



# Carbon Footprint Report

On behalf of Central West NSW Forestry Hub

## Document Approval and Revision

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## Executive Summary

The forestry industry's net carbon emissions and removals are not well understood in the CWFH Hub area. The CWFH committee wishes to better understand the regional industry's net carbon impact to gain context for the other projects under consideration by the committee. The report will be used to inform a wide range of stakeholders of the carbon impact of the plantation forestry industry within the Hub. These include growers, harvesters, contractors, local councils, government and farming communities.

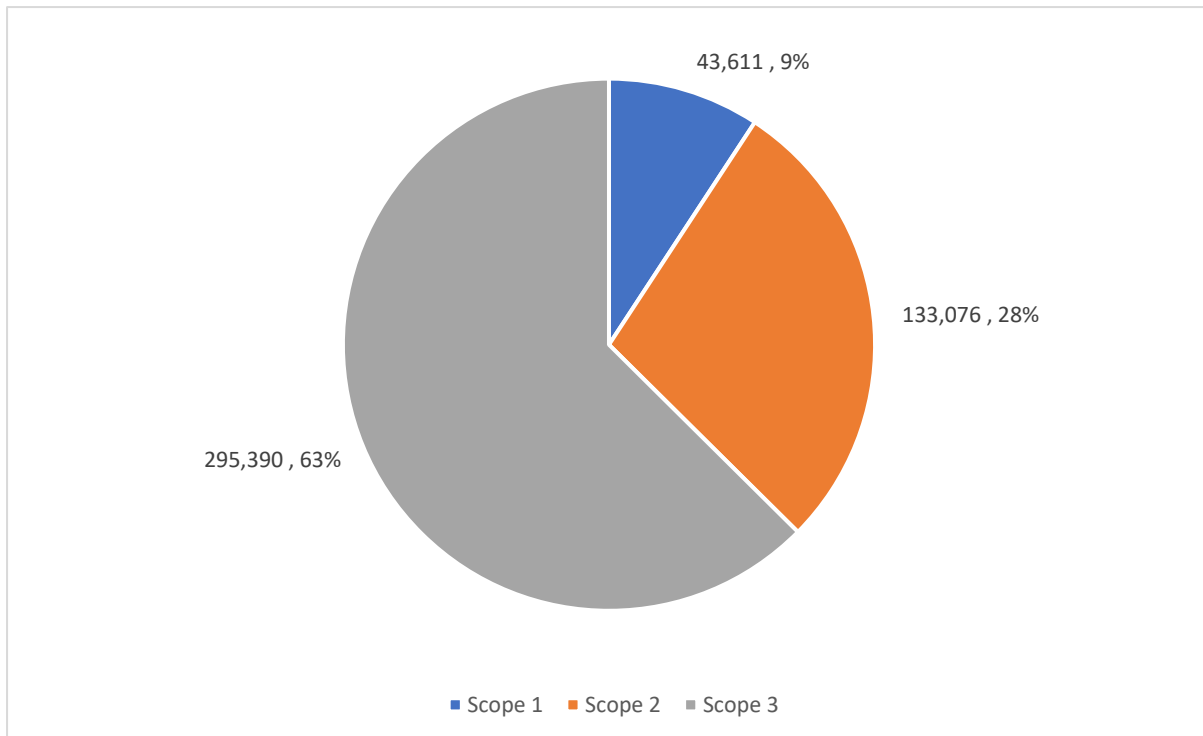
The CWFH area is unique in that the regions forest operations are almost exclusively one species. Radiata pine, and there are a relatively small number of growers and processors. It is, therefore more straightforward than many other forestry regions to undertake an analysis encompassing the whole industry, from plantation growing and management, log processing and end of life of manufactured products.

The CWFH was created under the Australian Governments Growing a better Australia policy. The policy supports the growth of plantation forests through the Hubs, the reduction of barriers to forestry expansion, the improved utilisation of forestry resources and growing the community understanding of plantation forestry. The overarching objective of the Hub is to provide information to industry and government for the purpose of expanding and improving the industry in Central West NSW.

### Carbon emissions

The carbon emission calculations presented in this report are presented for the 1 July 2020 – 31 July 2021 financial year. The data for plantation forest carbon sequestration is reported for the 2021 calendar year (1 January 2021-31 December 2021). The carbon emissions are based on ISO 14064-1 and the Greenhouse Gas Protocol (GHG Protocol). The GHG Protocol defines three Scopes of emissions: direct (Scope 1), indirect (Scope 2) and value chain (Scope 3).

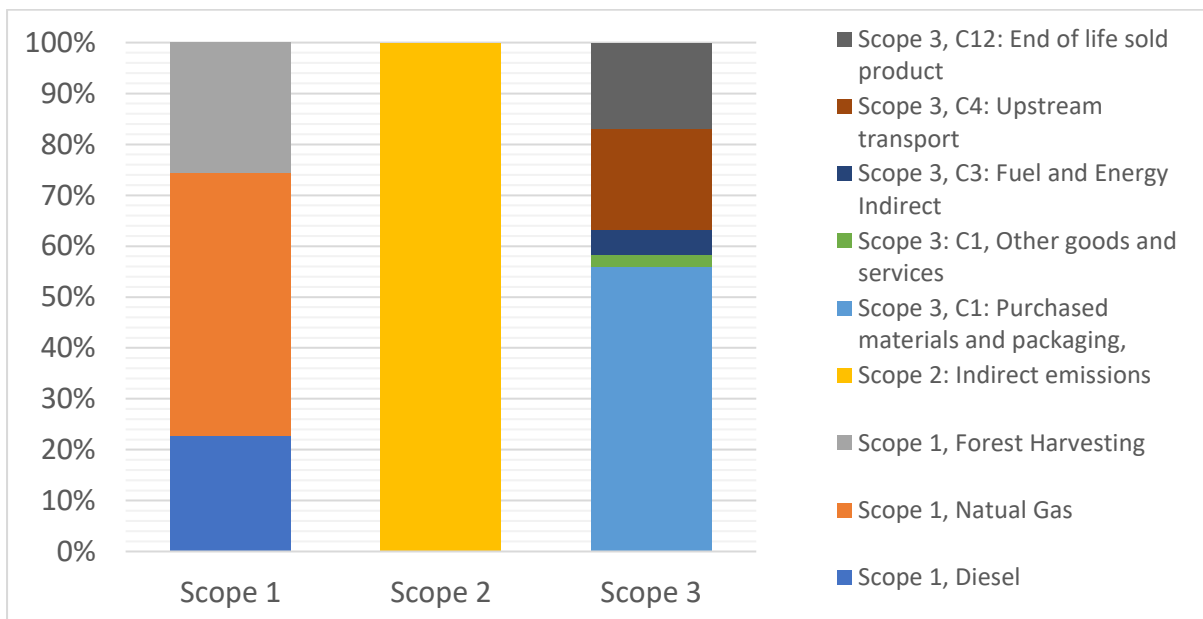
CWFH's carbon footprint is dominated by Scope 3 emissions which account for 63% of the total emissions. Scope 2 emissions contribute 28% to the total emissions and 9% come from Scope 1 emissions, as shown in Figure 0-1.



**Figure 0-1: CWFH's Scope 1, 2 and 3 emissions (% , t CO<sub>2</sub>e)**

Scope 3 emissions are divided into 15 distinct categories, of which four categories have been identified as applicable to CWFH. All four of these categories are defined as material (>1%), emissions were calculated as 295,392 t CO<sub>2</sub>e.

All three Scopes have one main contributing emission source or category, which is visualised in Figure 0-2. The main contributor to Scope 1 is emissions from natural gas. Electricity contributes all Scope 2 emissions. Scope 3 emissions are dominated by purchased material and packaging (mainly resin use).



**Figure 0-2: Main contributing emission sources and category per Scope**

CWFH's total FY21 GHG emissions are summarised in Table 2-1 with a breakdown by Scope 1, 2 and Scope 3 Category. Emissions are reported in tonnes of CO<sub>2</sub> equivalent (t CO<sub>2</sub>e).

CWFH combined Scope 1 and 2 emissions were 178,183t CO<sub>2</sub>e in FY21. Scope 3 emissions were 295,392 t CO<sub>2</sub>e, with a total of 473,574 t CO<sub>2</sub>e in FY21.

CWFH inventory is dominated by Scope 3 emissions, accounting for 63% of the total calculated emissions. As with most Scope 3 inventories, the Scope 3 emissions include many assumptions and therefore have higher uncertainties and limitations. The Scope 3 inventory has been developed to identify the most relevant emission sources in the CWFH value chain.

### Biogenic carbon emissions

Biogenic carbon emissions are estimated at 136,376 t CO<sub>2</sub>e in FY21. The burning of residues for kiln drying contributes the most to biogenic carbon emissions (81%).

### Biogenic carbon removals in wood products and plantation forest

Biogenic carbon stored in wood products produced in FY 2021 is 879,439 t CO<sub>2</sub>e and biogenic carbon removals by plantation forests in calendar year 2021 are estimated at 831,299 t CO<sub>2</sub>e (Table 0-1).

**Table 0-1: Biogenic carbon removals by CWFH assets (2021, tCO<sub>2</sub>e)**

|                                              | Biogenic carbon removals<br>(t CO <sub>2</sub> e) |
|----------------------------------------------|---------------------------------------------------|
|                                              | -879,439                                          |
| <b>Wood products produced in<br/>FY 2021</b> |                                                   |
| Plantation forest (calendar<br>year 2021)    | -831,299                                          |
| <b>Total</b>                                 | <b>-1,710,738</b>                                 |

### Summary

Biogenic carbon removals are substantially larger than the combined Scope 1, Scope 2, Scope 3 and Biogenic FY 2021 emissions in the CWFH. The total carbon footprint of the plantation industry in the CWFH was a net removal of 1,100,787 t CO<sub>2</sub>e in 2021 (Table 0-2).

**Table 0-2: Summary of CWFH emissions and removals (2021)**

|                            | t CO <sub>2</sub> e |
|----------------------------|---------------------|
| <b>Emissions</b>           |                     |
| Scope 1, 2 and 3 emissions | 473,572             |
| Biogenic emissions         | 136,376             |
| <b>Removals</b>            |                     |
| Wood Products              | -879,439            |
| Plantation forests         | -831,299            |
| <b>Total</b>               | <b>-1,100,787</b>   |

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# 1. Introduction

This study was commissioned by the Central West NSW Forestry Hub (CWFH) to prepare a regional carbon footprint of the softwood plantation forests and wood processing industry within the region, including carbon sequestration in products and plantations. The CWFH area is unique in that the region's forest operations are almost exclusively one species (Radiata pine), and there are a relatively small number of growers and processors. It is, therefore more straightforward than many other forestry regions to undertake an analysis encompassing the whole industry, from plantation growing and management, log processing and end of life of manufactured products

The CWFH committee wishes to better understand the regional industry's net carbon impact to gain context for the other projects under consideration. The report will be used to inform a wide range of stakeholders of the carbon impact of the plantation forestry industry within the Hub. These include growers, harvesters, contractors, local council, and farming communities. The report will be publicly available.

## 1.1. Project goal and scope

Central West Forestry Hub (CWFH) commissioned thinkstep-anz to:

Prepare a regional carbon emissions inventory of the softwood plantation forests and wood processing sites within the region. The carbon inventory includes:

- Scope 1 and 2 emissions from Radiata pine plantations through their management cycle.
- Scope 1 and 2 emissions from the manufacture of sawn timber, Medium Density Fibreboard (MDF) and particleboard.
- Scope 3 emissions:
  - 01 - Purchased goods & services (production-related only)
  - 03 - Fuel & energy-related activities (not included in scope 1 or 2)
  - 04 - Upstream transportation & distribution (this includes transport to customers by interviewed parties)
  - 05 - Waste generated in operations
  - 12 - End-of-life treatment of sold products
- Biogenic carbon emissions
- Sequestration of carbon in wood products,
- Sequestration of carbon in plantations

CWFH's regional carbon emissions for the softwood plantation forests and wood processing sites for the has been calculated for the financial year 2021 (1 July 2020 – 31 July 2021, hereafter expressed as FY21). This includes direct (Scope 1), indirect (Scope 2) and value chain (Scope 3) emissions. Biogenic emissions and removals are reported separately.

This report provides recommendations for future improvements. It is primarily intended for internal use.

## 1.2. Overview of CWFH

The CWFH was created under the Australian Governments Growing a better Australia policy. The policy supports the growth of plantation forests through the Hubs, the reduction of barriers to forestry expansion, the improved utilisation of forestry resources and growing the community understanding of plantation forestry. The overarching objective of the Hub is to provide information to industry and government for the purpose of expanding and improving the industry in Central West NSW.

CWFH includes (Figure 1-1)

Two major forestry managers

- Forestry Corporation NSW
- Hume Forests

Smaller area of forest is owned and managed by

- Plantation Pine Products (forest owned by Borg group of companies)
- Other private growers

Two major forest harvesting contractors

- Mangan Logging
- Pine Harvesters

Four wood manufacturing sites

- Borg's Oberon site (MDF and Particleboard manufacturer)
- Highland Pine Products Pty Ltd (sawmill)
- Australian United Timbers Ltd (sawmill)
- Australian Softwood Pty Ltd (sawmill)

Data was collected from the above companies for the carbon inventory. All company data is confidential so aggregated results are presented in this report.

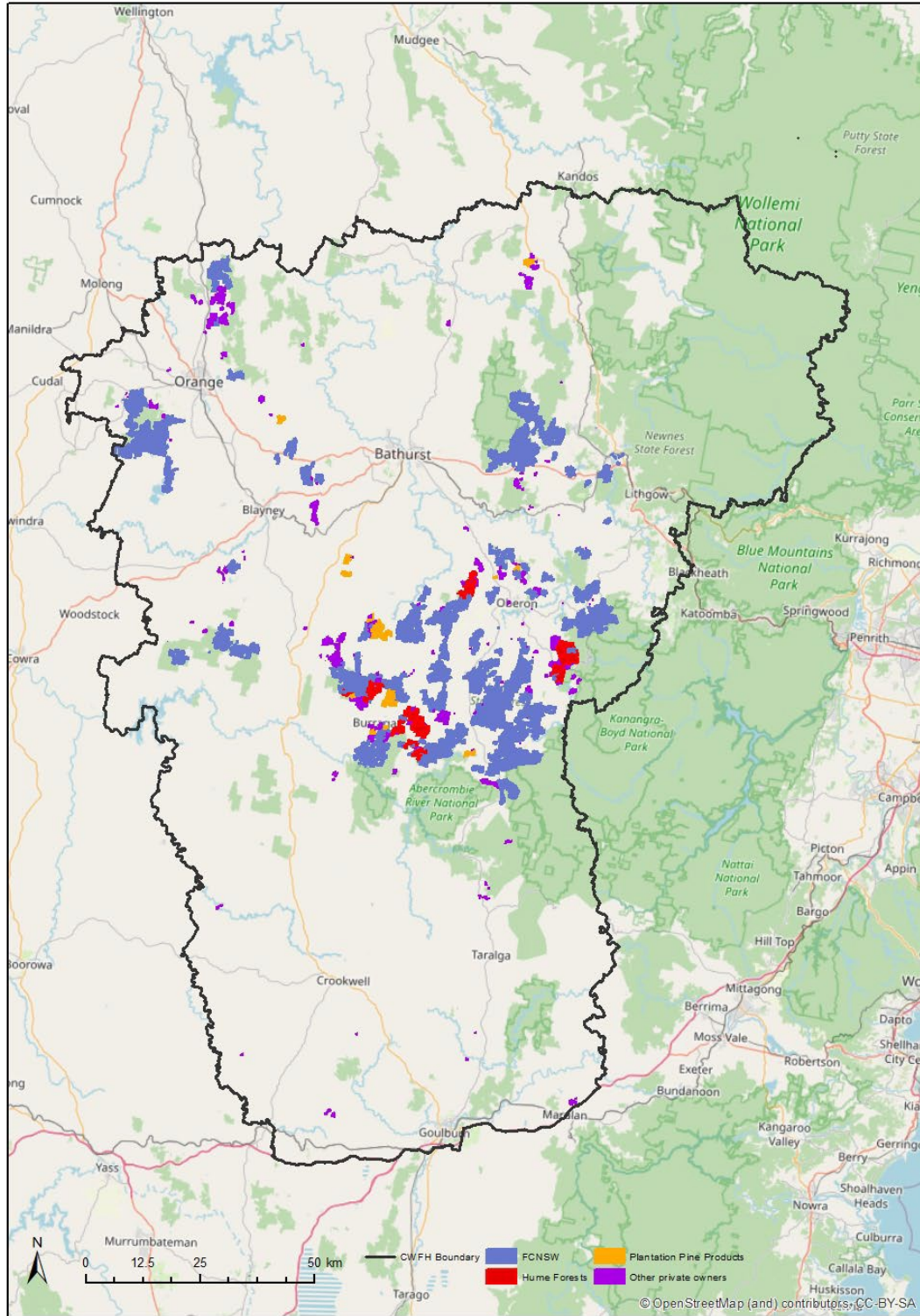


Figure 1-1: Map of CWFH

## 1.3. Standards and guidance documents

### 1.3.1. Regional carbon emissions inventory

CWFH's regional carbon emissions inventory has been prepared in accordance with the following standards and guidance:

Standards:

- ISO 14064-1:2018 - Greenhouse gases Part 1
- Greenhouse Gas Protocol - A Corporate Accounting and Reporting Standard
- Greenhouse Gas Protocol - Corporate Value Chain (Scope 3) Accounting and Reporting Standard

Guidance:

- Greenhouse Gas Protocol - Scope 2 Guidance
- Greenhouse Gas Protocol - Scope 3 Calculation Guidance

The Greenhouse Gas Protocol Corporate Standard (GHG Protocol) defines the different Scopes of a corporate carbon footprint as provided in Table 1-1. According to the GHG protocol, companies should account for emissions from all Scopes and disclose and justify any exclusions.

**Table 1-1: Definition of Scope 1, 2 and 3 emissions**

| Emission Type  | Definition                                                            |
|----------------|-----------------------------------------------------------------------|
| <b>Scope 1</b> | Direct emissions from sources owned or controlled by the company      |
| <b>Scope 2</b> | Indirect emissions from purchased electricity, steam, heat or cooling |
| <b>Scope 3</b> | Indirect value chain emissions                                        |

### 1.3.2. Biogenic carbon removals: wood products

The biogenic carbon stored in wood products has been included based on the following best-practice industry standards

- ISO 14067:2018 Greenhouse gases — Carbon footprint of products — Requirements and guidelines for quantification
- EN 16449:2014 Wood and wood-based products. Calculation of the biogenic carbon content of wood and conversion to carbon dioxide.

Specifically included will be the following:

- Carbon stored in finished products manufactured in the Hub region
- Carbon stored in residues and by-products
- Storage of carbon in end of life of sold products

Biogenic carbon removals are presented as a negative number.

## 1.4. Reporting period

The reporting period for this report is the financial year (1 July 2020 – 31 July 2021, hereafter expressed as FY21). This reporting year is appropriate to be used as a base year for future reporting.

The data for plantation forest is only available for a calendar year and is reported for the 2021 calendar year (1 January 2021-31 December 2021).

## 1.5. Organisational boundaries

This report has taken the operational control approach, as defined by the GHG Protocol (WBCSD/WRI, 2015), which means that 100% of the GHG emissions from operations over which CWFH organisations had control in financial year 2021 (FY21) are accounted for in this report (WBCSD/WRI, 2015).

All operations that were defined as part of the project scope in FY21 were assessed as listed below.

Two major forestry managers:

- Forestry Corporation NSW
- Hume Forests

Smaller area of forest is owned and managed by

- Plantation Pine Products (forest owned by Borg group of companies)
- Other private growers

Two major forest harvesting contractors:

- Mangan Logging
- Pine Harvesting

Four wood manufacturing sites:

- Borg's Oberon site (MDF and Particleboard manufacturer)
- Highland Pine Products Pty Ltd (sawmill)
- Australian United Timbers Ltd (sawmill)
- Australian Softwood Pty Ltd (sawmill)

Data was collected from the above companies for the FY21 and used in the carbon inventory.

## 1.6. Persons responsible

Personnel involved in the project including roles and responsibilities are detailed in Table 1-3.

**Table 1-3: Personnel involved in the project**

| Contact                              | Company                                                        | Responsibility                                                                                                                                                  |
|--------------------------------------|----------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Craig Taylor and Heath Molden</b> | CWFH Hub Manager                                               | Project liaison for CWFH, Pine Harvesters private harvest area, Southern Cross Forests (Hume Forests) forest area, harvest area, roading and transport distance |
| <b>Angus Spreckley</b>               | Borg Oberon, Plantation Pine Products                          | Provision of data for Borg Oberon site which includes Plantation Pine Products, Australian Panel Products (MDF), Australian Panel Products (StructaFlor)        |
| <b>Aaditi Dang</b>                   | Allied Timber Products                                         | Sawmill data                                                                                                                                                    |
| <b>Phil Burke</b>                    | Australian United Timbers                                      | Sawmill data                                                                                                                                                    |
| <b>Mike Bitzer</b>                   | Highland Pine Products                                         | Sawmill data                                                                                                                                                    |
| <b>Ray Krippner</b>                  | PF Olsen Regional Manager                                      | Mangan Logging private forest harvest area                                                                                                                      |
| <b>Russell Riepsamen</b>             | Planning Manager, Northern Softwoods, Forestry Corporation NSW | Forest area, harvest area, roading and transport distance                                                                                                       |

## 1.7. Materiality threshold

A materiality threshold of 1% of total emissions per Scope has been selected to classify each of the emissions sources and categories. If emissions from a particular source or category exceed this threshold, it is classified as 'material' in the context of each Scope. Sources or categories below this threshold are classified as immaterial. It should be noted that the materiality threshold can be defined by the reporting company.

Emission sources or categories below the materiality threshold may still be included in reporting where the data is easily available and deemed of interest to stakeholders.

## 1.8. Reporting units

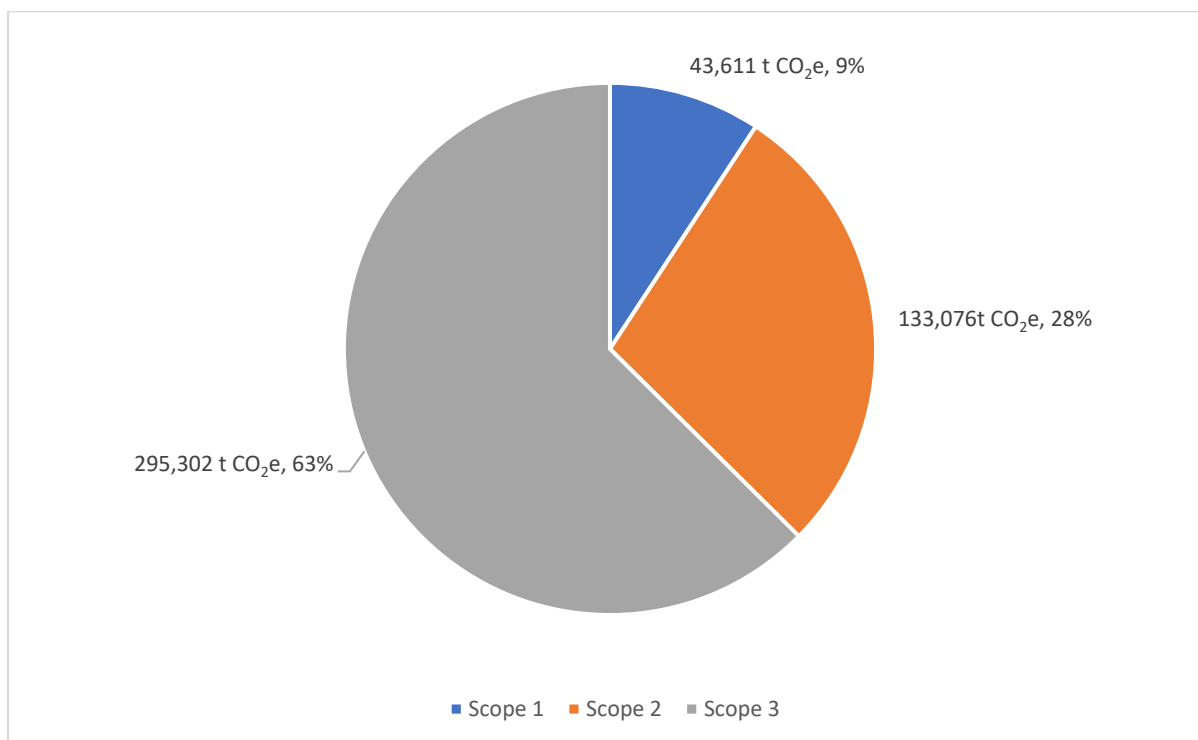
CWFH's GHG emissions are reported in tonnes of CO<sub>2</sub> equivalents (t CO<sub>2</sub>e), as required by the GHG Protocol.

## 2. Regional Carbon Footprint Overview

An overview of CWFH's GHG inventory is provided below, including all calculated and estimated emission sources

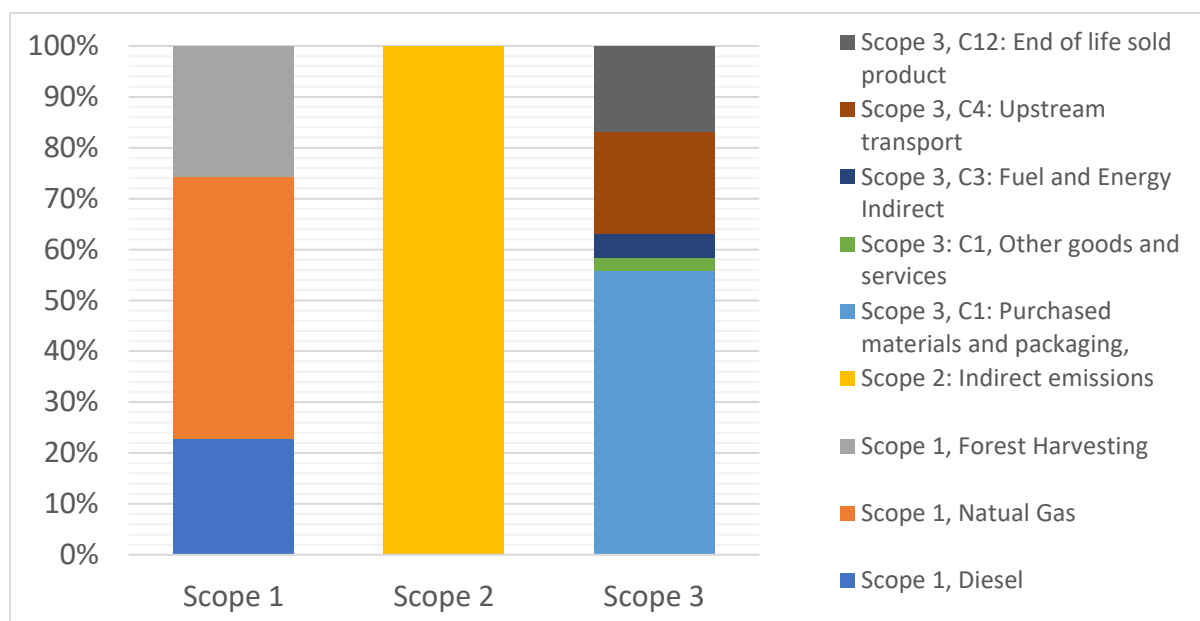
### 2.1. Footprint per scope

CWFH's carbon footprint is dominated by emissions from Scope 3 emissions which account for 63% of the total emissions. Scope 2 emissions contribute 28% to the total emissions, and Scope 1 contributes 9% as shown in Figure 2-1.



**Figure 2-1: Carbon footprint split by Scope, %**

Figure 2-2 shows that Scope 3 emissions are dominated by emissions from purchased materials and packaging (58%), and upstream transport (20%). Scope 2 emissions come from electricity consumption. Scope 1 emissions mainly come from the use of natural gas (50%), forest harvesting (25%) and diesel used at wood processing sites (22%).



**Figure 2-2: Main emission sources per Scope**

CWFH total FY21 carbon emissions are summarised in Table 2-1, with a breakdown by Scope and emission source. The Scope 3 categories that are in grey are excluded or not applicable.

**Table 2-1: CWFH FY20-21 carbon footprint**

| Emissions category                          | Total t CO <sub>2</sub> e | % of total   | % of scope | CO <sub>2</sub> | CH <sub>4</sub> | N <sub>2</sub> O |
|---------------------------------------------|---------------------------|--------------|------------|-----------------|-----------------|------------------|
| <b>Scope 1 - total</b>                      | <b>45,107</b>             | <b>9.5%</b>  |            | <b>43,540</b>   | <b>183</b>      | <b>1384</b>      |
| Natural gas                                 | 22,541                    | 4.8%         | 50.0%      |                 |                 |                  |
| Forest Management/<br>Harvesting            | 11,164                    | 2.4%         | 24.8%      |                 |                 |                  |
| Diesel                                      | 9,906                     | 2.1%         | 22.0%      |                 |                 |                  |
| Biomass                                     | 1,496                     | 0.3%         | 3.3%       |                 |                 |                  |
| LPG                                         | 0                         | 0.0%         | 0.0%       |                 |                 |                  |
| <b>Scope 2 - total</b>                      | <b>133,076</b>            | <b>28.1%</b> |            | <b>133,076</b>  |                 |                  |
| Electricity consumption -<br>Location based | 133,076                   | 28.1%        | 100.0%     |                 |                 |                  |
| <b>Scope 3 - total</b>                      | <b>295,392</b>            | <b>62.4%</b> |            |                 |                 |                  |
| Scope 3 - C1gs - total                      | 7,470                     | 1.6%         | 2.5%       |                 |                 |                  |
| Scope 3 - C1rm - total                      | 165,047                   | 34.9%        | 55.9%      |                 |                 |                  |
| Scope 3 - C2 - total                        | N/A                       | 0.0%         | 0.0%       |                 |                 |                  |
| Scope 3 - C3 - total                        | 14,204                    | 3.0%         | 4.8%       |                 |                 |                  |
| Scope 3 - C4 - total                        | 58,886                    | 12.4%        | 19.9%      |                 |                 |                  |
| <b>Scope 3 - C5 - total</b>                 | N/A                       | 0.0%         | 0.0%       |                 |                 |                  |
| Scope 3 - C6 - total                        | N/A                       | 0.0%         | 0.0%       |                 |                 |                  |
| Scope 3 - C7 - total                        | 2                         | 0.0%         | 0.0%       |                 |                 |                  |
| Scope 3 - C8 - total                        | N/A                       | 0.0%         | 0.0%       |                 |                 |                  |
| Scope 3 - C9 - total                        | N/A                       | 0.0%         | 0.0%       |                 |                 |                  |
| Scope 3 - C10 - total                       | N/A                       | 0.0%         | 0.0%       |                 |                 |                  |
| Scope 3 - C11 - total                       | N/A                       | 0.0%         | 0.0%       |                 |                 |                  |
| Scope 3 - C12 - total                       | 49,783                    | 10.5%        | 16.9%      |                 |                 |                  |
| Scope 3 - C13 - total                       | N/A                       | 0.0%         | 0.0%       |                 |                 |                  |
| Scope 3 - C14 - total                       | N/A                       | 0.0%         | 0.0%       |                 |                 |                  |
| Scope 3 - C15 - total                       | N/A                       | 0.0%         | 0.0%       |                 |                 |                  |
| <b>Scope 1+2+3 total</b>                    | <b>473,574</b>            |              |            |                 |                 |                  |

## 2.2. Biogenic carbon emissions

Sources of biogenic carbon emissions are:

- Burning of wood residues used for energy by the wood processors
- Decay of wood products in landfill

Burning of wood residues emits 109,863 t CO<sub>2</sub>e (81%)

Decay of wood products in landfill emits 26,513 t CO<sub>2</sub>e (19%)

Total biogenic carbon emissions are 136,376 t CO<sub>2</sub>e.

## **2.3. Biogenic carbon removals**

### **2.3.1. Biogenic carbon removals: wood products**

Biogenic carbon is stored in the wood products themselves. Biogenic carbon in the sawn timber, MDF and Particleboard produced within the CWFH in FY 21 is calculated at 879,439 t CO<sub>2</sub>e.

### **2.3.2. Biogenic carbon removals: plantation forests**

Plantation forests remove CO<sub>2</sub> from the atmosphere as they are growing. It is estimated that the plantation forests removed 831,299 t CO<sub>2</sub>e in calendar year 2021.

## 3. Carbon Footprint Methodology

The following sections define the emissions included in the inventory and explain the methodology and any assumptions used in the calculations per Scope and Category. The GHG Protocol relates to a reporting company but for this project relates to all relevant entities within the CWFH.

### 3.1. Scope 1

#### GHG Protocol definition

Direct greenhouse gas emissions occur from sources that are owned or controlled by the reporting company, for example, emissions from combustion of stationary or mobile fuel in owned or controlled machinery/vehicles, fugitive emissions, methane and nitrous oxide emissions due to combustion of wood residues for kiln drying.

#### Emissions

Emissions: 45,107 t CO<sub>2</sub>e

Percentage of total (Scope 1, 2 and 3) emissions: 9.5%

#### Methodology and assumptions

Table 3-1 gives an overview of CWFH Scope 1 emission sources and shows the dominant contribution from natural gas use in wood processing (50%). Other Scope 1 emissions come from forest harvesting (25%), diesel use by on site plant (22%) and CH<sub>4</sub> and N<sub>2</sub>O emissions from residue combustion. LPG contributes less than 0.5% of emissions.

**Table 3-1: Scope 1 emission sources in detail (FY21)**

| #            | S1 emission source                                      | Emissions (t CO <sub>2</sub> e) | %     | Uncertainty* | Emission source - detailed                    |
|--------------|---------------------------------------------------------|---------------------------------|-------|--------------|-----------------------------------------------|
| 1            | Natural gas                                             | 22,447                          | 50.0% | L            | Natural Gas use in wood processing            |
| 2            | Forest harvesting                                       | 11,164                          | 24.8% | H            | Fuel used for harvesting                      |
| 4            | Diesel                                                  | 9,906                           | 22.0% | H            | Used in mobile plant on wood processing sites |
| 5            | Biomass combustion (CH <sub>4</sub> & N <sub>2</sub> O) | 1,496                           | 3.3%  | L            | Residue burning for kiln drying               |
| 6            | LPG                                                     | 0                               | 0     | L            | Used at wood processing sites                 |
| <b>Total</b> |                                                         | <b>45,107</b>                   |       |              |                                               |

\*Uncertainty: L=Low, H=High

The wood processing sites provided information on their fossil fuel usage for FY21. Emissions from Diesel, Natural Gas and LPG were calculated by multiplying this activity data with the appropriate emission factors sourced from the Australian National Greenhouse Accounts Factors (DISER, 2021).

Forest management and harvesting companies provided information on the cubic metres of logs harvested. Harvesting companies data relates to their harvesting on privately managed forests only. The fossil fuel emission factors associated with forest establishment, forest management, thinning and clearfell harvesting, per cubic metre of log harvested, was taken from Forest and Wood Products Australia (FWPA) modelling (FWPA\_GaBi9\_SP40\_2021.06.22). Carbon emissions due to fossil fuels used for these activities were calculated by multiplying the total cubic metres of logs harvested by the FWPA model emission factor. This approach was taken as the forest companies didn't have the data available on fuel used for these activities. The FWPA model provides average Australian forest industry data, rather than data specific to the CWFH forests. We have been advised by the CWFH that the forest management and harvesting methods used within the Hub are consistent with normal Australian practice.

The combustion of residues results in methane (CH<sub>4</sub>) and Nitrous oxide (N<sub>2</sub>O) emissions. Wood processing sites provided information on the tonnes of residues combusted for kiln drying. Residue tonnes are converted to GJ based on the energy content of wood (= 10.4 GJ/tonne) This was then multiplied by the NGA CH<sub>4</sub> and N<sub>2</sub>O emission factors for wood solid fuels. Combustion of wood residues also results in CO<sub>2</sub> emissions and information on how these were calculated are presented in Section 4.

### Exclusions

One forest harvesting company has been excluded, due to lack of data. The CWFH have advised that the forest management and harvesting methods used within the Hub are consistent with normal Australian practice.

## 3.2. Scope 2

### GHG Protocol definition

Indirect emissions from the generation of purchased or acquired electricity, steam, heat or cooling consumed by the CWFH are reported for the location and market-based approaches.

The CWFH Scope 2 emissions come from purchased electricity consumed by the wood processing companies.

### Emissions (FY21)

Emissions (Location-based): 133,076 t CO<sub>2</sub>e

Emissions (Market -based) 154,974 t CO<sub>2</sub>e

Percentage of total (Scope 1, 2 and 3) emissions: 28.1% (location based)

## Methodology and assumptions

Each of the CWFH wood processing companies provided their FY21 electricity consumption. Electricity at one of the wood processing sites was 97% grid electricity and 3% solar. The solar was assumed to have zero associated emissions.

Scope 2 emissions were calculated using the location-based approach, which is defined by the GHG Protocol and uses grid average emissions intensities. Emissions were calculated using the latest New South Wales state-specific emission factors (DISER, 2021).

The alternative Scope 2 approach defined by the GHG Protocol is the market-based approach which reflects the choices made by consumers (e.g., 100% certified net zero), enabling the use of specific emission factors. Emissions for electricity not covered by contractual instruments must be calculated using the residual grid mix emission factor, ensuring that all emissions are accounted for. The GHG Protocol requires companies to report Scope 2 emissions using both approaches, where a market-based mechanism exists.

Australia have introduced market-based mechanisms, however, the residual grid mix factors were not yet included in the national emission factor reports provided by DISER and CWFH companies have not purchased any renewable electricity certificates in FY 21.

In Australia ClimateActive has provided a country-wide residual grid mix factor formula and is further developing methodology on market-based electricity factors which might include developing state-specific residual grid mix factors. Climate Active is a partnership between the Australian Government and Australian businesses to encourage voluntary climate action. For CWFH market-based Scope 2 emissions the Australian residual grid mix factor was calculated for 2018/19 as defined by ClimateActive (Climate Active, 2021). Note that the Australian average residual grid mix factor does not accurately reflect the major differences in grid mix factors between Australian states.

## Exclusions

Electricity use by forest managers for offices has been excluded, as actual electricity use data wasn't available.

### 3.3. Scope 3

Scope 3 emissions are a consequence of the activities of the reporting company but occur from sources not owned or controlled by the company (WBCSD/WRI, 2015). The GHG Protocol divides Scope 3 emissions into 15 distinct categories.

The following Scope 3 emission sources have been included within the assessment (Table 3-2). These are considered the core emission sources for products produced by wood processors in the region.

- C1 - Purchased goods & services (production-related only)
- C3 - Fuel & energy-related activities (not included in scope 1 or 2)
- C4 -Upstream transportation & distribution (this includes transport to customers by interviewed parties)
- C12 - End-of-life treatment of sold products

Emissions were calculated or estimated for all applicable categories. This report primarily assesses emissions materiality based on the magnitude of emissions. The GHG Protocol defines additional criteria (e.g., influence on potential emission reductions, stakeholder perspective, contribution to the company's risk exposure, etc.) that should be considered when identifying material emission sources.

CWFH should regularly review the relevance and materiality of Scope 3 emission sources over time, and particularly following any significant changes such as additional wood processing facilities. Significant changes may also trigger recalculation and restatement of the base year.

The following sections provide details for each relevant Scope 3 category, define included emissions sources, and explain the methodology and any assumptions used in the calculations.

**Table 3-2: GHG protocol Scope 3 emissions and their relevance to CWFH (FY21)**

| Scope 3 Category                                     | Description                                                                                                                                                                                                                                                                                                                                   | % of total S3 emissions | Relevance for CWFH         |
|------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|----------------------------|
| 1) <b>Purchased goods and services</b>               | Extraction, production, and transportation of goods and services purchased or acquired by the reporting company in the reporting year, not otherwise included in Categories 2 – 8<br>Raw Materials and Packaging<br>Other Goods and Services (seedling production, roading and treatments)                                                    | 58.4%                   | <b>Included - Material</b> |
| 2) <b>Capital goods</b>                              | Extraction, production, and transportation of capital goods purchased or acquired by the reporting company in the reporting year                                                                                                                                                                                                              | n/a                     | <b>Not applicable</b>      |
| 3) <b>Fuel- and energy related activities</b>        | Extraction, production, and transportation of fuels and energy purchased or acquired by the reporting company in the reporting year, not already accounted for in Scope 1 or Scope 2                                                                                                                                                          | 4.8%                    | <b>Included - Material</b> |
| 4) <b>Upstream transportation and distribution</b>   | Category 4 includes emissions from transportation and distribution of products purchased in the reporting year from tier 1 suppliers. As well as third party transport and distribution purchased by the reporting company. Includes inbound, outbound and inter-company logistics.                                                           | 19.9%                   | <b>Included - Material</b> |
| 5) <b>Waste generated in operations</b>              | Disposal and treatment of waste generated in the reporting company's operations in the reporting year (in facilities not owned or controlled by the reporting company). Waste generated in operations is minimal. Any (wood) waste that is generated, is fed back into processes as residue input and is counted under the biogenic emissions | n/a                     | <b>Excluded</b>            |
| 6) <b>Business travel</b>                            | Transportation of employees for business-related activities during the reporting year (in vehicles not owned or operated by the reporting company)                                                                                                                                                                                            | n/a                     | <b>Excluded</b>            |
| 7) <b>Employee commuting</b>                         | Transportation of employees between their homes and their worksites during the reporting year (in vehicles not owned or operated by the reporting company)                                                                                                                                                                                    | n/a                     | <b>Excluded</b>            |
| 8) <b>Upstream leased assets</b>                     | Operation of assets leased by the reporting company (lessee) in the reporting year and not included in Scope 1 and Scope 2                                                                                                                                                                                                                    | n/a                     | <b>Not applicable</b>      |
| 9) <b>Downstream transportation and distribution</b> | Transportation and distribution of products sold by the reporting company in the reporting year between the reporting company's operations and the end consumer (if not paid for by the reporting company), including retail and storage (in vehicles and facilities not owned or controlled by the reporting company)                        | n/a                     | <b>Not applicable</b>      |
| 10) <b>Processing of sold products</b>               | Processing of intermediate products sold in the reporting year by downstream companies (e.g., manufacturers)                                                                                                                                                                                                                                  | n/a                     | <b>Excluded</b>            |
| 11) <b>Use of sold products</b>                      | End use of goods and services sold by the reporting company in the reporting year                                                                                                                                                                                                                                                             | n/a                     | <b>Excluded</b>            |
| 12) <b>End-of life treatment of sold products</b>    | Waste disposal and treatment of products sold by the reporting company (in the reporting year) at the end of their life, landfill                                                                                                                                                                                                             | 16.9%                   | <b>Included - Material</b> |
| 13) <b>Downstream leased assets</b>                  | Operation of assets owned by the reporting company (lessor) and leased to other entities in the reporting year, not included in Scope 1 and Scope 2                                                                                                                                                                                           | n/a                     | <b>Not applicable</b>      |
| 14) <b>Franchises</b>                                | Operation of franchises in the reporting year, not included in Scope 1 and Scope 2 – reported by franchisor                                                                                                                                                                                                                                   | n/a                     | <b>Not applicable</b>      |
| 15) <b>Investments</b>                               | Operation of investments (including equity and debt investments and project finance) in the reporting year, not included in Scope 1 or Scope 2                                                                                                                                                                                                | n/a                     | <b>Not applicable</b>      |

Materiality threshold: 1%, Percentages might not add up to 100% due to rounding

### 3.3.1. Category 1 - Purchased goods and services

#### GHG Protocol definition

Category 1 includes the upstream (cradle-to-gate) emissions from all purchased goods and services not otherwise included in the other categories of upstream Scope 3 emissions (i.e., Category 2 through Category 8). Emissions from the transportation of purchased goods from a supplier are included in Category 4 (upstream transportation and distribution).

#### Emissions (FY21)

Emissions: 172,517 t CO<sub>2</sub>e

Percentage of Scope 3 emissions: 58.4%

Percentage of total (Scope 1, 2 and 3) emissions: 36.4%

CWFH upstream emissions from purchased goods and services are mainly due to resin production. Table 3-3 shows a detailed breakdown of CWFH emissions from Category 1.

**Table 3-3: Scope 3 - Category 1 emissions**

| Subcategory                                        | t CO <sub>2</sub> e | % of C1 | Uncertainty* |
|----------------------------------------------------|---------------------|---------|--------------|
| Resin                                              | 143,954             | 83.4%   | L            |
| Paraffin Wax                                       | 4,394               | 2.6%    | L            |
| Steel parts                                        | 318                 | 0.2%    | H            |
| Lubricating oil                                    | 9                   | 0.0%    | H            |
| LDPE Wrap                                          | 664                 | 0.4%    | H            |
| Plastic Strapping                                  | 15,708              | 9.1%    | H            |
| Seedling production, roading, chemical application | 5,477               | 3.2%    | H            |
| Timber treatment                                   | 1,993               | 1.2%    | L            |
| <b>Total</b>                                       | <b>172,517</b>      |         |              |

\*Uncertainty: Low (L), medium (M), high (H)

#### Methodology and assumptions

The mass of resin and paraffin wax inputs was provided by the wood processing companies. The Australian average (FWPA, 2022) were used for steel, lubricating oil and packaging (softwood gluts) LDPE wrap and plastic strapping) mass inputs based on the CWFH sawn timber, MDF and particle board production values provided by CWFH companies. Emissions factors are sourced from the Gabi database (Sphera, 2021) or the FWPA EPD as outlined in Table 3-. Emissions are calculated by multiplying the mass by the emission factors.

Forest companies contract out seedling production and chemical application. Emissions associated with these operations were estimated based on the three forest companies' log harvest volumes and an emission factor for these activities from the FWPA softwood model.

The two forest harvesting companies operate in private forests and the emissions associated with seedling production and chemical application in the private forests is estimated based on the log harvest volumes of the two forest harvesting companies.

The production of timber treatment chemicals is also included in this category. The wood processing companies provided data on cubic metres of treated wood and the treatment type (CCA and LOSP). Emission factors are from the FWPA EPDs.

**Table 3-4: Scope 3, Category 1 activity data and emission factor source.**

| Input                                               | Activity data source                               | Emission factor source |
|-----------------------------------------------------|----------------------------------------------------|------------------------|
| <b>Resin</b>                                        | Specific data from wood product manufacture        | Sphera 2021            |
| <b>Parafin Wax</b>                                  | Specific data from wood product manufacture        | Sphera 2021            |
| <b>Steel parts</b>                                  | Industry average data FWPA Gabi Model              | Sphera 2021            |
| <b>Lubricating oil</b>                              | Industry average data FWPA Gabi Model              | Sphera 2021            |
| <b>Packaging</b>                                    |                                                    |                        |
| LDPE Wrap                                           | Industry average data FWPA Gabi Model              | Sphera 2021            |
| Plastic Strapping                                   | Industry average data FWPA Gabi Model              | Sphera 2021            |
| <b>Seedling prod, roading, chemical application</b> | Specific data from Forest Managers on area managed | FWPA Gabi Model        |
| <b>Timber treatment CCA (H3)</b>                    | Specific data from Wood product manufacture        | FWPA Sawn Softwood EPD |
| <b>Timber treatment LOSP (H2F)</b>                  | Specific data from Wood product manufacture        | FWPA Sawn Softwood EPD |

## Exclusions

Small volumes of paper, inks and paints have been excluded from the packaging inputs. Softwood gluts are used for packaging, but as these are produced by a company within the CWFH, these have been excluded from Category 1 to avoid double counting.

### 3.3.2. Category 3 - Fuel- and energy-related activities

#### GHG Protocol definition

Category 3 emissions are related to the production of fuels and energy purchased and consumed by the reporting company in the reporting year that are not included in Scope 1 or Scope 2. Typically, these are referred to as cradle-to-gate or well-to-tank (WTT) emissions, but they also include transmission and distribution losses for distributed energy (i.e., electricity and natural gas).

#### Emissions

Emissions: 14,204 t CO<sub>2</sub>e

Percentage of Scope 3 emissions: 4.8%

Percentage of total (Scope 1, 2 and 3) emissions: 3.0%

Category 3 emissions are mainly due to electricity transmission and distribution losses (95%).

#### Methodology and assumptions

Category 3 emissions included in CWFH's Scope 3 inventory are:

- a) emissions generated by the extraction, refining and transportation of purchased fuels (cradle-to-gate or well-to-tank (WTT) emissions).
- b) emissions generated by the extraction, production, and transportation of fuels consumed in the generation of purchased electricity.
- c) Transmission and distribution losses of purchased energy (electricity or natural gas) that is consumed (i.e., lost) in a transmission and distribution system.

Emissions from Category 3 are entirely linked to CWFH's fuel and energy consumption which are covered in Scope 1 and Scope 2.

Fuel WTT emissions and have been calculated by applying emission factors sourced from the Australian National Greenhouse Accounts Factors (DISER, 2021).

New South Wales electricity Scope 3 emissions, as described in b), have been calculated using a NSW specific emission factor for electricity generation sourced from (DISER, 2021). These cover both b) and c) above.

#### Exclusions

The Scope 1 Emission factor for forest management and harvesting is a life cycle emission factor and includes the WTT emissions. Forest management and harvesting WTT emissions are not reported under scope 3 category 3 to avoid double counting.

### 3.3.3. Category 4 - Upstream transportation and distribution

#### GHG Protocol definition

Category 4 emissions include all third-party transportation and distribution services purchased by the reporting company in the reporting year (either directly or through an intermediary), including inbound logistics, outbound logistics, and third-party transportation and distribution between a company's own facilities.

#### Emissions

Emissions: 58,886 t CO<sub>2</sub>e

Percentage of Scope 3 emissions: 19.9%

Percentage of total (Scope 1, 2 and 3) emissions: 12.4%

#### Methodology and assumptions

Emissions from upstream transportation and distribution arise from:

- a) Inbound logistics: transport of purchased products from CWFH suppliers to CWFH wood processing sites, (not included in Scope 1), and
- b) Outbound logistics: transport of products to CWFH customers.

Emissions were calculated using the 'distance-based method', which involves multiplying the mass of purchased or sold products transported by the distance travelled.

Category 4 a) emissions account for 38% of total Category 4. The mass of purchased logs and woodchips were provided by the CWFH wood processing companies. Woodchip transport distance was provided by the wood processing company. One wood processing site receives wood chip from demolition sites, contributing 7% of the woodchip inputs. Log and wood chip transport distance was provided by each of the forest harvesting and wood processing companies.

In addition to the logs and woodchips the transport of the resin, steel, lubricating oil and packaging is included. The mass of resin inputs was provided by the wood processing companies. The Australian average (FWPA, 2022) were used for steel, lubricating oil and packaging mass inputs. A transport distance of 100 kms was assumed for these materials.

Category 4 b) emissions account for 62% of total Category 4. The mass of products sold was provided by the CWFH wood processing companies. Three of the wood processing companies provided information on the transport distance to customer. One sawmill didn't have this information, so the average transport distance for the other 2 sawmills was used.

The mass-distance data was then multiplied by mass-distance emission factors sourced from the UK (BEIS, 2021). In addition to the combustion emissions from the consumption of fuel, the cradle-to-gate or well-to-tank (WTT) emissions related to the extraction, refining and transportation of the fuel were calculated using factors provided by BEIS (BEIS, 2021). This follows the GHG Protocol recommendation to including WTT emissions where possible.

#### Exclusions

N/A

### **3.3.4. Category 5 - Waste generated in operations**

#### **GHG Protocol definition**

Category 5 includes the disposal and treatment of waste generated in the reporting company's operations in the reporting year (in facilities not owned or controlled by the reporting company). This includes both solid waste and wastewater treatment.

#### **Methodology and assumptions**

Each of the wood processing sites produces wood residues, these are either used on site for kiln drying or sold. The emissions due to the combustion of wood residues for kiln drying is reported separately in scope 1 for CH<sub>4</sub> and N<sub>2</sub>O emissions and under biogenic for CO<sub>2</sub> emissions.

No emissions are reported under this category as any other waste is assumed to be de minimis.

### 3.3.5. Category 7 – Employee commuting

#### GHG Protocol definition

This category includes emissions from the transportation of employees between their homes and their worksites.

#### Emissions (FY21)

Emissions: 2 t CO<sub>2</sub>e

Percentage of Scope 3 emissions: 0.0%

Percentage of total (Scope 1, 2 and 3) emissions: 0.0%

#### Methodology and assumptions

To calculate emissions from employee commuting:

- The employee number per employee category was calculated using the percentages in the employment survey report and the total number of employees.
- The average commuting distance per employee type was multiplied by number of employees per employee type to find the distance travelled each day by each employee type.
- The distance travelled each day per employee type was multiplied by number of employees per fuel type (calculated by multiplying the total employee number by the percentage of vehicles for each fuel type).
- The distance travelled each day per fuel type was then multiplied by the total number of days assumed to be worked.

The CWFH survey report (file name "CWFH009\_Final\_Report - Forest works") supplied a percentage of CWFH employees per employee type, which was multiplied by the total number of employees and rounded up. The commuting distance per category from Australian Bureau of Statistics data (ABS, 2018) was applied, shown in brackets below:

- Machinery operators: 416 employees (20km)
- Labourers: 165 employees (15.4km)
- Technicians and trade works: 165 employees (18.2km)
- Managers: 52 employees (17.3km)
- Professionals: 35 employees (16.2km)
- Clerical and administrative workers: 35 employees (16.1km)

It was assumed that 71.7% of employees travelled to work via petrol-powered vehicles and 26.4% via diesel-powered vehicles, which matched national averages (ABS, 2021).

To calculate the total number of days each employee travelled to work (216 days) during the reporting period, the following was assumed:

- All employees were entitled to leave (i.e., no casual workers),
- All employees used all annual leave (20 days) and sick leave (10 days) that was legally allocated to them (Fair Work AU, 2022)
- No commuting occurred on public holidays, which amounted to 14 days in New South Wales during the reporting period (Industrial Relations, 2021-2023).

### 3.3.6. Category 12 - End-of-life treatment of sold products

#### GHG Protocol definition

Category 12 includes emissions from the waste disposal (decay) and treatment of products sold by the reporting company at the end of their life. This category includes the total expected end-of-life emissions from all products sold in the reporting year.

#### Emissions

Emissions: 49,783 t CO<sub>2</sub>e

Percentage of Scope 3 emissions: 10.5%

Percentage of total (Scope 1, 2 and 3) emissions: 16.9%

#### Methodology and assumptions

It was assumed that the wood products are landfilled at the end of life. Some products maybe reprocessed into other products before being landfilled. However it is conservatively estimated that over a hundred year time period all wood products will end up in landfill. The methane (CH<sub>4</sub>) emissions associated with decay of wood products in landfill are estimated based on the quantity of the products and the associated emission factor from FWPA 2022 for landfill typical. The assumptions used for the landfill typical emission factor calculation are

- degradable organic carbon fraction (DOCf) of wood of 0.1%. This is based on bioreactor laboratory research by (Wang, 2011) on Radiata pine timber, the dominant softwood species in Australia.
- Of the gases formed from any degradation of wood in landfill, 50% is methane and 50% is carbon dioxide (Australian Government, 2020).
- All carbon dioxide is released directly to the atmosphere.
- 43% of the methane is captured, based on weighted average methane captured in Australian landfills (Australian Government, 2021).
- Of this 43% captured, one-quarter (10.8% of the total) is flared and three-quarters (32.3% of the total) are used for energy recovery (Carre, 2011).
- Of the 57% of methane that is not captured, 10% (5.7% of the total) is oxidised (Australian Government, 2021) and 90% (51.3%) is released to the atmosphere.
- In summary, for every kilogram of carbon converted to landfill gas, 74.4% is released as carbon dioxide and 25.7% is released as methane.

The carbon dioxide emitted from the biodegradation of woody biomass is biogenic and reported separately – see section 4.

#### Exclusions

End of life of packaging is excluded.

## 4. Biogenic Carbon Emissions

The carbon dioxide emitted from the combustion and biodegradation of biofuels and biomass (including wood) is biogenic, meaning it equates to the carbon dioxide absorbed by the feedstock during its lifespan. The *GHG Protocol Corporate Standard* requires that direct CO<sub>2</sub> emissions from the combustion of biomass be included in the public report, but reported separately from the scopes, rather than included in scope 1. The separate reporting requirement also applies to scope 3. Biogenic CO<sub>2</sub> emissions (e.g., CO<sub>2</sub> from the combustion of biomass) that occur in the reporting company's value chain are required to be included in the public report, but reported separately from Scope 3.

The requirement to report biogenic CO<sub>2</sub> emissions separately refers to CO<sub>2</sub> emissions from combustion or biodegradation of biomass only, not to emissions of any other GHGs (e.g., CH<sub>4</sub> and N<sub>2</sub>O), or to any GHG emissions that occur in the life cycle of biomass other than from combustion or biodegradation (e.g., GHG emissions from processing or transporting biomass).

Sources of biogenic carbon emissions with the CWFH are

- Burning of wood residues used for energy by the wood processors (Scope 1): 109,863 t CO<sub>2</sub>e
- Decay of wood products in landfill (Scope 3): 26,513 t CO<sub>2</sub>e

It was assumed that all products sold by CWFH wood processing companies will be sent to landfill at end of life. The production of Sawn Timber, MDF and Particleboard were provided by the CWFH companies. The landfill emission factors for Sawn timber, MDF and Particleboard are from the relevant product FWPA EPDs.

Wood processing sites provided information on the mass of wood residues used for kiln drying. The emission factor for residues was calculated assuming 50% moisture content and 50% carbon content (Gifford, 2020) and converting to CO<sub>2</sub> to provide an EF of 916 kg CO<sub>2</sub>/tonne residues.

## 5. Biogenic carbon removals

### 5.1. Biogenic carbon removals: wood products

Biogenic carbon is also stored in the wood products themselves. This was calculated based on the mass of wood products and the GWP biogenic emission factor from the relevant product EPD (FWPA, 2022), (FWPA, Particleboard Environmental Product Declaration, 2017) and (FWPA, Medium Density fibreboard Environmental Product Declaration, 2017). Biogenic carbon stored in wood products is 680,076 t CO<sub>2</sub>e.

### 5.2. Carbon in plantation forests

This work was undertaken by NSW Department of Primary Industries (Ximenes, 2022). Their report presented results in tonnes of carbon (tC) and have been converted to tonnes CO<sub>2</sub> (t CO<sub>2</sub>e) for this report.

#### 5.2.1. Carbon stocks in plantation forest (standing trees and dead organic matter) established prior to 31 December 2021

Carbon in the plantations managed by FCNSW was estimated using FLINTpro (<https://flintpro.com/>), a data analysis platform designed to rapidly calculate greenhouse gas emissions from changes in land use including forests. One key advantage of FLINTpro is that its outputs are entirely consistent with those from FullCAM, and delivered more quickly and efficiently. FCNSW has recently acquired the license to use FLINTpro to carry out its annual forest carbon assessments.

The majority of the Radiata pine estate in the CWFH is managed by FCNSW, with approximately 65,000 hectares of plantation Radiata pine. Detailed recent forest carbon modelling has been undertaken for the key Central West plantations managed by FCNSW.

In addition to the FCNSW estate, according to the Greenwood Strategies report produced for the CWFH (Greenwood Strategy), there was a total of 18,886 hectares that are privately owned by Hume Forests Limited, Plantation Pine Products Australia Pty Ltd and a large number of smaller growers.

Since we did not have access to inventory data from the other growers, we could not directly estimate carbon for those plantations. The approach here was to derive a weighted average of carbon stocks by hectare based on the relative age class distributions (as detailed in the Greenwood Strategy report) and the typical carbon sequestration profile obtained by running the FullCAM model. The factor obtained for FCNSW was compared with that obtained by the mean of the other three grower categories. The result was then applied to the relative total areas of plantation to derive carbon estimates for the plantations not managed by FCNSW.

In order to account for the age-class factor, a weighted mean carbon value for each of the age classes was derived based on growth curves contained in the FullCAM model. The resulting weighted carbon value per hectare was approximately 36% lower than that for the FCNSW estate, due to the overall older age class profile of the FCNSW plantations.

Table 5-1 relates to the carbon contained in the above-ground and below-ground components of the planted trees within the CWFH, as well as the dead organic matter on the forest floor. The below-ground component relates to the root biomass only – it does not include soil carbon, which has a high level of uncertainty. The majority of the carbon is contained in the above-ground portion of the trees as expected.

The total estimated amount of biomass currently in the aboveground, below ground and dead organic matter components of the Radiata pine stands in the CWFH region is approximately 30,300,000 t CO<sub>2</sub>e (Table 5-).

**Table 5-1: Carbon stocks in the different components of Radiata pine stands**

|              | Forest<br>Aboveground<br>Biomass<br>(tCO <sub>2</sub> ) | Forest<br>Belowground<br>Biomass<br>(tCO <sub>2</sub> ) | Forest<br>Organic<br>Matter (tCO <sub>2</sub> ) | Dead<br>Emissions<br>(tCO <sub>2</sub> ) | Total             |
|--------------|---------------------------------------------------------|---------------------------------------------------------|-------------------------------------------------|------------------------------------------|-------------------|
| FCNSW        | 14,739,047                                              | 4,595,019                                               | 6,182,752                                       |                                          | 25,516,814        |
| Non FCNSW    | 2,758,455                                               | 859,969                                                 | 1,157,119                                       |                                          | 4,775,544         |
| <b>Total</b> | <b>17,497,498</b>                                       | <b>5,454,988</b>                                        | <b>7,339,871</b>                                |                                          | <b>30,292,361</b> |

## Exclusions

An additional 1475 hectares were authorised for planting in the CWFH in 22 (pers. comm. DPI Plantation Regulation Unit). As it is unclear what proportion of those would have been actually planted and given the very small carbon sequestration associated with the very young seedlings, any carbon contained in that resource has conservatively not been included.

### 5.2.2. Carbon removals in 2021 calendar year

The FLINTpro estimates for the FCNSW estate are available for consecutive calendar years and were used to derive annual carbon sequestration values (Ximenes, 2022). The annual carbon sequestration of Radiata pine stands managed by other growers was derived based on average carbon sequestration values contained in the FullCAM model, annualised for each of the relevant age classes. These values were then applied to the calculated carbon stocks to retrospectively estimate annual carbon sequestration values for those plantations.

Annual carbon sequestration varies dependant on growing conditions and large fire events. The total annual sequestration for 2021 was 831,299 t CO<sub>2</sub>e (Table 5-2) and is slightly higher than the four-year average.

**Table 5-2: Annual biogenic carbon removals for Radiata pine stands in the CWFH region.**

| Year        | Annual<br>increase -<br>FCNSW (tCO <sub>2</sub> ) | Annual increase<br>- other growers<br>(tCO <sub>2</sub> ) | Annual<br>increase – total<br>(tCO <sub>2</sub> ) |
|-------------|---------------------------------------------------|-----------------------------------------------------------|---------------------------------------------------|
| <b>2018</b> | 272,730                                           | 198,887                                                   | 471,618                                           |

| Year           | Annual increase - FCNSW (tCO <sub>2</sub> ) | Annual increase - other growers (tCO <sub>2</sub> ) | Annual increase – total (tCO <sub>2</sub> ) |
|----------------|---------------------------------------------|-----------------------------------------------------|---------------------------------------------|
| 2019           | 304,036                                     | 208,985                                             | 513,022                                     |
| 2020           | 1,131,126                                   | 219,597                                             | 1,350,723                                   |
| 2021           | 600,552                                     | 230,747                                             | 831,299                                     |
| 4-year average | 577,111                                     | 214,554                                             | 791,665                                     |

### 5.2.3. Carbon removal impacts of forest expansion scenarios (over 100 years).

The model FullCAM was used to estimate long-term carbon impacts of two scenarios of potential plantation expansion in the region (1000 and 2000 hectare expansion) (Ximenes, 2022). The plantations were assumed to be planted in the Bathurst region, using average growth parameters as set out in FullCAM for ERF projects. Two thin events were modelled before clearfell at year 33. This regime was then modelled over a 100-year period (Figure 5-1).

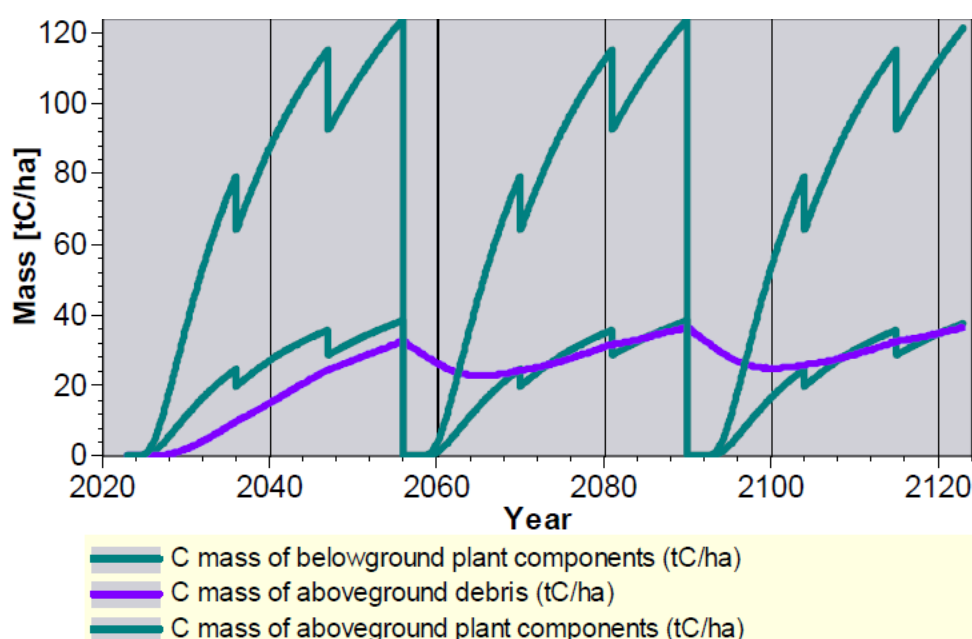


Figure 5-1: Carbon dynamics of a planted Radiata pine stand in the Bathurst region

The mean total long-term carbon benefit associated with the above-ground and below-ground tree components as well as forest dead organic matter ranged from 434,900 for 1,000 new hectares to 896,799 t CO<sub>2</sub>e for 2,000 new hectares of plantations (Table 5-4).

**Table 5-3: Carbon mass for a Radiata pine plantation, tCO<sub>2</sub>e /ha**

| Belowground plant components | Forest dead organic matter | Carbon mass of aboveground plant components | Total |
|------------------------------|----------------------------|---------------------------------------------|-------|
| 82                           | 89                         | 264                                         | 435   |

**Table 5-4: Carbon benefits for a Radiata pine plantation in the Bathurst region of NSW over 100 years (FullCAM outputs), tCO<sub>2</sub>e**

| Area           | Belowground plant components | Forest dead organic matter | Carbon mass of aboveground plant components | Total   |
|----------------|------------------------------|----------------------------|---------------------------------------------|---------|
| <b>1000 ha</b> | 81,928                       | 89,067                     | 263,901                                     | 434,900 |
| <b>2000 ha</b> | 163,856                      | 178,138                    | 527,806                                     | 869,799 |

## 6. Summary and Recommendations

### 6.1. Summary

CWFH combined emissions are

Scope 1 and 2: 178,183 t CO<sub>2</sub>e in FY21.

Scope 3 emissions: 295,392 t CO<sub>2</sub>e,

Total of 473,574 t CO<sub>2</sub>e.

Scope 1 and 2 emissions contribute 10% and 28% respectively to the CWFH FY21 GHG Inventory and are under the direct control and influence of the CWFH companies.

The CWFH inventory is dominated by Scope 3 emissions, accounting for 62% of the total calculated emissions. As with most Scope 3 inventories, the Scope 3 emissions include many assumptions, and therefore have higher uncertainties and limitations. The Scope 3 inventory has been developed to identify the most relevant emission sources in the CWFH value chain.

Scope 3, Category 1 (raw material and packaging) contributes most to the total emissions (37%), largely due to the use of resin (83% of Scope 3, Category 1), and plastic strapping (9% of Scope 3, Category 1).

Scope 3, Category 4 emissions contribute 12% to total emissions with inbound transport of logs/materials contributing 38% of Category 4 emissions and outbound transport of products contributing 62%.

Biogenic emissions were calculated separately and come from wood residue burning and decay of wood products (136,376 t CO<sub>2</sub>e).

Biogenic carbon removal was quantified for carbon stored in wood products and plantation forests. Biogenic carbon in wood products manufactured in CWFH FY21 is 879,439 t CO<sub>2</sub>e. Biogenic carbon removals by plantation forest in CWFH in calendar year 2021 is 831,209 t CO<sub>2</sub>e.

Biogenic carbon removals are substantially larger than the combined Scope 1, Scope 2, Scope 3 and biogenic emissions (Table 6-1).

**Table 6-1: Summary of CWFH emissions and removals (2021)**

|                            | t CO <sub>2</sub> e |
|----------------------------|---------------------|
| <b>Emissions</b>           |                     |
| Scope 1, 2 and 3 emissions | 473,572             |
| Biogenic emissions         | 136,376             |
| <b>Removals</b>            |                     |
| Wood Products              | -879,439            |
| Plantation forests         | -831,299            |
| <b>Total</b>               | <b>-1,100,787</b>   |

## 6.2. Recommendations

The emissions inventory could be improved by using company specific data for all forestry and wood processing site inputs where Australian average data has been used. Additional data could be collected to allow inclusion of business travel and processing of sold products.

While the CWFH may be removing more carbon than is being emitted (due to carbon storage in wood products and removals by forests) fossil carbon emissions can still be reduced.

In order to reduce emissions within the CWFH companies the easiest place to start is with Scope 1 or 2 emissions which they have direct control over. Electricity is a significant hotspot. In FY21 the MDF and Particleboard manufacturing site had 3% of their electricity provided by solar. Since then the site has increased its use of solar and it is likely the emissions associated with electricity use has also decreased. Replacement of NSW grid electricity with renewable electricity by the CWFH companies would further reduce emissions due to electricity use.

Raw materials and packaging are significant emission hotspot but there is limited opportunity to reduce these emissions.

There may be opportunity to reduce transport emissions in the future as viable options for electric or hydrogen trucks become available. This would require collaboration with the trucking companies. Another option to reduce transport emissions is the use of rail to transport products to market.

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## Abbreviations and Glossary

| Term                                     | Definition                                                                                                                                                                                                                                                                                                                                                                     |
|------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>ANZSIC</b>                            | Australia and New Zealand Standard Industrial Classification                                                                                                                                                                                                                                                                                                                   |
| <b>AU</b>                                | Australia                                                                                                                                                                                                                                                                                                                                                                      |
| <b>DISER</b>                             | Australian Department of Industry Science Energy and Resources                                                                                                                                                                                                                                                                                                                 |
| <b>Biogenic CO<sub>2</sub> emissions</b> | Emissions data for direct CO <sub>2</sub> emissions from biologically sequestered carbon (e.g., from burning biomass and biofuels), reported separately from the scopes.                                                                                                                                                                                                       |
| <b>Biogenic CO<sub>2</sub> removals</b>  | Removals of CO <sub>2</sub> from the atmosphere by biological systems (eg forests and wood products), reported separately                                                                                                                                                                                                                                                      |
| <b>CO<sub>2</sub>e</b>                   | CO <sub>2</sub> equivalent, or carbon dioxide equivalent is calculated using the mass of a given GHG multiplied by its global warming potential                                                                                                                                                                                                                                |
| <b>EOL</b>                               | End of life (for example, landfilling of waste is an EOL process)                                                                                                                                                                                                                                                                                                              |
| <b>EPD</b>                               | Environmental Product Declaration                                                                                                                                                                                                                                                                                                                                              |
| <b>FY21</b>                              | Financial year 2021 (1 <sup>st</sup> July 2020 to 30 <sup>th</sup> June 2021)                                                                                                                                                                                                                                                                                                  |
| <b>GHG</b>                               | Greenhouse gas<br>For the purposes of this report, GHGs are the seven gases listed in the Kyoto Protocol. These GHGs are currently: carbon dioxide (CO <sub>2</sub> ), methane (CH <sub>4</sub> ), nitrous oxide (N <sub>2</sub> O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulphur hexafluoride (SF <sub>6</sub> ), and nitrogen trifluoride (NF <sub>3</sub> ). |
| <b>GHG Protocol</b>                      | The Greenhouse Gas Protocol, a partnership between World Resources Institute (WRI) and the World Business Council for Sustainable Development (WBCSD). The GHG Protocol develops standards and guidance, such as the Corporate Standard and the Corporate Value Chain (Scope 3) Standard, both used as referenced for this report.                                             |
| <b>GWP</b>                               | Global warming potential                                                                                                                                                                                                                                                                                                                                                       |
| <b>LCA</b>                               | Life Cycle Assessment                                                                                                                                                                                                                                                                                                                                                          |
| <b>NGA</b>                               | Australian National Greenhouse Accounts                                                                                                                                                                                                                                                                                                                                        |
| <b>PCF</b>                               | Product Carbon Footprint                                                                                                                                                                                                                                                                                                                                                       |
| <b>Scope 1</b>                           | Direct emissions from sources owned or controlled by the company                                                                                                                                                                                                                                                                                                               |
| <b>Scope 2</b>                           | Indirect emissions from purchased electricity                                                                                                                                                                                                                                                                                                                                  |
| <b>Scope 3</b>                           | Indirect value chain emissions                                                                                                                                                                                                                                                                                                                                                 |
| <b>WTT</b>                               | Well-to-tank emissions, i.e., those emissions associated with the production and distribution of fuels/electricity                                                                                                                                                                                                                                                             |

## Applicability and Limitations

### Restrictions and Intended Purpose

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Our mission is to enable organisations to succeed sustainably. We develop strategies, deliver roadmaps, and implement leading software solutions. Whether you're starting out or want to advance your leadership position, we can help no matter your sector or size.

Why us? Because we are fluent in both languages of sustainability and business. We are translators.

We've been building business value from sustainability for 15 years, for small or large businesses, family-owned and listed companies, or government agencies.

Our approach is science-based, pragmatic, and flexible.

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Our services range from ready-to-go packages to solutions tailored to your needs.

As a certified B Corp with an approved science-based target, we make sure we are walking the talk.

Our services cover:



## Product

- Life Cycle Assessment (LCA)
- Environmental Product Declarations (EPD)
- Carbon footprint
- Circular Economy (CE)
- Cradle to Cradle (C2C)
- Water footprint
- Packaging
- Independent reviews



## Carbon

- Carbon Footprint
- Scope 3 emissions
- Reduction strategy
- Carbon targets
- Science-based targets (SBT)
- Offsetting strategies
- Inventory verification



## Strategy

- Materiality assessment
- Green Star
- Sustainable Development Goals (SDGs)
- Foresighting & regenerative futures
- Roadmaps & action plans
- Responsible procurement & supply chain engagement



## Software & tools

- GaBi LCA software
- GaBi Envision
- Material Circularity Indicator (MCI)
- OpenLCA
- eTool
- Packaging calculator
- SoFi sustainability reporting



## Reporting & disclosures

- Task Force on Climate-related Financial Disclosures (TCFD)
- Global Reporting Initiative (GRI) & Integrated reporting (<IR>)
- B Corp
- Voluntary & compliance reporting
- CDP



## Communications

- Short form reports
- Case studies
- Infographics
- Workshops
- Storytelling
- Stakeholder engagement
- Sustainability reports



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