Department of Primary Industries and Regional Development

Residues for Carbon Mitigation: a Potential New ACCU Methodology

Fabiano Ximenes – DPIRD Forest Science – Forestry Australia Symposium 2025

How can residues assist with climate mitigation

- Residues left in the forest burn or decay over time
- Use of a % of residues for bioenergy typically displaces GHG emitting fossil fuels
- Use of residues for carbon storage applications (e.g. biochar; engineered wood products) extends the carbon sequestration benefits of trees
- Economics is challenging – C revenue may make marginal propositions viable

Forestry residues

- Each year – large volumes of residues generated

Estimated forest harvest residue generation

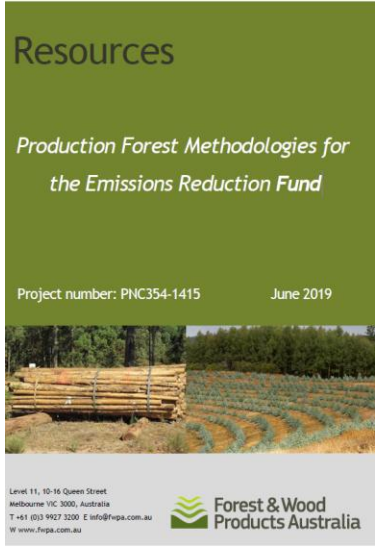


Table 7: Annual volume of residues from native forests and hardwood plantations

State	Extractable residues ('000 t green tonnes)	Non-extractable residues ('000 t green tonnes)*	Pulp logs from Native forest only ('000 t green tonnes)
NSW	623	415	290
VIC	558	239	788
TAS	392	168	640
QLD	316	79	0
WA	229	153	126
Total	2,118	1,054	1,843
* This includes bark / stump/ smaller parts of crown material in the forest retained			
Sources: ABARES 2015; pers. comm. by Fabiano Ximenes			

From: https://fwpa.com.au/report/production-forest-methodologies-for-the-emissions-reduction-fund/

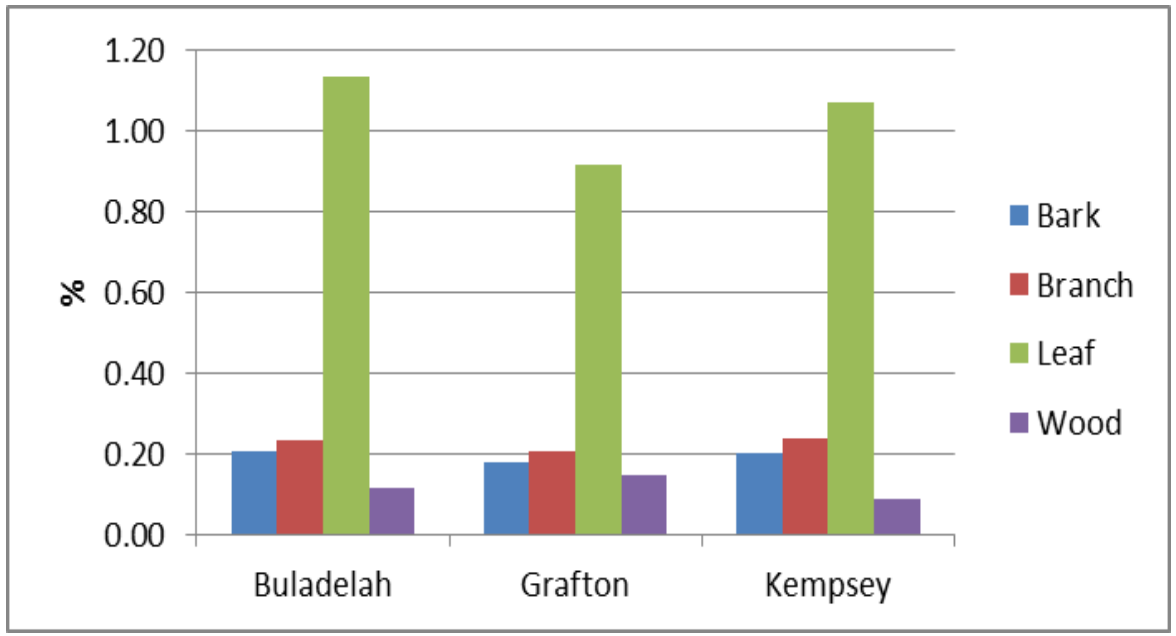
Table 8: Estimate of available waste ('000 t/year) from processing sawlogs from native forests and hardwood plantations

State	Green waste ('000 green tonnes)	Dry waste (12% moisture, '000 tonnes)
NSW	354	38
VIC	200	61
TAS	141	35
QLD	99	25
WA	95	24
Total	**889**	**183**
Assumes approximately 25% of waste generated is already committed to stable, higher-value markets		

Harvest residues

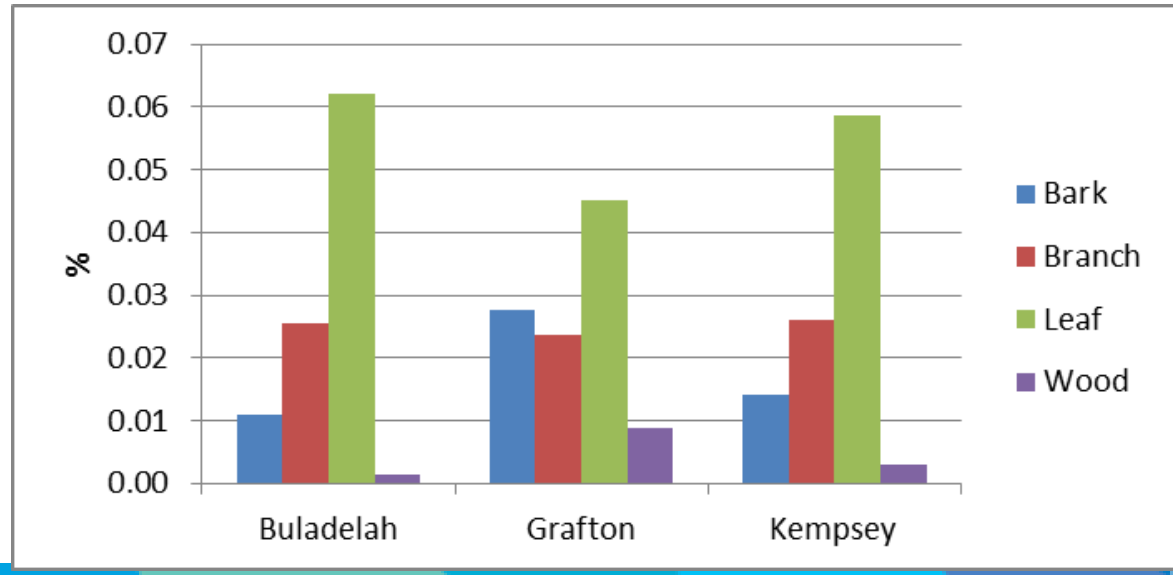
- Each year – large volumes of residues generated
- However – often located in areas away from where key markets are
- Increased fire risks / operational costs
- Economics challenging primarily due to transport costs
- Linking with hard to abate sectors of the economy
- Identified as a priority area for development

Impact on future tree growth



Mean nitrogen concentration in key biomass fractions

Mean phosphorus concentration in key biomass fractions



Key action: retain nutrient rich tree components in the forest

Impact of residue use on biodiversity

* Important biological resource
  - Ecosystem processes (nutrient cycling, soil formation)
  - Critical habitat for fauna

Antechinus

Goanna

Bandicoot

Echidna

Key action: retain enough large residues to maintain biodiversity values

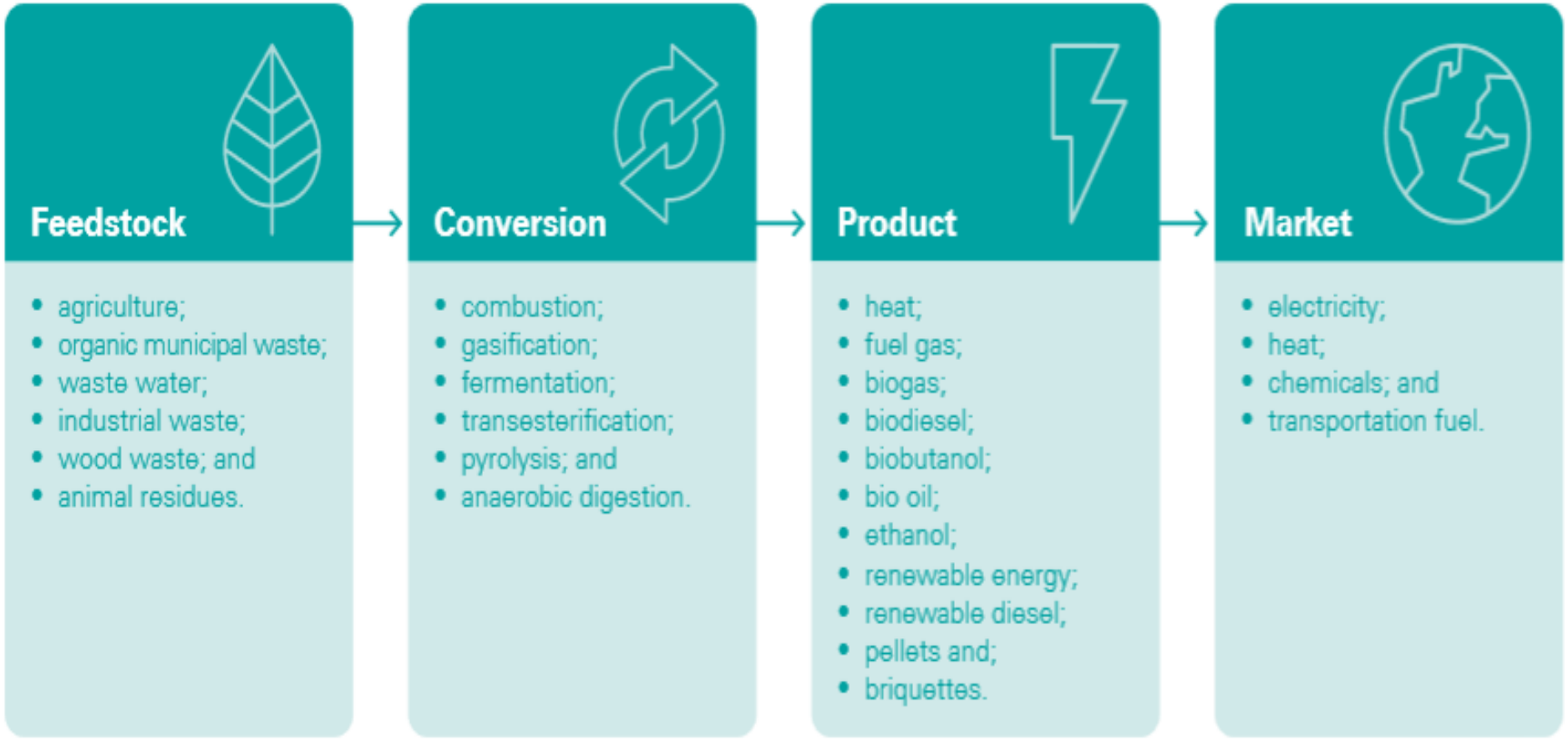
Challenge: Radiata pine harvest residues

How to remove residues in a cost effective way

Consider:

- Machinery options (chipper, biobaler); specialised crews?
- Residue aggregation, distance to markets, biomass price
- Retention of biomass on site for some time – moisture reduction –lower transport costs
- Matching biomass with end market…

Biomass conversion pathways



Plus green hydrogen, biochar, bio-chemicals, nano-cellulose...

Biomass Markets

Cape Byron Power – Broadwater

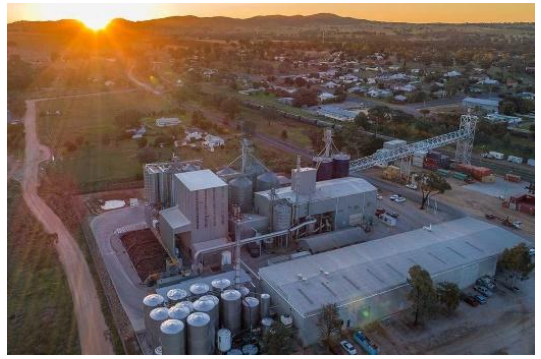
- Power station – 100% biomass
- Next to a sugar mill – they use sugarcane bagasse and forestry residues
- Capacity – 30 MW
- Supply power to the mill and the grid

MSM Milling– Manildra

- Biomass Fuel Switch Project involves replacing current LPG fuelled boilers with a 5MW biomass fuelled boiler using locally sourced timber residue (cypress pine) as a fuel source (within 120 km from the facility).

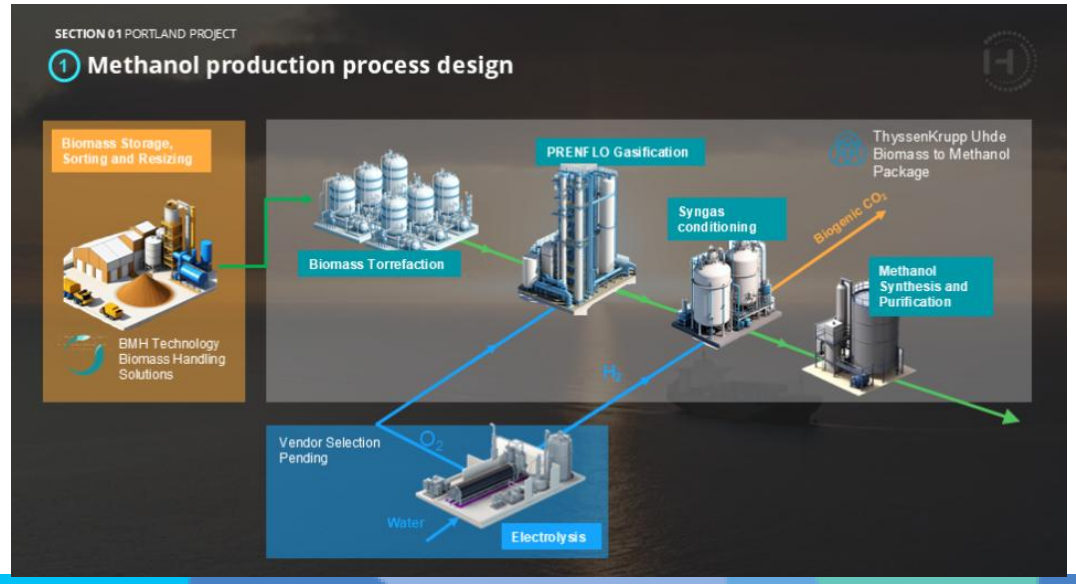
- Project saves around 4,000 tCO_2-e per annum and over 80,000 tCO_2-e for the project life.

https://arena.gov.au/projects/msm-milling-biomass-fuel-switch/



Liquid biofuels – HMAR

- Methanol production; for shipping or SAF (methanol to Jet)
- Gasification process – syngas converted to methanol
- Portland plant: near GT; target 300kt/year



- https://www.hamrenergy.com/

OneFortyOne and HAMR's MOU to supply biomass for renewable methanol

24 September 2025

OneFortyOne and HAMR Energy have entered into a Memorandum of Understanding to collaborate on the supply of sustainable biomass for renewable methanol production in Australia and New Zealand. Source: Timberbiz

The MoU marks a significant step forward in the development of HAMR Energy's flagship Portland Renewable Fuels Project (PRF Project) in Victoria. T

he project will produce up to 300,000 tonnes per annum of renewable methanol, derived from forestry residue biomass and green hydrogen, which can be used to fuel planes and ships, helping decarbonise hard-to-abate transport.

The partnership aligns with the Australian Government's Cleaner Fuels Program, announced this week, which will provide $1.1 billion to support the supply of low carbon liquid fuels (LCLF).

"Our MoU with OneFortyOne is another important milestone as we continue to develop our pipeline of LCLF projects and finalise our Series A fundraise," David Stribley, Co-Founder of HAMR Energy, said.

"We have MoUs in place to supply all the feedstock for the PRF Project and recently completed Pre-FEED with global chemical design company ThyssenKrupp UHDE, positioning us to move quickly through the next phase of project development. We are looking forward to working with OneFortyOne, our other project partners, state and federal governments and off-takers so that locally sourced forestry residues are soon fuelling Australian aviation and shipping."

Liquid Biofuels – Licella

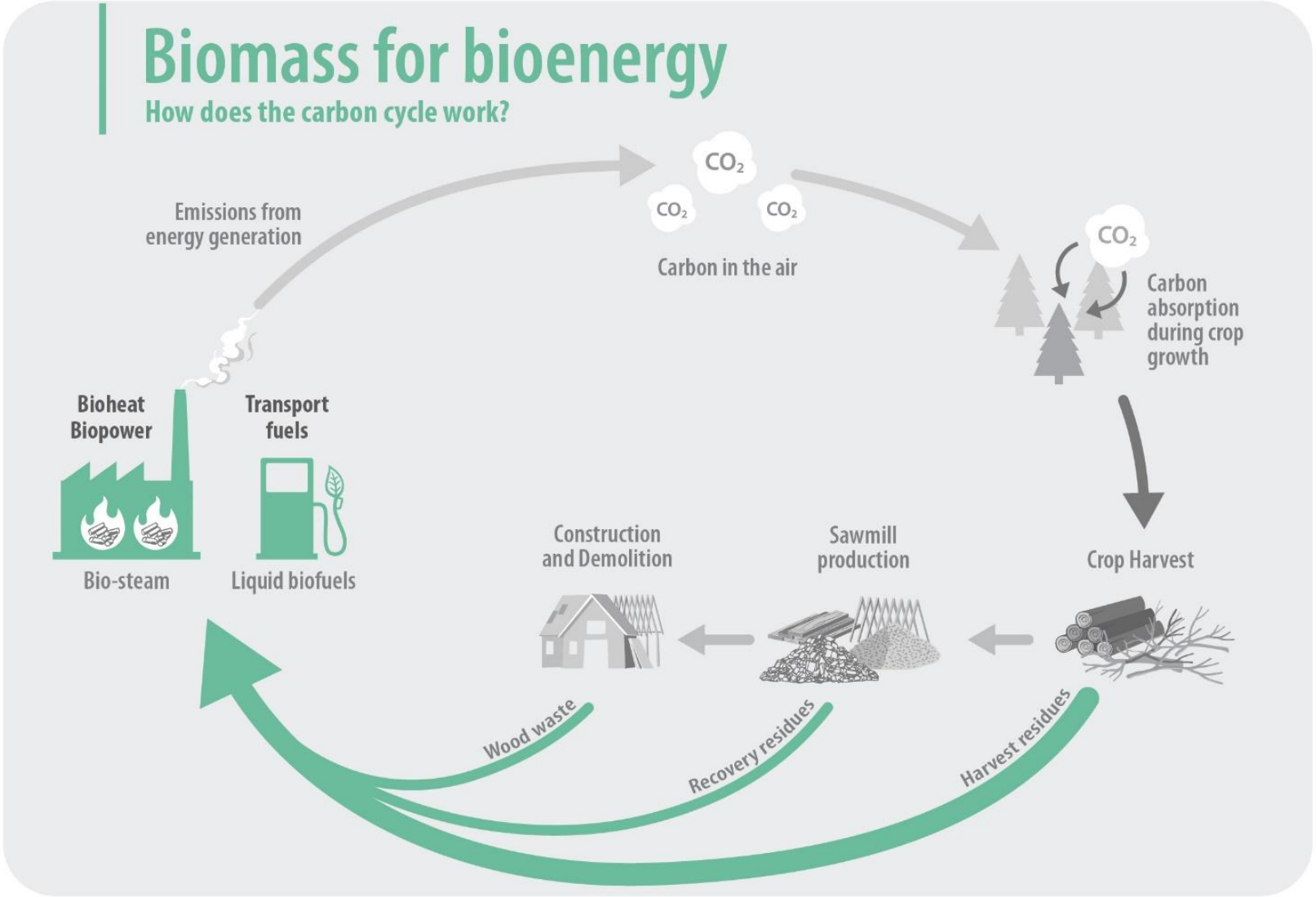
- Liquid biofuels for a range of applications
- Catalytic hydrothermal liquefaction process
- Biomass conversion – forestry and ag feedstocks
- Lower temperatures, higher yields
- Conversion to SAF

Arbios Biotech announces construction complete of its biomass to bio-oil facility at Prince George
Arbios announce completion of its biomass to bio-oil facility in Prince George, Canada. Using Licella's Cat-HTR technology, it is the largest hydrothermal liquefaction in the world.

Licella announce collaboration with Shell Catalysts & Technologies to develop a global, low-carbon, biomass-to-biofuels commercial solution
With a strong focus on sustainable aviation fuel (SAF), the collaboration is developing a new, economically attractive pathway to produce SAF through an integrated biomass-to-advanced biofuels commercial solution.

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.



Engineered wood products

- Mass timber market
- Small diameter logs
- Guaranteed long-term carbon storage
- Displacement of materials with a large GHG footprint
- Small proportion of current market
- Technology evolving fast

NeXTimber: Cross laminated timber & glue laminated timber

CLT & GLT

NeXTimber® by Timberlink manufactures Australian made Engineered Wood Products (EWP) and provides mass timber building solutions with Cross Laminated Timber (CLT) panels and Glue Laminated Timber (GLT) members.

Made from sustainably managed Australian plantation pine, NeXTimber CLT panels and GLT members offer long term carbon capture and storage like traditional timber but with the strength, uniformity and technical predictability to support increasingly demanding applications such as hybrid and tall wood buildings.

Whilst NeXTimber does not offer structural engineering design services or certification, our locally based technical team can provide support to help optimise the use of NeXTimber products in your project and help to achieve cost, time and environmental efficiencies.

STRONG FOUNDATIONS

XLAM is a Hyne Group Company

Hyne Group is a collective of integrated sustainable wood products manufacturers. Our sister business, Hyne Timber, is one of Australia's largest producers of structural timber. XLAM facilities are strategically located to receive an unrestricted flow of raw materials from Hyne Group mills, ensuring we can offer a secure, reliable supply of product, delivering greater project certainty.

The Hyne Group is backed by James Jones & Sons, one of the world's largest wood products manufacturers with a network spanning Europe, North America and Australasia. XLAM benefits from the manufacturing know-how and clever production innovations shared across the network.

LEARN MORE ABOUT HYNE GROUP

Timbers Plantation Oak Glacial Oak IronAsh Australian Oak

MASSLAM ASH

MASSLAM – the industry-leading mass timber solution.

A RANGE OF GLUE-LAMINATED TIMBER SYSTEMS INCLUDING HARDWOOD BEAMS, COLUMNS, FLOORS AND ROOF STRUCTURES

MASSLAM is a glue-laminated (GLT) mass engineered timber solution from Australian Sustainable Hardwoods (ASH). Accelerating the use of mass timber in Australia is a known pathway to significantly assist with decarbonising the construction sector and contribute to Australia's goal of achieving net zero by 2050. Additional benefits including construction speed, sustainability and occupant well-being solidify MASSLAM as the modern construction choice for architects, specifiers and builders alike.

MASSLAM utilises uniquely attractive Australian timbers like Australian Oak (Tasmanian Oak) and Plantation Oak, chosen because they have some of the best strength-to-weight ratios of any timber species worldwide. ASH's glulam timber systems (including columns, beams, and floors) are manufactured at our Australian-owned timber plant in Heyfield, Victoria.

Our mass timber solutions are designed and manufactured for assembly by our

A unique plantation to project approach with a restless curiosity that powers continual innovation.

Image: Oslotre Architects.

Cusp is the future of construction.

Engineered value-added timber products sourced from sustainable hardwood plantations for mass timber construction of buildings and homes.

Offering a negative carbon footprint to shape a more sustainable future for the building and housing industry, and doing our part in combating climate change.

Our appetite for smarter solutions means we are forever on future's cusp. As it moves relentlessly forward, so do we.

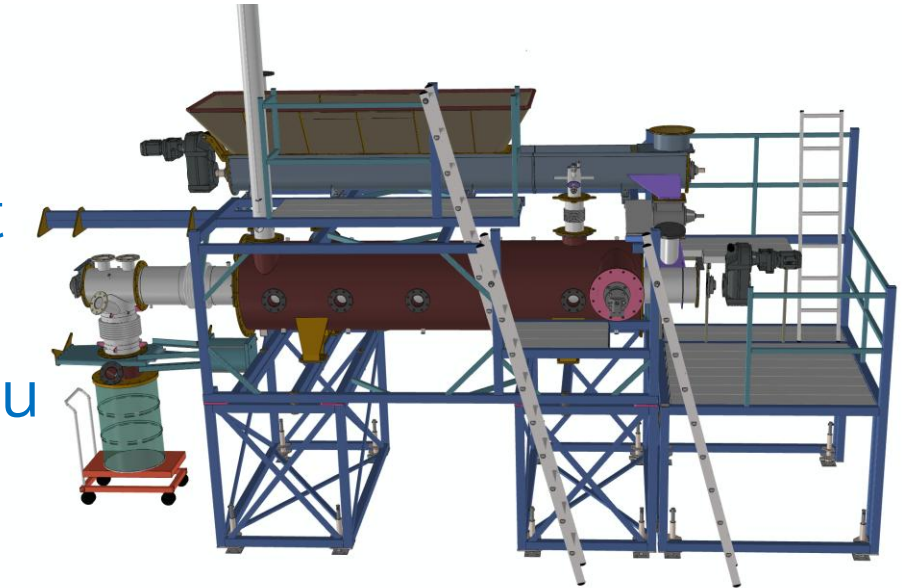
Biochar

- Pyrolysis plant, next to sawmill
- Char product used to reduce emissions in steel manufacture (replacing coal)
- Wood vinegar – sold as soil additive

https://biocarbon.com.au/

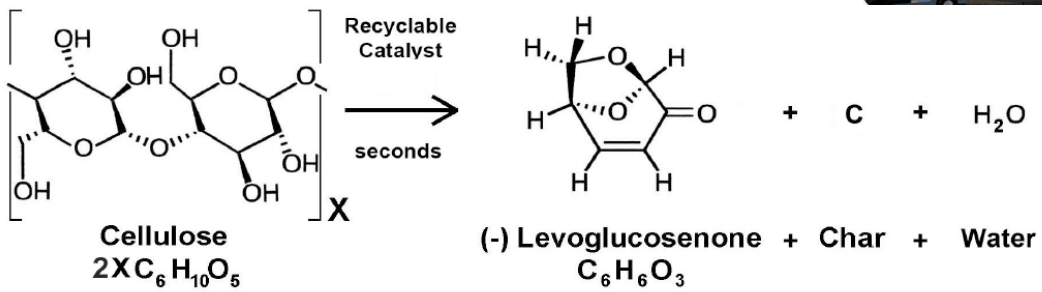
Mobile biochar unit

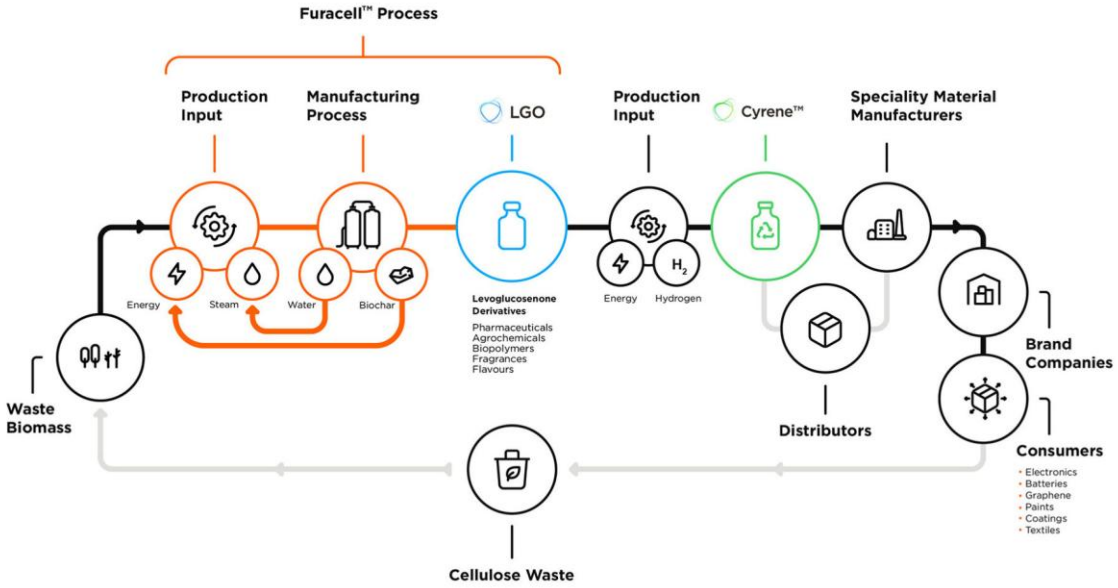
Biochar application in situ



Circa – green chemicals

- Established in 2017, with Norske Skog (Tasmania)
- Green solvent – Cyrene
- Annual output – 8-15 tonnes
- Biochar is a by-product
- Expansion plans, wide range of pharmaceuticals, etc…





National carbon market: the ACCU Scheme

- Participants run projects that reduce or avoid greenhouse emissions (emissions avoidance) or remove and store carbon from the atmosphere (sequestration) generating ACCUs.
- One ACCU represents one tonne of CO_2-e that would have otherwise been released into the atmosphere.
- ACCUs can be sold on the secondary market or to the Australian Government; value based on supply and demand
- Buyers also include Australia's highest emitting facilities under the Safeguard Mechanism.
- ACCU Methods set the requirements and rules for projects

Rationale for a carbon method

- A range of current and previous methods based on biomass to displace a fossil fuel alternative
- “Industrial and Commercial Emissions Reduction”; “Industrial Equipment Upgrades” and “Facilities” Methods: Opportunity for plantation harvest and processing residues
- “Aviation” and “Land and Sea Transport” Methods: no restriction of biomass type; however expired in March 2025:
- Opportunities for broader industry participation
- Opportunities for a wide range of biomass markets

Residues Method – key principles

- Facility level – Proponent is the Processor; Forest Owner benefits from new market, reducing fuel loads; costs, etc…
- Plantations and native forests
- Abatement from carbon storage and/or emissions avoidance
- Need to discount temporary carbon storage in the forest
- Range of end uses possible
- Meaningful abatement

Carbon benefits – native forest residues

Emissions avoidance *(tC/tC in residues)*		
Industrial heat	0.5	
Electricity	0.58	
Liquid biofuels	0.92	
Biochemicals	2	
	Emissions avoidance *(tC/tC in residues)*	**Carbon storage** *(HL, years)*
CLT	1.0	35
Biochar	0.5	250

e.g. – if 10,000 tonnes of residues used for liquid biofuel production = Abatement of around 10,000 tonnes CO2-e

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- Facility level – Proponent is the Processor; Forest Owner benefits from new market, reducing fuel loads; costs, etc…
- Plantations and native forests
- Abatement from carbon storage and/or emissions avoidance
- Need to discount temporary carbon storage in the forest
- Range of end uses possible
- Meaningful abatement
- Compliance with offset integrity standards

Offset Integrity Standards

Offset Integrity Standards	Comments
Additional	Additionality can be assessed as regulatory / financial / new or better than industry average. "At the method-level, additionality tests should be applied on the basis of evidence and observable common practice, and not require statements of intent or financial viability by project proponent".
Measurable and verifiable	Several options including direct measurement / modelling / factors developed previously.
Eligible carbon abatement	"Abatement must be capable of being used to meet Australia's mitigation targets under the Kyoto Protocol and Paris Agreement."
Evidence-based	"Where initial research was industry-led, it could be worth commissioning an independent review of that research." "Identifying gaps and whether further research would be needed to provide clear and convincing evidence." and "The level of support for the assertions made by technical experts and industry."
Conservative	"Does the level of conservatism reflects the likelihood of direct and indirect leakage from the method?"
Other criteria	
Permanence	Typically choice between 25 or 100 year periods for sequestration projects
Double-counting risk	For new forestry abatement projects – is there potential double-counting risk with existing plantation forestry method?
Likely industry uptake	Directly linked with considerations on industry related criteria below
Abatement potential	Distinguish between carbon sequestration/storage and substitution-based approaches
Geographical coverage	Limited coverage may still be ok if associated with large abatement potential

Residues Method – compliance

- *Additional*:

  * Limited current use; greater than current baseline; diversion to a new product with higher abatement potential

  * Not prescriptive; default factors regularly updated; could specify ineligible applications

- *Eligible abatement:*

  * Applied to all forests that can be legally harvested and wood processing facilities

  * Residues can be calculated using factors in the NGGI; discounts based on default turnover / decay factors

Residues Method – compliance

- *Measurements, evidence base*:

  * Use of FullCAM and project scenarios verified by company inventory data; modifications required for displacement calcs

  * Precedent from existing ACCU methods – e.g Industrial and Commercial Emissions Reduction

- *Conservative:*

  * Realistic baseline levels including all FF emissions; considerations on gradual reduction in FFs use; discounts to account for existing uses (e.g. industrial heat); minimise risk of double-counting

Summary

- Large volumes of underutilised residues
- Carbon abatement via carbon storage and/or fossil fuel displacement
- Limited incentive currently
- Carbon revenue could unlock the potentialAssist hard to abate sectors of the economy
- Assist with forestry operational costs and reduce fuel
- Ensure sustainability concerns addressed
- Residues method can meet offset integrity criteria

Department of Primary Industries and Regional Development

Thank You

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