2021

Greenhouse Gas Accounting Methodology

New Forests

Important Note

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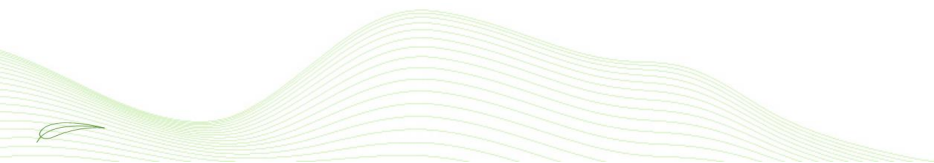
Glossary

Term	Description
Activity data	Data relating to the activity to emissions sources such as dollars spent, kilometres travelled, or kilograms purchased. Activity data is used to calculate emissions
Consolidation approach	The approach taken to determine the organisational boundary (equity share, operational control, financial control)
EEIO	Environmentally extended input output (EEIO) factors provide a simple method for evaluating the linkage between economic consumption and environmental impact. EEIO factors derived for greenhouse gas impact has been used where activity data is limited to financial data
Emissions boundary	The complete set of emission sources identified within the organisational and operational boundaries used by the reporting entity
Emission sources	The activities within a company's operational emission boundary that generate greenhouse gas emissions
Emissions factors	Emission factors are used to estimate the emissions associated with a product, activity, or service based on activity data
GHG	Greenhouse gas. GHGs include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and the so-called F-gases (hydrofluorocarbons and perfluorocarbons) and sulphur hexafluoride (SF_6). Each gas is weighted by its global warming potential and aggregated to give total greenhouse gas emissions in CO_2 equivalents
GHG accounting	Process of developing a GHG emission account by multiplying activity data by an appropriate emissions factor to determine emissions across identified and relevant sources. This results in a GHG account
GHG Protocol	Organisation providing best practice GHG accounting standards
KgCO$_2$e	Kilograms of carbon dioxide equivalent. The atmospheric impact of a GHG standardized to one unit of CO_2, based on the global warming potential of the gas
kWh	Kilowatt hours. A unit of energy equal to one kilowatt of power sustained for an hour
MJ	Mega joules; a unit of energy
Planning unit	An area of forest characterised by having consistent species mix, age class, silvicultural history and management intent. The size of individual planning units will vary within and between assets.
Relevancy testing	Process of applying the GHG Protocol guidance to scope 3 emissions sources to determine what sources are 'relevant' to an organisation
Removal (carbon)	The process of removing GHG from the atmosphere which can occur through forestry and agricultural soil management
Scope 1, 2 & 3	Categorisation of sources of emissions and removals based on influence over those emission sources. Scope 1 are direct (fuel consumption, carbon removal by the forest), scope 2 indirect (electricity), and scope 3 arise from value chain (employee commuting, carbon stored in harvested wood products)
Storage (carbon)	Carbon stored in long-lived harvested wood products
tCO$_2$e	Tonne of carbon dioxide equivalent. The atmospheric impact of a GHG standardized to one unit of CO_2, based on the global warming potential of the gas
Tonne.km	Unit of measurement for freight transport which represents the transport of one tonne of goods over one kilometre. This unit is multiplied by relevant emissions factor for transport mode (sea, road, or air)
Value chain	The full range of activities involved with producing goods and services, starting with raw materials, and ending with a delivered and useful product

1 Introduction

1.1 Purpose of this document

New Forests' vision is to see investment in land use and forestry as central to the transition to a sustainable future. New Forests seeks to generate climate-positive outcomes in its own corporate activities and in assets that it manages.

This statement documents New Forests' Greenhouse Gas (GHG) Accounting methodology, which, as outlined in section 1.3 below, is aligned with accepted best practice of the GHG Protocol.[1] GHG Accounting is an inventory of actual emissions and removals for a given reporting period. This statement is a key component of New Forests' stakeholder engagement, reflecting our values of transparency and disclosure around material sustainability issues.

This statement builds on New Forests' Climate Disclosure Report[2] and outlines our methodology to measure and report scope 1, 2, and 3 emissions and scope 1 and 3 removals from our business operations and assets under management. New Forests' GHG emissions and removals accounting methodology was developed over the course of 2020 and 2021.

1.2 Structure of this document

This statement outlines the accounting methodology used to prepare New Forests' group GHG accounts. The group GHG accounts include emissions from corporate activities (section 2) and emissions from assets under management (section 3). Accounting for carbon storage and removals from assets under management are detailed separately (section 4). Combined, these methodologies form New Forests' group GHG accounts. This statement also discusses New Forests' approach to emissions reduction activities in alignment with its net zero commitment (section 5).

The GHG Protocol has been used to guide the structure of this document, whereby the explanation of New Forests' methodology has been broken down by scope 1, 2, and 3 emissions. The GHG Protocol breaks scope 3 emissions into 15 categories, which have been used to structure New Forests' accounts and this document. It should be noted that the GHG Protocol is currently updating its guidance for accounting for emissions and removals associated with land use; therefore, this document reflects New Forests' current understanding of the expected final guidance but it subject to change as the GHG Protocol Guidance on Land Use and Removals in finalised.

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[1] Greenhouse Gas Protocol. See: http://ghgprotocol.org/.
[2] New Forests Climate Disclosures Report. See: https://newforests.com.au/wp-content/uploads/2020/03/New-Forests-Climate-Disclosure-Report-2020-web.pdf

1.3 GHG accounting standards and guides

Best practice GHG Accounting standards and guidance were used to develop New Forests' corporate and asset inventories, including:

- *GHG Protocol Corporate Accounting and Reporting Standard* (GHG Protocol)[3]

- The *Corporate Value Chain (Scope 3) Accounting and Reporting Standard* (Corporate Value Chain Standard)[4] and the *Technical Guidance for Calculating Scope 3 Emissions (v1.0)* (GHG Protocol Technical Guidance).[5]

1.4 Boundaries

Under the GHG Protocol, all scope 1 and 2 emissions sources should be included in a GHG account, whereas inclusion of scope 3 sources are subject to relevancy testing. A long list of scope 3 emission sources across New Forests' corporate and asset activities was developed and relevancy testing was subsequently conducted to identify which scope 3 emission sources should be included in New Forests' GHG account. Any scope 3 emissions not included in New Forests' GHG accounts is because they do not satisfy the relevancy test i.e., they are not relevant.

Emissions from corporate activities and assets under management are consolidated to develop New Forests Pty Ltd's GHG inventory using the equity share approach.

Carbon removals from assets under management (scope 1 removals) and carbon stored in harvested wood products (scope 3 removals) are reported separately (and not netted off against emissions from corporate activities and assets under management).

Please see our annual Sustainability Report for all data as outlined here.

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[3] GHG Protocol Corporate Standard. See: https://ghgprotocol.org/corporate-standard
[4] GHG Protocol Corporate Value Chain. See: https://ghgprotocol.org/standards/scope-3-standard
[5] GHG Protocol Scope 3 Calculation Guidance. See: https://ghgprotocol.org/scope-3-technical-calculation-guidance

2 Emissions from corporate activity

New Forests' corporate emissions occur from activities associated with corporate operations. **Figure 1** presents corporate activity emission sources.

Figure 1: New Forests' corporate activity emissions sources

Scope 1

Direct emissions from owned or leased offices or vehicles e.g. gas for heating (No scope 1 emission sources)

Scope 2

Indirect emissions from electricity from all owned and leased offices

Scope 3

GHG Protocol categories	Activities
1. Purchased goods and services	Purchased paper
3. Fuel- and energy-related activities (not included in scope 1 or scope 2 emissions)	Energy extraction, production, transportation of fuels, and transmission and distribution losses for electricity
5. Waste generated in operations	Waste generated across offices
6. Business travel	Flights, hotel stays, taxi trips, and staff hire car
7. Employee commuting	Working from home and staff commute to and from New Forests' offices
8. Upstream leased assets	Base building services in tenanted buildings (e.g., HVAC, lifts, and lobby lighting (electricity and natural gas))
15. Investments	*Refer to the investment inventory boundary*

2.1 Corporate activity scope 1 and 2 emissions

2.1.1 Scope 1 emissions

New Forests does not have any scope 1 emission sources associated with corporate activities, as New Forests does not use any fleet vehicles and does not own office facilities. Natural gas consumed as part of base building services is categorised as scope 3 emissions from upstream leased assets (see 2.3.6 Category 8 below). Base building services are those that occur in shared spaces within a leased building, including lifts, common area lighting, and heating.

2.1.2 Scope 2 emissions

New Forests has scope 2 emissions associated with the electricity consumed for tenant lighting and power at leased office locations in Australia, New Zealand (NZ), the United States (US), and Singapore.

Electricity consumed as part of base building energy services e.g., lifts, common area lighting, is accounted for in scope 3 emissions from upstream leased assets as these sources are not under the control of New Forests (see 2.3.6 Category 8 below).

Scope 2 emissions from electricity consumption are calculated by multiplying the activity data of 'kilowatt-hours (kWh)' by the appropriate regional electricity grid factor ($kgCO_2e/kWh$). The sources of emission factors for the regions in which New Forests operates include:
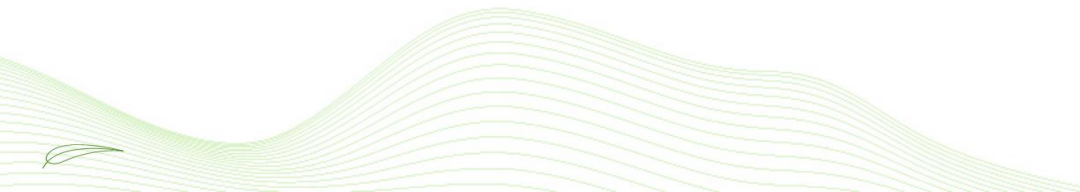
- National Greenhouse Account (NGA) Factors, Australian Government[6]

- Measuring emissions: a guide for organisations, New Zealand Government[7]

- Emission Factors for Greenhouse Gas Inventories, United States Environmental Protection Authority[8]

- Singapore Energy Statistics, Singapore Government[9]

Transmission and distribution losses from purchased electricity are accounted for in scope 3 category 3 fuel and energy related activities.

2.2 Corporate scope 3 emissions

Scope 3 emissions are 'other indirect' emissions from activities occurring in each asset's value chain. In calculating scope 3 emissions we have selected the leading sources for emissions factors that are the most robust and recent. These have been applied globally where a country or regional emissions factor is unavailable. We will continue to review emissions factors.

2.2.1 Category 1: Purchased goods and services

Paper

Paper purchased for New Forests' offices is the only relevant purchased good and service. Emissions from paper purchased are calculated by multiplying the activity data of 'reams of paper purchased per year' by the emission factor ($kgCO_2e$/ream). The emission factor is sourced from Environmental Protection Authority Victoria, Australia, GHG Inventory Activity Data and Quantification Methods and used globally.

2.2.2 Category 3: Fuel- and energy-related activities

Transmission and distribution losses

Category 3 emissions occur from the upstream processing of fuel and energy including transmission and distribution (T&D) losses of purchased electricity.
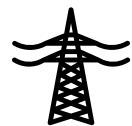
We calculate emissions from transmission and distribution losses by multiplying the activity data of 'kWh' by the appropriate regional T&D electricity grid emission factor ($kgCO_2e$/kWh). The emission factors are sourced from the same as for scope 2 electricity emissions (see section 2.1.2 above).

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[6] Australian Government NGA Factors. See: https://www.industry.gov.au/data-and-publications/national-greenhouse-accounts-factors

[7] Measuring GHG Emissions, NZ. See: https://environment.govt.nz/publications/measuring-emissions-detailed-guide-2020/

[8] US EPA. See: https://www.epa.gov/climateleadership/ghg-emission-factors-hub

[9] Singapore Government Energy Statistics. See: https://www.ema.gov.sg/Singapore_Energy_Statistics.aspx

2.2.3 Category 5: Waste

Waste

New Forests measures GHG emissions associated with the various waste streams generated in offices including landfill, recycling, and compost. Emissions from waste are calculated by multiplying the activity data of 'annual weight of waste to landfill (tonnes),' 'annual waste recycled (tonnes),' and 'annual waste composted (tonnes)', respectively, by the appropriate emission factor ($kgCO_2e$/tonnes). The emission factors for landfill, recycling, and composting are sourced from United Kingdom (UK) Government GHG Conversion Factors, issued by the Department for Business, Energy, and Industrial Strategy (DBEIS) and Department of Environment, Food, and Rural Affairs (DEFRA)[10].

Emissions from the treatment of wastewater is currently not accounted for but is less than 1% of emissions and so not included on de minimis grounds.

2.3.4 Category 6: Business travel

Flights

New Forests measures GHG emissions associated with flights taken by New Forests employees during business-related travel. Emissions from flights are calculated by multiplying the activity data of 'number of flights' broken down by cabin class (i.e., economy, business, or first class) and distance category (i.e., remote, short-haul, or long-haul) and multiplying this by an assumed distance per distance category (km) and the appropriate emission factor ($kgCO_2e$/km). The emission factors are sources from the UK Government GHG Conversion Factors, issued by DBEIS & DEFRA.

Ground transport

New Forests measures GHG emissions associated with hire car and taxi trips taken by New Forests employees during business related travel. Emissions from hire car and taxi trips are calculated by multiplying the activity data of 'spend ($)' by the appropriate emission factor ($kgCO_2e$/$). The emission factors are sourced from Measuring emissions: a guide for organisations, NZ Government.

Hotel accommodation

New Forests measures the GHG emissions from hotel accommodation used by New Forests employees during business related travel. Emissions from hotel accommodation are calculated by multiplying the activity data 'hotel night stays' broken down by country by the appropriate country-based emission factor ($kgCO_2e$/night). The emission factors are sourced from the UK Government GHG Conversion Factors, UK DBEIS & DEFRA.

2.3.5 Category 7: Employee commuting

Employee commuting

New Forests measures the GHG emissions associated with New Forests employees commuting between their offices and home. Emissions from employee commuting are calculated by multiplying the activity data 'annual distance (km)' broken down by transport method (i.e., active transport such as cycling or walking, bus, train, subway, car, or motorcycle) by the appropriate transport method emission factor. The annual activity data is estimated

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[10] DEFRA & BEIS Government conversion factors (UK). See:
https://www.gov.uk/government/collections/government-conversion-factors-for-company-reporting

from a week of actual data provided employees through an annual survey. The emission factors are sourced from the UK Government GHG Conversion Factors, UK DBEIS & DEFRA.

Working from home

New Forests measures the GHG emissions associated with employees working from home. While an optional source under the GHG Protocol, we have chosen to include this source due to changes in working arrangements resulting from the COVID-19 pandemic. The emissions from working from home are calculated by estimating the electricity consumption per employee per day (using office electricity intensity per employee (kWh/Full Time Equivalent (FTE)) and multiplying this by the combustion plus transmission and distribution losses emission factor ($kgCO_2e$/kWh) of the respective electricity grid. The number of days working from home per employee is estimated from data provided by an internal employee survey on commuting habits. The emission factors are the same sources as for scope 2 electricity emissions (see section 2.1.2 above).

2.3.6 Category 8: Upstream leased assets

Base building electricity

New Forests measures the GHG emissions associated with consumed electricity through the base building areas of leased offices.

Due to the lack of actual base building electricity data from leased offices, emissions from base building electricity are calculated by estimating the electricity consumption (kWh) using an average energy intensity (kWh/m^2) of commercial office buildings in New South Wales and Victoria, Australia. This average intensity (kWh/m^2) is multiplied by the net leased area of each office and then multiplied by the combustion and transmission and distribution losses emission factor ($kgCO_2e$/kWh) of the respective electricity grids. The emission factors are the same sources as scope 2 electricity emissions (see section 2.1.2 above).

Base building natural gas

New Forests measures the GHG emissions associated with consumed natural gas through the base building areas of leased offices.

Due to the lack of actual base building natural gas data from leased offices, emissions from base building natural gas are calculated by estimating the natural gas consumption (MJ) using an average energy intensity (MJ/m^2) of commercial office buildings in New South Wales and Victoria, Australia. This benchmark (MJ/m^2) is multiplied by the floor area of each office location and then multiplied this by the combustion and upstream extraction, processing, and transportation (EPT) emission factor ($kgCO_2e$/MJ) of the respective regions where offices are located. The emission factors are sourced from:

- National Greenhouse Account (NGA) Factors, Australian Government

- Emission Factors for Greenhouse Gas Inventories, US Environmental Protection Agency

- Measuring emissions: a guide for organisations, NZ Government

- UK Government GHG Conversion Factors, UK DBEIS & DEFRA

3 Emissions from assets

3.1 Overview of emissions boundary

This section presents New Forests' methodology for calculating the emissions from assets under management such as harvesting and processing. These emissions represent a significant proportion of New Forests' Group GHG emissions inventory and are accounted for in Category 15 Investments. New Forests collects activity data from assets related to scope 1, 2, and relevant scope 3 emission sources. Activity data is captured through an annual survey completed by each asset's property manager.

To understand the various scope 3 emission sources and test for relevancy to assets under management, four asset activity types were developed:

- Australia, New Zealand (ANZ) & US plantation assets

- ANZ & US processing assets

- Agriculture assets

- Asia plantation and processing assets

The legend below indicates by colour shading when an emission source has been identified and is relevant and reported on for each asset activity type.

Data collected for the following asset types	ANZ & US plantation	ANZ & US processing	Agriculture	Asia plantation & processing

Figure 2 presents relevant emission sources from assets under management.
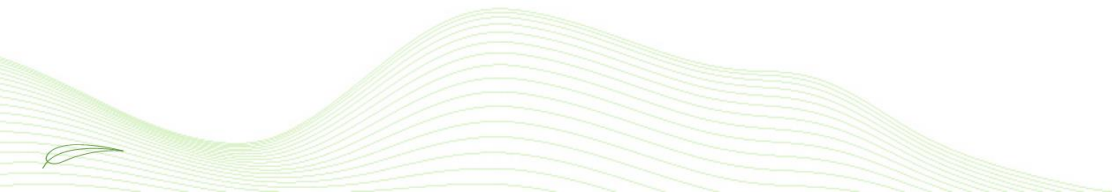
Figure 2 New Forests asset activity emission sources

Scope 1	Scope 3	
	GHG Protocol categories	**Activities**
Direct emissions from owned or leased sites or vehicles e.g. transport fuels, stationary fuels, fertiliser and lime application, biomass burned	1. Purchased goods and services	Biocides, fertiliser, lime seed and feed, purchased timber logs, construction services, storage and warehouse services, pre-harvesting services, and contracted harvesting.
	2. Capital goods	Capitalised equipment purchases.
	3. Fuel- and energy-related activities	Energy extraction, production, transportation of fuels, and transmission and distribution losses for electricity.
	4. Upstream transportation	Road, rail, and sea freight paid for by property manager of asset.
	5. Waste generated in operations	Waste generated and potable water purchased from mains.
	6. Business travel	Flights, hotel stays, taxi trips, and staff hire car.
	7. Employee commuting	Employees working at asset commute to and from home.
Scope 2	8. Upstream leased assets	Base building services in tenanted buildings (e.g., HVAC, lifts, and lobby lighting (electricity and natural gas)).
	9. Downstream transportation	Road, rail, and sea freight not paid for by property manager of asset.
Indirect emissions from electricity consumed at owned or leased	10. Processing of sold products	Processing of intermediary products sold including forestry products (e.g., paper, lumber, engineered wood & panels, and other, and agriculture products (i.e. milling, canning, packaging)).
	11. Use of sold products	Burning of wood chips or breakdown of wood chips/sawdust in garden or animal bedding.
	12. End of life treatment	Disposal at end of life of sold product of paper.
	13. Downstream leased assets	Activities on leased land including cattle grazing, sheep grazing, agricultural cropping, and dairy farm enterprises.

3.2 Scope 1 and 2 emissions

3.2.1 Scope 1 emissions

There are four main sources of scope 1 emissions across New Forests' assets under management. Data from each asset is collected in the units indicated below and emissions are calculated using the associated emissions factors. These are summarised in **Table 1**.

Table 1: Data inputs and emission factors for direct emissions (scope 1)

Source	Activities	Data Input (units)	Emissions Factor
Stationary energy consumption	Generators and non-road mobile machinery	Diesel, petrol, and LPG: volume (litres or US gallons) Natural gas: megajoules or therms	National Government Sources. • NGA Factors, Australia • Measuring Emissions, NZ Government • Emission Factors, US EPA
Transport energy consumption (owned)	Fleet vehicles Mobile machinery	Diesel, petrol, marine fuel, and LPG: volume (litres or US gallons)	

Source	Activities	Data Input (units)	Emissions Factor
Fertiliser application	Forestry and agriculture operations	Weight of nitrogen (tonnes)	IPCC 2006 Guidelines for National Greenhouse Gas Inventories, Vol 4: Agriculture, Forestry and Other Land Use.
Biomass burned*	Energy consumption at timber processing	Wood residues, wood logs, and/or chips burned for operations: weight (tonnes or short tons)	Emission Factors, UK DEFRA & DBEIS

Data collected for the following asset types	ANZ & US plantation	ANZ & US processing	Agriculture	Asia plantation & processing

*Note, the 2021 accounts do not include emissions associated with wildfire and controlled burning events within the forest estate. This is due to the complexity of estimating the amount of biomass burned in these events. We will review this in preparation of the 2022 inventory.

3.2.2 Scope 2 emissions

Scope 2 emissions are those associated with electricity consumption. Data regarding electricity consumed (kWh) at each asset is collected and emissions are calculated using a location-based approach applying the appropriate regional electricity grid factor ($kgCO_2e$/kWh). The sources of emission factors for the regions in which we operate include:

- National Greenhouse Account (NGA) Factors, Australian Government

- Emission Factors for Greenhouse Gas Inventories US EPA

- Measuring emissions: a guide for organisations, NZ Government

Grid emission factors from Institute for Global Environmental Strategies[11] (IGES) are used where National Government figures are unavailable.

Data collected for the following asset types	ANZ & US plantation	ANZ & US processing	Agriculture	Asia plantation & processing

[11] IGES Grid emissions factors. See: https://www.iges.or.jp/en/pub/list-grid-emission-factor/en

3.3 Scope 3 emissions

Scope 3 emissions are 'other indirect' emissions as a result of activities occurring in each asset's value chain. Where spend is used to calculate emissions, figures are provided in local currency and converted to AUD or USD.

3.3.1 Category 1: Purchased goods and services

New Forests' assets under management have three relevant emission sources from purchased goods and services. Emissions are calculated by multiplying the activity data (input) by the relevant emissions factor these are summarised in **Table 2**

Table 2: Data inputs and emission factors for purchased goods and services

Source	Activities	Data Input (units)	Emissions Factor
Embodied emissions of purchased products	Fertiliser, biocide, lime, seeds, and feed	Weight **OR**	EcoInvent 3.8 database
		Spend (local currency)	EEIO factors
	Purchased timber logs	Weight (tonnes or short ton)	EcoInvent 3.8 database
Emissions from services purchased from third-party companies	Engineering or maintenance services of equipment, construction, storage and warehousing, and preharvesting activities (spraying etc).	Spend (local currency)	EEIO factors
	Harvest contractors (forestry)	Weight (tonnes or short ton) **OR**	EcoInvent 3.8 database
		Number of days worked by third-party harvesting companies (forests)	
	Harvest contractors (agriculture)	Weight (tonnes or short ton) **OR**	
		Area: hectares or acres harvested (agriculture)	

Data collected for the following asset types	ANZ & US plantation	ANZ & US processing	Agriculture	Asia plantation & processing

3.3.2 Category 2: Capital goods

Embodied emissions in capital goods purchased at each asset is included under Category 2. Capital goods reported in this category follow financial accounts and capitalised expenditure. Category 2 represents the GHG emitted during the extraction, manufacturing, and transportation of capital goods purchased by the assets. This may include vehicles, plant, or equipment. Data is collected regarding the spend ($) on capitalised machinery and plant from each asset to calculate emissions using EEIO factors.

Data collected for the following asset types	ANZ & US plantation	ANZ & US processing	Agriculture	Asia plantation & processing

3.3.3 Category 3: Fuel- and energy-related activities

Category 3 emissions occur from the upstream processing of fuel and energy including transmission and distribution (T&D) losses of purchased electricity.

We calculate emissions from transmission and distribution losses by multiplying the activity data of 'kWh' by the appropriate regional T&D electricity grid emission factor ($kgCO_2e/kWh$). The emission factors are sourced from the same as for scope 2 electricity emissions (see section 3.2.2 above).

3.3.4 Category 4: Upstream transport and distribution

The emissions from upstream transportation and distribution services, such as freight, that are paid for by each asset is captured under Category 4. Data regarding the transportation mode (rail, road, or ship), average distance (either to processing location or to customer; km or miles) and the total weight of product sold (tonnes or short tons) to estimate the tonne.km of transported sold goods is collected to calculate emissions using emission factors from the UK Government GHG Conversion Factors, UK DBEIS & DEFRA.

Data collected for the following asset types	ANZ & US plantation	ANZ & US processing	Agriculture	Asia plantation & processing

3.3.5 Category 5: Waste

Emissions arising from the various waste streams generated including the treatment of wastewater at each asset is captured under Category 5.

- Emissions from waste includes emissions of landfilled, recycled, composted, or incinerated commercial waste, including metals, plastics, paper and cardboard, and organic materials. Data is collected with regarding the weight (tonnes or short tons) of each waste type disposed of under each method and calculate emissions using emission factors from the UK Government GHG Conversion Factors, UK DBEIS & DEFRA.

- Emissions arising from the supply of water to assets represents the energy required to transport the water from potable mains to the asset location and treatment for consumption. Data is collected regarding the volume (litres or US gallons) of potable water purchased and calculate emissions using emission factors from the UK Government GHG Conversion Factors, UK DBEIS & DEFRA.

Data collected for the following asset types	ANZ & US plantation	ANZ & US processing	Agriculture	Asia plantation & processing
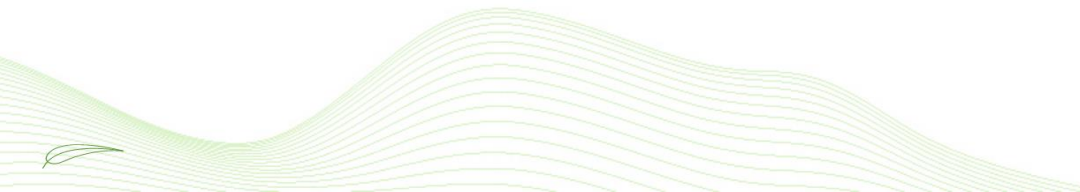
3.3.6 Category 6: Business travel

Business travel undertaken by the asset-level property managers is captured in Category 6. This includes four sources of business travel – air travel, accommodation, taxi and hire car services. Accommodation, taxi and hire car services were not identified as an emission source for agriculture or ANZ & US plantations.

- Emissions from air travel. Data is collected regarding the number of flights taken broken down by cabin class (economy, premium economy, business, or first class) and distance category (short-, medium-, or long-haul) and estimate the total distance travelled by assuming distances for each distance category to calculate emissions using emission factors from the UK Government GHG Conversion Factors, UK DBEIS & DEFRA.

Data collected for the following asset types	ANZ & US plantation	ANZ & US processing	Agriculture	Asia plantation & processing

- Emissions from hotel accommodation. Data is collected regarding the number of hotel night stays in hotels in Australia, Asia, NZ, and the US to calculate emissions using emission factors from the UK Government GHG Conversion Factors, UK DBEIS & DEFRA. If the number of hotel night stays is unavailable, then data is collected regarding expenditure ($) and emissions are calculated using an average cost per night to estimate the number of hotel stay nights.

Data collected for the following asset types		ANZ & US processing		Asia plantation & processing

- Emissions from hire car services. Data is collected regarding the number of days hire cars were used or the amount spent on hire cars (local currency) and estimates of total distance travelled using an estimated daily distance travelled (37 km)[12] to calculate emissions using the UK Government GHG Conversion Factors, UK DBEIS & DEFRA.

Data collected for the following asset types		ANZ & US processing		Asia plantation & processing

- Emissions from taxi trips. Data is collected regarding the distance travelled (km or miles) or the amount spent ($ local currency) for taxi trips to calculate emissions using emission factor from the NZ Government.

Data collected for the following asset types		ANZ & US processing		Asia plantation & processing

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[12] Survey of Motor Vehicle Use, Australia, 12 months ended 30 June 2018, Australian Bureau of Statistics. See: www.abs.gov.au
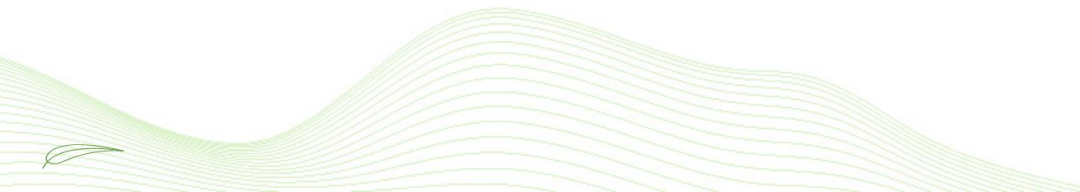
3.3.7 Category 7: Employee commuting

Asset-level direct employee commuting is captured in Category 7. Data is collected regarding the number of employees, average annual number of days on site, and average commuting distance (km or miles) broken down by transport method (car, truck, public transportation, or active transportation) to estimate annual distance travelled and calculate emissions using emission factors from the UK Government GHG Conversion Factors, UK DBEIS & DEFRA.

Data collected for the following asset types		ANZ & US processing		Asia plantation & processing

3.3.8 Category 8: Upstream leased assets

Category 8 includes base building services for leased offices or buildings. Base building areas include lifts, lobbies, entry ways, parking facilities, etc.

If an asset has leased facilities, data is collected regarding the area (m^2 or square feet) of the space to estimate the electricity (kWh) and natural gas (MJ or therms) consumption of the leased spaces using an average NABERS 3-star rating for base building energy consumption.

Data collected for the following asset types	ANZ & US plantation	ANZ & US processing	Agriculture	Asia plantation & processing

3.3.9 Category 9: Downstream transport and distribution

Downstream transportation and distribution emissions from each asset are included in Category 9. These are emissions from transportation and distribution services that are not paid for by each asset but paid by a third party.

Data is collected regarding the transportation mode (rail, road, or ship), average haul distance (either to vendor or buyer in km or miles) and the total weight of product sold (tonnes or short tons) to estimate the tonne.km of transported sold goods. Emissions are calculated using emission factors from the UK Government GHG Conversion Factors, UK DBEIS & DEFRA. The methodology also confirms confirms whether these sold products are sold to other New Forests-managed assets to avoid double counting of transportation emissions.

Data collected for the following asset types	ANZ & US plantation	ANZ & US processing	Agriculture	Asia plantation & processing

3.3.10 Category 10: Processing and packaging of intermediary sold products

Emissions associated with the processing and packaging of products sold as intermediary products from each asset type in Category 10 are calculated. Intermediary products are those that require further processing before use or consumption by a customer such as logs processed into lumber or canola crop processed into vegetable oil.

For forestry assets, data is collected regarding the total weight (tonnes or short tonnes) of products sold that require further processing. This includes wood chip sold for processing into cellulose and paper, as well as intermediary logs sold for processing into lumber and engineered wood. Property managers provide total weight sold on for further processing and the percentage breakdown across these end products. The emissions are then calculated based on weight, using emission factors from the EcoInvent 3.8 database for manufacturing of end products.

Data collected for the following asset types	ANZ & US plantation	ANZ & US processing		Asia plantation & processing

For agriculture assets, data is collected regarding the total weight (tonnes or short tons) of agricultural harvest sold. Emission factors are derived from the primary international destination for sold product and most common end product. These are summarised in **Table 3.**

Table 3 End markets and products for Australian agriculture

Product	Primary Destination	Primary end product
Barley	United Arab Emirates	Animal feed (no processing, includes packaging)
Canola	United Arab Emirates	Vegetable oil
Oats	China	Packaged Oats
Pulses	India	Canning of pulses
Wheat	Central and Southeast Asia	Flour (milling)

The emissions factors are derived from global data sets in EcoInvent 3.8 database where possible based on the most common end use of agricultural harvest products.

Data collected for the following asset types			Agriculture	

3.3.10 Category 11: Use of sold products

Emissions from the use of sold products from ANZ & US processing and Asia plantation and processing assets in Category 11 is calculated. For most sold products, due to their inert nature, there are no emissions produced as a result of their use e.g. paper, structural timber. Only wood or woodchips sold for fuel, woodchips or saw dust sold for animal or garden bedding result in emissions from their use.

Data is collected regarding the weight (tonnes or short tons) of firewood/woodchips sold for fuel combustion, woodchips, and sawdust, and calculate emissions using emission factors from the UK Government GHG Conversion Factors, UK DBEIS & DEFRA.

Data collected for the following asset types		ANZ & US processing		Asia plantation & processing
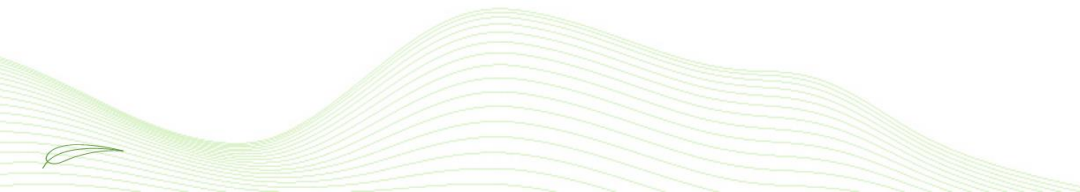
3.3.11 Category 12: End of life treatment of sold products

Emissions are produced at the end of a product's useful life when it breaks down in landfill. Emissions from the end of life of timber products sold for paper production from ANZ & US processing and Asia plantation and processing assets in Category 12 are calculated. End of life emissions from other timber products e.g. lumber and engineered timber are excluded due to the long lived nature of storage in these products.

Data is collected regarding the total weight of timber products sold for paper production (tonnes or short tons) and it is assumed 40% of paper is disposed to land fill[13] and the remainder is recycled. Emissions are calculated using emissions factors from the National Greenhouse Account (NGA) Factors, Australian Government.

Data collected for the following asset types		ANZ & US processing		Asia plantation & processing

3.3.12 Category 13: Downstream leased assets

Emissions from downstream leased agriculture assets in Category 13 are calculated. Activities that occur on leased agricultural land includes cropping, cattle and sheep grazing, and dairy farm enterprises. Data is collected regarding the average number of livestock during the reporting period for the dairy farming, and cattle and sheep grazing and calculate emissions using factors from the NZ Government. For agricultural cropping, data is collected regarding the area of land (hectares or acres) and emissions are calculated using emission factors from the EcoInvent 3.8 database.

Data collected for the following asset types			Agriculture	

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[13] Australian Government, National Waste Report 2020.

4 Carbon removals from assets

In a forest carbon inventory, removals result from the increase in carbon stored within the forest due to growth. Conversely, emissions are reported when carbon is removed from the forest due to disturbances such as harvesting or fire, or from the decomposition of organic matter (e.g. debris). The emissions from harvesting are partly offset by storage of carbon in long-lived harvested wood products (HWP). The net balance between removals from growth and HWP versus emissions from disturbances determines whether there is a net removal or emission reported in the accounts.

Investment in sustainable forestry and land use can generate significant carbon sequestration and create optionality among different land uses and forestry management decisions. Importantly, the GHG Protocol is now developing the GHG Protocol Land Sector and Removals Guidance[14] which will provide a framework for how organisations should account for GHG emissions and removals from land use, land use change, bioenergy, and related topics in their GHG inventories, building on the Corporate Standard and Scope 3 Standard. New Forests was a member of the Technical Working Group for Carbon Removals in 2020 and continues to consult on the drafting of the Guidance through its membership in the Forest Solutions Group of the WBCSD. The current expectation is that the final Guidance will be released by the end of 2022.

This explanatory statement describes how New Forests accounts for changes in carbon stored within the forests under our direct control, which are classified as Scope 1 removals (or emissions, if there is a net negative balance). The method for estimating removals associated with storage in long-lived harvested wood products associated with assets under management, classified as Scope 3 removals, is also described.

New Forests does not account for changes in carbon stocks in forests that supply logs to New Forests-managed processing facilities but are owned by third parties. Accounting for these changes would result in Scope 3 removals/emissions, but the information available to account for the net change in these forests is limited.

4.1 Scope 1 removals (in forest)

There are two common types of methods for estimating changes in carbon stock (or storage) in forest systems (IPCC 2006):

- **Gain-loss method.** Estimates carbon stocks from data at a point in time, and uses models to predict the carbon stock at a future point in time, accounting for growth (removals) and disturbances e.g. harvesting, fires etc (emissions) that occur in the intervening period. The impacts of removals and emissions can be estimated separately.

- **Stock-difference method.** Independent estimates of carbon stocks at two points in time, with the difference between the estimates being the net carbon removal or emission. This method does not separately estimate the impact of growth or disturbances.

New Forests uses the gain-loss method, as this integrates well with the data sources that are available through the forest management systems and processes that we operate. This method also allows for the separate attribution of impacts of growth and harvest, as well as changes due to acquisition or sale of assets.

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[14] GHG Protocol. See: https://ghgprotocol.org/land-sector-and-removals-guidance.

At a high level the approach used by New Forests is similar across geographies. Primary data sources include forest inventory (height, diameter, species), forest age, and planning unit area. The methodology is:

1. Forest inventory is conducted at a given point in time. A given inventory can be specific to an individual planning unit (or group of planning units) or be estate-wide (such as in the case of a LiDAR based inventory). Note: not all planning units will have inventory data available (most often due to their young age); in such cases a planning unit will be allocated to a yield curve based on historical production and/or similar stands that do have inventory.

2. Regional and species-specific growth models are used to estimate forest growth between the inventory date and the start of the reporting period. Depletions are accounted for due to harvest and other disturbances between the inventory date and the start of the reporting period.

3. Allometric equations and/or expansion factors are used to scale up from individual tree measurements (diameter, height) or stem volume (at individual tree or stand level) to above- and below-ground carbon stock.

4. Forest growth is estimated between the start and end of the reporting period using the same growth models as in item 2 above, and above- and below-ground carbon stock at the end of the reporting period is estimated using same allometric equations and/or expansion factors as mentioned in item 3 above.

5. For ANZ plantation assets the carbon stock in harvest debris[15] from prior clearfell harvest events[16] is estimated.

6. The process described above results in estimates of carbon stock per area (metric tonnes CO_2-equivalent per acre or hectare). These values are then multiplied by the area for each planning unit to derive estimates of carbon stock (metric tonnes CO_2-equivalent) for the planning unit. Values for all areas within a given asset are summed to derive a total value for the asset.

7. The estimates of carbon stock described above are used to calculate three components:

   a. Removals due to tree **growth** during the reporting period are estimated from the difference in above- and below-ground carbon stocks at the start and end of the reporting period (excluding harvest depletions).

   b. Emissions due to **harvest** depletions are estimated as the product of the area harvested (by planning unit) multiplied by the opening carbon stock (above- and below-ground) for that planning unit.

   c. Changes in **debris** carbon pool (ANZ only). This pool is estimated at the beginning of the carbon reporting period as well as the end of the period, with the latter accounting for decay of the initial debris carbon (linear trend over 10 years) and including additions from harvest during the reporting period (components of harvested trees not removed from site). This could result in either a net emission or removal.

   The net removal (or emission) over the reporting period for the asset is the sum of carbon stock changes due to growth, harvest and debris.

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[15] Debris refers to tree material that has accumulated on the ground and also root material that is in the soil
[16] We currently do not specifically include the debris from thinning events in the pine forests.

8. An adjustment is then made to account for carbon stored in assets (individual properties or combinations of properties) that were sold or purchased during the carbon reporting period. In the case of assets that were sold, it is assumed that the removals due to growth and emissions from harvest occur prior to the sale of the properties and are therefore included in the accounts for the reporting period. For assets that were purchased during the carbon reporting period it is assumed that there is no growth or harvest in these assets during the reporting period, and so there is no impact of these properties on the estimate of removals or emissions for the period. They do, however, contribute to an updated estimate of the closing balance of carbon stored in the estate at the end of the reporting period.

In addition to the components described above, there is a further adjustment incorporated into the carbon estimates to account for changes in modelled inventory (due to remeasurement of forests) and/or changes in the detailed methodology used to estimate carbon stocks (e.g. an updated allometric equation, or adjustment to the way carbon in the debris pool is estimated). This adjustment is reflected as the difference between the closing balance for one reporting period and the opening balance for the subsequent reporting period.

These components are demonstrated graphically in **Figure 3**.

Figure 3: Generalised example of f carbon storage and removals[17]
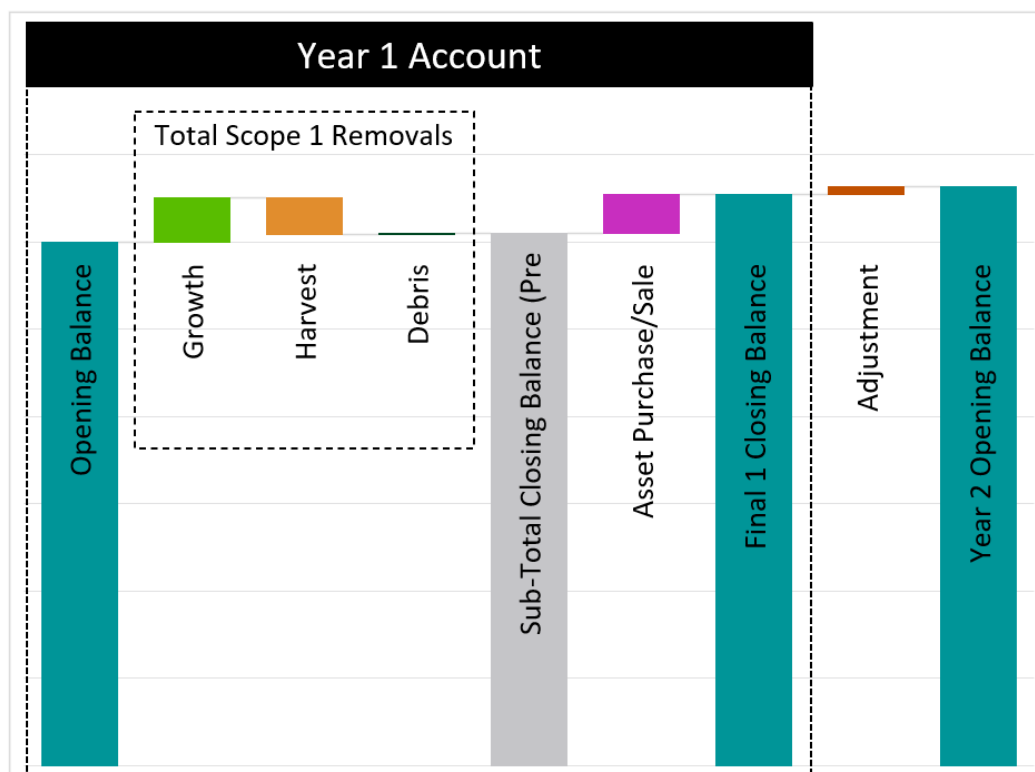
Note: Emissions from disturbances other than harvesting, such as fires, are not currently included in the calculations.

4.1.1 Regional differences in methodology

As outlined below, there are differences in the detailed calculations used to estimate carbon storage and removals between geographies across New Forests' business. These arise due to differences in

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[17] Based on FY21 figures

the data available and the operating procedures used in each of the regions. The key differences among regions are described in Table 4.

Area	ANZ & Asia	USA
Inventory	Primarily plot based inventory undertaken at routine times throughout a rotation, with some LiDAR based inventory. Results in a varying time since inventory across planning units within a given asset. Data summarised to stand level for growth model.	Combination of extensive LiDAR inventory (with all trees measured at the same time) and standard plot-based inventory (progressive inventory of all stands over time). Individual tree list data are used as input to growth models.
Growth models	Regional and species-specific growth models applied at the stand level.	Individual tree growth based, using standard industry growth models parameterised by forest type.
Estimating carbon stock from tree measurement	Regional and species-specific expansion factors used to scale up from merchantable stem volume to above- and below-ground biomass.	Individual tree allometric relationships used to estimate above- and below-ground biomass from tree height and stem diameter. These are consistent with calculations required under the California Climate Action Registry.
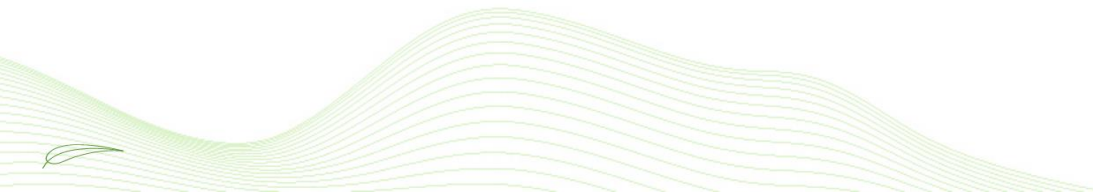
## 4.2 Scope 3 removals (Harvested Wood Products)

In 2021, New Forests developed a methodology to calculate the carbon stored in wood harvested from assets under management. When trees are harvested and used to produce wood products, carbon remains stored in that product while it is in use or in landfill. Although the GHG Protocol Guidance on Land Use and Removals is yet to be finalised, New Forests expects that long-term carbon storage from harvested wood products will be reported as a scope 3 removal.

New Forests' methodology is based on the International Life Cycle Data Guide for Life Cycle Assessment and country-specific guidance, including, but not limited to:

- Australia: Full Carbon Accounting Model (FullCAM)

- New Zealand: guidance from the Ministry of Primary Industries

- United States: US Forest Service

The inputs for the process are harvest volumes broken down by species, product flow (i.e., the proportion of the harvest used for different products, such as paper, sawn wood, etc.), and location. The tool then uses regional data for mill efficiencies, product flow (if not known) product end use, product service lives (i.e., the half-life), and radiative forcing to calculate the long-term carbon storage associated with the harvested wood products. The high-level steps in the calculation are outlined below, though there is some variation across the regions.

Figure 4 Calculation methodology for carbon removals
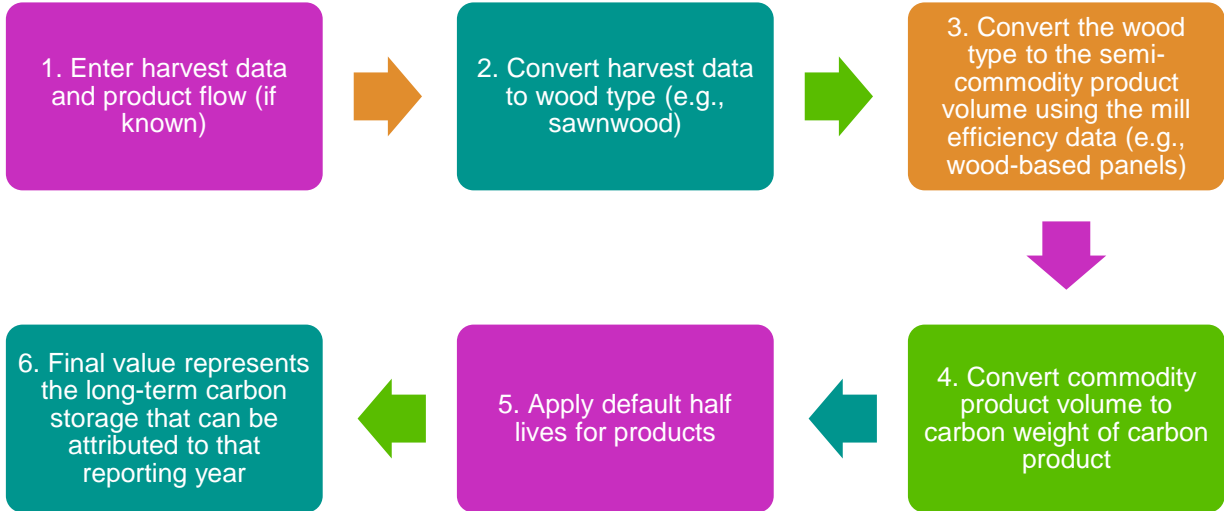
5 Emission reduction plans

New Forests is committed to reaching net zero emissions by no later than 2050; this is formalised through our membership in the Net Zero Asset Managers Initiative. Net zero refers to a state in which GHG emissions released into the atmosphere are balanced by emissions removals out of the atmosphere.

Our current target is to reduce emissions from assets under management by 53% by 2030, relative to our baseline year of 2020. This accounts for 72% of our scope 1 and 2 emissions from our assets undermanagement. New Forests will refine our net zero target over the course of 2022.

New Forests is committed to pursuing a Science-based reduction Target (SBT). Per our Climate Action Plan, we plan to develop a SBT in 2022.

To deliver our net zero target and SBTs, New Forests plans to develop emissions reduction plans for our corporate operations and across our assets under management. We plan to develop these plans in FY23.