Department of Primary Industries and Regional Development

Forestry and Carbon








Fabiano Ximenes – DPIRD Forest Science – October 2024

Carbon in Australian Forests

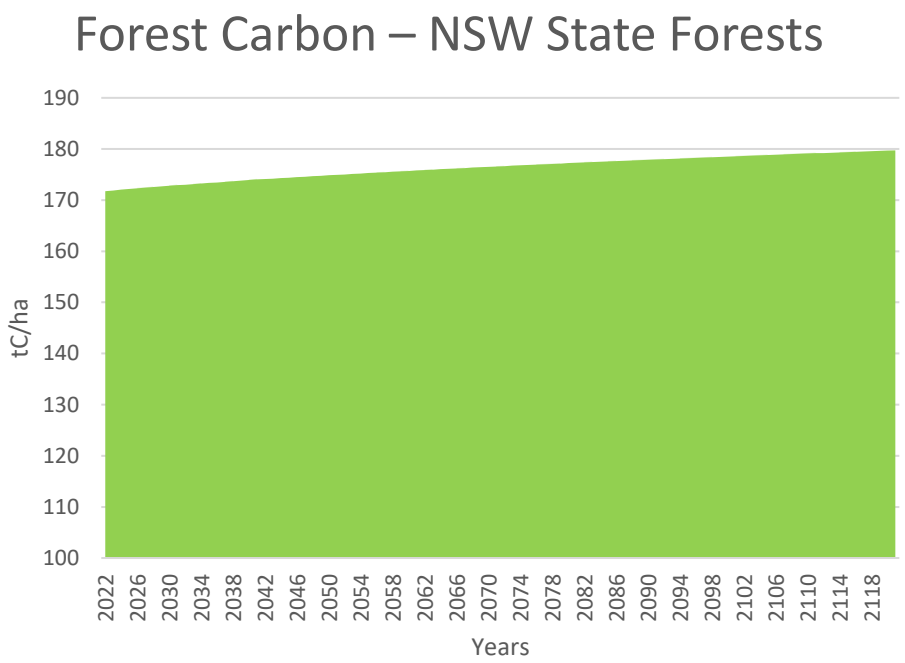
- Forests in Australia store 10.5 billion tonnes of carbon (excluding soil carbon), or 77 times Australia's annual net greenhouse gas emissions. Approximately 11.5 billion tonnes of carbon is estimated to be stored in forest soils in Australia.

- The rate of carbon sequestration in trees typically decreases with age. In tall dense eucalypt forests the growth rates decrease from around 6.4 tonnes C/ha/yr to 0.7 C/ha/yr per year as the trees age

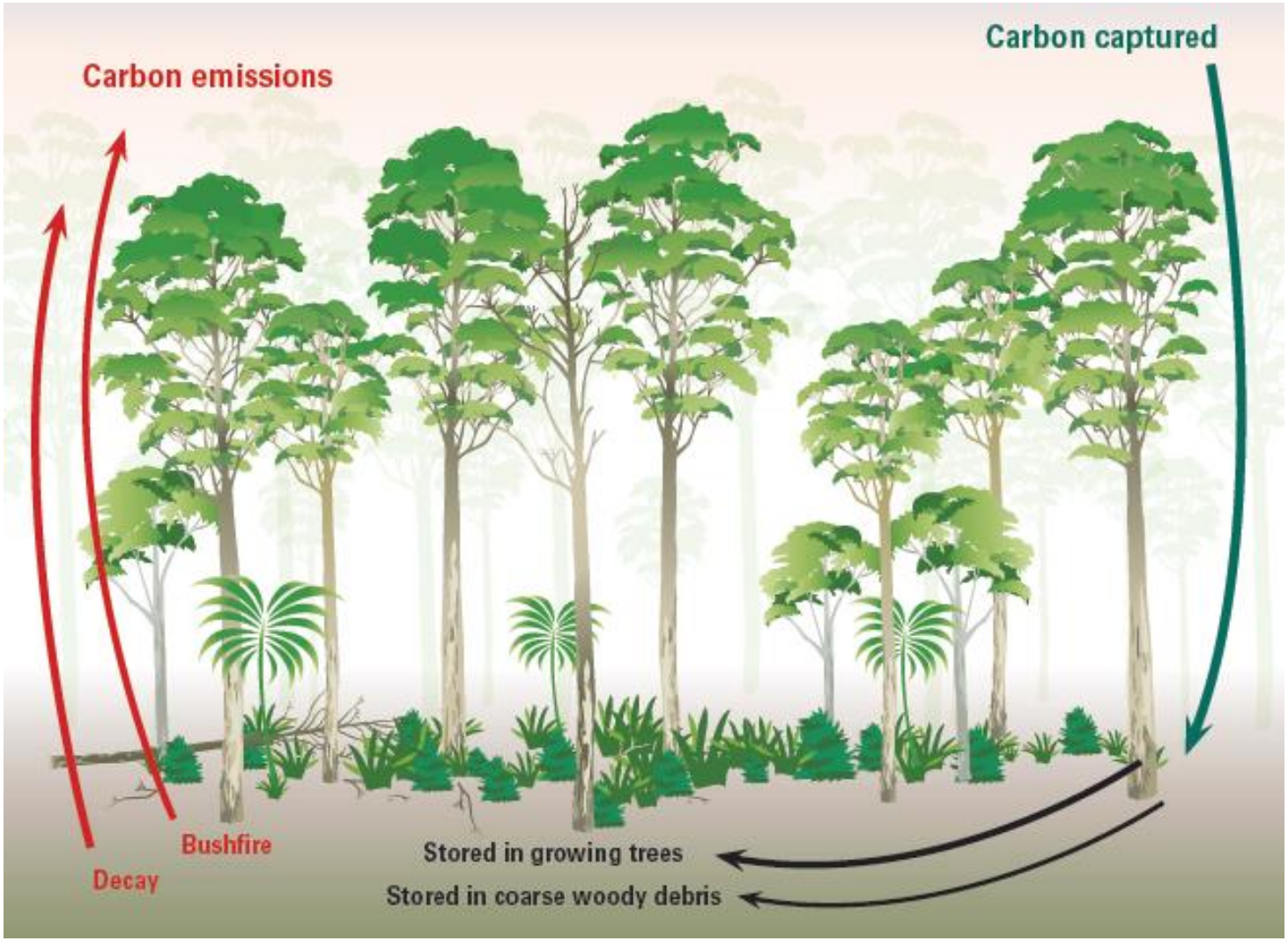
- Most of the biomass in trees is in the woody fraction (stem and branches) and roots. Bark and leaves typically account for 10–15% of the biomass in mature trees. Typically, 50% of the dry weight of trees is made up of carbon.

Montreal Protocol

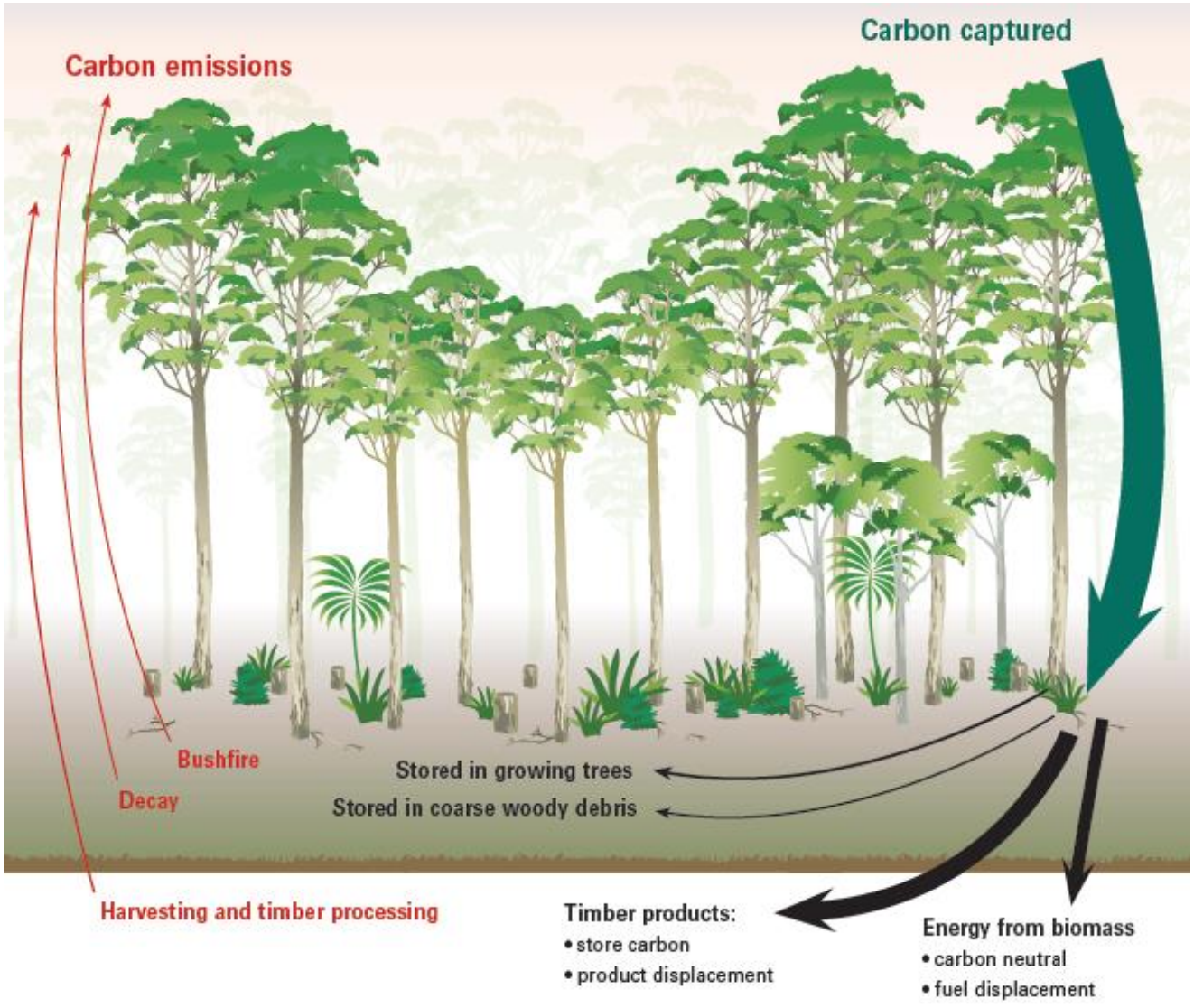
- Comprehensive set of criteria and indicators for forest conservation and sustainable management for use by their respective policy-makers (Santiago Declaration).
- Criteria and indicators used in Australia's State of the Forests report
- Criterion 5. Maintenance of forest contribution to global carbon cycles



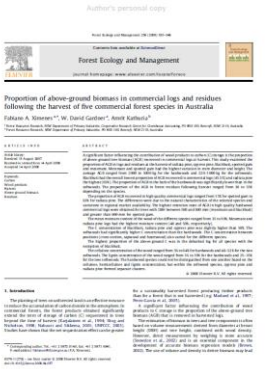
Carbon Stocks and Flows – Conservation Forests

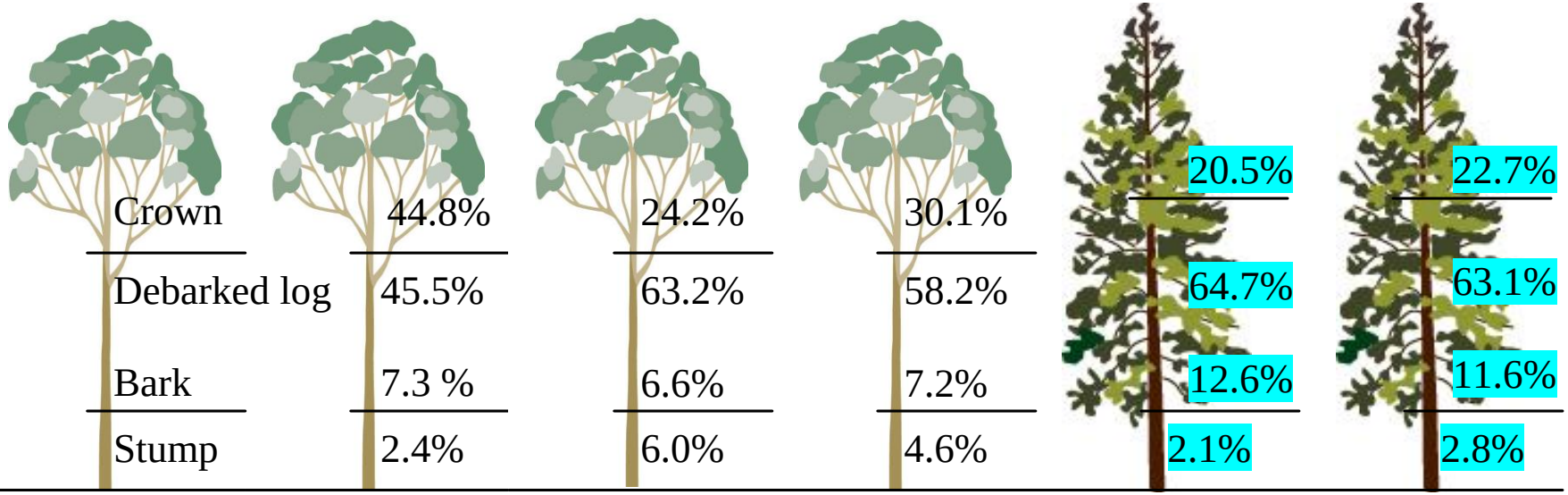


Carbon Stocks and Flows – Production Forests



Biomass distribution following harvest of key commercial species





Tree	Blackbutt	Messmate	Spotted gum	Radiata pine	Cypress pine

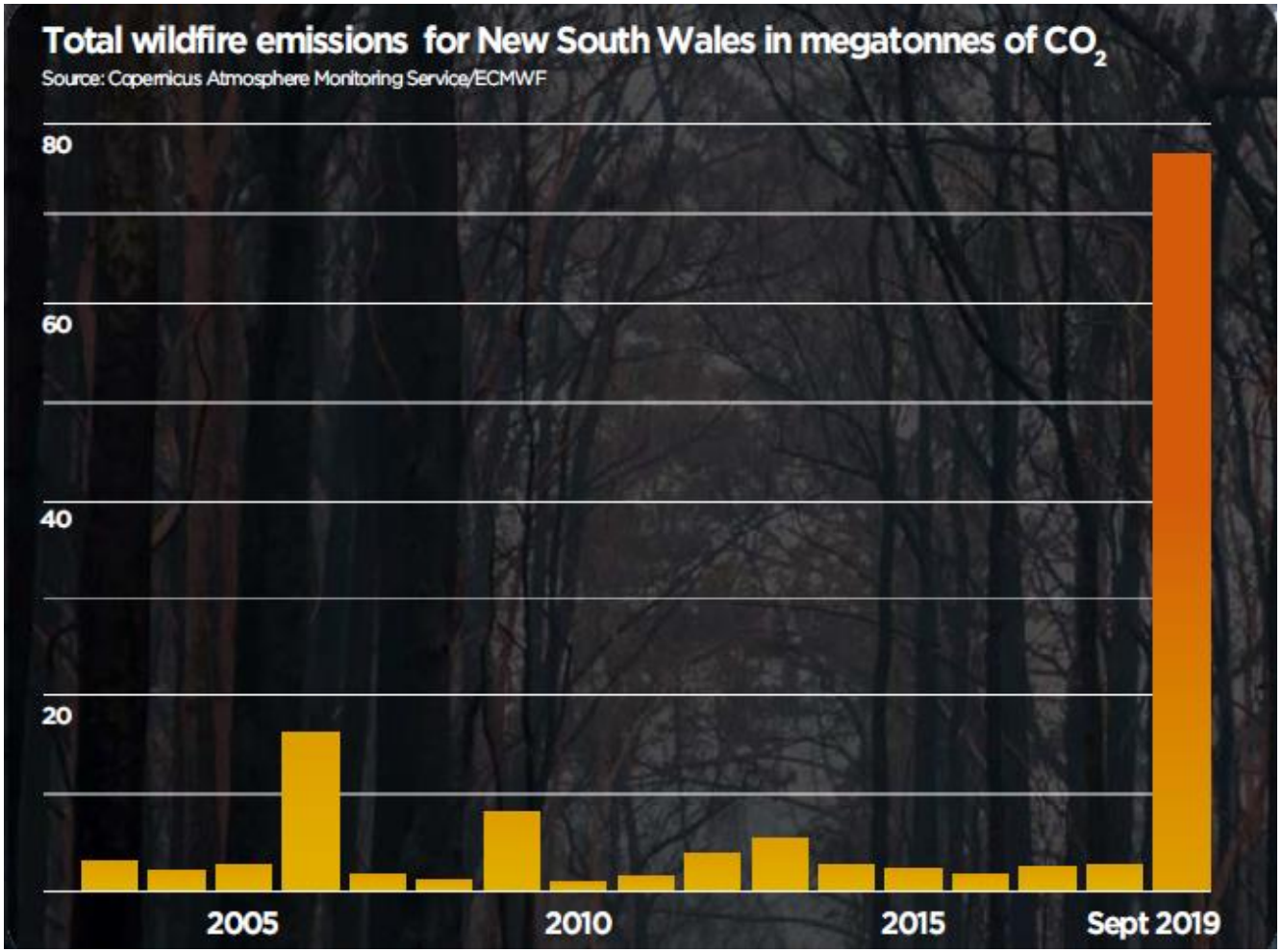
Carbon emissions in forests – key sources

- The large 2019 bushfires in Australia resulted in the emission of approx. 830 million tonnes CO_2-e

- Natural decay of biomass results in CO_2 emissions

- Use of heavy machinery for haulage leads to greenhouse emissions

Carbon emissions in forests – bushfires



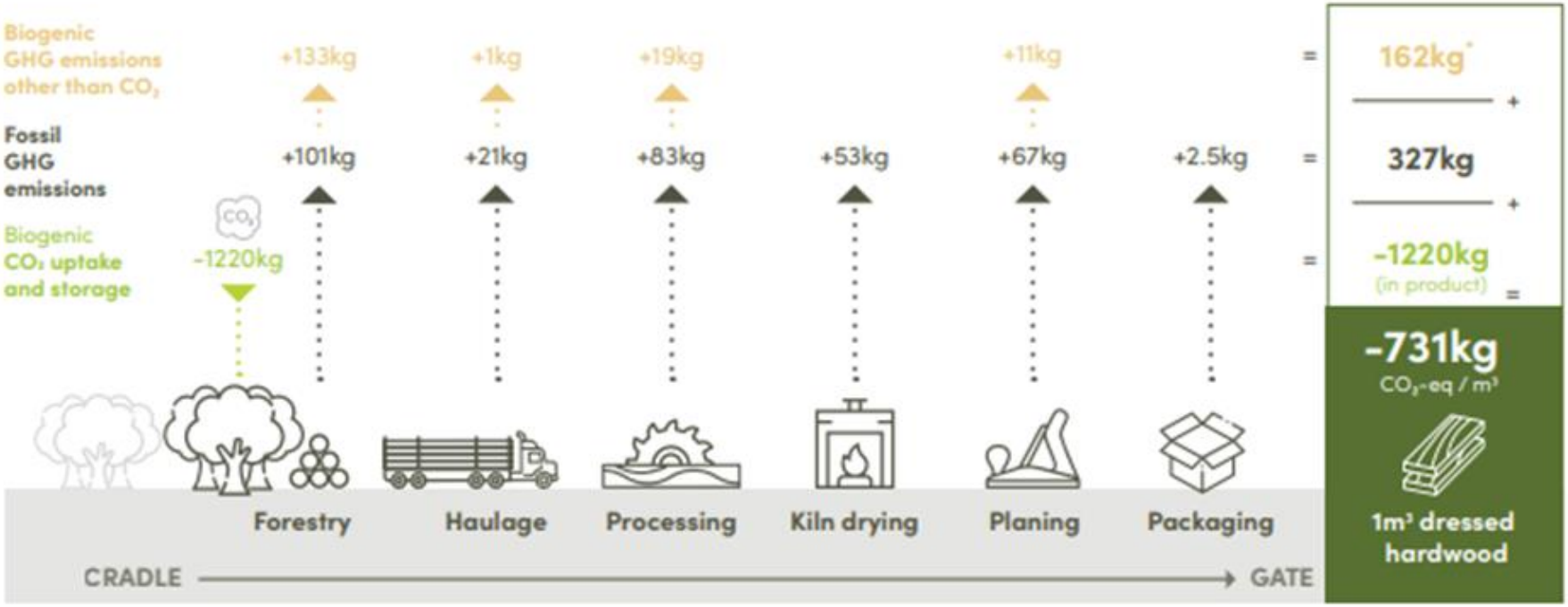
Carbon dynamics in forests and wood products

- Forest carbon (sequestration, emissions)
- Carbon in harvested wood products in service
- Carbon in harvested wood products in landfills
- Emission reductions due to displacement of greenhouse gas intensive products

Carbon in wood products in service

- Short, medium and long-lived products, with varying half-lives
- Each year a % of the carbon leaves the various pools
- Fate of carbon post-service: recycle/re-use; landfill or energy
- 97 million tonnes of carbon are stored in HWPs in service in Australia

Carbon footprint of 1m³ of kiln-dried dressed hardwood – Australian Sawn Hardwood EPD



Carbon footprint 1m³ of KD dressed hardwood

'Cradle to Gate' A1 – A3

*CO_2 biogenic emissions from production (e.g. from combustion and degradation of residues) are excluded as they are balanced by uptake during tree growth (i.e., balance to zero)

What happens to wood in landfills

- Current options: Recycle/reuse; landfill
- Wood waste to landfills in Australia: historically large – 1.5- 2 Mt / year
- Research to determine carbon dynamics from excavated samples and experimental bioreactors

Brisbane

Brisbane

Brisbane

Eastern Creek

ADVERTISERS FREES

THE AGE

TUESDAY 25 FEBRUARY 1992

Education Age
- Making time
- Fluency in French
- VCE geography
- Calculating VCE scores

PAGES 15 AND 16

Here soon: Computer living PLUS In defence of pasta

HOME AND EPICURE

Sports star of the year: The nominations

SPORT

Big boost for ailing clothing industry

PM in royal row

Relationship has changed: Keating

DIGEST

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Super funds open to fraud, laundering

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Crucial cricket meeting

Another blow for Carlton

THE STATE

Doctor on prescription charges

Surprise in Democrats' caucus

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Apathy on black deaths, says QC

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THE GREAT NZ CRICKET AMBUSH

The Sydney Morning Herald

Late Edition — Tuesday, February 25, 1992

CAN HE RESCUE AUSTRALIA?
OUR EXPERTS PREVIEW THE ECONOMIC STATEMENT

JAPAN
TO APOLOGISE OR NOT TO APOLOGISE

$1bn to boost roads, railway

Smiles, but PM upsets the monarchists

COLUMN 8

The Sydney Morning Herald

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46 years in landfill

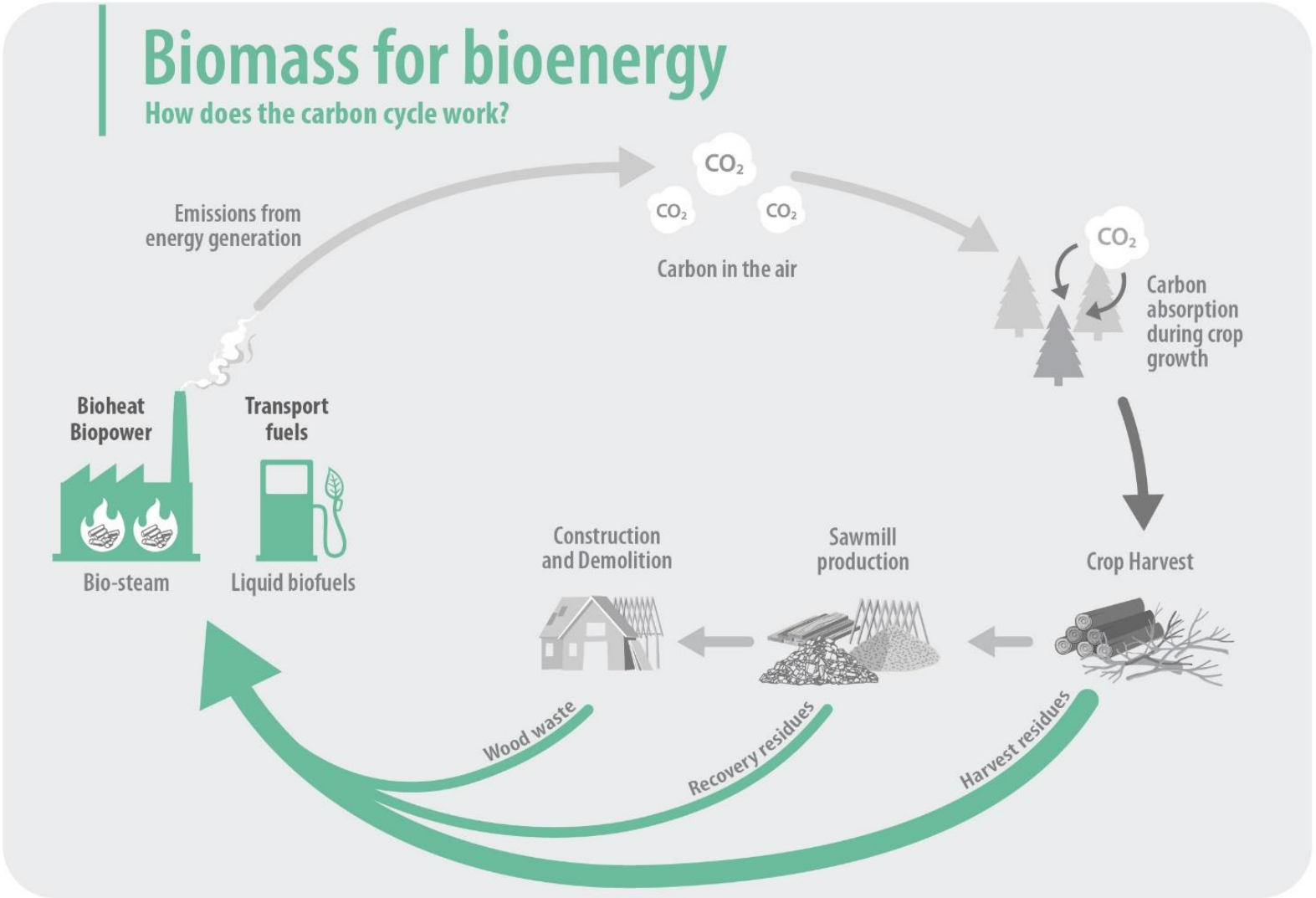
Carbon storage in HWP in landfills

- Only a maximum 1.4% of the carbon in HWPs is lost from Australian landfills

- Recycling / Landfill / Energy = **Good GHG outcome**

Bioenergy

Bioenergy plays a key role in all (IPCC) scenarios designed to limit global warming – the share of primary energy provided by bioenergy is predicted to increase from a median value of 10.3% in 2020 to 26.4% by 2050.



Cape Byron Power – Broadwater

- Power station – 100% biomass
- Next to a sugar mill – they use sugarcane bagasse and forestry residues
- Capacity – 30 MW
- Supply power to the mill and the grid

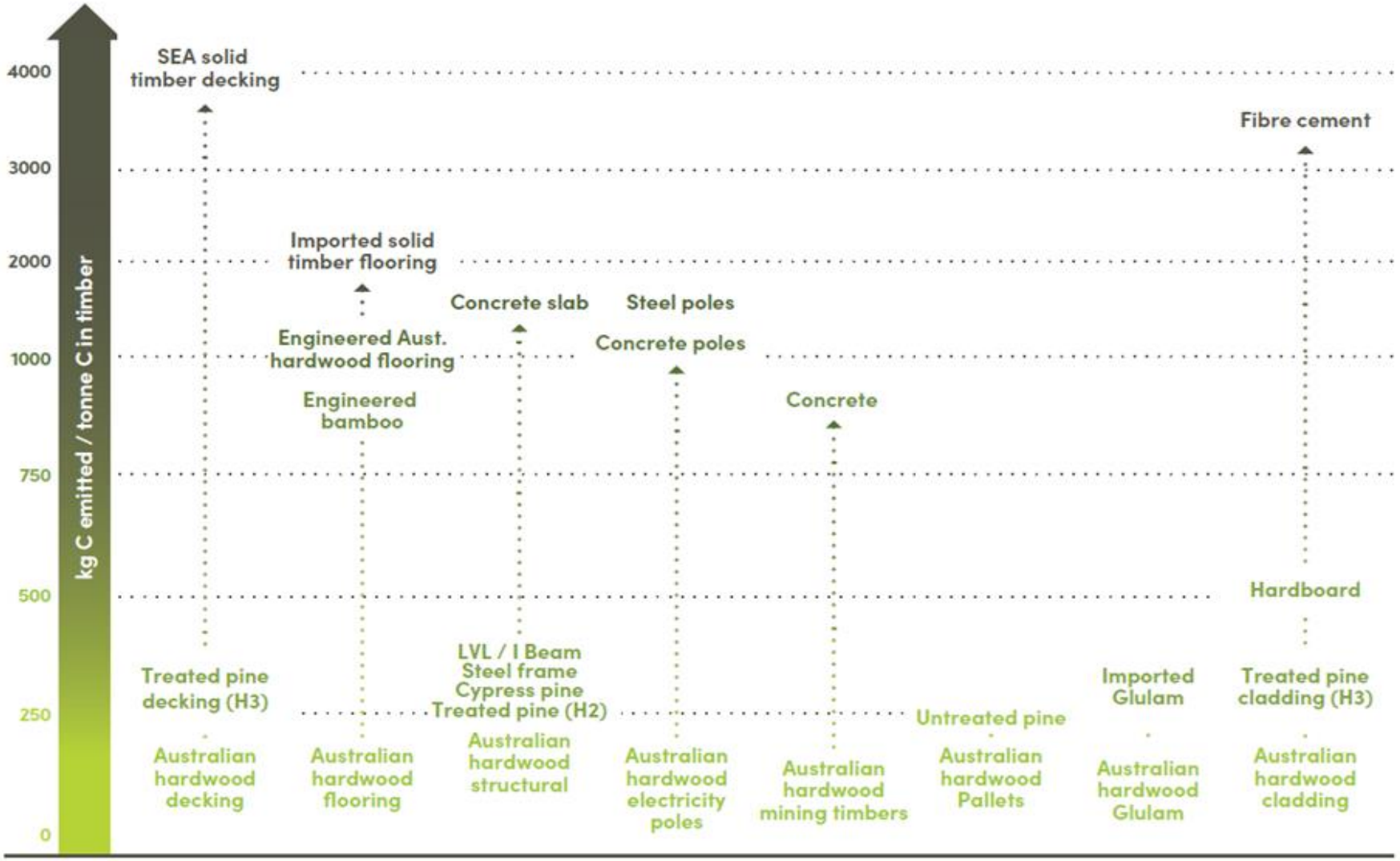
Product Substitution

- Wood: renewable material
- Wood manufacture: low-energy intensity
- Processing residues used to generate energy
- Physical carbon storage

Alternatives: non-wood and imported wood

- Non-renewable
- High emission intensity
- No carbon storage

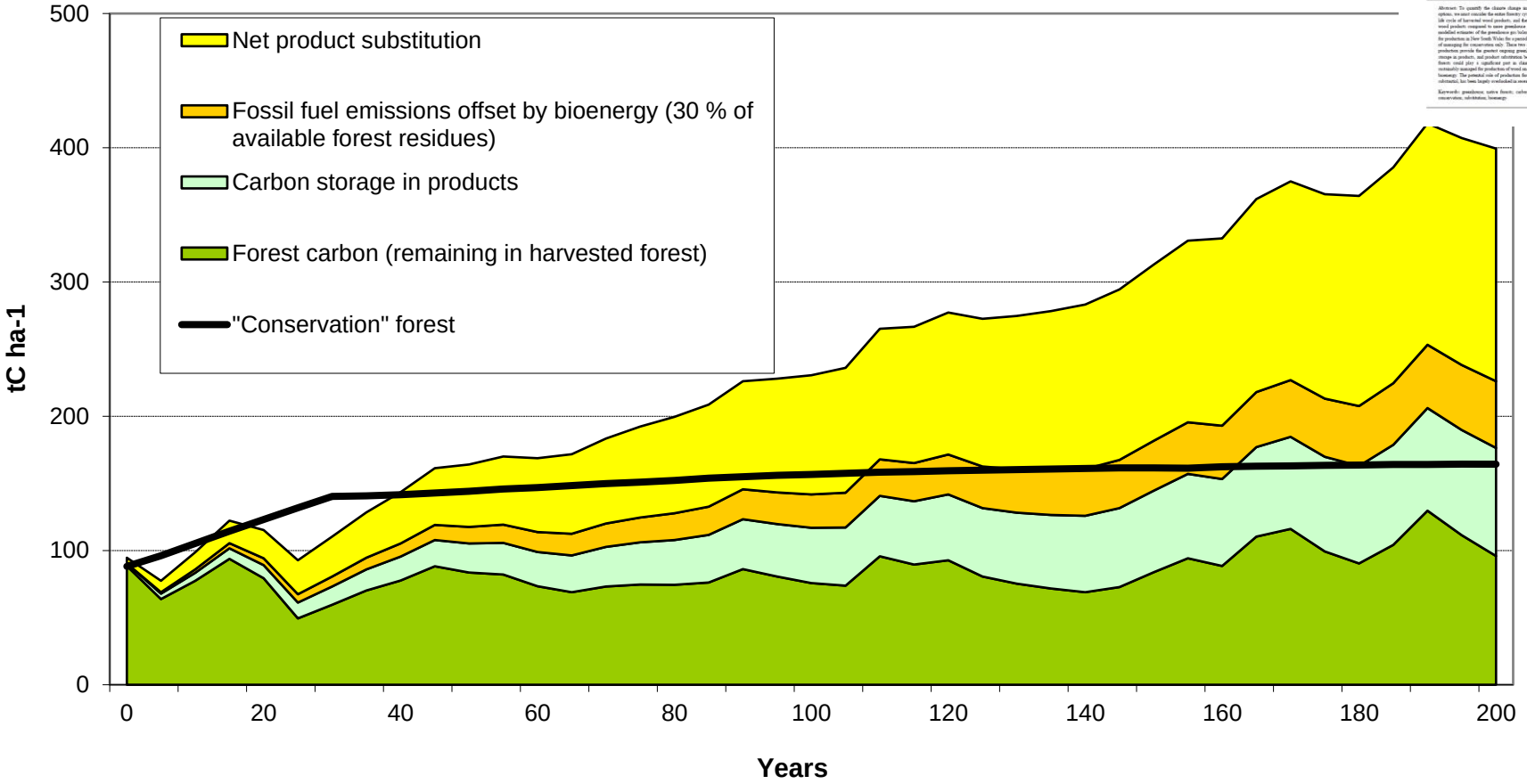
Metric: How much C is saved for each t C in wood products



The emission footprint for Australian hardwood harvested wood product and their likely replacement products

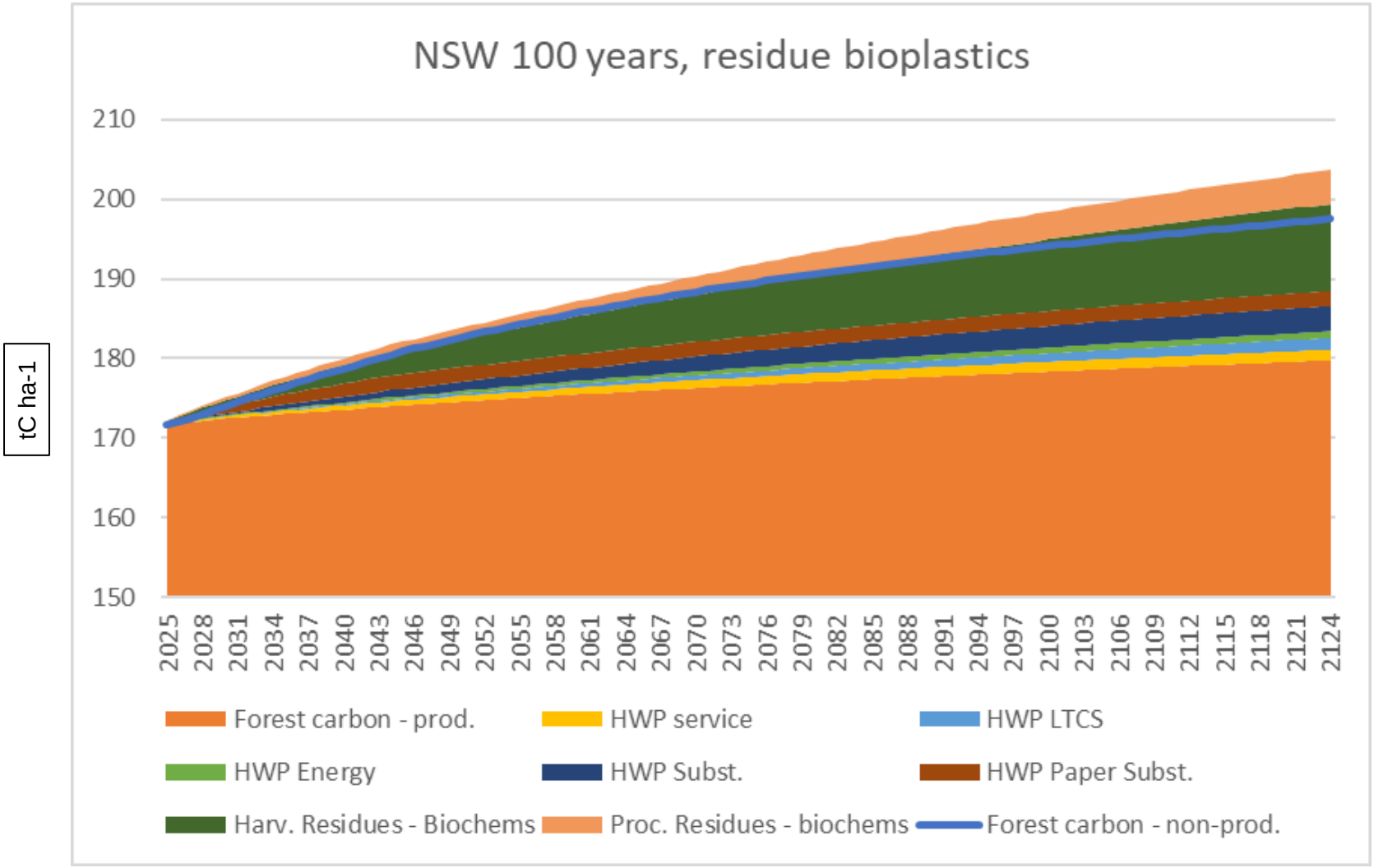
Reference: Ximenes et al. (2016)
Carbon stocks and flows in native forests and harvested wood products in SE Australia. PNC285-1112.
Prepared for Forest and Wood Products Australia

Carbon Balance NSW North Coast forests



Others studies have arrived at different conclusions. The differences in conclusions reflect to a large extent the scope of the analyses, the adequacy of data used, localised conditions and the accounting framework used.

Carbon balance – native hardwood State Forests



Sustainable Bioproducts

- Projected rise of industrial roundwood production; 19 to 53% increase by 2065
- Novel biofuels: Renewable diesel, Sustainable Aviation Fuel
- Wood for textile fibres: Market estimated to be 146 Mt by 2030; subst. benefit of 2.8 kg C / kg C
- Wood-based chemicals, packaging and furniture: between 1.0 to 1.5 kg C / kg C in wood
- Bioplastics currently only 1% of total annual production (335 Mt)

*FAO report (*https://www.fao.org/documents/card/en/c/cb7274en/)

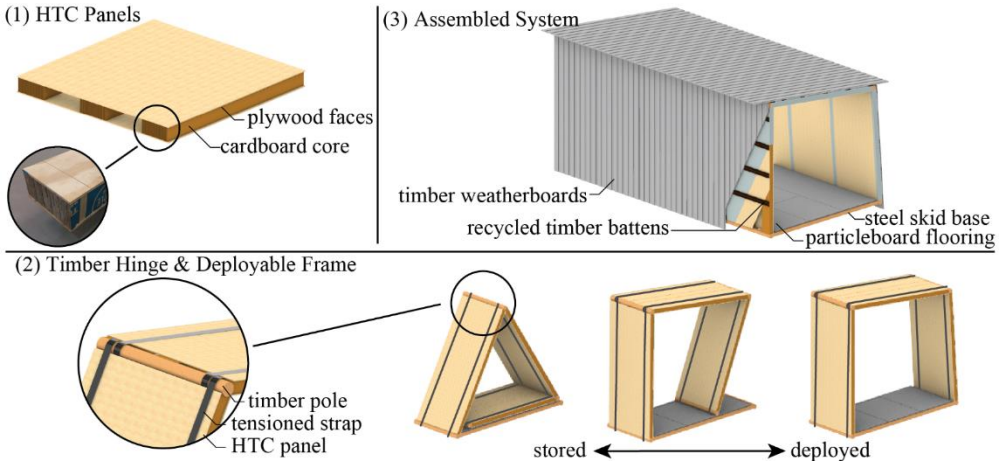
Opportunities for carbon abatement

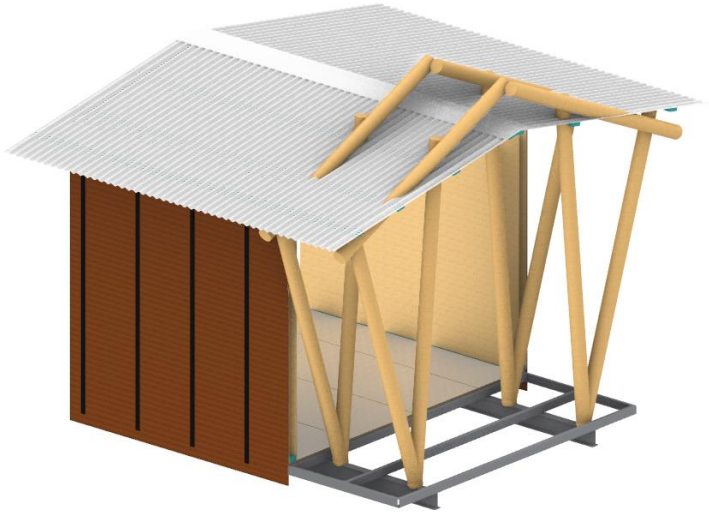
- *Residue management to assist hard to abate sectors:*
  - Biochar in steel manufacture (https://biocarbon.com.au)
  - Renewable electricity (https://www.capebyronpower.com/)
  - Green chemicals (https://circa-group.com/)
  - Sustainable Aviation Fuel (https://www.licella.com/solutions/biomass/
  - Engineered wood products (https://weathertex.com.au/)

- *Use of timber in buildings*
  - CEFC Timber Program (https://www.cefc.com.au/insights/investment-insights/cefc-timber-building-program/)
  - Emergency Housing

Low-Carbon and Bio-Based Emergency Housing System for Northern NSW

- Increasing need for temporary housing in Australia
- Current reliance on imported, flat-packed steel systems
- Opportunity to design a cheaper, locally sourced and climate-friendly bio-based equivalent





IPCC Special report on climate change and land Summary for Policy Makers 2019

- “Sustainable forest management aimed at providing timber, fibre, biomass, non timber resources and other ecosystem functions and services, can lower GHG emissions and can contribute to adaptation”.

- “Sustainable forest management can maintain or enhance forest carbon stocks, and can maintain forest carbon sinks, including by transferring carbon to wood products, thus addressing the issue of sink saturation. Where wood carbon is transferred to harvested wood products, these can store carbon over the long-term and can substitute for emissions-intensive materials reducing emissions in other sectors”

ACCU Schemes: Method EOIs submitted

Greening Construction with Sustainable Wood	The proposed method will incentivise project developers of large-scale buildings to use sustainable wood products as an alternative to the use of other more emissions-intensive building materials. Projects will achieve lower embodied carbon by replacing non-renewable construction materials (reinforced steel, concrete, etc.) with increased use of timber products through innovative Mass Timber Construction (MTC) designs.	Australian Forest Product Association
Enhancing Native Forest Resilience through Active and Adaptive Management	There is a suite of ecologically sustainable forest management activities that can generate eligible carbon abatement, while also enhancing landscape resilience and providing a broader range of co-benefits. The proposed method would apply a broad, holistic approach to active and adaptive management of native forests across all tenures.	Forestry Australia
Improved Native Forest Management in Multiple-use Public Native Forests (INFM)	The proposed INFM method would incentivise projects involving the cessation or deferral of harvesting in multiple-use public native forests, to increase removals in, and avoiding emissions from, relevant forest-related carbon pools.	NSW Dept. of Climate Change, Energy and Environment

Plus methods on biochar, liquid biofuels, bamboo and hemp…

https://www.dcceew.gov.au/climate-change/emissions-reduction/accu-scheme/assurance-committee/method-development-tracker

Avoided harvest method –Potential Issues

- The ERAC needs to identify priorities to progress based on key criteria
- Net climate benefit (scale of abatement)
- Complexity (including):
    - Additionality – challenging to demonstrate
    - Inclusiveness – only applies to State Forests
    - International leakage
    - Opportunity cost

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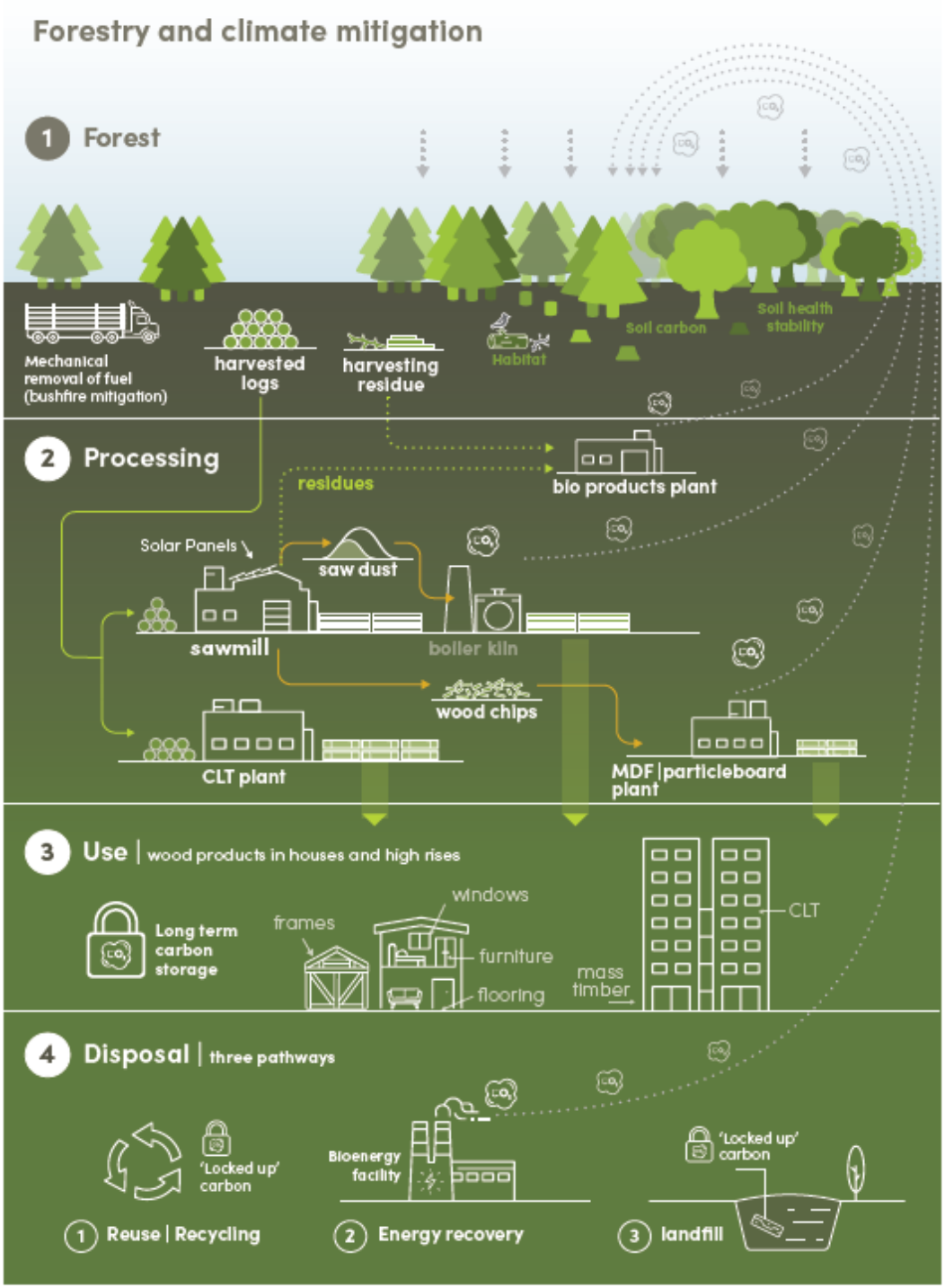

How can Australian forestry help with climate mitigation?

https://fwpa.com.au/tool/fwpa-carbon-guides-social-media-assets/

Department of Primary Industries and Regional Development

Thank You




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