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South-East Forestry Hub

Bega Valley Quantification of Available Biomass Resources SENSW-2023-013

24 November 2025

Cover Photo:

Pipers Lookout, near Brown Mountain, looking east into Bega Valley taken 11 August 2025 by Margules Groome.

PREFACE

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The report contains analysis and recommendations for the benefit of the client. The release of this report is subject to the terms of the Disclaimer provided on the following page.

We trust our report proves useful to you and we would be pleased to provide assistance to you again on future assignments.

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GLOSSARY OF TERMS

Term	Description
ABARES	Australian Bureau of Agricultural and Resource Economics and Sciences
ABBA	Australian Biomass for Bioenergy Assessment
ACCU	Australian Carbon Credit Unit
ACT	Australian Capital Territory
ADt	Air dry tonne
ANZBIG	Australia New Zealand Biochar Industry Group
APZ	Asset Protection Zone
ARENA	Australian Renewable Energy Agency
AUD	Australian Dollar
AWG	At wharf gate
BDMt	Bone dry metric tonne
BFMP	Bush Fire Management Plan
BHKP	Bleached Hardwood Kraft Pulp
BioSmart	NSW DPI Biomass Spatial Mapping and Reporting Tool
BVSC	Bega Valley Shire Council
BOO	Build–Own–Operate model
BVSC	Bega Valley Shire Council
CCA	Copper Chromium Arsenic (treated timber)
CCS	Carbon Capture Storage
CEFC	Clean Energy Finance Corporation
CER	Clean Energy Regulator
CIF	Cost, Insurance and Freight
CLT	Cross-Laminated Timber
CPI	Consumer Price Index
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CTL	Cut to length
CY	Calendar year
DAF	Department of Agriculture, Fisheries and Forestry
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DD	Due diligence
DITRDCSA	Department of Industry, Trade, Regional Development, Communications and the Arts
DPI / DPIRD	Department of Primary Industries / Regional Development
EPA	Environment Protection Authority (NSW)
ENGOs	Environmental Non-Government Organisations
FCNSW	Forestry Corporation New South Wales
FEZ	Fire Exclusion Zone
FOB	Free on board
FSC	Forest Stewardship Council

Term	Description
FY	Financial year
GDP	Gross Domestic Product
GFC	Global Financial Crisis
GIS	Geographic Information System
GMt	Green metric tonne
ha	Hectare
HQ logs	High quality logs
IFOA	Integrated Forest Operations Approval
IMF	International Monetary Fund
IMZ	Ignition Management Zone
km	Kilometre
LCLF	Low Carbon Liquid Fuels
LGA	Local Government Area
LiDAR	Light Detection and Ranging
LMZ	Land Management Zone
LLS	Local Land Services (NSW)
LVL	Laminated Veneer Lumber
m / mm	Metres / Millimetres
m³	Cubic metre
MAI	Mean Annual Increment
MDF	Medium-Density Fibreboard
MIS	Managed Investment Scheme
NFI	National Forest Inventory
NPA	Net Plantable Area
NPWS	National Parks and Wildlife Service
NPV	Net Present Value
NRC	Natural Resources Commission
NSA	Net Stocked Area
PNF	Private Native Forest
PTR	Private Timber Reserve (Tasmania)
RCC	Regional Circularity Cooperative
RET	Renewable Energy Target
RFS	Rural Fire Service
RU1/2/3	Rural Land Zoning Categories 1-3
SAF	Sustainable Aviation Fuel
SED	Small End Diameter
SEFH	South-East Forestry Hub

Term	Description
SFAZ	Strategic Fire Advantage Zone
SRS	Stand Record System
SFAZ	Strategic Fire Advantage Zone
t/yr	tonnes per year
T1 / T2 / T3	First / Second / Third thinning
TfNSW	Transport for New South Wales
TRV	Total Recoverable Volume
UCF	Unthinned Clearfell
USD	United States Dollar
WSA	Wood Supply Agreement
YTD	Year to Date
°C	Degrees Celsius
%	Percent (proportion)

SUMMARY

This report examines the prospects for a biomass industry in the South-East of NSW, comprising Bega Valley, Snowy Monaro, Queanbeyan-Palerang and Eurobodalla Local Government Areas. Biomass is organic matter derived as a by-product of forestry or agriculture operations, or industrial and municipal waste streams, available on a renewable basis. Prospective biomass products range from traditional forestry products such as pulp and paper, engineered wood products, heat and power, to newer forms such as soil conditioners, low carbon liquid fuels, and cellulose-based chemicals.

The report draws from a substantial body of work by the NSW Department of Primary Industries and Regional Development (DPIRD). Research findings by the Forest Research Department describe negligible ecological impact of biomass production arising from native forests, and the beneficial impact on climate from substituting bioenergy for fossil fuels.

Another research project reported by DPIRD observed the benefits for managing risk of wildfire in forests by reducing fuel loads through mechanical extraction.

The potential nexus between mitigating risk of wildfire in forests through vegetation management and a prospective biomass industry was a recurring theme in stakeholder interviews, prompted by the impact of the Back Summer wildfires of 2019-20.

Stakeholder concerns reinforced the literature cited in the study, which observed the dilemma for Australian forest managers seeking to maintain healthy and resilient forests, in the context of modern regulatory regimes and anticipated impact of climate change.

Estimated total biomass resource in the study area is approximately 2.98 million dry tonnes/yr. Taking into account the likely operational constraints and existing uses, estimated *potentially recoverable* biomass is in the order of 825 000 dry tonnes/yr.

Biomass resource estimates are based on publicly available information including the NSW BioSMART tool, supplemented in some cases by industry data. Triangulation of data was conducted and deficiencies or limitations in working assumptions documented. Recommendations are made for additional work to validate the resource estimates provided in the report.

Confidence Ratings (High-Medium-Low) are assigned to the various pools representing relative ease of access. For example, a High Confidence Rating is assigned to the public softwood plantation estate, reflecting presence of existing forestry enterprises with technology and skills capable of materials recovery and handling, and relatively little competition for the resource. Conversely a Low Confidence Rating is assigned to private native forest, due to local government constraints which currently prohibit forestry activities in some areas. A recommendation is made to align state and local government planning laws, and remove the blanket ban on forestry by local government on certain land zones.

The largest potential biomass pool identified in the report could arise from wildfire hazard reduction activities on private land, aligning with a finding of the NSW Inquiry into the Black Summer Wildfires that green waste should be made available for processing into biomass products such as bioenergy or biofuels.

Recommendations are made to seek NSW State Government endorsement and to liaise with NSW Rural Fire Service to promote utilisation of biomass extracted through mechanical intervention in bush fire plan zones.

The Australian government 2050 Net Zero Plan includes ambitious abatement targets through future reforestation. The extent to which this could promote new plantations in the study area was not examined, however any expansion of the plantation estate could increase the potential biomass resource.

The Net Zero Plan provides incentives for prospective biomass products such Low Carbon Liquid Fuel (LCLF).

The plan also contains passing references to reducing native forest harvesting, suggesting the national carbon accounts may not fully recognise the benefits of actively and sustainably managed forests.

Recommendations are made to strengthen policy advice on benefits of active management of native forests, and to support ACCU methodologies which are beneficial to forest management and development of biomass industries. Other recommendations seek to remove roadblocks such as a proposed ACCU methodology which could negatively impact native forest production, and the prohibition of native forest residues in the RET scheme.

Prospective processing options for the study area, taking into account local factors such as existing businesses and resource scale, include pellets and briquettes, biochar, activated carbon, biomass heat and power, and compost. The recommendation to maintain a watching brief on developments in the liquid fuel space, is prompted by the Net Zero Plan.

Practical considerations for attracting new investment into biomass processing in the region are examined. A primary concern is the likely requirement of investors into processing technologies for security of biomass supply. As the potentially recoverable resource represents several discrete pools, identifying counterparties capable of entering into some form of supply agreement is likely to be challenging.

The concept of a "BioHub", a centrally located precinct in which biomass is processed as part of a train of so-called higher value processing assets (e.g. solid and engineered timber products), was raised by stakeholders. Prospective locations were identified with a recommendation for further investigation.

A pathway forward is presented for implementing recommendations presented in Table S-1.

Table S-1:
Recommendations

	Recommendation	Counterparty	Expected outcome
Policy and Planning (presented in main report)			
1	**FCNSW Softwood Biomass Recovery Trial**		
	Engage with FCNSW Softwood Management Division on the proposed trial and if appropriate, seek funding to study the utility of biomass produced from the trial for candidate products.	Forestry Corp NSW	Collaboration will generate and disseminate new information on potential production and utilisation of biomass.
2	**Wildfire Risk and Hazard Reduction Management**		
(a)	Investigate further the response by NSW state government regarding recommendations 20, 21, 28, 32 from the 2019-2020 NSW Bush Fire Inquiry.	Rural Fire Service	Government response to the recommendations of the Inquiry was cursory. Little public information is available regarding the RFS perspective for potential alignment of fuel management and an emerging biomass industry.
(b)	Investigate the extent to which mechanical options for vegetation control works have been analysed and incorporated by RFS managers in NSW.		
(c)	Engage with RFS to promote commercial utilisation of biomass extracted through mechanical intervention from bush fire plan zones		To be successful, the sector will require a champion capable of navigating the regulatory and potential political hurdles.
3	**Market Development**		
(a)	Prepare an Investment Memorandum style document to promote regional resource to candidate processors	Consortium of South East Forestry Hub and stakeholders	Facilitates investment through provision of information, identification and removal of obstacles.
(b)	Establish a reliable resource database including ownership, estimated volume and intermediaries capable of gathering and delivering biomass resource		
(c)	Appoint a "regional resource facilitator" to promote a biomass industry and support investor Due Diligence		
(d)	Seek DPI biomass production cost model and adapt for SE NSW Study Area		
(e)	Investigate candidate locations to establish a "biohub".		
(f)	Broaden FCNSW trial to incorporate other sources of biomass, for example bushfire plan APZ/SFAZ/LMZ	FCNSW	
4	**Governance**		
(a)	Seek NSW State Government support to align state and local planning laws regulating forestry	• NSW Local Land Services, • Office of Local Government, NSW Department of Planning, Housing and Infrastructure • Bega Valley Council • Queanbeyan-Palerang Council	Removal of blanket ban by local government of forestry on RU2 land, in favour of state government control
(b)	Seek NSW State Government endorsement of mechanical vegetation removal for fuel	• EPA • DPI	Aligns management options on private land and public lands.

		Recommendation	Counterparty	Expected outcome
		management in APZ, SFAZ, and LMZ for all public land tenures including State Forest, National Parks and Crown Lands	• NPWS • FCNSW • Crown Lands • Natural Resources Commission • Premier & Cabinet	
5		**Climate Change Policy**		
	(a)	Monitor closely Net Zero Plan Initiatives to fund Low Carbon Liquid Fuels (LCLF) decarbonisation of large industry, and Carbon Capture and Storage (CCS)	• DCCEEW • CEFC • DITRDCSA • DAFF	Identify funding opportunities and avoid artificial barriers such as exclusion of native forests
	(b)	Strengthen policy advice on carbon benefits for active management of native forests.	• DAFF • CER	ACCU market and RET scheme are influential for promoting forestry and prospective biomass markets. Important to avoid artificial barriers.
	(c)	Provide support for ACCU methodologies which promote active forest management and uptake of biomass processing technologies. Observe potential negative implications of ACCU methodology "Improved Native Forest Management In Multiple-Use Forests".		
	(d)	Seek policy support to re-introduce native forest residues into RET Scheme		
Data and Analysis (presented in Appendices)				
6		**BioSMART Tool**		
	(a)	Request access to BioSMART algorithms	• DPIRD	Verify Resource Estimates
	(b)	Verify resource estimates from Bega Valley Shire Council on municipal waste	• Bega Valley Shire	
	(c)	Verify prospective agricultural residues	• Bega Corp • DPIRD	
7		**Public Forest Log Production**		
		Estimates of log production on public lands for Study area should be verified and biomass estimates triangulated against BioSMART algorithms	• FCNSW • DIPRD	
8		**Private Native Forest**		
	(a)	Seek actual production figures for private native forest in study area	• DPIRD	
	(b)	Seek spatial data underlying DPI analysis of potential productive forest and analyse for study area applying biomass rule set		
	(c)	Triangulate biomass estimates against BioSMART algorthms		
9		**Wildfire Planning**		
	(a)	Seek spatial data for Bush Fire Plans	• RFS	Determine extent of biomass availability in APZ, SFAZ and LMZ within study area
	(b)	Estimate biomass availability for mapped zones based on BioSMART algorithms		
10		**Transport Corridors**		
	(a)	Engage NSW Bushfire Resilience Program to determine future plans	• Transport for NSW	Verify resource estimates
	(b)	Field-test the transport network analysis		

CONTENTS

1   INTRODUCTION

The South-East Forestry Hub (SE Forestry Hub) has commissioned a pilot project to identify, investigate and assess the quantities, locations, and current/potential uses for woody biomass in the Bega Valley Shire Council (BVSC) and surrounding local government areas of Snowy Monaro, Queanbeyan-Palerang, and Eirobodalla.

Biomass is organic matter derived as a by-product of forestry or agriculture operations, or industrial and municipal waste streams, available on a renewable basis (ARENA, Enea & Deloitte, 2021). Prospective applications for biomass may include conventional forestry products such as pulp, paper, engineered wood products and emerging applications such as solid and liquid energy, stationary heat and power, cellulose-derived chemical products, or carbon-based products such as biochar and activated carbon. These products offer the prospect to replace higher emission alternatives, or more directly, sequestration benefits, aligning with Australia's goals to reduce carbon emissions (Australian Government, 2025).

The rationale for this project is driven by the relatively large extent of forests and agriculture in the south-east NSW region.

While the forests give rise to the character of the region, left unmanaged biomass can accumulate and under the right conditions, increase risk of damage from wildfire. The fire season of 2019-2020 was the largest by area recorded since 1903, affecting over half the Bega Valley Shire and three quarters of neighbouring Eurobodalla shire, resulting in loss of life and destruction of property.

Reflecting on the circumstances of the recent wildfires, questions arise as to the management of forests and vegetation, and whether laws and regulations designed in previous times to control forest clearing and degradation, are still fit for purpose. The dilemma for Australian forest managers is aligning the role of fire in maintaining healthy and resilient forests, in the context of modern policies to protect life and property, and anticipated impact of climate change.

A commercial industrial outlet for biomass extracted in the process of legitimate fire risk-reduction purposes, could reduce cost to landowners and forest managers seeking mitigation against future fire events in the presence of climate change.

This report examines the options for a biomass industry, building on existing capacity in the regional supply chain. A spatial and quantitative analysis is undertaken for the study area, leading to identification of commercial processing opportunities and recommendations to address policy and regulatory roadblocks.

2 STUDY APPROACH

The project comprised:

1. Desktop research

2. Field visit and on-line interviews with stakeholders

3. Report and recommendations.

The resource review drew from publicly available information, supplemented in some cases by commercially sensitive industry data[1]. Where possible information was triangulated with third party sources. Deficiencies or gaps in data is noted and recommendations for further investigation made where appropriate.

Stakeholder interviews with forest sector entities and field inspections were conducted 11-15 August 2025. Entities outside the forest sector interested in biomass, waste management and recycling were also consulted. Notable amongst this is Bega Valley Waste Shire Council[2] and Bega Circularity Initiative[3].

Stakeholder interviews with forest industry participants highlighted the potential for biomass production and commercialisation in the South-East of NSW is linked to mitigating the risk of wildfires, and the need for asset protection through vegetation control. Entities outside the sector emphasised the opportunity for improved sustainability outcomes.

This set the context for considering policy and regulation relating to forest management (public and private), climate change policy, and the interaction with natural, social and economic capital.

2.1 Literature Review

New South Wales Department of Industries and Regional Development Forest Science Department has a long history of research and publications in this area[4]. Key to this project is the BioSMART tool[5] which provides a spatial platform for quantifying the potential resource size in the study area.

A major study by Ximenes F. C. et al, 2017 took a multi-disciplinary approach to examining biomass availability and the potential production in North East NSW, including availability and cost of delivery, chemical composition, impact of production on forest nutrition, habitat and carbon balances. The report found the proposition of salvaging biomass associated with existing harvesting operations to be benign in the long run for stand nutrition, and positive for bats and birds. The importance of retaining appropriate levels of coarse wood debris for ground-based animals was emphasised.

Importantly, the analysis of carbon balances concluded *"..from a climate perspective, using biomass that would have otherwise been left in the forest to*

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[1] Commercial-in-confidence data has not been included in the report.
[2] Waste-Strategy-2025---2035-Resources-Not-Waste.PDF
[3] Home - Bega Circular Valley
[4] Forest Carbon
[5] NSW BioSMART Tool

burn and/or decay for bioenergy generation results in positive outcomes, especially if biomass is used to produce electricity displacing the use of coal…even when the carbon dioxide emissions from burning the biomass to generate energy are included in the calculations. In practice, the CO2 released will be reabsorbed by the growing trees in a sustainable harvest system, eventually negating the impact of such emissions" (Ximenes F. C., 2017).

In 2022, Strandgard examined biomass availability and potential markets in South East Qld, observing challenges on the hardwood sector due to:

- imminent cessation of harvesting in public native forests
- lack of coordination amongst private native forest owners/managers
- quality as a biofuel.

The challenges of salvaging municipal and demolition waste streams was also addressed including contamination from multiple sources including CCA treated timber.

By contrast biomass arising from the relatively large and sophisticated plantation softwood sector in South East Qld was found to be in high demand and highly committed for various uses including manufacture of particle board and MDF, export woodchips, production and export of wood pellets, animal bedding, boiler fuel and compost (Strandgard, 2022).

Concerns about stewardship and social license featured in a report for the North East NSW Forestry Hub (MS2, 2022). The author called on the industry to *"..raise awareness and understanding that residues are not simply waste, but feedstocks that are integral to the establishment of ciruclar economies based on higher order use and improved sustainability across abroad range of products and related industry sectors*".

The role of fire in the Australian landscape and effect of traditional practices for management, maintaining low fuel levels and open park-like forest structures is described by Gammage (2012). Changes to Australia's forests, and the modern dilemma for forest management are analysed by (Flannery (1994), Pyne (1991) and Jurskis (2015).

In contemporary terms, the relationship between forest management and fire risk was addressed by Samuel et al, (2024) who noted "*even in severe weather conditions, substantially reducing fuel availability in the areas surrounding assets should reduce fire intensitites and consequent risk. Reducing available fuels in the landscape can also slow the initial rate of fire spread and fire intensity, which can provide opportunities for fire suppression and thereby reduce the risk of fires escalating into extreme fire events.*"

3   REGIONAL DESCRIPTION

The Bega Valley Shire located on the Far South Coast of New South Wales, is the pilot study area for this project[6]. The three surrounding local government areas (LGA's) Eurobodalla, Queanbeyan-Palerang and Snowy Monaro, define a practical supply catchment to the Bega Valley LGA and are also considered part of the case study (Figure 3-1).

The pilot study area represents the south-eastern most portion of the South-East Forestry Hub[7]. Future studies could expand the area of interest, to Australian Capital Territory (ACT), south-west slopes (Tumut-Tumbarumba), and south of the state border, into the East Gippsland region of Victoria.

The importance of forests as a potential source of biomass is apparent from the spatial description. Forests represent 61% by area of the four LGA's, including forests on public land (40%) and private land (22%). By comparison agriculture represents 17% by area, with the remaining 21% comprising towns, villages, roads and other uses (Table 3-1).

Production forests, that is forests from which biomass production could be produced, include public forests classified Multiple-Use (12% by area) and forests on private land (22% by area) (Table 3-2). It is possible biomass could be salvaged from fire control operations on so-called conservation forests (27% by area).

As described below, other sources of biomass could include agriculture, municipal waste, managed under authority of the four local government organisations, or diverted industrial waste in various forms.

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[6] Terms of reference as defined in the Concept Brief SENSW 2023-013
[7] Forestry in South East NSW | South East Forestry Hub

Table 3-1:
Broad land Use Classifications by LGA (ha & %)

LGA (ha)	Public	Private Land			Total
	Forest	Forest	Agriculture	Non-Forest	
Bega Valley	400 845	101 677	86 012	40 078	628 613
Eurobodalla	246 217	56 798	16 633	23 327	342 975
Queanbeyan-Palerang	118 673	148 923	126 162	138 304	532 062
Snowy Monaro	435 822	346 096	288 800	445 529	1 516 247
Total	**1 201 558**	**653 495**	**517 606**	**647 238**	**3 019 897**

LGA (%)	Public	Private Land			Total
	Forest	Forest	Agriculture	Non-Forest	
Bega Valley	64%	16%	14%	6%	100%
Eurobodalla	72%	17%	5%	7%	100%
Queanbeyan-Palerang	22%	28%	24%	26%	100%
Snowy Monaro	29%	23%	19%	29%	100%
Total	**40%**	**22%**	**17%**	**21%**	**100%**

Source: (ABARES, 2025) (State Government of NSW and Spatial Services, 2025)

Figure 3-1:
Study Area Showing Forest Type by LGA
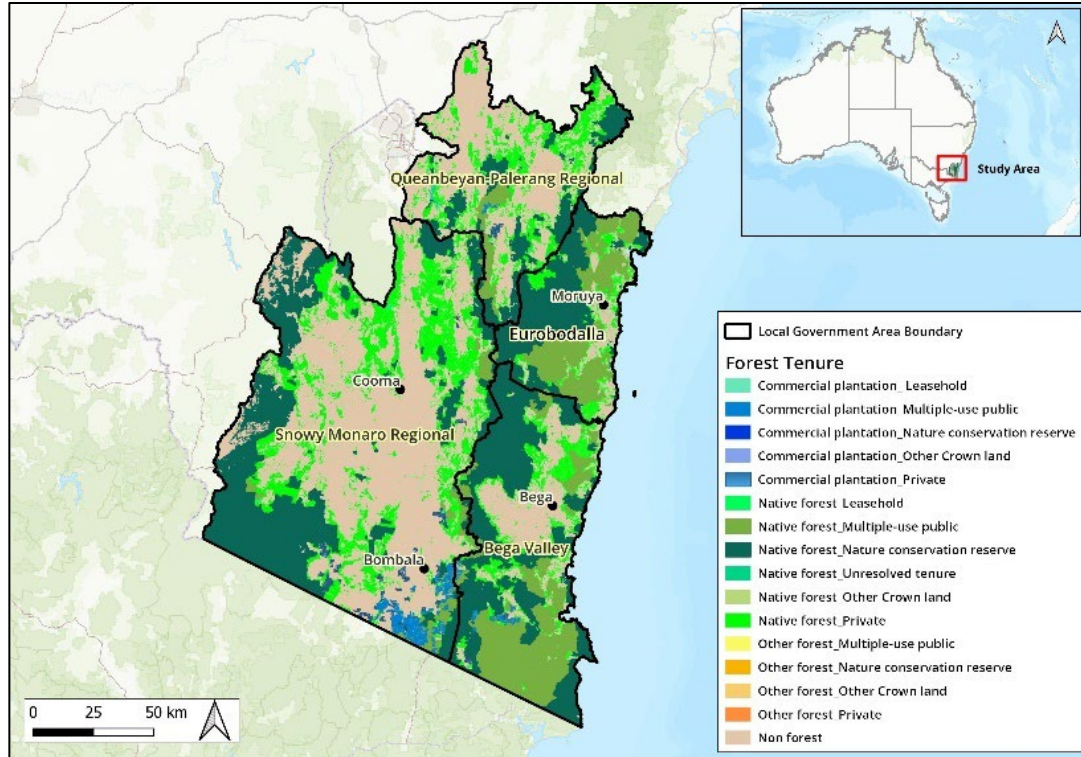
Source: (ABARES, 2025) (State Government of NSW and Spatial Services, 2025)

Table 3-2:
Area of Forest Tenure by LGA (ha)

LGA	Public land			Private Land		Total
	Multiple Use	**Conservation**	**Other**	**Forest**	**Non-Forest**	
Bega Valley	160 107	236 046	4 692	101 677	126 090	628 613
Eurobodalla	106 668	135 925	3 624	56 798	39 960	342 975
Queanbeyan-Palerang	23 507	81 553	13 613	148 923	264 466	532 062
Snowy Monaro	60 948	352 455	22 420	346 096	734 328	1 516 247
Total	**351 230**	**805 979**	**44 349**	**653 495**	**1 164 844**	**3 019 897**
Proportion of Total	**12%**	**27%**	**1%**	**22%**	**39%**	**100%**

Source: (ABARES, 2025) (State Government of NSW and Spatial Services, 2025)

3.1 Change in Forest Area

The contemporary forest area descriptions provided in Table 3-2 should not be thought of as static.

The State of the Forests Report (ABARES, 2025) demonstrates at a national level change in forest area since 1990. Clearing of mature or primary forest for agriculture, once a major contributor to deforestation in Australia, has largely ceased. Any clearing of primary forest now is confined to comparatively small-scale intensive development such as infrastructure or housing and is usually required under state law to be offset by replanting or forest protection elsewhere.

Clearing of secondary forest, that is regrowth forest which has emerged on previously cleared land, continues periodically, synchronous with longer term drought and rain cycles.

Reforestation through replanting and natural regeneration on previously cleared land, continues at a rate that balances deforestation in the national accounts. As a result, net deforestation at the national level has ceased in Australia. It is possible the long-term trend is towards forest expansion (Figure 3-2).

The recent trend observed in the ABARES dataset, corresponds with *Forest Transition Theory* described Ritchie (2025), Mather (2004) and Rudel (2010) in which expansion of national forest area is correlated with economic and social development. While Australia's dataset is relatively short compared to its peer countries (Figure 3-3) the expansionary trend can be expected as government regulation continue to limit clearing and incentives directed towards forest expansion.

Regionally specific data for the study area is unavailable, however anecdotal evidence suggests the area of forest on private lands in Bega Valley and surrounding areas has increased in recent years. This observation is based on the author's direct experience having lived and worked professionally in the region in the early 1990s, and shared with stakeholders (Appendix 1).

Figure 3-2:
Change in Australia's Forests 1990-2023
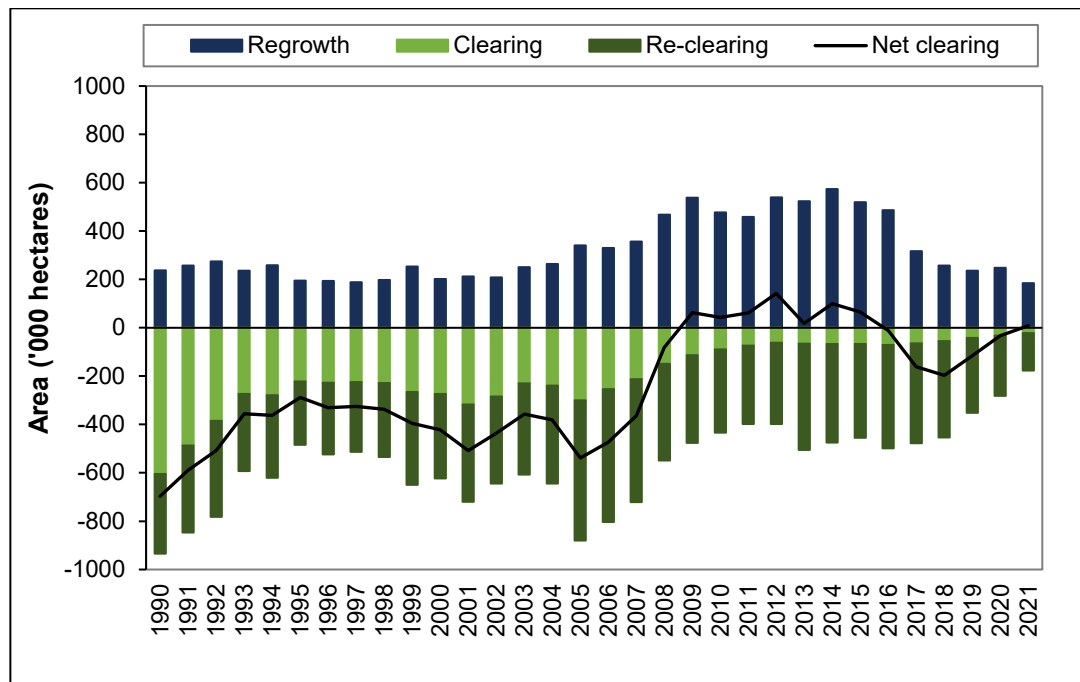
Source: (ABARES, 2025)

Figure 3-3:
Snapshot of Country-level Data Showing Forest Expansion
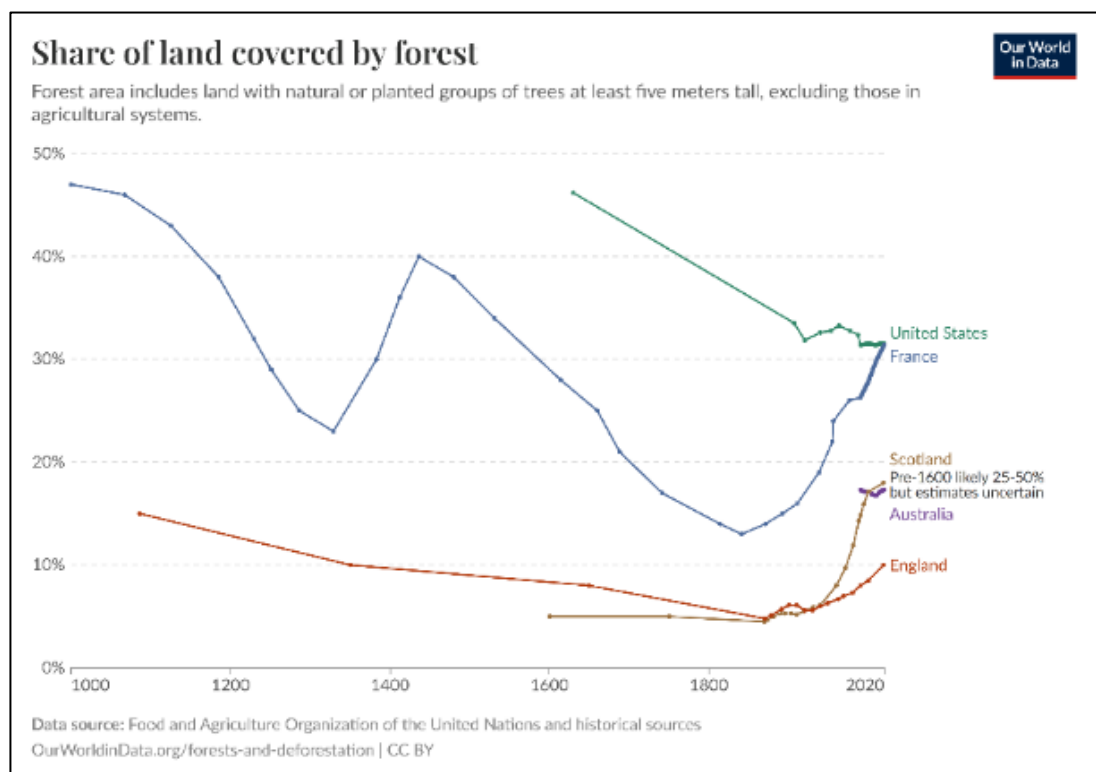
Source: (Ritchie, 2025)

3.2 Social Geography

The populations of Bega Valley and Eurobodalla LGA's are concentrated around several coastal and hinterland towns and villages. The predominant economic activities are services and tourism, with agriculture and some ongoing native forestry operations (management, harvesting and processing).

The Snowy Monaro and Queanbeyan-Palerang LGA's are characterised by the tablelands topography and share an economic exposure to the national capital territory located to the north. In comparison to the coastal LGAs, agriculture in the tablelands LGAs is bigger by area (Table 3-1) and both include a thriving softwood plantation forestry industry (growing and processing).

The total population for all four regions is 161 181 (in 2021) and is modestly increasing at an aggregate average of 0.93%/yr (Table 3-3).

While visiting the region the presence was noted of many modern dwellings in hinterlands areas such as the river region between Bega and Tathra, valley villages of Candelo and Wolumla, and the Merimbula-Pambula hinterland. These new developments have occurred concurrently with the increase in forest and vegetation as land use changes from traditional farming to hobby-farming or lifestyle occupancies.

Table 3-3:
Population and Growth Rate by LGA (2021)

LGA	Population	Annual Growth Rate %/yr
Bega	35 759	0.53%
Eudrobodalla	40 403	0.61%
Queanbeyan-Palerang	63 409	1.48%
Snowy Monaro	21 610	0.58%
Total	**161 181**	**0.93%**

Source: atlas.id

3.3 Local Initiatives

Key local initiatives pertinent to the study are the Resilience Framework, Regional Circularity Project and Bega Shire Council Waste Strategy.

In recognition of a series of natural hazards experienced in recent years, including the 2019-20 wildfires, a project funded by NSW government and Bega Valley Shire Council, in collaboration with CSIRO and a private consultant, engaged with local communities to develop a resilience investment framework for future decision-making. Pertinently, in a scenario workshop, utilisation of biomass was identified as an opportunity "*to assist with a circular economy-harvesting natural products and fuel for the next fire*" (O'Connell, 2021) p. 34. (Xenarios, 2024). (Bega Valley Shire Council, 2025)

The Regional Circularity Co-operative Limited (RCC) was established in 2021 with support from the Australian corporate Bega Group[8]. The RCC aims to guide the

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[8] The Bega Circular Valley Program - Bega Circular Valley

vision for Bega Valley to "*become Australia's most circular economy by 2030 and then target becoming a world leading circular region by 2050*" (Box 1).

The RCC aims to provide positive support at government, business and community level towards its aims, whilst commencing an ambitious project to develop the National Circularity Centre, a cultural and education centre.

The RCC vision for success (Figure 3-4) shows several opportunities for forestry and biomass to contribute. In its promotional video, the RCC provides glimpses of the existing Eden-based biomass industry [9].

The Bega Valley Shire Council Waste Strategy (2025) presents 5 themes for decreasing waste generation and increasing diversion, re-use and recycling. Themes 2 and 3 include relevant actions for biomass including:

- work with other organisations to adopt diversion programs (2D)
- expand and improve organic recycling (3G)
- Resource Recovery Precinct at Wolumla (3H)

Box 1:
Circular Economy

What is a circular economy?

An economic system designed to maximise resource efficiency by keeping the value of products, materials and resources in use for as long as possible.

The circular economy is guided by 3 core principles:

1. Designing out waste and pollution
2. Keeping products and materials in use and at highest value through reuse, repair, refurbishing and re-manufacturing
3. Regenerating natural systems

Source: DCCCEEW, 2024

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[9] Recycling Technologies Group | Wood Pellet Experts

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Figure 3-4:
Vision for Bega Valley Circularity Project showing Potential for Forestry

What would success look like?

Exploring the business case for Australia's first circular net-zero footprint region

HORIZON 1 1 - 2 Years

Waste generation/ repurposing	Water	Soil	Biodiversity	Energy / GHG emissions	Nutrients / Animal feed	Packaging & Logistics	Animal Care	Community/ Education/ Innovation/ Aged Care	Rural economy/ Tourism

HORIZON 2 3 - 5 Years

Waste generation/ repurposing	Water	Soil	Biodiversity	Energy / GHG emissions	Nutrients / Animal feed	Packaging & Logistics	Animal Care	Community/ Education/ Innovation/ Aged Care	Rural economy/ Tourism
Tonnes of waste to landfill; Tonnes of waste diverted from landfill; Recycling rate by waste stream; Circular inflows and outflows	kL water used; % water recovery, treatment and re-use (water circularity); Water quality (e.g. eutrophication)	Soil acidification; Land productivity; Rejuvenated soil; No. farms with regenerative practices	Land productivity and efficiency; Land use per industry/nature; Local biodiversity; Threatened species	% renewables; GHG from landfill reduced; Biofuel/gas captured; Carbon offset	Soil fertility; Land productivity and efficiency; External nutrient input phase out	Scope 3 (Value chain) emissions decrease; Single use packaging phase out; % transport fleet using electric vehicles or biofuels	Reducing animal emissions; Reduced animal waste; Hormone-free/organic fed	Population growth; $ community funding; Poverty rate; Homelessness rate; Local stakeholders engaged, circularity participation %; Domestic Violence rates	$ Invested into economy from solution; No. jobs created; Unemployment rate; No./$ training programs; Skills improvement; No. new businesses and industries; Private investment; Regional growth

HORIZON 3 5-10 Years

Waste generation/ repurposing	Water	Soil	Biodiversity	Energy / GHG emissions	Nutrients / Animal feed	Packaging & Logistics	Animal Care	Community/ Education/ Innovation/ Aged Care	Rural economy/ Tourism
Closed loop; Close to zero waste to landfill; $ Re-manufactured goods sold; $ trade in recycled/reused materials; % Waste-to-Hydrogen energy	**Water recovery and reuse**; % of water is recovered or reused (Waste-to-Hydrogen); Recovered waterways; Water quality	**Soil and land preservation**; Re-forestation; Re-wildered regions; Closed soil nutrient cycle; Land productivity; # farms with regenerative practices	**Biodiversity in business model**; Re-forestation; Re-wildered regions; Local biodiversity; Threatened species	**100% renewable electricity by 2030**; % Renewable energy; Biofuels captured; Carbon sequestered	**Closed soil nutrient cycles**; Limited input of external nutrients; Nutrient recycling	**Circular logistics**; Scope 3 emissions minimised; % of transport fleet using electric vehicles or biofuels; No. companies with a circular business model	**Holistic animal care**; No. credentials issued; No. patents for animal care initiatives	**Rural (mental) health Barometer**; Population growth; $ community funding; Poverty rate; Local stakeholders engaged circularity participation %; Mental and general healthcare costs	**No. 1 Food & Agri Innovation Hub in Australia**; No. jobs created; Unemployment rate; Training programs; Business innovation (start ups and social enterprises); Private investment in regional growth; % circular revenue/growth

Source: Regional Circularity Cooperative Ltd, 2025

3.4 Meetings with Local Businesses and Stakeholders, and Field Inspections

Over the course of this project, interviews were held with stakeholders with varying levels of interest in producing or processing biomass. Table 3-4 & Appendix 1 is offered as a sample list and does not represent a complete survey of the number of businesses already active or considering entering this space.

A common theme amongst stakeholders and businesses was a desire to see an expansion of the business in this space. Social license was mentioned from time to time. Technology was usually not a concern; however, market economics was raised as being challenging without assistance or support. This in part could be ameliorated with removal of policy or regulatory barriers, as discussed below.

Table 3-4:
Business Stakeholders Active in the Study Area

	Entity	Location	Biomass and Biomass production				
			Producer	Consumer	Processor	Retailer	Interviewed
1	Recycling Technology Group	Eden		✓	✓	✓	✓
2	South Coast Timber	Eden	✓	✓	✓	✓	✓
3	Pentarch	Edrom	✓	✓	✓	✓	✓
4	Ocean2Earth	Melbourne		✓	✓	✓	
5	Borg	Bombala		✓	✓	✓	✓
6	Bega Group	Bega		✓			✓
7	Bega Valley Council	Wolumla	✓	✓	✓		✓
8	Forestry Corp NSW	Various	✓				✓
9	BioCare	Sydney			✓	✓	✓

Source: Margules Groome Consulting

3.4.1 Softwood Plantation Protection

In a stakeholder meeting (Appendix 1) FCNSW Bombala shared a proposal for a major operational trial for mechanical removal of biomass from APZ and SFAZ surrounding its softwood estate. The proposal is to recover residues and biomass from:

- Current and historic thinning sites
- Unmerchantable burned stands
- Under-canopy regeneration pre-clearfall
- Roadside regeneration
- Firebreaks.

The estimated volume of recovery by FCNSW is 30 000m^3/yr (15 000 t/yr dry) from thinning events, rising to 150 000m^3/yr (75 000 t/yr dry) if site preparation (post-clearfall) is included. These estimates are consistent with the analysis presented in Table 12-2 & Table 13-3.

In addition to fuel reduction in asset management zones, the proposal would see a reduction in cost for site preparation for replanting.

Recommendation 1

Recommendation 1 is to engage with FCNSW on the proposed trial and potentially leverage the results to generate information on quality and utilisation of the biomass produced from the trial.

Recommendation 1	Counterparty	Expected outcome
FCNSW Softwood Biomass Recovery Trial		
Engage with FCNSW Softwood Management Division on the proposed trial and if appropriate, seek funding to study the utility of biomass produced from the trial for candidate products.	Forestry Corp NSW	Collaboration will generate and disseminate new information on potential production and utilisation of biomass.

Figure 3-5:
Roadside Mulching Tathra Bermagui Road

Source: Margules Groome, 15 August 2025

Figure 3-6:
Roadside Forest, Bega Valley LGA

Well maintained woodland configuration, entrance to Boydtown, 14 August 2025.

Typical forest road, Broadwater State Forest 13 August 2025.

4 WILDFIRE RISK AND HAZARD REDUCTION MANAGEMENT

During the season 2019-2020 the study area experienced a series of wildfires which totalled over 900 000 ha, the largest area recorded since 1903 (Figure 4-1 to Figure 4-3). The reported losses of dwellings in Bega Valley and Eurobodalla totalled around 975 (Owens, D. O'Kane, M., 2020). Three fire fighters were killed in the Snowy Monaro region, and losses of wildlife and farmstock also occurred. The wildfires in the study area were part of a wider series across Australia, colloquially known as the *Black Summer Fires*.

Table 4-1:
Area of Wildfire 2019-20 as a Proportion of LGAs

LGA	Wildfire	LGA	% LGA
	Area (ha)		
Bega	349 613	628 613	56%
Eurobodalla	260 836	342 975	76%
Queanbeyan-Palerang	117 640	532 062	22%
Snowy Monaro	180 320	1 516 247	12%
Total	**908 409**	**3 019 897**	**30%**

Source: (State Government of NSW and NSW Department of Climate change, Energy, the Environment and Water, 2025), (State Government of NSW and Spatial Services, 2025)

Figure 4-1:
Area Wildfire and Prescribed Burning Recorded for 4 LGAs 1903-2024
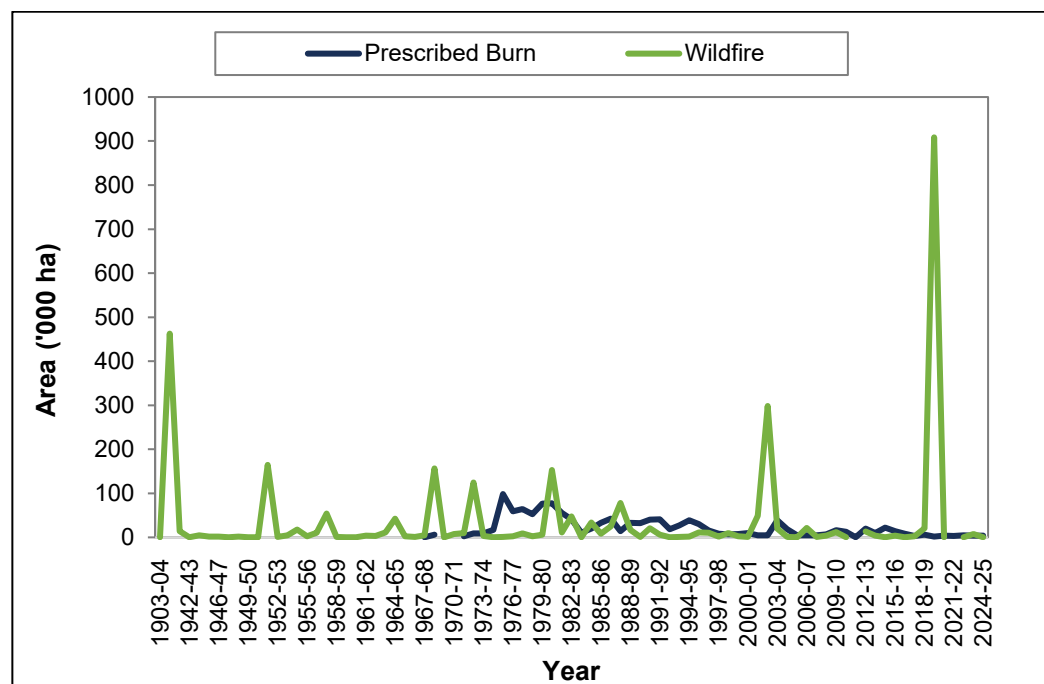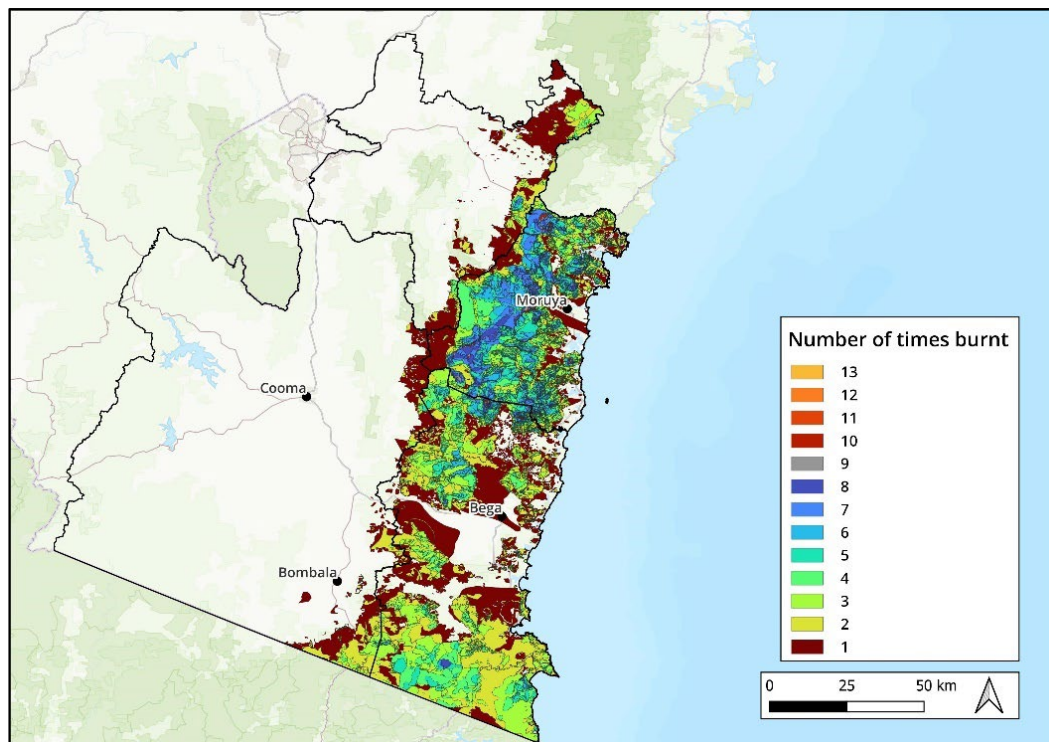

Source: State Government of NSW and NSW Department of Climate Change, Energy, The Environment and Water , 2025.

Figure 4-2
History of Wildfires across the Study Area 1903-2024
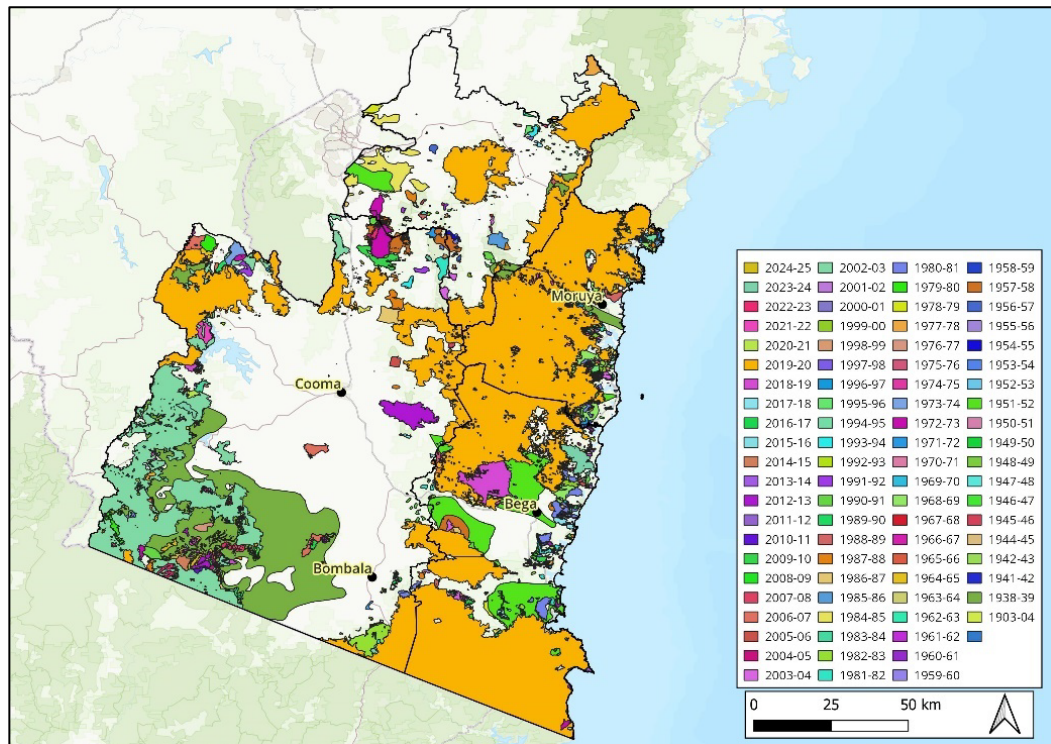
Source: (State Government of NSW and NSW Department of Climate change, Energy, the Environment and Water, 2025)

Figure 4-3:
Number of Times Burned since 1901 (excludes Western portion)

Source: State Government of NSW and NSW Department of Climate Change, Energy, The Environment and Water, 2025.

The NSW Independent Inquiry into the 2019-20 wildfires made 148 recommendations (including sub-recommendations) which the state government accepted in full. (Owens, D. O'Kane, M., 2020) (Premier's Department NSW, 2025)

A strong theme through the report was community concern with hazard reduction practices in NSW (Box 2). Despite observations in the report that government agencies have maintained hazard reduction targets across the state, the trend in Figure 4-1, suggests prescribed burning in the study area peaked in the 1970s and steadily declined thereafter.

Of the recommendations directed towards improving methods and regulations supporting hazard reduction, most are targeted towards burning. However, several recommendations by the Owens & O'Kane consider non-burning options (Box 3) including:

- *Recommendation 20 to provide for easy disposal of green waste into processors turning it into bioenergy or biofuels.*

- *Recommendation 21 to commission research into a range of hazard reduction techniques.*

- *Recommendation 28 review vegetation policies to enable appropriate bushfire risk management without undue cost or complexity.*

- *Recommendation 32 reduce roadside tree fall and grass ignitions through a framework for roadside vegetation management based on context and risk.*

The NSW Government response to the four recommendations is noted in Box 3 (Premier's Department NSW, 2025). The documented responses are at best cursory and do not provide the level of detail to evaluate if or how biomass production could be incorporated into fuel management.

It was not possible within the timeframe of this report for Margules Groome to independently investigate the responses and outcomes of the Inquiry's recommendations.

Box 2:
NSW Bushfire Inquiry Comments on Community Reaction to Hazard Reduction

Section 4.4.2.1 of the NSW Bushfire Inquiry deals with hazard reduction and notes:

- Hazard reduction includes

    – prescribed burning,

    – mechanical treatments to remove fuel (heavy machinery, mowers etc)

    – and includes clearing and maintenance of Asset Protection Zones and defendable space.

- Many people felt that their lives and properties were put at risk during the 2019-20 bush fires because fuels were not managed appropriately on public land or other neighbouring properties.

- Community members also reported that too much bureaucracy and red tape and green tape get in the way of their own hazard reduction burning on their own properties, and that this also puts them at risk.

- Many landholders argued that they should be allowed to clear, burn, put in fire breaks and burn of piles of collected scrub on their own land without some of the requirements that apply.

(Owens, D. O'Kane, M., 2020) p. 157.

Recommendation 2

Given the significance of the Inquiry findings, recommendations are made for further investigation into the government response and to engage with RFS to promote commercial utilisation of biomass extracted through mechanical intervention from bush fire plan zones (Recommendation 2).

	Recommendation 2	Counterparty	Expected outcome
	Wildfire Risk and Hazard Reduction Management		
(a)	Investigate further the response by NSW state government regarding recommendations 20, 21, 28, 32 from the 2019-2020 NSW Bush Fire Inquiry.	Rural Fire Service	Government response to the recommendations of the Inquiry was cursory. Little public information available on the RFS perspective for potential alignment of fuel management and an emerging biomass industry.
(b)	Investigate the extent to which mechanical options for vegetation control works have been analysed and incorporated by RFS managers in NSW.		
(c)	Engage with RFS to promote commercial utilisation of biomass extracted through mechanical intervention from bush fire plan zones		To be successful, the sector will require a champion capable of navigating the regulatory and potential political hurdles.

Box 3: Government Response to Key Recommendations from 2020 Bushfire Inquiry Relating to Mechanical Vegetation Control

Recommendation	Action	Progress to Date
Recommendation 20: that government, noting that hazard reduction targeted in proximity to assets is on balance more likely to provide help than hinder, should:		
Support local councils and partner agencies to implement ..hazard reduction at a local level around towns/cities, communities and local infrastructure assets…This will involve a suite of.. techniques..including clearing, mowing and mechanical treatments, and easy disposal of green waste into processors turning it into bioenergy or biofuels.	NSW RFS to increase access to mitigation resources to support local government and land managers with implementation of Asset Protection Zones (APZ) and Strategic Fire Advantage Zones (SFAZ).	Completed Q2 2022.
Recommendation 21: That in order to improve understanding of optimal hazard reduction techniques and their application in the landscape:		
Government commission research into a range of other hazard reduction techniques to understand netter the cost effectiveness of different practices in various circumstances, including grazing	The NSW RFS in collaboration with BFCC and universities to research initiatives for hazard reduction practices, techniques and technologies.	Recommendation completed in Q2 2023. The NSW RFS undertook a grazing trial as an alternative method of fuel reduction capability. The trial area grazed more than 162 ha state-wide with positive results.
Recommendation 28: That Government acknowledge that a strategic approach to planning for bushfire will take time, and in order to protect, prepare and build resilience into existing communities better, should immediately:		
Review vegetation clearing policies to ensure that the processes are clear and easy to navigate for the community. And that they enable appropriate bushfire risk management by individual landowners without undue cost or complexity.	The Government will implement legislation to empower rural landowners to clear their property boundaries in accordance with a code of practice but otherwise without further approval.	Completed Q3 2021. The Rural Fires Act 1997 was amended to simplify vegetation management for rural land holders and allow clearing of vegetation within 25 meters of their property boundary.
Recommendation 32: That in order to ensure outcomes-based roadside vegetation management to reduce roadside tree fall and grass ignitions in planning and preparing for bush fire, Transport for NSW, NSW RFS establish a consistent framework for roadside vegetation management that analyses road priority, utility, amenity, strategic value and risk.		
The Framework should take into consideration landscape characteristics like distance, slope, set back, vegetation maturity and type. Acceptable outcomes under this framework could include clear verges, or safe zones/pullouts.	TfNSW Bushfire Corridor Resilience Program, designed to improve evacuation and emergency services access routes...	Completed Q3 2021. TfNSW Vegetation Management Framework is operational.

Source: Premier's Department NSW, 2025.

5 POTENTIALLY AVAILABLE BIOMASS RESOURCE

The estimated total biomass resource the four LGA's is approximately 2.98 million dry tonnes/yr. The estimate of *potentially recoverable* biomass is 825 000 dry tonnes/yr (Table 5-1).

As detailed in Appendices 2 to 5, the estimate is based on multiple datasets and working assumptions, triangulated (where possible) against local knowledge of stakeholders and professional knowledge of the author.

The resource comprises several separate pools. To provide a reasonable estimate of the *potentially recoverable* biomass, discounts are applied to the estimated total for each pool which take into account likely operational constraints and competition for existing uses.

A Confidence Rating (High-Medium-Low) evaluates other issues around biomass production. For example, it is assumed forest biomass residues arising from native forest on public land could be recovered with Medium confidence. The (M) ranking takes into account existence of forestry enterprises with technology and skills capable of materials handling and recovery (H), low or no competition for the residue resource (H), offset by ongoing regulatory uncertainty and political pressure to discontinue production on public lands (L). Contrast this with a High (H) confidence rating that biomass residues could be recovered from softwood plantations on public lands, reflecting the relatively higher level of regulatory certainty and negligible political pressure on plantation production.

Confidence in potentially estimates of potentially recoverable biomass from private native forests, estimated to be the largest potential biomass resource in the study area, is Low (L). This is due to several challenges including local government zoning constraints which limits actual forest production to relatively small quantities. Any upscaling of production to salvage biomass from private native forest will need to overcome this regulatory obstacle.

For sawmill residues, a Low confidence rating applies despite deep discounts on estimated likely availability, due to existing third-party markets or use on site.

Estimates of Potentially Recoverable biomass from wildfire fuel hazard reduction management is based on several assumptions requiring further investigation. At the time of writing it was not possible to determine the quantity of biomass salvage arising from mechanical fuel management activities observed on roadsides (Figure 3-5). The confidence rating for potentially recoverable biomass from Asset Protection (APZ) and Strategic Fire Advantage Zones (SFAZ) is Medium (M) and for transport corridors Low (L), reflecting the need to establish social license for enterprises sourcing native residues produced from these zones[10]. Further investigation should verify and increase confidence in the biomass estimates.

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[10] It is assumed no double counting between private forestry and fuel management.

Interviews with local agricultural stakeholders suggested potential agricultural residues identified by BioSmart are unlikely to be available in the Bega LGA, hence the assumption of no residue available is made with High confidence.

The High confidence rating of Municipal waste recovery is based on the strong support from Bega Valley Sanitation Engineers for diversion opportunities prior to delivery at the Wolumla landfill facility and needs to be tested further.

A full description of the source data and underlying assumptions is provided in the Appendices 2-5 in this report, which also contains recommendations (6-10) for further work to verify the estimates.

Table 5-1:
Summary of Potentially Recoverable Biomass by Type and Confidence Rating for the Four Local Government Areas of the Study Area

	Public	Private	Total	Confidence Rating
	Dry tonnes/yr			
Production harvesting				
Native hardwood	85 157	226 162	311 319	M-L
Planted softwood	59 110	27 853	86 963	H
Planted hardwood		1 846	1 846	H
Sawmill native			3 142	L
Sawmill softwood			15 739	L
Subtotal	**144 267**	**255 861**	**419 009**	**M**
Wildfire Hazard Reduction Management				
APZ	-	10 000	10 000	M
SFAZ	45 000	45 000	90 000	M
Roadside corridor 10 m	33 777	17 905	51 682	L
Roadside corridor 50 m	84 442	44 763	129 205	L
Subtotal	**163 219**	**117 668**	**280 888**	**M**
Total Forest	**307 486**	**373 529**	**699 896**	**M**
Agriculture				
Dairy		0	0	H
Piggery		0	0	H
Poultry		0	0	H
Shells		0	0	H
Subtotal		**0**	**0**	**H**
Municipal Waste				
Municipal Solid waste			85 905	M
Commercial and Industrial			37 120	M
Construction and Demolition			2 137	M
Subtotal			**125 162**	**M**
Grand Total			**825 058**	**M**

6 MARKET DEVELOPMENT OPTIONS

To examine the latest market developments, we start with the estimates of potentially recoverable biomass, before turning our attention to existing markets in the study area, and prospective market development options for biomass.

Table 5-1 summarises the estimated potentially recoverable biomass:

- Forest Production: 420 000 dry tonnes/yr
- Wildfire Hazard Reduction: 280 000 dry tonnes/yr
- Agricultural Waste: 0 dry tonnes/yr
- Municipal Waste: 125 000 dry tonnes/yr
- Total Waste: 825 000 dry tonnes/yr.

Known existing markets/processors in the region include:

- Pellets: RTG Eden
- Briquettes: Pentarch Edrom (suspended)
- Heat: South Coast Timbers (on-site), Bega Cheese (purchased)
- Compost: Ocean2Earth
- Bedding: Straw Services Bombala & Goulburn
- Borg Bombala: Unknown

The list of existing markets is likely to be an underestimate of utilisation in the region, but it is sufficient to say that production and consumption in the region is towards on-site use, heat and power, pellets and compost.

6.1 Future Prospects

Analysis of the literature (Teischinger et al, 2023) eliminates traditional forestry processing options on the grounds of scale and quality (Table 6-1).

A review of ARENA, Enea & Deloitte (2021) provides insights into the technological and commercial readiness of biomass to bioenergy (Figure 6-1 and Figure 6-2). The highest ranked options relevant to this project include heat and electricity from solid biomass, and first-generation bioethanol and biodiesel.

Margules Groome has examined these options and taking into account existing local producers and markets suggests the following prospects for the region, come of which are already in production (Table 6-2):

- Pellets and briquettes
- Biochar
- Activated carbon
- Biomass heat and power
- Compost

- Maintain a watching brief on developments in the liquid fuel space.

Table 6-1:
Forest Biomass Production Options

	Capacity	Unit	Potential	Comment	Source
Softwood Sawmill	1 000 000	m³/yr	no	scale, quality	Teischinger, (2023)
Hardwood Sawmill	300 000	m³/yr	no	scale, quality	
Plywood Mill	90 000	m³/yr	no	scale, quality	
CLT plant	35 000	m³/yr	no	scale, quality	
Glulam	50 000	m³/yr	no	scale, quality	
LVL plant	100 000	m³/yr	no	scale, quality	
Particleboard Plant	600 000	m³/yr	no	scale, quality	
Pulpmill	2 000 000	Tonnes/yr dry	no	scale, quality	
Wood bio-refinery					
Bio-diesel and naptha	100 000	Tonnes/yr	yes	subject to further investigation	
Biobased chemicals	220 000	Tonnes/yr	yes		
Pellets and Biomass Energy	100 000	Tonnes/yr	yes		

Table 6-2
Prospective Biomass Processing Options for Study Area

		Capacity	Unit	Potential	Comment	Source
Pellets[11]						Margules Groome
	Upper	300 000	m³/yr	no	World class scale	
	Lower	100 000	m³/yr	yes	Existing market	
Biochar		100 000	t/yr dry	yes	Subject to DD	
Activated carbon		20 000	t/yr dry	yes	Subject to DD	
Biomass heat						
	Upper	unknown				
	lower[12]	8 000	t/yr dry	yes	Existing market	
Compost[13]						
	Upper	300 000	t/yr green	yes	Subject to DD	
	lower[14]	20 000	t/yr green	yes	Existing Market	

Source: Margules Groome

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[11] Noting RTG Eden are offering units capable of producing 200KT/yr and have their own capacity on site.
[12] Bega Cheese biomass boiler reported to consume 8,000 tonnes/yr (unverified)
[13] Combined with regional Food Organic Garden Organic (FOGO) program
[14] Noting Ocean2earth are drawing an unknown quantity

Figure 6-1:
**Biomass to Bioenergy Options**

Bioenergy pathway	Maturity	Cost competitiveness	Technological advantages	Low emissions potential
Heat				
Heat from biogas	Mature technology with commercial examples in Australia	Competitive with most conventional fuels and low emissions alternatives	Can address most industrial heat applications, unlike low emissions alternatives	Low emissions potential with no or limited alternatives
Heat from solid biomass				
Electricity				
Electricity from biogas	Mature technology with commercial examples in Australia	Competitive with wind and solar combined with batteries but not conventional fuels	Can provide dispatchable electricity, use on-site wastes	Low emissions potential but not as much as other renewables
Electricity from solid biomass		Not competitive		
Electricity from wastes	Mature technology with first commercial projects operating in Australia	Competitive with wind and solar combined with batteries but not conventional fuels	Can provide dispatchable electricity, use on-site wastes, co-firing with existing coal plants	Low emissions potential due to avoidance of waste emissions
Electricity from solid biomass + CO2 capture & storage (CCS)	Demonstration with no projects in Australia	Not competitive, even with significant cost reductions		Can achieve negative net lifecycle emissions
Transport				
1G bioethanol	Mature technology with commercial examples in Australia	Can be competitive on a total cost of ownership basis	Can be used in existing engines and some refuelling infrastructure with blending limits, although there are low emissions alternatives	Low emissions potential but there are alternatives, such as electric vehicles with varying levels of emissions savings
1G biodiesel		Could be competitive depending on relative feedstock and conventional fuel costs		
2G bioethanol	Demonstration with no examples in Australia	Competitive with low emissions alternatives but not conventional fuels		
Renewable diesel	Mature technologies with demonstration projects in Australia	Can be competitive on a total cost of ownership basis	Can be used in existing engines and infrastructure with limited low emissions alternatives	Low emissions potential but there are alternatives, such as hydrogen with varying levels of emissions savings
BioCNG/LNG	Mature technology with trials in Australia	Competitive with hydrogen but not conventional fuels	Can be used in limited existing engines and refuelling infrastructure	
Biojet fuels as SAF	Research and development with demonstration projects in Australia, standards have been developed for 7 pathways	Not competitive with conventional jet fuels	Can be used in existing engines and infrastructure with blending limits, with no likely low emissions alternatives	Low emissions potential with limited alternatives in the short to medium term
Renewable gas grid injection				
Biomethane from anaerobic digestion	Mature technology but no commercial examples in Australia	Competitive with hydrogen but not natural gas	Can be used in existing grid even at high/any penetration(s), unlike hydrogen	Low emissions potential with no or limited alternatives in the short term
Biomethane from landfill gas		Close to being competitive		
Hydrogen from biomass gasification	Demonstration but no projects in Australia	Competitive with other hydrogen pathways but not natural gas	Limited use before upgrading infrastructure and appliances	Low emissions potential but not cost competitive with biomethane

Source: ARENA, Enea & Deloitte, 2021.

Figure 6-2:
Biomass Technology and Commercial Readiness Pathways

Bioenergy pathway	Technology Readiness Level									Commercial Readiness Index in Australia			
Heat													
Heat from solid biomass									8-9				6
Heat from biogas									8-9				6
Electricity													
Electricity from biogas									8-9				6
Electricity from wastes									8-9			3	
Electricity from solid biomass									8-9				6
Electricity from solid biomass + CCS			3-7							1			
Transport													
1G bioethanol									8-9				6
1G biodiesel									8-9				6
BioCNG/LNG						7-8				1			
2G bioethanol						6-7				1			
Renewable diesel				4-8						1			
Sustainable aviation fuels		2-7								1			
Gas grid injection													
Biomethane from anaerobic digestion									8-9	1			
Biomethane from landfill gas									7-8	1			
Hydrogen from biomass gasification				4-5						1			

Key for graphic above:
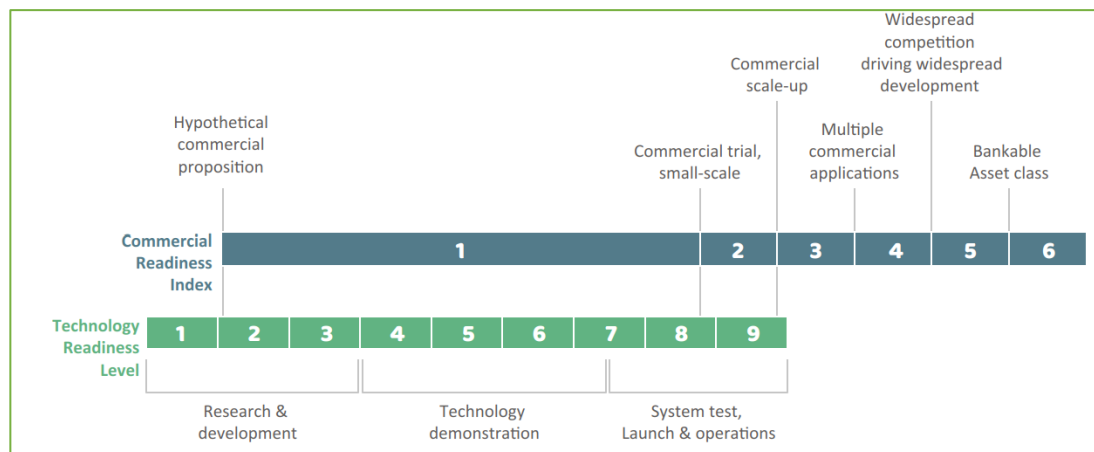
Source: ARENA, Enea & Deloitte, 2021.

6.2   Biochar and Activated Carbon

Biochar is a charcoal-like product made by heating biomass under limited oxygen. The term biochar is applied when the product is used as a soil amendment.

The benefits of biochar, according to its promoters include:

- Permanent carbon removal
- Soil regeneration and improved crop yields
- Water purification and odour control
- Livestock feed additive
- Sustainable building materials

ANZBIG (2025).

Literature reviewed for this project observes:

- Biochar improves soil health, structure, water retention and plant resilience
- Benefits are specific to site and product
- More research is required to optimise benefits.

Antonagelo (2025), Koziol (2024), Joseph (2021) DPI (2025) and SoilQuality (2025).

A developer of biochar projects was interviewed for this project. BioCare is a Sydney-based company that offers to Build, Own and Operate (BOO) projects in partnership with biomass suppliers [15].

The concept behind the BOO model offered by BioCare would be to establish a central processing facility in the region, in partnership with a local supplier.

It is understood BioCare has ongoing discussions with at least two potential partners in the region and has demonstrated a willingness to progress due diligence.

The business model requires the generation of Carbon Removal Units to supplement the market price of biochar produced. This in turn requires some form of circularity in the business model, potentially aligning with the Bega Circularity project.

Based on interviews with stakeholders, it is understood that local farmers have a low level of knowledge and awareness of Biochar and its uses, implying some market development may be required by BioCare at the retail end of the supply chain.

Activated Carbon is a more refined version of charcoal which provides adsorption properties, suitable for industrial applications such as:

- Water treatment
- pollution control

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[15] About | Biocare Projects | Net-Zero Carbon

- Air purification

- Medical uses

- Food and beverage

- Industrial applications such as gold mining

- Batter technology

The global market is valued at USD12 billion and said to be growing at 10% CAGR (BYGEN, 2025).

The business model of the company interviewed for this project, BYGEN, is to provide technology and expert knowledge, but not to own and operate, and is not a project developer[16].

6.3   Investment Considerations

Practical consideration needs to be given to how the resource could be presented to prospective investors or purchasers of biomass. Issues such as quantity, quality and contamination would need to be considered in the presentation of biomass processors.

Investors into biomass processing, such as BioCare, would likely require as a condition of funding, some form of contractual security on the supply arrangements.

The resource described in Table 5-1 represents several discrete pools, including forestry operations on public and private forests, waste from sawmills, municipal and industrial sources. The largest potential pool, arising from Wildfire Hazard Reduction Management and forestry operations on private land, would likely be gathered from numerous unrelated parties which means there is no obvious counterparty for contracting supply arising from small private holdings.

Contractors responsible for vegetation management services could provide an intermediary role, although they could not be expected to enter into binding supply commitments without assurances from forest owners.

Public land managers could however enter into supply arrangements. The most sophisticated counterparty capable of this would be FCNSW, but it is also possible other land managers such as NPWS, DPIRD and Transport for NSW could enter into periodic supply agreements.

Margules Groome has considered the steps required to present the regional biomass resource to prospective investors (Recommendation 3 and Section 9.1 Next Steps).

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[16] Bygen: Activated Carbon Producer and Supplier in Australia

6.4 Cost Model

Ximenes et al (2017) reported a cost model for delivered biomass to three locations North East NSW. The cost model indicated an aggregate delivered cost for 1.97 million tonnes for AUD60/GMt over transport distances 50-150km, with the lowest delivered price being AUD48/GMt and highest AUD65/GMt.

The costs quoted included an undisclosed stumpage to the forest owner, inferring a fully commercialised operation applies.

A broader perspective could take into account the alternative cost of vegetation management for fire mitigation to the landowner/manager, underwriting (offsetting) the cost of production to the processor.

The trial proposed by FCNSW considers the cost saving by avoiding site cleanup after harvesting (heaping and burning of residues) for re-establishment of softwood plantations. This concept could be extended to consider potentially avoided future losses due to wildfire through improved forest management.

Biomass processing options will require some level product segmentation. Criteria for quality will be imposed by the processor, which will in turn set capacity to pay (purchase price). The analysis presented by Ximenes et al (ibid) does not consider materials handling required for eliminating contaminants, size screening, moisture and organic content.

6.5 BioHub

Several conversations with stakeholders raised the prospect of developing a central processing zone, referred to in the literature as a *Biohub* (ARENA, Enea & Deloitte, 2021).

The concept to co-locate a train of biomass processing industries to create economies of scale as well as infrastructure and planning advantages, is not a new idea. It has to some extent occurred organically in the region since the advent of the timber industry.

The likely zones that could be considered within the Study Area are mostly existing timber processing areas, with the complementary opportunity to synergise with the Wolumla Central Waste Facility:

- Bega Valley LGA:
  - Government Road precinct, Eden
  - Edrom multi-purpose wharf
- Snowy Monaro LGA:
  - Delegate Road – Sandy Lane precinct

Each of these sites would represent brownfield development opportunities, with a long history of processing on site, existing infrastructure and a local workforce.

Figure 6-3:
Examples of Local Manufacturing
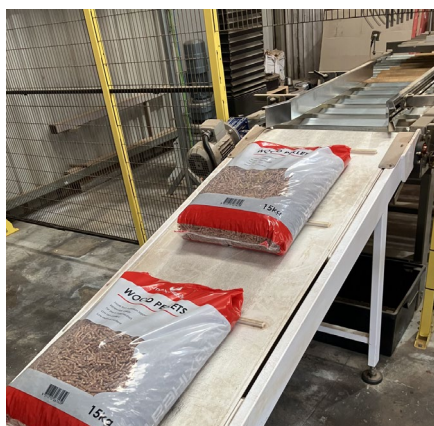
RTG Eden, Pellet Manufacturing, sourced from sawmill residues. 13 August 2025

Pentarch Edrom, Pallet Manufacturing, sourced from plantation hardwoods, Gippsland Victoria. 14 August 2025

Source: Margules Groome Consulting

Recommendation 3

The recommendations made below, lay out the tasks to promote the SE Study Area as an investment destination for biomass processing and should be read in conjunction with the other recommendations, including Recommendations 6-10 (Appendices 2-5), which seek to verify the resource estimates.

	Recommendation 3	Counterparty	Expected outcome
	Market Development		
(a)	Prepare an Investment Memorandum style document to promote regional resource to candidate processors	Consortium of South East Forestry Hub and stakeholders	Facilitates investment through provision of information, identification and removal of obstacles.
(b)	Establish a reliable resource database including ownership, estimated volume and intermediaries capable of gathering and delivering biomass resource		
(c)	Appoint a "regional resource facilitator" to promote a biomass industry and support investor Due Diligence		
(d)	Seek DPI cost model and adapt for SE NSW Study Area		
(e)	Investigate candidate locations to establish a "biohub"		
(f)	Broaden FCNSW trial to incorporate other sources of biomass, for example bushfire plan APZ/SFAZ/LMZ	FCNSW	

7 GOVERNANCE

7.1 Forestry

The regulation of forestry and biomass production in the study area is determined by land tenure and forest type (Table 7-1).

Forestry Corporation NSW[17] is the government trading enterprise authorised to manage forestry operations from which biomass could be salvaged on multiple-use public land. Regulation of FCNSW operations is by EPA[18] through a process known as the Integrated Forest Operations Approval (IFOA).

The IFOA requires harvesting operations must be driven by high quality sawlog production, with strict limits on production targets. Exceptions apply for regrowth thinning which allows for low quality logs, pulp logs, heads and offcuts (part 5 page 34) (State of NSW and Environment Proteciton Authority, 2023). This regulation is reflected in the BioSMART-derived estimates for public forest in the region and there are no recommendations here to alter this constraint.

Native forest management on private land is regulated by EPA, under authorisation by Local Land Services. Specifically, LLS provides approval and extension services, and EPA is responsible for compliance and enforcement against the approved forest management plans and Code of Practice[19].

A confounding factor for private native forestry is the role of local government on setting land use policy. Zoning in Local Environmental Plans contains two classifications in which forestry is a permitted activity without consent:

- RU1: Primary Production
- RU3: Forestry[20]

In three LGAs RU1 allows forestry as a permitted activity without consent. Queanbeyan-Palerang allows forestry as permitted with consent.

The LEPs for Bega Valley and Queanbeyan-Palerang include a Landscape Zone (RU2) in which forestry is prohibited (Table 7-2).

Analysis of the intent of the Landscape Zone, and its apparent incompatibility with forestry, is not apparent from the objectives of the plan (Table 7-3). On the contrary, forestry as governed by the Codes of Practice as administered by LLS and EPA should be perfectly compatible with the objectives of RU2.

The spatial implications of the RU2 classification can be examined on the NSW Planning Portal[21]. RU2 land zoning on private forest for Bega Valley accounts for 30% by area (Table 7-4). Another 37% of private forest is zoned conservation and therefore unavailable for forest harvesting. RU1 Primary Production accounts for

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[17] Forestry Corporation - Home
[18] Native forestry | EPA
[19] Private native forestry | EPA
[20] RU3 applies to publicly-owned Multiple Use Forest.
[21] NSW Planning Portal Spatial Viewer

30%. For Queanbeyang-Palerang, the area zoned RU2 is less than 1%, and Conservation 8%.

Margules Groome observes in Tasmania landowners have the option to establish a formal Private Timber Reserve (PTR), which provides long-term legal protection for forestry use and exempts the land from local planning controls for forest operations. While not mandatory, PTRs offer a streamlined regulatory path and are often preferred by landowners and investors[22]. We observe the Tasmanian precedent to resolve regulatory disharmony could be applied in New South Wales.

Table 7-1:
Regulation of Forestry and Biomass Production in the Study Area

Forest Type	Attribute	Public Land	Private Land
Native	Area (ha)	315 925	635 756
	Manager	FCNSW	Private
	Regulator	EPA	LLS, EPA, LGA
	Mechanism	IFOA	Code of Practice; Forest Management Plan
	Regulation	Forestry Act 2012	Local Land Services Act 2013
	Link	Native forestry | EPA	Getting started in Farm Forestry | NSW Government
Planted	Area (ha)	35 305	17 739
	Manager	FCNSW	Private
	Regulator	DPIRD	
	Mechanism	Operating plan & Harvesting Plan	
	Regulation	Plantations and Reafforestation Act 1999	
	Link	DPI Plantations Regulation - Overview Summary	

Table 7-2:
Forestry Zoning by Local Government Area

Forestry Zoning by LGA	RU1: Primary Production	RU2: Landscape	RU3: Forestry	Reference
Bega Valley	Permitted without consent	Prohibited	Permitted without consent	Bega Valley Local Environmental Plan 2013 - NSW Legislation
Eurobodalla	Permitted without Consent	N/A		Eurobodalla Local Environmental Plan 2012 - NSW Legislation
Queanbeyan-Palerang	Permitted with Consent	Prohibited		Queanbeyan-Palerang Regional Local Environmental Plan 2022 - NSW Legislation
Snowy Monaro	Permitted without Consent	N/A		Snowy River Local Environmental Plan 2013 - NSW Legislation

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[22] Private timber reserves | Forest Practices Authority
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Table 7-3:
Objectives of Zones RU1 & RU2 in Bega Valley and Queanbeyan-Palerang Local Environmental Plans

	Bega Valley	Queanbeyan-Palerang
RU1	To encourage sustainable primary industry production by maintaining and enhancing the natural resource base To encourage diversity in primary industry enterprises and systems appropriate for the area To minimise the fragmentation and alienation of resource lands To minimise conflict between land uses within this zone and land uses within adjoining zones To encourage development for tourism-related activities. To maintain and protect the scenic value and rural landscape characteristics of land in the zone.	To encourage diversity in primary industry enterprises and systems appropriate for the area To minimise the fragmentation and alienation of resource lands To minimise conflict between land uses within this zone and land uses within adjoining zones To minimise the impact of development on the natural environment To ensure development does not unreasonable increase the demand for public services of public facilities.
RU2	To encourage sustainable primary industry production by maintaining and enhancing the natural resource base. To maintain the rural landscape character of the land To provide for a range of compatible land uses, including extensive agriculture.	
	Bega Valley Local Environmental Plan 2013 - NSW Legislation	Queanbeyan-Palerang Regional Local Environmental Plan 2022 - NSW Legislation

Table 7-4:
Private Forest by Local Government Zoning

Private Forest by LEP Code	Bega Valley	Eurobodalla	Queanbeyan-Palerang	Snowy Monaro	Grand Total
Total	**101 677**	**56 838**	**148 930**	**346 111**	**653 557**
RU1	30 383	39 186	136 290	321 351	527 210
% total	30%	69%	92%	93%	81%
RU2	30 879	3	62	0	30 944
% Total	30%	0%	0%	0%	5%
Ru3	1 106	893	123	1 176	3 298
% Total	1%	2%	0%	0%	1%
C1-4	37,693	10,579	12,004	19,077	79,354
% Total	37%	19%	8%	6%	12%
Other	1 616	6 176	452	4 508	12 752
% Total	2%	11%	0%	1%	2%

Source: State Government of NSW and Spatial Services, 2025. ABARES, 2025.

7.2 Fire Management

Work to manage fire hazards on private land is authorised by the Rural Fire Service. Recent reforms to planning regulations have created a single pathway to obtaining permissions, via the *Bushfire Hazard Reduction Certificate Environmental Approval*[23]*,* supported by the Code of Practice[24].

The Code is written in a way which supports the use of mechanical methods for fuel reduction, and is not restricted to a particular size.

It is possible that for more extensive treatment areas, for example areas designated SPZ/LMZ, the assessment may require a more sophisticated approach to approvals. Margules Groome has considered the requirements of the Bushfire Hazard Reduction Certificate Environmental Assessment for the issuance of a Bushfire Hazard Reduction Certificate in order to proceed with mechanical vegetation removal (Table 7-5).

Recommendation 4

Recommendation 4 seeks to align the prospective biomass industry with the state government goals and policies, removing the obstacle to forestry operations on RU2 zoned land, and wider adoption of mechanical fuel removal techniques for public and private lands.

	Recommendation 4	Counterparty	Expected outcome
	Governance		
(a)	Seek NSW State Government support to align state and local planning laws regulating forestry	• NSW Local Land Services, • Office of Local Government, NSW Department of Planning, Housing and Infrastructure • Bega Valley Council • Queanbeyan-Palerang Council	Removal of blanket ban by local government of forestry on RU2 land, in favour of state government control
(b)	Seek NSW State Government endorsement of mechanical vegetation removal for fuel management in APZ, SFAZ, and LMZ for all public land tenures including State Forest, National Parks and Crown Lands	• EPA • DPI • NPWS • FCNSW • Crown Lands • Natural Resources Commission • Premier & Cabinet	Widen the concept from private land to public lands.

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[23] BUSH FIRE HAZARD REDUCTION CERTIFICATE ENVIRONMENTAL APPROVAL - APPLICATION FORM
[24] Application instructions for a bush fire hazard reduction certificate

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Table 7-5:
Bushfire Hazard Reduction Certificate Environmental Assessment

Considerations for the Code	Response
Genuine Hazard Reduction: A certificate can only be issued for hazard reduction works that are consistent with the local Bush Fire Management Plan. Certificates will not be provided for operations such as land clearance, domestic or industrial rubbish burning, or for avoiding Tree Preservation Orders or other regulations or ordinances.	Mechanical methods should aim to remove understory and only sufficient canopy to satisfy fire risk objectives. Minimum interval thresholds described in LGA Bushfire Management Plans Table 7-2 would be observed, for example: • Dry Sclerophyll forest shrub subformation 7 years • Wet Sclerophyll forest shrubby subformation 25 years
Soil Erosion The NSW RFS will consider potential damage that may cause soil erosion and slope instability, especially from mechanical methods of hazard reduction. Conditions may be added to the Certificate.	Mechanical vegetation removal would largely utilise tracked machines
Flora, Fauna, Biodiversity The NSW RFS will consider the potential impact on threatened species and vegetation communities sensitive to various hazard reduction methods. The fire intervals requirements for the type of vegetation to be hazard reduced will also be assessed	Noting the minimum intervals above, low intensity fire may still be required to maintain ecological vigour.
Vegetation Clearing Consideration will be given to the vegetation clearing required to provide adequate fire protection for the retention of some vegetation.	Rainforest and other sensitive vegetation would be excluded.
Standards Asset Protection Zones Low Intensity Bush Fire Hazard Reduction Burning (for Private Landholders)	Mechanical vegetation removal is consistent with the APZ Standard. The Low Intensity Code may be applied where fire is required for ecological reasons. A new broadscale standard may be required for mechanical removal of vegetation.

Source: Footnote 23 & 24

8 AUSTRALIAN GOVERNMENT CLIMATE CHANGE POLICY

The Australian government's climate change policy contains several elements relevant to the consideration of biomass in the Study Area.

8.1 Net Zero Plan

On 18th September 2025 the Australian government released its net zero plan (Australian Government, 2025).

The Net Zero Plan affirms the goal to achieve net zero by 2050, with the intermediary target of 62-70% below 2005 emission levels by 2035.

A key feature of Australian climate policy is the lack of any attempt to adopt a general economy-wide carbon price, since the Carbon Pollution Reduction Scheme (CPRS) was abandoned in 2010. For this reason, climate change policy at the national level continues to take an interventionist approach, promoting specific sectors, innovations or behaviours through the mix of policy levers available to the federal government.

The market mechanisms that already exist – the Australian Carbon Credit Unit (ACCU) Scheme, aligned with the new Nature Repair Market, targets land and agriculture and the Safeguard Mechanism targets the largest 200 emitters. Voluntary carbon markets will continue to be encouraged, while withholding international access via the ITMO framework (Internationally Traded Mitigation Outcomes).

Some opportunities may exist for biomass development in the Net Zero Plan Priorities 3, 4 & 5 of the Net Zero Plan (Table 8-1), by way of drop-in fuels, new technologies for heat and power associated with carbon capture and storage.

Table 8-1:
Net Zero Plan Policy Initiatives which May Impact Biomass

Priority 1: Clean Energy Across Economy	
Existing Policies: n/a	New Policies: N/a
Biomass Opportunities: N/a	
Priority 2: Lowering Emissions by Electrification and Efficiency	
Existing Policies: N/a	New Policies: N/A
Biomass Opportunities: N/A	
Priority 3: Expanding clean Fuel Use	
Existing policies: $250M innovation fuels for low emissions fuels including SAF and renewable diesel	New Policy: $1.1B Low Carbon Liquid Fuel Production (LCLF) for drop-in fuels
Biomass Opportunities: Biomass (forestry and agriculture) residues for LCLF	
Priority 4: Accelerating New Technologies	
Existing Policies: ARENA funding CEFC expanded mandate	New Policies: $5B Net Zero Fund to support decarbonisation of large industry and scale up low emissions technologies
Biomass Opportunities: Biomass Heat and Power associated with CCS	
Priority 5: Net Carbon Removals	
Existing Policies: ACCU: strengthened scheme Plantations: $73.8 M subsidy for expansion	New Policies: Expand data collection and analysis of land-based programs Carbon Capture and Storage: $52M to accelerate development of new technologies
Biomass Opportunities: Plantation expansion, Heat and Power associated with CCS; promotion of Biochar with ACCU methodology	

Source: Australian Government, 2025.

8.1.1 Agriculture and Land Sector Plan

The Agriculture and Land Sector Plan (Australian Government, 2025) is one of six sectoral emission reduction plans[25] which support the overarching Net Zero Plan.

The importance of forestry to the governments baseline scenario cannot be understated. Offsets from existing projects and future reforestation are the largest in the forecasts presented in Figure 8-1. Despite the significance of forestry to the plan, there is scant detail on how the additional sequestration is to be achieved (Australian Government, 2025). Speculation by interested parties has suggested 8 M ha[26] of additional plantings will be required to support the projections in Figure 8-1. If this speculation is accurate, is it possible additional plantations in the tablelands LGAs of Snowy-Monaro and Queanbeyan-Palerang could provide additional biomass not currently included in the estimates provided in Table 5-1.
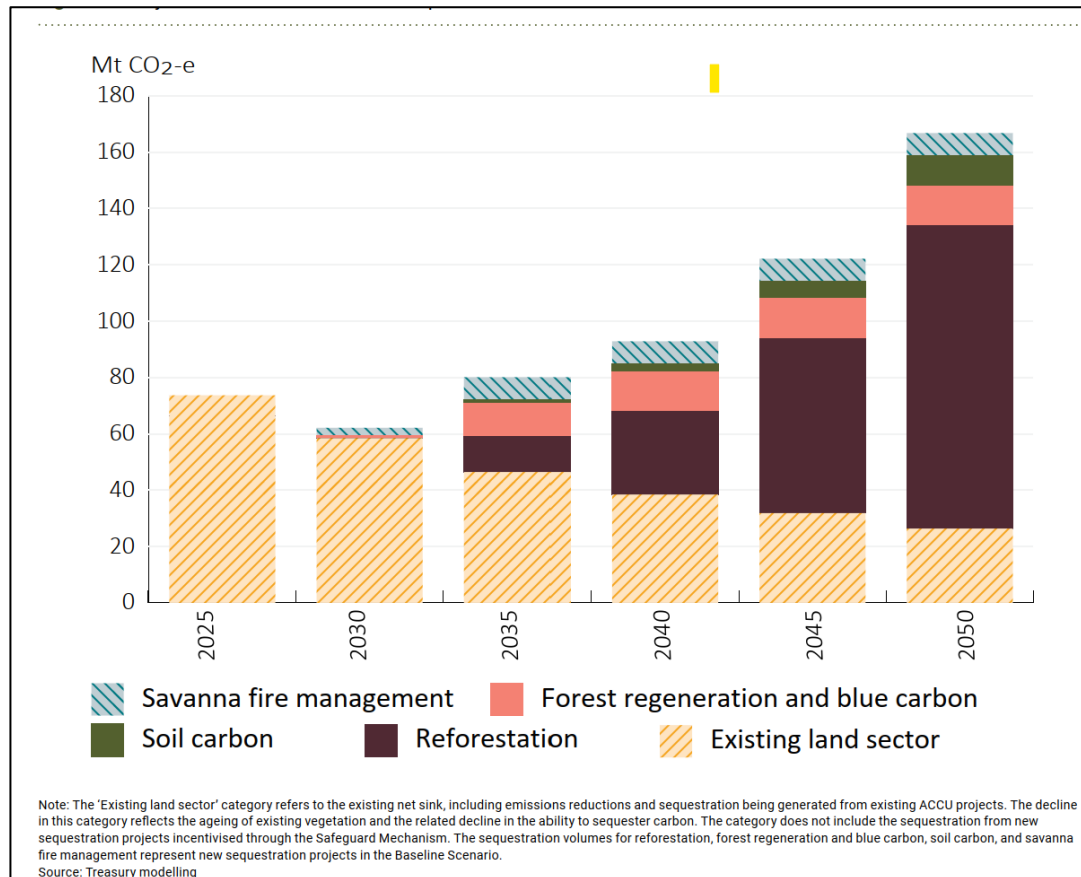
Further investigation into the Agriculture and Land Sector Plan (Table 8-2) offers very little guidance on initiatives which could support biomass production. On the contrary, suggestions are made in the document that production from native forests is being included in the baseline in a way that promotes reduced harvesting (page 6 paragraph 1). The reference in *Action 4* to Protecting Existing Carbon Stores notes how "States and territories are changing how they manage their native forest estates to support emissions, nature and other goals." (p. 26), further illustrated in the *Moving Forward* section which provides links to the Victorian government pledge to stop native forest harvesting by 2030 (page 30).

Bearing in mind the analysis presented by (Ximenes F. C., 2017), active management of native forests, including for native forests, is positive from a climate change perspective, the policy perspective of the federal government towards native forests is concerning.

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[25] Sowing the seeds for net zero: Agriculture's role in Australia's emissions transition - DAFF
[26] (23) Post | Feed | LinkedIn

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Figure 8-1
Contribution of Land Sector to 2050 Baseline Abatement Targets

Note: The 'Existing land sector' category refers to the existing net sink, including emissions reductions and sequestration being generated from existing ACCU projects. The decline in this category reflects the ageing of existing vegetation and the related decline in the ability to sequester carbon. The category does not include the sequestration from new sequestration projects incentivised through the Safeguard Mechanism. The sequestration volumes for reforestation, forest regeneration and blue carbon, soil carbon, and savanna fire management represent new sequestration projects in the Baseline Scenario.
Source: Treasury modelling

Source: (Australian Government, 2025) (Australian Government, 2025)

Table 8-2:
Agriculture and Land Sector Plan Policy Initiatives Which May Impact Biomass

Action 1: Understand Emission at the Enterprise and National Level
Biomass Opportunities: N/a
Action 2: Support Innovation to Deliver Commercially Viable Abatement Options
Biomass Opportunities: Biochar and soil carbon; low carbon liquid fuels, small scale renewables, farm forestry and plantation forestry; Circular economy; R&D ZNE CRC
Action 3: Strengthening On-Ground Action
Biomass Opportunities: N/A
Action 4: Enhance Land's Role in a Net Zero Economy
Biomass Opportunities: ACCU & Nature Repair Market, Safeguarding Mechanism; Low Carbon Liquid Fuels Biomass Threats: Protection of existing carbon stores – change in management by states.
Moving Forward
Biomass Threats: reference to State and Territory Government Emissions Reduction Commitments and Strategies

8.2 ACCU Market

The ACCU Method Development Tracker hosted by the Clean Energy Regulator [27] provides a transparent method for proposing and following progress on new methodologies.

Overall, most proposed methods are positive for biomass production and commercialisation (Table 8-3). For example, Methods 5, 8, 12 & 13 could promote use of biomass in liquid fuels and biochar. Several of the remaining methods are positive for forest expansion (1, 2, 3) or improved management (11). Others could promote consumption of biomass (6, 9). However, Method 4 which is prioritised for development, could threaten biomass availability from public lands.

Table 8-3:
ACCU Methodologies Relevant to Biomass

No	Name	Comment
	Existing methods	
1	Plantation Forestry	Supports new plantings
2	Reforestation ad afforestation	Supports new plantings
3	Reforestation by environmental or mallee plantings	In finalisation
	Prioritised	
4	Improved Native Forest Management in Multiple-Use Public Forests.	Could lead to Closure of harvesting on public forests
	Not Prioritised	
5	Renewable liquid fuels via fast pyrolysis of plantation biomass	Promising for biomass demand
6	Greening Construction with Sustainable Wood	Promising for use of engineered wood products, and production of biomass as side benefit
7	Circular Economy Carbon Credit Method	Supports Bega Valley Circular Economy Project
8	Conversion of Biomaterials for permanent carbon dioxide removal	Proposal supports biochar
9	Power generation and avoidance of landfill gas emissions	Supports energy production from non-renewable waste
10	Biomass Carbon Abatement	Avoided burning of crop residues positive for biomass recovery
11	Enhancing native forest resilience	A positive proposal for enhancing management on all tenures, aligns with nature positive management.
12	Rangelands Soil Carbon Method	Improved soil management including biochar additives
113	Low carbon Liquid Fuels	Supports biomass

Source: Method Development Tracker - DCCEEW & ACCU Scheme methods | Clean Energy Regulator

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[27] Australian Carbon Credit Unit Scheme | Clean Energy Regulator

8.3   Bioenergy Roadmap & RET Scheme

The Bioenergy Roadmap (ARENA, Enea & Deloitte, 2021) provides a national approach to the potential contribution of biomass to Australia's energy needs, in context of net zero, and offers a vision for the potential future of bioenergy in Australia.

Differences emerge between state and federal government policies relating to bioenergy potential from native forests.

Whereas the NSW BioSMART tool, provides resource information on theoretical biomass availability from public forests in NSW, the Bioenergy Roadmap distances itself from native forests as a biomass source. For example, the Appendix Resource Availability notes:

- *Pg 2: Given the low community support for harvesting native forests, this resource is an unlikely contributor to the growth of Australia's bioenergy industry.*

- *Pg 13: It is expected that sustainability considerations might limit the contribution of the forestry sector to Australia's bioenergy resource potential. It might be limited, for example, to only forestry plantations, forestry residues and wood waste.*

- *Australia is a global leader in sustainable forestry. In line with this, harvesting of native forests is closely regulated to conserve natural resources. In addition, it faces strong objection from the broader community.*

The bias against wood waste originating from native forests is translated into the eligibility criteria for wood waste and biomass used to create Large-scale Generation Certificates (LGCs) under the Renewable Energy Target (RET) mechanism.

Biomass from native forests was removed from the definition of wood waste by an amendment to the regulations in December 2022.[28] The criteria which does apply is now limited to:

a. Non-native environmental weeds harvested for control or eradication

b. Manufactured wood product or by-product form a manufacturing process

c. Waste products from the construction of buildings or furniture

d. Sawmill resides.

e. Native forests under transitional arrangements apply for power stations that were accredited before the regulation was amended.

Biomass arising from energy crops, that is planted forests, is still eligible albeit tightly regulated.

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[28] Wood waste and energy crops guidance | Clean Energy Regulator
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8.4 **International Bioenergy Policy Case Study**

Although the Australian climate policy has some encouraging components for biomass production, we observe an example of policy in the UK which demonstrates the capacity for large scale innovation in this space (Box 4).

Box 4: UK Government Policy for Bioenergy

The DRAX bioenergy plant at Selby, North Yorkshire, England, is the largest bioenergy plant in the world. Originally developed as a coal-fired facility in the 1960's, conversion of 4 of its 6 boilers to biomass commenced in 2018[29].

Today the plant produces 14 Terrawatt hours/yr renewable electricity, sufficient for around 5 million UK homes, consuming around 6.5M tonnes wood pellets per year.

DRAX has in recent years commenced building on this initiative with a proposal to combine BioEnergy with Carbon Capture and Storage (CCS) so-called BECCS[30].

While DRAX has focussed on developing the technology and infrastructure to support BECCS, UK government has provided policy support. In July 2025 it was announced that Greenhouse Gas Removal units generated by BECCS will be eligible to enter into the UK Emissions Trading Scheme[31].

The DRAX bioenergy plant generates low carbon, renewable and sustainable power with firming capacity to complement solar and wind. The BECCS proposal will build on this to generate a unique form of carbon positive power.

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[29] Drax Power Station - Drax Global
[30] What is bioenergy with carbon capture and storage (BECCS)? - Drax Global
[31] uk-ets-ggrs-main-response.pdf

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Recommendation 5

The National Forest Policy Statement (1992) (Commonwealth of Australia, 1992) provides the structure for a coordinated state-federal planning and accreditation mechanism, known as the Regional Forest Agreement (RFA) process, which has been operational for nearly 30 years. The RFA provides assurances that state forests are managed to a nationally consistent high standard. In addition, independent certification is available and is in place for NSW state forests.

Given the long history of joint state-federal planning via the RFA, there is no rationale for the federal government to arbitrarily exclude native forest biomass from participating in the RET, neither should climate change policy be inappropriately applied to limit production in native forests.

The Recommendations in 5 (below) are aimed at strengthening advice to federal government on the benefits of active management of native forests, supporting positive and limiting negative aspects of policy instruments such as ACCU methodologies and RET.

	Recommendation 5	Counterparty	Expected outcome
	Climate Change Policy		
(a)	Monitor closely Net Zero Plan Initiatives to fund Low Carbon Liquid Fuels (LCLF) decarbonisation of large industry, and Carbon Capture and Storage (CCS)	• DCCEEW • CEFC • DITRDCSA • DAFF	Identify funding opportunities and avoid artificial barriers such as exclusion of native forests
(b)	Strengthen policy advice on carbon benefits for active management of native forests.	• DAFF • CER	ACCU market and RET scheme are very important for promoting forestry and prospective biomass markets. Important to avoid artificial barriers.
(c)	Provide support for ACCU methodologies which promote active forest management and uptake of biomass processing technologies, and potential negative implications of ACCU methodology "Improved Native Forest Management In Multiple-Use Forests"		
(d)	Seek policy support to re-introduce native forest residues into RET Scheme		

9   DISCUSSION

In the years since Black Summer wildfires, initial concerns with healing the scars of fire affected communities have given way to an optimistic focus on the future. Visions of a better, more sustainable economic and social model have prompted initiatives like the Bega Resilience Framework & Regional Circularity Project.

At the same time questions arise whether regulations and practices, developed in previous times, are still fit for purpose. Australia's forests are no longer contracting because regulatory measures to stop clearing of primary forest have been successful. Australia's economic prosperity encourages people to place more importance on the environment, and new investment models have arisen which place value on ecosystem services, carbon and nature as an investment class[32].

Forests established by private endeavour, or more formal offset programs and nature investment models, together with existing forests, require management to avoid continuation of the cycle of wildfires evident in the Bega Valley (Figure 4-1) potentially amplified under the influence of climate change.

Authors like Gammage (2012), Flannery (1994) and Jurskis (2015), point to the dilemma for modern managers in which non-interventionist policies allow forest fuels to accumulate, increasing risk and impact of wildfire.

Samuel (2024) observes mechanical reduction of fuel load is widely adopted in Canada and USA and "*its potential in Australia is significant*". While treatments to mitigate risk of wildfires are not without cost, the cost of acting needs to be weighed against the cost of not acting. In 2019-2020 communities and individuals experienced significant losses as a result of the wildfires, and as observed by the NSW Wildfire Inquiry, seek to avoid this happening again.

The government response to the NSW Inquiry has been to reform planning and approval procedures for fuel management for legitimate fire mitigation. This allows for the development of a modern biomass industry capable of offsetting cost to forest owners and managers seeking to reduce future wildfire risk. At the same time the production of low carbon or carbon positive products aligns with government net zero plans.

The challenge for the sector is to establish social license to operate based on its credentials as an environmentally sustainable industry and gain the policy support it needs to thrive. Baseline work like Ximenes et al (2017) which established that biomass extraction under modern forest practices is benign to positive for habitat and carbon balances, needs continue and could be extended to the study area.

On the regulatory front, the sector requires removal of unnecessary obstacles such as the ban on native forest residues as eligible feedstock to the REC market and prohibition of forestry in RU2 land zones. The proposed ACCU methodology Improved Native Forest Management in Multiple-Use Public Forests should be rejected, and further investigation should be undertaken into the policy

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[32] Platform for Land and Nature Repair | PLANR

mechanisms which support the federal governments projected sequestration through future reforestation.

9.1 Next Steps

The recommendations made in this report, follow two themes:

- Recommendations 1-5 Planning and Policy (main report): for communication to the Australian Department of Agriculture, Fisheries and Forestry, and state and federal departments interested in biomass.

- Recommendations 6-10 Data and Analysis (Appendices): required to verify resource estimates provided in the report.

The following suggests a pathway for implementing the recommendations:

1. *Communicate and engage with state and federal government agencies regarding policy recommendations and data requests: Recommendations 2,4,5*
2. *Verify the resource estimates as Recommended 6-10.*
3. *Implement recommendation 1: FCNSW softwood biomass recovery trial*
4. *Implement recommendation 3: Market Development*

10   CONCLUSION

This report has taken a broad view on potential sources of biomass and highlighted several regulatory and policy hurdles the sector needs to address, if it is to thrive. Several processing options are identified that could start in the short-medium term, if conditions were suitable. In the longer terms, new product options such as drop-in fuels could revolutionise the sector.

Recommendations are provided, most of which represent additional work required to identify and represent the resource. Steps are also suggested to mobilise interest and attract investment to the region.

11   APPENDIX 1: RECORD OF STAKEHOLDER MEETINGS

1. ByGen		1 Aug 2025	Thomastown Vic
Lewis Dunnigan	• Met on location; inspected operations; see client pack		
2. SENSW Forest Hub		11 August 2025	Pambula
Rob de Fegeley Chloe Wilson	• Don't require financial model for investment • Seeking policy advice for reporting to Federal govt • BVSC Zoning RU2 does not allow native forestry		
3. FCNSW		12 August 2025	Bombala
Tim Gillespie – Jones Matthew Forrester	• Lost resource in 2019-20 wildfires • Preparation is key for future security, vulnerable to border • Fire and fuel breaks to south, east and west • Proposal to collect additional residues • T1 36 m3/ha, CF 6m3/ha. Pre CF 16m3/ha • Current spend mulching $200K/yr road maintenance $100K/yr		
4. Bega Valley Shire Council		13 August 2025	Bega
Peter Wild	• Provided overview of BVSC approach		
5. Recycling Technology Group		13 August 2025	Eden
Lachlan Esplin Kari Esplin Tony Esplin	Mixed business model: • Engineering consulting • Supply, install, commissioning • Retail domestic heaters • Pallet collars • Briquettes • Pellets Key issues: • Pellets: requires ongoing fibre • New gasification technology • Black pellets • Connected to South Coast Timbers		

6. South Coast Timber		13 August 2025	Eden
Damian Bunting Norm Walker	• Supply: 85% private; 15% crown?? • Practices ecological sustainable Selection (group selection) • Total input 18,000 tonnes in FY24 (check) Key risk around supply: • FCNSW supply adhoc and incremental • Private native forest is key – risk in implantation • BVSC RU2 and C2 constraints • Mentioned Kybean litigation & FCNSW smokey mouse issue • Examining activated carbon		
7. Bega Group		14 August	BEga
Melissa Balas Andrew Taylor	• Overview of business and circularity concept • Biomass interest for landowers includes African lovegrass, tea-tree and kunzea invasion on agricultural land • 47 remaining farmers in Bega Valley – high intensity production systems • Not currently using biochar – would need to be convinced • EPA would have an interest on biochar being deployed on land • CSIRO Bega Valley Resilience Baseline		
8. ANWE Pentarch		14 August 2025	Edrom

Charlie Fisher	• harvesting capacity 300KT/yr
	• plantation resource: 4500 ha
	• target production: 40,000 t/yr
	• species: E. glob, nitens and convert to pine
	
	business activities:
	
	• Woodchip exports
	• Log exports
	• Chep pallet boards (log source GRP regnans, dispatched back to Morwell for pallet manufacturing)
	• Tried briquettes but discontinued
	• Not sure about pellets
	• Boral previously examined Biofuel
	• Ocean2Earth
	• Key area of interest in applying silviculture for forest and fuel management
	    ○ Wonboyn proposed trial with LAC
	    ○ Asset protection
	    ○ Key issue RU2 restriction
	    ○ LLS: retained BA too high to regenerate, but must regenerate as condition of harvesting		

Gas substitution: RECS issue		
9. BVSC	15 August 2025	Wolumla

Tim Cook						
			Tonnes per year	Red general waste	Yellow recycling	Green FOGO
	MSW	46%	13,500	6,900	3,600	5,000
	C&I	23%	6,500			
	C&D	31%	8,887			
	Total		30,887			

10. FCNSW	15 Aug	Narooma

Lee Blessington	• CIFOA allows sawlog only operations • Thinnings allowed • Community protection and forest resilience

11. Borg	21 Aug 2025	Somersby

Andrew Chaung	• Large and growing business – multi-staged • Bettergro • Biosolidas • Group energy

12. FCNSW	2 Sept 2025	Pennant Hills

Rebel Talbert Tijmen Klootwijk	• 10/50 Rule: clearing from house 10 m trees 50m veg • Rural boundary clearing 20&50m • Bega is opt-in • APZ tool • RFS buishfire complaint service

13. BioCare	Several calls & 11 Sept meeting	Sydney

Abraham Robertson Jack Bennetto	• Biochar capacity to pay $40/t Green $80/t dry • Can offer BOO model • Very keen to investigate further

12 APPENDIX 2: ANALYSIS OF BIOSMART RESOURCE ESTIMATES

The BioSMART Tool (Department of Primary Industries and Regional Development, 2025) developed as part of the Australian Biomass for Bioenergy Assessment (ABBA) (Australian Renewable Energy Agency, 2025) provides the platform for estimation of the potential biomass resource in the study area.

The regional analysis suggests a resource in excess of 1 million dry tonnes[33]/yr can be identified from public forests, agriculture and municipal waster pools (Table 12-1).

Table 12-1:
BioSMART Summary of Biomass by LGA

LGA	Forest Biomass	Agriculture	Other	Total
	Dry tonnes/yr			
Bega	220 987	50 763	29 207	**300 957**
Monaro	128 363	237	169 953	**298 553**
Eurobodalla	25 175	9 263	17 643	**52 081**
Queanbeyan	8 412	932	409 006	**418 350**
Total	**382 937**	**61 195**	**625 809**	**1 069 941**

Source: BioSMART

Table 12-2:
BioSMART Forest Biomass Availability by LGA

LGA	Forest Biomass (dry tonnes/yr)				
	Public Native Hardwood	Public Plantation Softwood	Sawmill Native	Sawmill Softwood	Total
Bega	104 149	72 032	6 264	38 542	**220 987**
Monaro	40 038	46 091	2 154	40 080	**128 363**
Eurobodalla	19 083	2	6 089	1	**25 175**
Queanbeyan	7 044	94	1 204	70	**8 412**
Total	**170 314**	**118 219**	**15 711**	**78 693**	**382 937**

Source: BioSMART

Table 12-3:
BioSMART Agricultural Biomass Availability by LGA

LGA	Agricultural Biomass (dry tonnes/yr)				
	Dairy	Piggery	Poultry	Shells	Total
Bega	50 720	13	30	-	**50 763**
Monaro	178	1	39	19	**237**
Eurobodalla	9 260	-	3	-	**9 263**
Queanbeyan	504	5	423	-	**932**
Total	**60 662**	**19**	**495**	**19**	**61 195**

Source: BioSMART

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[33] 0% moisture content

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Table 12-4:
BioSMART Municipal, Construction and Industrial Waste

LGA	Municipal Biomass (dry tonnes/yr)			
	Municipal Solid Waste	Commercial and Industrial	Construction and Demolition	Total
Bega	23 402	3 850	1 955	**29 207**
Monaro	113 672	54 018	2 263	**169 953**
Eurobodalla	11 655	4 137	1 851	**17 643**
Queanbeyan	280 795	123 597	4 614	**409 006**
Total	**429 524**	**185 602**	**10 683**	**625 809**

Source: BioSMART

A triangulation exercise drawing from third party sources and professional judgement of the author was undertaken to estimate the *potentially recoverable portion* of the BioSMART estimate, together with biomass not included in the model.

The BioSMART tool does not provide estimates for potential biomass arising from:

- commercial logs from public or private forests, that is, logs that would be otherwise sold into markets for solid wood or so-called higher use products,
- biomass (logs and residues) arising from private forests.

The underlying algorithms to BioSMART are commercial in confidence and cannot be verified directly. However, publications by the principal author provides insight into the construction of BioSMART and the underlying algorithms, including Ximenes et al (2004), Ximenes et al (2005), Ximenes et al (2008), Ximenes et al (2012), Ximenes etl al (2016).

Estimates for biomass arising from public forest are based on historic average commercial log production 2012-2023, and variations in future production that alter volume or species composition could impact actual biomass availability.

The metadata and supporting information to the BioSMART tool is available and was reviewed for this study (New South Wales , 2025) (Table 11-5)[34].

Table 12-5:
BioSMART Assumed Salvage by Component (%)

Forest Type	Branches and Leaves	Bark	Stump
Softwood plantation	Unknown		
Hardwood plantation	50%	0%	0%
Native forest	50%	0%	0%

Source: (New South Wales , 2025)

When the BioSMART numbers were triangulated against local knowledge of stakeholders in the region, respondents highlighted uncertainty in the *potential recoverability* of estimated resource estimates.

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[34] Bioenergy_Assessment/BiomassTool_Forestry (MapServer)

The estimates of *potentially recoverable* biomass, calculated as *percentage of total* (Table 12-6) takes into account feedback from stakeholders and known competition with existing industries. A confidence rating (High-Medium-Low) ranks the relative ease of access.

Table 12-6:
BioSMART Estimate of Potentially Recoverable Biomass for Study Area

Biomass Source	Total Biomass	Potentially Recoverable Biomass		Confidence
	Dry tonnes/yr	Percent	Dry tonnes/yr	
Forest				
Public Native Hardwood	170 314	50%	85 157	M
Public Plantation Softwood	118 219	50%	59 110	M
Sawmill Native Residues	15 711	20%	3 142	L
Sawmill Softwood Residues	78 693	20%	15 739	L
Total	382 937	43%	163 147	M
Agriculture				
Dairy	60 662	0%	-	H
Piggery	19	0%	-	H
Poultry	495	0%	-	H
Shells	19	0%	-	H
total	61 195		-	H
Municipal Biomass				
Municipal Solid Waste	429 524	20%	85 905	M
Commercial and Industrial	185 602	20%	37 120	M
Construction and Demolition	10 683	20%	2 137	M
Total	625 809	20%	125 162	M
Grand Total	**1 069 941**	**27%**	**288 309**	**M**

Source: BioSMART

The confidence rating is subjectively based on the judgement of the author. For example, it is assumed 50% of forest biomass arising from production on public forests could be recovered with medium confidence. The (M) ranking takes into account high confidence in existing technology for materials handling and recovery, and lack of competition for the resource, offset by ongoing regulatory uncertainty in the continuity of native forest production on public lands.

For sawmill residues, the assumption that 20% could be recovered is made with low confidence because of likely existing third-party markets or use on site.

Interviews with local agricultural stakeholders suggested 0% agricultural residues would likely be available in the Bega LGA, hence the assumption of no residue available is made with High confidence.

The High confidence rating of Municipal waste recovery is based on the strong support from Bega Valley Sanitation Engineers for diversion opportunities prior to delivery at the Wolumla landfill facility and needs to be tested further.

Based on this calibration exercise, the estimate of total Potentially Recoverable Biomass from BioSMART is 288 309 dry tonnes/yr.

Recommendation 6

Recommendation 6 is to verify the resource estimates from BioSMART.

Recommendation 6	Counterparty	Expected outcome
BioSMART Tool		
Request access to BioSMART algorithms	• DPIRD	Verify Resource Estimates
Verify resource estimates from Bega Valley Shire Council on municipal waste	• Bega Valley Shire	
Verify prospective agricultural residues	• Bega Corp • DPIRD	

13 APPENDIX 3: BIOMASS PRODUCTION FROM PUBLIC FORESTS

Research was undertaken into publicly available data sources for forest production in the study area, in order to benchmark the BioSMART application and estimate additional biomass from unchartered private forests.

Annual production forecasts for native and planted forests on public land were analysed for:

- Public native forests: South Coast and Eden regions (Table 13-1)
- Public softwood plantations Bombala Management Area (Table 13-2).

Direct production figures for the Study Area were not available, so indirectly calculated from publicly available figures for South Coast and Eden Regions (Forestry Corporation, 2018).

The mean annual production increment for public native forest was calculated from the literature and applied to the study area and then correlated to the BioSMART output. The ratio of log volume: biomass residue dry tonnes reported in (Table 13-3) is considered reasonable and in proportion to the ratios reported in the literature.

Production figures for Bombala Softwood Management Area were available and used to correlate directly with BioSMART outputs (Table 13-2 & Table 13-3).

Table 13-1:
Sustainable Yield Forecasts 2019-2023 by Region and Area with Associated Mean Annual Increment

FCNSW Region	Area (ha)			Production (m^3/yr)			
	Gross Area	Net Area	NHA %	HQ Logs	Pulp Logs	Total	Gross m^3/ha/yr
South Coast	200 400	98 100	49%	50 000	160 000	210 000	1.0
Eden	164 300	114 300	70%	26 000	195 000	221 000	1.3
Total	364 700	212 400	58%	76 000	355 000	431 000	1.2

Source: Forestry Corporation, 2018

Table 13-2
Forecast Softwood Plantation Average Annual Production 2026-2032
FCNSW Bombala Management Area

Bombala Plantation Area		
Area (ha)	35 265	
Product	Average production (m^3/yr)[35]	MAI (m^3/ha/yr)
Sawlog	262 143	7.43
Pulplog	290 714	8.24
Total	**552 857**	**15.68**

Source: Forrester, 2025 and Margules Groome Consulting.

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[35] Average production forecast 2026-2032, Pers. Comm. Matthew Forrester, Bombala Manager.

Table 13-3:
Estimated Log Production and Biomass Residues by LGA (ha)

Region	Unit	Multiple Use Public Forest		Source
		Native	**Planted Softwood**	
Bega Valley	**Forest area (ha)**	154 255	5 825	NFI (ABARES, 2025)
Eurobodalla		106 668	-	
Queanbeyan-Palerang		22 084	1 423	
Snowy Monaro		32 918	28 017	
Total		**315 925**	**35 265**	
MAI m³/ha/yr	**m³/ha/yr**	1.20	15.68	Table 13-1& Table 13-2
Log Production	**m³/yr**	379 110	552 857	
Residues	**t dry/yr**	170 314	118 219	BioSMART
Ratio residues:logs	**dry t/m³ logs**	45%	21%	

Source: Margules Groome Consulting

The analysis suggests native forest production on public lands in the study area is around 380 000m³/yr and the corresponding residue availability another 170 000 dry tonnes/yr. The Planted softwood estate represents over 552 000m³/yr with potential residues around 118 000 dry tonnes/yr.

Recommendation 7

Recommendation 7 acknowledges the workings required to derive these estimates and suggests further work to verify the resource estimates.

	Recommendation 7	Counterparty	Expected outcome
	Public Forest Log Production		Verify Resource Estimates
	Estimates of log production on public lands for Study area should be verified and biomass estimates triangulated against BioSMART algorithms	• FCNSW • DIPRD	

14 APPENDIX 4: BIOMASS PRODUCTION FROM PRIVATE FORESTS

Data for actual and potential production arising from forests on private land in the study area is difficult to access.

The reported native forest production for entire south coast region between Sydney and the state border region is presented in Table 14-1. Applying the biomass ratio from Table 13-3 provides an estimate of potential residual biomass for the South Coast region, that could have been recovered during the reporting period.

Relevant to the study area is a report by Department of Primary Industries (2024) which examined the area considered suitable for log production in South Coast New South Wales (Table 14-2).

Starting with around 1.27 million ha of private forest located between Sydney and the southern border, the study eliminated potential productive area based on topography, regulatory constraints, forest species and structure. The screening eliminated over 90% of private forest from the productive estate, with the largest pool being species composition and structure, at 46% of the forest area.

Applying the reported average production in Table 14-1 to the area calculated in Table 14-2, returns an average MAI 0.54 m^3/ha/yr, considered reasonable compared to the 1.2 m^3/ha/yr calculated for public native forest in Table 13-3.

The area calculated in the DPI report is based on the notion that commercial operations can only be driven by conventional sawlog production. Liberating this constraint, to allow for potential biomass production, would likely increase available productive area.

A hypothetical analysis of the potential production from private native forest, based on a modest production MAI of 0.54 m^3/ha/yr (Table 14-2) suggests the potential future production of biomass from private native forest could be substantially higher than suggested from reported historic sawlog production.

Table 14-1 estimates potential biomass residues associated with reported sawlog production could have been around 20 000 dry tonnes/yr.

Releasing the constraint that sawlog production must be the primary driver, and applying the production increment of 0.54m^3/yr, suggests log production on private forest in the study area could total 343 308 m^3/yr and residues 154 203 t/yr (dry) (Table 14-3).

Assuming the additional volume of logs produced on private native forest were to be directed towards biomass, and the proportion of residues recovered remained stable at 50%, the grand total of biomass potentially available from public and private forests (native and planted) could be as much as 400 128 t/yr (dry).

Confidence ratings for the resource varies, due in part to regulatory uncertainty and constraints. As discussed in Section 7, ongoing pressure to reduce native forest harvesting on public lands presents a level of uncertainty, and Bega Valley Council prohibition of forestry on RU2 Zoned lands restricts forestry activity

altogether. As a result, the overall Confidence Rating for forest biomass is Medium (Table 14-4).

This does not include sawmill residues and municipal waste accounted in Table 12-6.

Table 14-1:
Landowner Reported Production Southern Region

Year	Unit	2022-23	2023-24	2024-25	3-year average	Source
Production	m³/yr	21 250	86 855	27 536	45 214	(Natural Resources Commission, 2025)
Biomass ratio	biomass/logs	45%				Table 5-3
Potential Biomass	t dry/yr	9 547	39 019	12 370	20 312	

Source: Natural Resources Commission, 2025 and Margules Groome Consulting.

Table 14-2:
Private Forest Suitability for Log Production Analysis and Reported Actual Production

	Area (ha)	Ha	% Total	Source
Total area	1 270 000			PNF
Topography	1 100 000	-170 000	-13%	
Regulatory	670 000	-430 000	-34%	
Species Composition and Form	83 355	-586 645	-46%	

Average production	45 214	NRAC
MAI	0.54	

Source: Natural Resources Commission, 2025 & Department of Primary Industries, 2024.

Recommendation 8

Recommendations provided in 8 seek to verify the resource estimates for private native forest.

	Recommendation 8	Counterparty	Expected outcome
	Private Native Forest		
(a)	Seek actual production figures for private native forest in study area	DPIRD	Verify Resource Estimates
(b)	Seek spatial data underlying DPI analysis of potential productive forest and analyse for study area applying biomass rule set		
(c)	Triangulate biomass estimates against BioSMART algorithms		

Table 14-3:
Potential Native Forest and Plantation Production Logs and Biomass on Private Land

LGA	Unit	Private Land			Source
		Native Forest	Planted softwood	Planted hardwood	
Bega Valley	forest area (ha)	100 461[36]	542	667	NFI (ABARES, 2025)
Eurobodalla		56 798	-		
Queanbeyan-Palerang		146 221	2 702		
Snowy Monaro		332 276	13 373	447	
Total		635 756	16 617	1,114	
MAI m³/ha/yr	m³/ha/yr	0.54	16	10	Table 5-2 & 7 Table 6-2
Log production	m³/yr	343 308	260 513	11 139	
Residues	t dry/yr	154 230	55 706	3 693	
Residues/logs	dry tonnes /m³ logs	45%	21%	33%[37]	Table 5-3

Source: Margules Groome

Table 14-4:
Summary of Potential Biomass Production Arising from Public and Private Forest, with Confidence Ratings

		Native	Plantation		Total	Source
			Softwood	Hardwood		
		Public				
Logs	m³/yr	379 110	552 857		931 967	
Available for biomass		-	-			
Residues available	t/yr	170 314	118 219		288 533	
Residues potentially recoverable		50%	50%			
Subtotal	**t/yr**	**85 157**	**59 110**	**-**	**144 267**	BioSMART
Confidence		M	H			
		Private				
Logs	m³/yr	343 308	260 513	11 139	614 960	
Available for biomass	t/yr	149 047	-	-	149 047	
Residues available	t/yr	154 230	55 706	3 693	213 629	
Residues potentially recoverable		50%	50%	50%		
Subtotal	**t/yr**	**226 162**	**27 853**	**1 846**	**255 862**	
Confidence		M-L	H	H		
Grand Total					**400 128**	Combined
Confidence					M	

Source: Margules Groome Consulting

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[36] Bega Valley Shire Council does not allow forestry on RU2 zones land. See Section 9 for further discussion.
[37] Plantation hardwood biomass is not reported by BioSMART in study area. An estimate is taken from average of softwood and native biomass.

15 APPENDIX 5: BIOMASS PRODUCTION FROM WILDFIRE HAZARD REDUCTION

The management of vegetation for risk mitigation against wildfire is addressed through regional Bush fire Management Plans. Classification of forest and vegetation is categorised by intent:

- Asset Protection Zones (APZ): a frequently maintained buffer between a bush fire hazard and an asset, preventing direct flame contact and reducing radiant heat and ember attack.

- Strategic Fire Advantage Zones (SFAZ): forested areas located closer to townships and other assets, in which hazard reduction is undertaken at regular intervals.

- Ignition Management Zones (IMZ): exposed areas such as ridgetops in which fuel is reduced to minimise risk of ignition

- Fire Exclusion Zones (FEZ): special areas in which fire should be excluded eg rainforest

- Land Management Zones (LMZ): forest areas not identified above.

(HotSpots Fire Project, 2025)

Bush Fire Management Plans are prepared under the supervision of regional committees and updated or refreshed every 5 years. At the time of writing Bushfire plans for all four LGAs are under review (Table 15-1).

Table 15-1
Bush Fire Management Plans for LGA's

LGA	Current Plan	Next Generation Plan	Residential dwellings	Status	Reference
Bega	Bega Valley BFMP 2018	Far South Coast BFMP	40 373	Contributions to consultation closed for evaluation and review	Far South Coast - NSW Rural Fire Service
Eurobodalla	Eurobodally BFMP 2019				
Queanbeyan-Pelang	Lake George BFMP 2018	Lake George BFMP	26 503		Lake George - NSW Rural Fire Service
Snowy Monaro	Snowy Monaro BFMP 2009	Snowy Monary BFMP	10 589	Public exhibition of plan to commence soon	Snowy Monaro - NSW Rural Fire Service

Source: Margules Groome Consulting

While new bush fire plans are in preparation[38], existing plans provide guidance on the opportunity for biomass production arising from the need to plan for protection of assets of various descriptions.

The four Bushfire Plans for the study area provide works plans for protection of identified assets being:

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[38] Next Generation Bush Fire Plans are to adopt new approaches to managing risk as a result of the Inquiry to the Black Summer fires.

- Human settlement assets: residential assets such as towns and villages and Special Protection zones such as schools, retirement homes, hospitals etc

- Economic Assets: including roads, utilities including powerlines, agricultural and forestry plantation assets

- Environmental Assets: ecologically sensitive areas

- Cultural Assets: aboriginal and non-aboriginal assets including recreation facilities, community halls etc.

Zone Objectives are described in Table 15-2. Hazard reduction by eliminating biomass through burning or mechanical means features heavily within the APZ. Although the Plans and codes (NSW Rural Fire Service, nd) (NSW RFS, nd) are prepared with burning in mind for SPAZ and LMZ's, there is nothing in these documents which prohibits mechanical removal methods.

The bush fire plans identify assets spatially and together with the works plan, it would be possible to develop a production forecast for a biomass business. (Bega Valley Bushfire Management Committee 2018, 2025) (Eurobodalla Bushfire Mangement Committee 2019, 2025) (Snowy Monaro Bushfire Management Committee 2009, 2025) (Lake George Bushfire Management Committee 2018, 2025).

Table 15-2
Hazard Reduction Objectives by Zone

Zone	OBJECTIVES
Asset Protection Zone (APZ)	- reduce fine fuel load and structure to a level that provides a safe 'defensible space' around an asset; - reduce fine fuels within the zone to prevent a ground fire reaching the asset; - reduce vertical structure of the fine fuels by reducing shrub fuels.
Strategic Fire Advantage Zone (SFAZ)	- reduce fine fuel load and structure to a level that provides firefighters with an area in which they have a high probability of success in containing bush fires burning within, or into, the area; - reduce fine fuels by approximately 50-80% within area; and - reduce vertical structure of the fine fuels by reducing shrub fuels.
Land Management Zone (LMZ)	- provide a mosaic of areas with varying fuel load structures; - maintain or enhance biodiversity; and - provide fuel reduced areas in which firefighting suppression efforts are safer and have greater chance of success.
Fire Exclusion Zone (FEZ)	protect fire sensitive areas such as rainforest, cultural sites, plantations and commercial crops.

Source: NSW Rural Fire Service, nd.

15.1.1 Potential Biomass Production from Asset Protection Zones

APZs are managed to "minimise fuel loads and reduce potential radiant heat level, flame, localised smoke and ember attack". (NSW Rural Fire Service, 2019). The dimensions are determined by slope and vegetation type (Figure 15-1).

Standards of management for APZ are described in (NSW RFS, nd) comprising canopy gaps 2-5m, removal of all understory vegetation, with constraints to prevent soil erosion.

The subject area which could produce biomass from management of APZ's can be calculated based on the LGA bush fire plans. By way of example, if 15% of the 79 163 dwellings and businesses identified in the bush fire plans were located in forest, the annual biomass produced through regular maintenance could be in the range of 10 000 dry tonnes per year (Table 15-4).

The 50 m radius selected for the analysis is consistent with the 10/50 rule which provides landowners an automatic right to maintain vegetation in the LGA[39].

This analysis could be expanded to include other assets such as roads, towns and villages, powerlines and infrastructure, nor the capacity for biomass extraction to replace hazard reduction burning across the broader landscape.

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[39] 10/50 vegetation clearing - NSW Rural Fire Service

Figure 15-1:
Asset Protection Zone Configuration
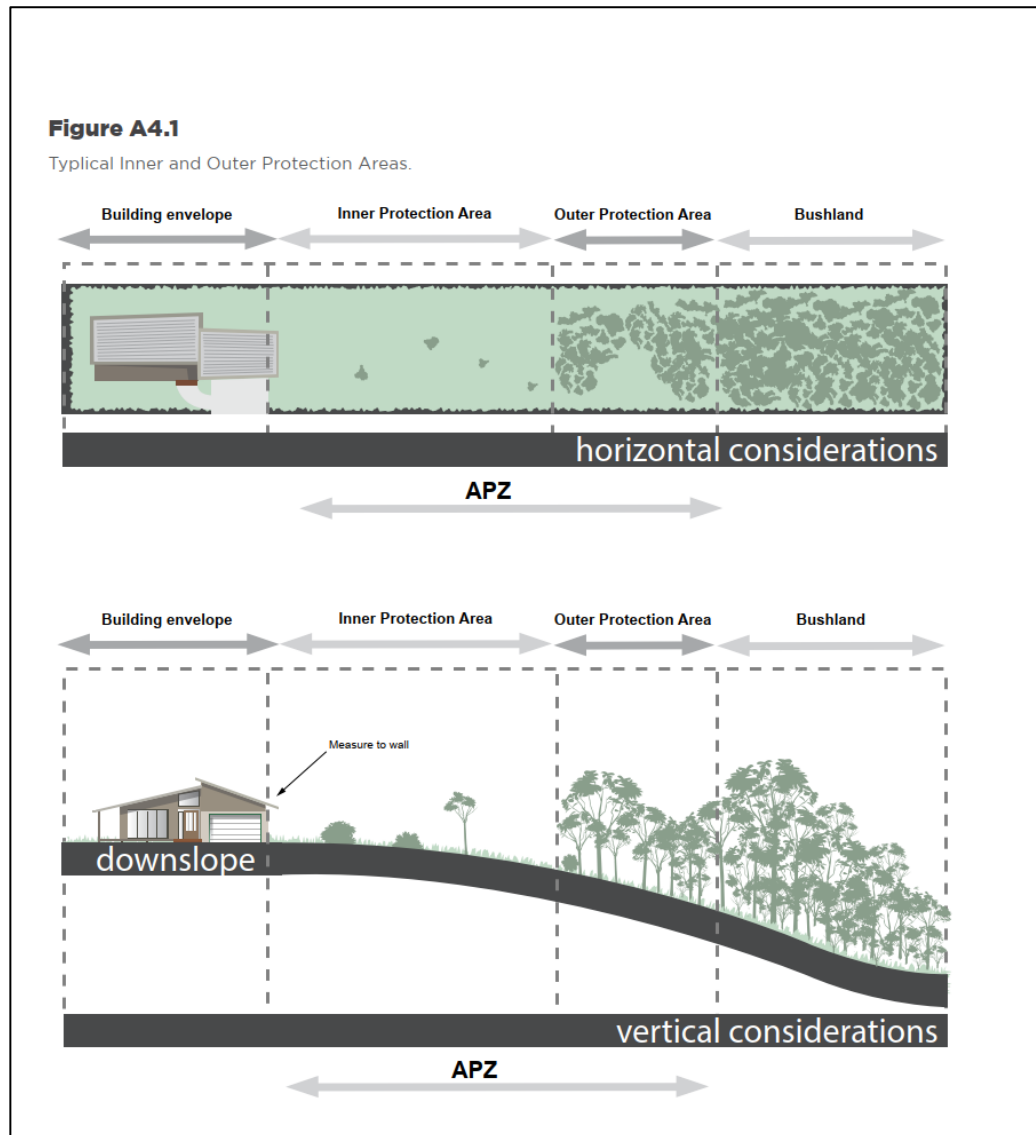
NSW Rural Fire Service, 2019 p. 108.

Table 15-3
Fire Interval Thresholds (yrs) for Hazard Reduction by Vegetation Type

Vegetation formation	Minimum SFAZ Threshold	Minimum LMZ Threshold	Maximum Threshold	Notes
Rainforest	NA	NA	NA	Fire should be avoided.
Alpine complex	NA	NA	NA	Fire should be avoided.
Wet Sclerophyll forest (shrubby subformation)	25	30	60	Crown fires should be avoided in the lower end of the interval range.
Wet Sclerophyll forest (grassy subformation)	10	15	50	Crown fires should be avoided in the lower end of the interval range.
Grassy woodland	5	8	40	Minimum interval of 10 years should apply in the southern Tablelands area. Occasional intervals greater then 15 years may be desirable.
Grassland	2	3	10	Occasional intervals greater than 7 years should be included in coastal areas. There was insufficient data to give a maximum interval; available evidence indicates maximum intervals should be approximately 10 years.
Dry sclerophyll forest (shrub/grass subformation)	5	8	50	Occasional intervals greater than 25 years may be desirable.
Dry sclerophyll forest (shrub subformation)	7	10	30	Occasional intervals greater than 25 years may be desirable.
Heathlands	7	10	30	Occasional intervals greater than 20 years may be desirable.
Freshwater wetlands	6	10	35	Occasional intervals greater than 30 years may be desirable.
Forested wetlands	7	10	35	Some intervals greater than 20 years may be desirable.
Saline wetlands	NA	NA	NA	Fire should be avoided.
Semi-arid woodlands (grassy subformation)	6	9	No max	Not enough data for a maximum fire interval.
Semi-arid woodlands (shrubby subformation)	10	15	No Max	Not enough data for a maximum fire interval.
Arid shrublands (chenopod subformation	NA	NA	NA	Fire should be avoided.
Arid shrublands (acacia subformation)	10	15	No Max	Not enough data for a maximum fire interval.

Source: Bega Valley Bushfire Management Committee 2018, 2025.

Table 15-4
Potential Biomass Production from APZ Maintenance

Dwellings[40]	Bega	Eurobodalla	Queanbeyan	Snowy	Total
Private Dwellings	18 890	24 593	21 432	12 248	77 163
Business	2 000	-	-	-	
Total	20 890	24 593	21 432	12 248	79 163
Area per Dwelling					
Radius m	50				
Area (ha)	0.79				
t/ha/yr (dry)	1.00				
t/yr	0.79				
Scenario: Estimated Proportion of Forest Dwellings					
Guestimate					
Forest Dwellings %	25%	25%	5%	5%	16%
t/yr	4 102	4 829	842	481	10 253
Residues potentially Recoverable	100%				
t/yr	4 102	4 829	842	481	10 253
Confidence Rating	H	H	H	H	H

Source: Margules Groome Consulting

15.1.2 Potential Biomass Production from Other Management Zones

Management of SFAZ and LMZ is based on threshold intervals (years) by forest type. The minimum threshold (yrs) is set to minimise ecological impact, and maximum thresholds (yrs) to limit accumulation of fuels. For example, dry sclerophyll forest should not be subject to hazard reduction at less than intervals of 5 to 7 years in SFAZ, and 8-10 years in LMZ. Maximum intervals are 30 to 50 years (Table 15-3) (Bega Valley Bushfire Management Committee 2018, 2025) (NSW Rural Fire Service, nd).

The potential for mechanical control of biomass was identified by the 2020 Inquiry (Recommendations 20 & 21), however, to date it has not been possible to find evidence of a broader level of inquiry beyond the government response noted previously.

The maps provided in the four LGA bush fire management plans were not of sufficient quality to undertake spatial analysis of SFAZ and LMZ for this project. In addition, it was not possible to obtain the underlying data in the time available.

However, based on the hypothetical analysis in Table 15-4, in which 10 000 ha was estimated to represent potential APZ forest, it is not unreasonable to suspect the

[40] Sourced from existing bush fire management plans.
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inclusion of SFAZ and LMZ areas could increase total area to 100 000 ha. This could generate up to 100 000 dry tonnes of biomass/yr.

Recommendation 9

Recommendations made in 9 below are to continue this line of inquiry and to access spatial data to support this analysis.

	Recommendation 9	Counterparty	Expected outcome
	Wildfire Planning		
(a)	Seek spatial data for Bush Fire Plans	RFS	Determine extent of APZ, SFAZ and LMZ in study area
(b)	Estimate biomass availability for mapped zones based on BioSMART algorithms		

15.1.3   Transport Corridors

The state government response to Recommendation 32 of the Bush Fire Inquiry is the TfNSW Bushfire Corridor Resilience Program is now operational (Box 2)[41]. Interestingly this includes a sub-project to incorporate traditional cultural burning practices[42].

During the field inspection roadside mulching was observed along sections of the Princes Highway and the Tathra-Bermagui Road (Figure 3-5).

Research undertaken for this project was unable to determine if this is a one-off or an ongoing program. Further investigation would determine where the biomass was taken from this work to date, future plans is this is to continue.

Analysis of the potential size of the resource associated with roadside management was undertaken by intersecting roads and forest information. The total length of roads within forest area in the study area is 25 841 km, with Bega Valley having the longest forest road network accounting for 8 660km (Table 15-5). The potential biomass resource has been calculated using consistent assumptions to the APZ. It is possible up to 188 000 dry tonnes/yr could be extracted from an ongoing program.

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[41] Regional and Outer Metropolitan – Network Resilience Program | Transport for NSW
[42] Bolstering traditional practices to ramp up bushfire resilience | NSW Government

Table 15-3
Analysis of Forest Road Network within Study Area

	Length (m)	Area (ha)	
		Fuel Removal	**Thinning**
		10 m corridor	**50 m corridor**
Bega	8 660 956	17 322	86 610
Eurobodalla	5 507 047	11 014	55 070
Queanbeyan-Palerang	3 675 101	7 350	36 751
Snowy Monaro	7 997 986	15 996	79 980
Total	**25 841 090**	**51 682**	**258 411**
Growth t/ha/yr (dry)		1	0.50
Total biomass t/yr (dry)		51 682	129 205
Potentially Recoverable		100%	100%
Confidence Rating		L	L

Source: ABARES, 2025 & (State Government of NSW and Spatial Services, 2025)

Recommendation 10

Recommendations made in 10 are aimed at verifying the potential transport network analysis.

	Recommendation 10	Counterparty	Expected outcome
	Transport Corridors		
(a)	Engage NSW Bushfire Resilience Program to determine future plans	Transport for NSW	Verify resource estimates
(b)	Field-test the transport network analysis		

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