STAGE 1 REPORT

Building the case for supporting intervention to increase sawlog production from Australia's forests

Prepared for the Tasmanian Forestry Hub

May 2023

GREENWOOD STRATEGY

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EXECUTIVE SUMMARY

Australia faces an ongoing shortage of structural grade timber for use in the construction of houses to meet the requirements of a population which will grow to 40 million by 2050. Longer term policy settings are in place to encourage the establishment of new plantations with the aim of growing more timber to meet those requirements. However, it will be at least thirty years before additional wood is available from new plantations.

There are potential forest management solutions which could be introduced now which could result in increased sawlog production from the existing forest estate. However, in some cases those solutions are not commercially viable. There is a strong rationale for Government intervention, in the form of structured incentives, to help forest owners realise these opportunities.

The analysis undertaken for this report has demonstrated that there are opportunities for Government funded incentives to support short to medium actions which can deliver up to 650,000m^3 per year of additional sawlog production by the mid-2030s, which otherwise would not be commercially viable. This represents an increase over current sawlog production of about 7%. Importantly, the proposed actions (conversion of hardwood plantations from short to long rotation and active silvicultural management of regrowth native forests) will deliver important and tangible environmental benefits for the whole community, including increased accumulation and storage of carbon, improved forest health and improved ecosystem function. The authors have developed a series of recommendations which could be considered by Governments as part of future incentive programs to support the broader aim of increasing sawlog supply. The recommendations are based on the consultant's analysis and do not necessarily represent the position of the Hub.

Proposed recommendations to support the silvicultural intervention programs outlined in this report include:

1. Emissions Reduction Fund rules:
   a) Ensure that *E. nitens* and *E.globulus* are recognised as eligible long rotation species in Tasmania and Victoria.
   b) Ensure that the additionality exclusion for government program funded projects is relaxed for long rotation conversion projects.
   c) Ensure that actively managed regrowth native forests are eligible for ERF participation where additional and tangible forest and ecosystem health benefits can be demonstrated.
2. Long rotation plantation forestry fund:
   Establish a dedicated long rotation conversion fund of up to $2.5 million annually for ten years, for eligible plantations with agreed criteria addressing species, productivity, scale and proximity to processing facilities and infrastructure.
3. Forest health restoration fund:
   Establish a forest health restoration fund of up to $4 million annually for ten years to support active silvicultural management of regrowth native forests on private land where additional and tangible forest and ecosystem health benefits can be demonstrated and the activity would not be viable without financial support. Criteria for participation to be determined through the application of an appropriate natural capital accounting method and monitoring.

This paper is supported by a detailed case study for Tasmania.

INTRODUCTION

Australia's population is forecast to grow from 25 million in 2022 to between 34 and 40 million by 2050. That will result in continued growth in demand for construction of new dwellings. Australia's forest estate currently does not produce enough sawn structural grade timber to meet existing dwelling construction demand. It has relied historically on significant levels of sawn timber imports to supplement domestic sawn wood production for use in construction. Since 2020, a growing supply-demand imbalance has emerged between housing construction requirements and available timber supply, influenced by several factors which include:

1. The 2019/20 fires in southern New South Wales and north-east Victoria which resulted in the loss of significant areas of mature softwood plantation, which will take some time to recover.
2. The reduction in sawn timber import levels associated with COVID-19 supply chain disruptions, and increased building and renovation activity in supplying economies.
3. The influence of COVID-19 economic stimulus measures implemented by the Commonwealth Government, which resulted in a significant increase in construction approvals.

While these factors have exacerbated the situation, the fundamental issues run more deeply and have been at play for some time. Australia's plantation estate has stabilised in area at about 1.74 million hectares and timber production from native forests continues to decline. Sawn timber imports are expected to be subdued for the medium term. If nothing changes, it will become increasingly more difficult to meet construction demand for timber. A recent media release by the Australian Forest Products Association (AFPA) and Master Builders Australia suggests that, on current trends, Australia will be 250,000 house frames short of demand by as early as 2035[1]. One of the more significant implications of this is the potential for substitution of structural wood for other building materials (steel and brick) which have a much larger environmental footprint than timber.

In 2018, the Commonwealth Government released its *Growing a better Australia – A billion trees for jobs and growth*[2] policy framework which aims to facilitate the establishment of one billion trees in key Australian regions by 2030. However, the lead time for production of sawn timber from plantations established today is at least 20 to 30 years. Successful implementation of the policy is welcome but won't address the short- to medium-term supply challenges.

Put simply, any increase in sawlog availability over the next 30 years means getting more out of the current forest estate. There are five options available to achieve this:

Option 1: Increase the amount of wood grown on each hectare (productivity).

Option 2: Increase the recovery of sawn timber from sawlogs (manufacturing technology).

Option 3: Increase the proportion of logs which are used to produce sawlog rather than pulp log (manufacturing technology and markets).

Option 4: Increase the proportional volume of sawlogs produced from each hectare (silvicultural interventions, markets and manufacturing technology).

[1] 250,000 house frames short by 2035 – new report confirms looming cliff without new plantings, https://ausfpa.com.au/250000-house-frames-short-by-2035-new-report-confirms-looming-cliff-without-new-plantings/ Accessed 27 September 2022

[2] Department of Agriculture and Water Resources 2018, *Growing a better Australia – A billion trees for jobs and growth*, Canberra

Option 5: Change construction systems from solid wood frames and trusses to engineered panels which require different types of logs to produce woodchips and strands (processing technology, markets).

This paper is focused predominantly on Option 4. There are management interventions which can result in increased production of timber which is suitable for use in dwelling construction. There is a potential role for governments to support those interventions through policy settings and financial resourcing. This will create a broader benefit to the Australian economy which can be quantified.

This paper provides a national perspective on the challenge of construction timber availability, the broad economic implications of that and potential solutions that the forest and wood products sector could implement, with support from governments. It includes detailed background analysis, description and quantification of potential solutions and cost benefit analysis to support potential interventions. It is supported by a detailed case study for Tasmania.

BACKGROUND AND CONTEXT

Australia needs more wood to construct enough dwellings to house a growing population that is forecast to reach as many as 40 million people by 2050. In the long term, that is best addressed by increasing the area of productive forest estate. In the next three decades, it requires strategies which can increase the availability of structurally suitable solid wood from the existing forest estate. There are five options available to address this issue:

Option 1: Grow more wood on each hectare (productivity). This option relies on improving genetic and site productivity factors such as nutrition, pest and disease management, and silviculture to increase per hectare yields of timber.

Option 2: Increase the recovery of sawn timber from sawlogs (manufacturing technology). Sawn timber recovery from all (plantation and native forest) saw logs ranged between 35 and 45 per cent for total Australian production between 2005/06 and 2020/01. For softwood plantation logs it was between 35 and 48 per cent. This suggests there may still be improvements in recovery that can be achieved. However, it requires addressing issues related to log quality and processing/manufacturing technology. Also, a critical challenge to this is that any increase in smaller and lower quality logs being used for sawn timber production will naturally result in lower recovery rates.

Option 3: Increase the proportion of logs which are used to produce sawlog rather than pulplog (manufacturing technology and markets). Saw logs comprised between 39 and 48 per cent of total log volume harvested between 2005/06 and 2020/21. There are many reasons why the proportion has been volatile through time, including the availability of markets for lower grade logs and the increase in hardwood plantation harvest (predominantly for pulp log) since about 2011. However, there may be opportunities to move more lower grade log into sawn timber production. Anecdotal evidence suggests that this occurred from early in 2020, due to the impact of the 2019/20 fires on softwood log availability. However, significant shifts are likely to require considerable changes in processing technology.

Option 4: Increase the proportion of sawlog volume produced from each hectare (silvicultural interventions, markets, and manufacturing technology). Changes in silvicultural practice and rotation length may work to generate an increase in the proportion of structural sawlog compared to pulp and lower grade logs produced from the current estate over a relatively short period of time.

Option 5: Change construction systems from solid wood frames and trusses to engineered panels which require different types of logs to produce woodchips and strands (processing technology, markets). This would require a fundamental shift through the entire supply chain, from forest growing to house construction, and is outside the scope of this report.

Defining the problem

Historically Australia's gap between supply and demand for construction timber has been met with imported sawn timber. Woods & Houghton (2022) recently completed an analysis for Forest & Wood Products Australia (FWPA) which is the most comprehensive consideration of the issue currently available. The report notes that by far the majority of Australia's sawn wood output is used in residential construction. Similarly, imported sawn wood (which historically accounts for up to 20 per cent of Australian sawn wood consumption) is used predominantly in housing construction. Forecast population growth and associated housing construction needs will see the gap between supply and demand increase over the next 30 years. Plantation area (and log production) is static and native forest harvest levels continue to decline. Imports have also declined and according to Woods and Houghton (2022) would need to increase to 40% of consumption to close the gap.

It is estimated that for Australia to be capable of producing enough timber to meet its own future needs for sawn wood, between 400,000 ha and 500,000 ha of new plantations will need to be established – an increase of up to about 30 per cent over the current plantation area (AFPA 2018; Woods & Houghton, 2022). The Commonwealth Government, in 2018, launched an ambitious policy statement aimed at facilitating the establishment of one billion trees in existing regional centres for the forest and wood products sector (Commonwealth of Australia, 2018).

While this supportive policy development is welcomed, the reality is that the lead time between establishment of new plantations and production of wood which can be used in housing construction is up to 35 years. Therefore, successful realisation of the policy will not address the more immediate requirements of the Australian economy. As outlined in the introduction to this section, there are potentially five options available which may go some way to address those requirements. In particular, there are potential management interventions available for the existing plantation and native forest estate that could result in an increase in the proportion of sawlogs and/or logs suited to engineered timber applications, being produced. There is potentially a net benefit to the Australian economy if the cost of implementing these interventions is supported by policy and budget commitment to facilitate enterprises to shift management strategies.

Log production and market dynamics

Consolidated production

Total Australian log production (Figure 1) from all commercial forest harvesting averaged 28.4 million m^3 annually between 2011/12 and 2020/21. On average 43% was classified as sawlog and veneer, although the annual variation is significant (between 10.5 and 13.5 million m^3 in any specific year). The remaining proportion comprises mostly pulp logs for both domestic use and export. Nearly 40% of all log production in that period was exported as woodchip. Average annual sawn timber production from Australian logs over the same period is about 4.6 million m^3 and is quite stable (between 4.4 and 4.8 million m^3).

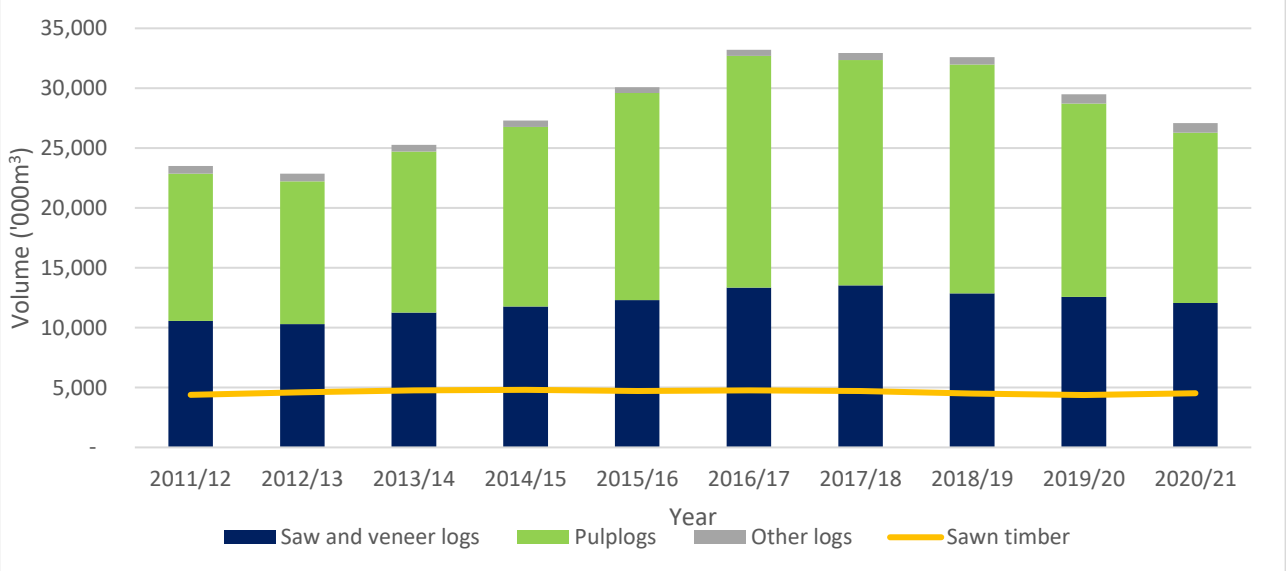

Figure 1: Australian log and sawn timber production, 2011/12 to 2020/21 (Source: ABARES, 2021)

Cursory analysis indicates a volatile relationship between sawlog production and sawn timber recovery. However, when sawlog production is adjusted for round log exports, the relationship between domestic

sawlog input and sawn timber output is much tighter (refer to Figure 2). This also demonstrates that sawlog production for domestic processing has been quite stable, between 8.5 and 9.1 million m^3 annually.

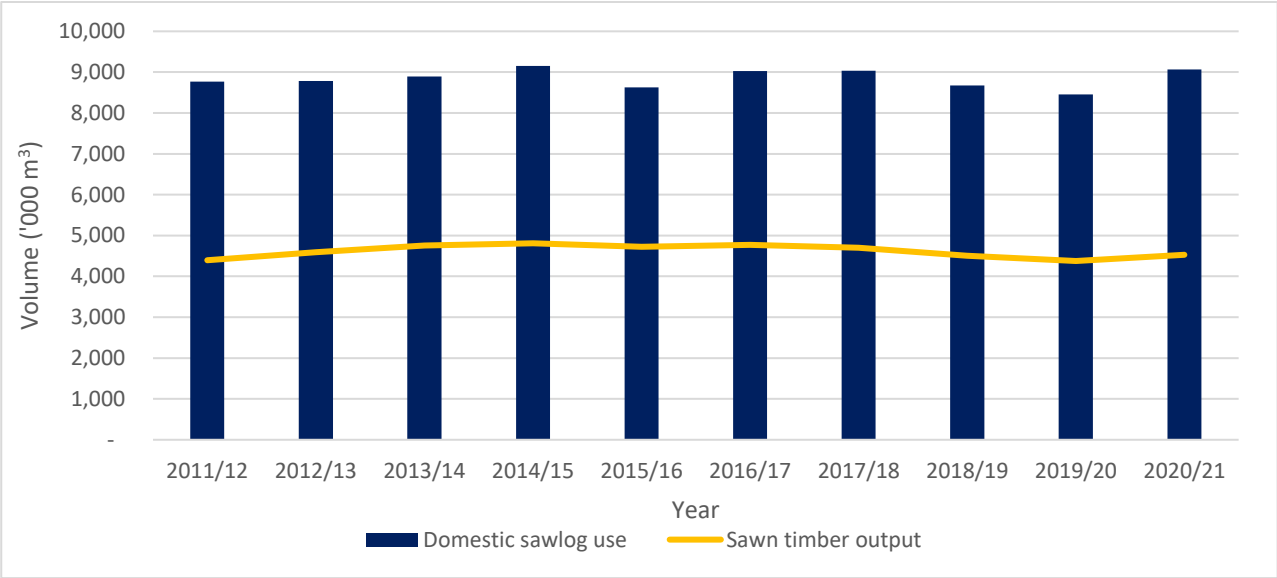

Figure 2: Domestic sawlog consumption and sawn timber output 2011/12 to 2020/21 (Source: ABARES, 2021)

An important inference is that the Australian solid wood processing sector is possibly at, or close to capacity. If that is the case, then regardless of the opportunities available to source additional solid wood from the existing plantation base, processing capacity is a limiting factor to increasing solid wood output. There is a lack of firm data about solid wood processing capacity in Australia. Downham *et al* (2019) identified a total of 299 facilities nationwide, including hardwood sawmills (182), softwood sawmills (58), wood-based panel manufacturers (23), post and pole facilities (19) and cypress sawmills (17). Hardwood and softwood sawmills were categorised by input capacity ranges. A rough analysis of total sawmill numbers in each range suggests that total annual capacity is between 2 to 3 million cubic metres for hardwood sawmills and between 9 to 11 million cubic metres for softwood sawmills. However, alignment of sawmill location with resource location complicates the picture. Figure 3 compares 2020/21 sawlog production for hardwood (native and plantation) and softwood (plantation) against estimated sawlog processing capacity by state (interpreted from Downham *et al*, 2019). This high level analysis indicates that softwood sawmilling capacity and sawlog production are reasonably well aligned for all states, and capacity is generally slightly greater than log production (between 1% and 15%). However, the picture for hardwood is quite different. In New South Wales, Victoria, Queensland and Western Australia, hardwood sawlog processing capacity is considerably greater than sawlog production (between 24% and 97%). In Tasmania, hardwood sawmilling capacity is about 53% less than hardwood sawlog production. One hypothesis for this is that the Tasmanian hardwood plantation sector produces significantly more sawlog (which has mostly been exported as round log to this point) than other regions. Native forest sawlog production (0.31 million cubic metres) is similar to hardwood sawmilling capacity (0.35 million cubic metres), which reinforces that theory.

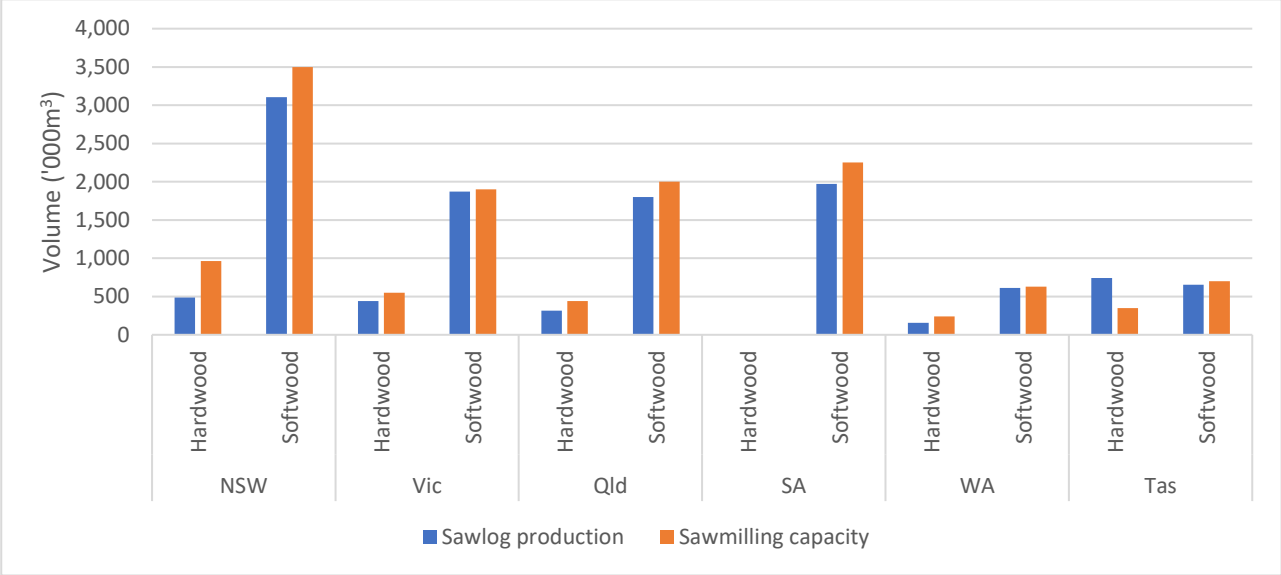

Figure 3: Comparison of 2020/21 log production and sawmilling capacity by state (Source: ABARES, 2021 and Downham et al 2019)

The broader situation with exports also raises an interesting issue. Over the decade in question, the proportion of log production which was exported (as either round log or woodchips) has ranged from 28% to 46% (refer to Figure 5). Conventional wisdom has it that these are logs which are not suitable for solid wood processing in Australia, at least with existing processing technology. Recent developments in Victoria and Tasmania, in particular, suggest that this traditional view is rapidly becoming outdated for hardwood plantations, with increasing interest in processing hardwood plantation sawlogs among some innovative millers. It is also less certain for softwood plantation and native forest production, and anecdotally some large Australian softwood sawmills have meaningfully adjusted expectations about log specifications over the past two years (Greenwood Strategy, 2021). The log production and market dynamics for each of the broad production forest types is explored in more detail below.

The question then is not so much whether some of the exported fibre could be retained for domestic production but rather, what are the capacity and technological changes required to enable some proportion of that fibre to be used in domestic solid wood manufacturing?

Softwood plantation

More than 60% of total Australian log production is from softwood plantations, which also account for about 80% of all sawlogs inputs and 85% of sawn timber output. The softwood plantation estate has remained largely stable in area over an extended period of time, although large fire events have had a medium term impact on the availability of mature plantation timber in Gippsland, north-east Victoria, southern New South Wales and Kangaroo Island over the past decade or so. Log production has also remained stable over the past five years (refer to Figure 4), following a period of increase from 2011 to 2016.

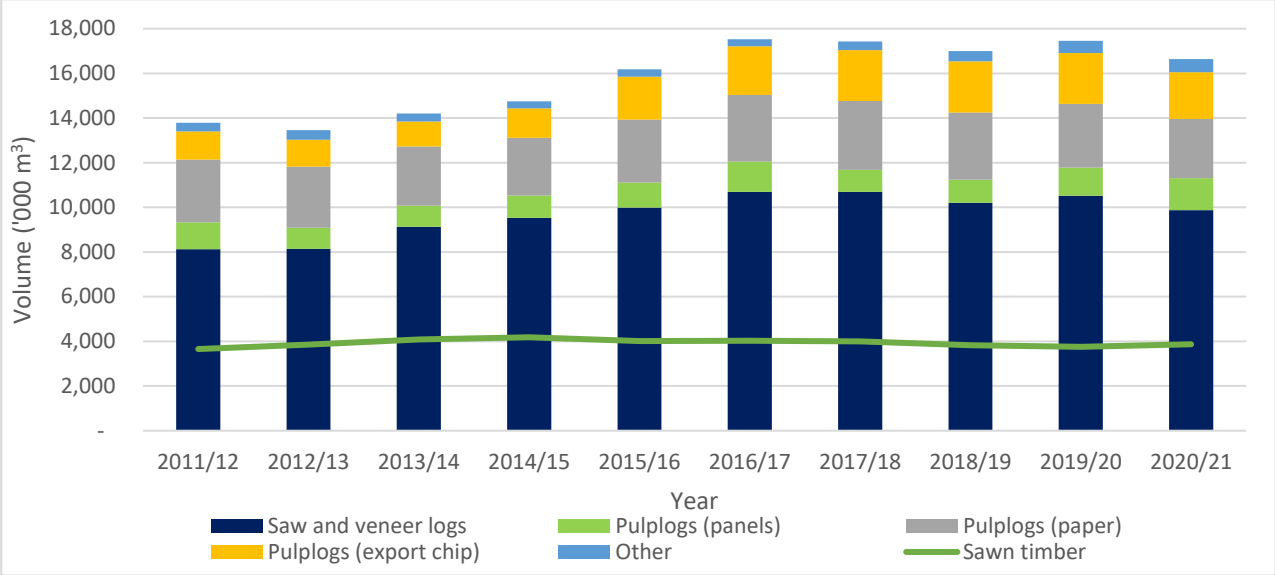

Figure 4: Australian softwood plantation log production 2011/12 to 2020/21 (Source: ABARES, 2021)

The primary driver for that increase was Chinese demand for round logs, which is reflected in the increase in sawlog production during the period. However, domestic sawn timber output has remained relatively stable, between 3.6 and 4.2 million m^3 annually, as shown in Figure 4.

Opportunities to increase the availability of fibre from softwood plantations through changes in silvicultural regimes vary considerably between regions in Australia and are strongly influenced by the relative maturity and depth of regional markets (for example, the presence of pulpwood markets that can improve the economics of processing smaller or poorer form logs for sawn timber, or provide a commercial return for early rotation thinning to encourage higher sawlog growth). There are real opportunities, although they are limited and regionally specific. For example, work undertaken for the Central West NSW Forestry Hub identified potential increased log availability of 144,000 m^3 annually (more than 10% of current regional supply) through short term actions to develop nuanced silvicultural regimes and with changes to log specifications, such as reducing small end diameter for thinning operations and relaxing sawmill specifications for sweep and log length (Greenwood Strategy, 2021). Broadly, however, these opportunities are limited in quantum and location. That is mainly because forest management regimes and sawmilling processes are already quite efficient for the softwood sector in most regions and, as shown in Figure 3, sawlog production and sawmilling capacity are currently quite closely aligned.

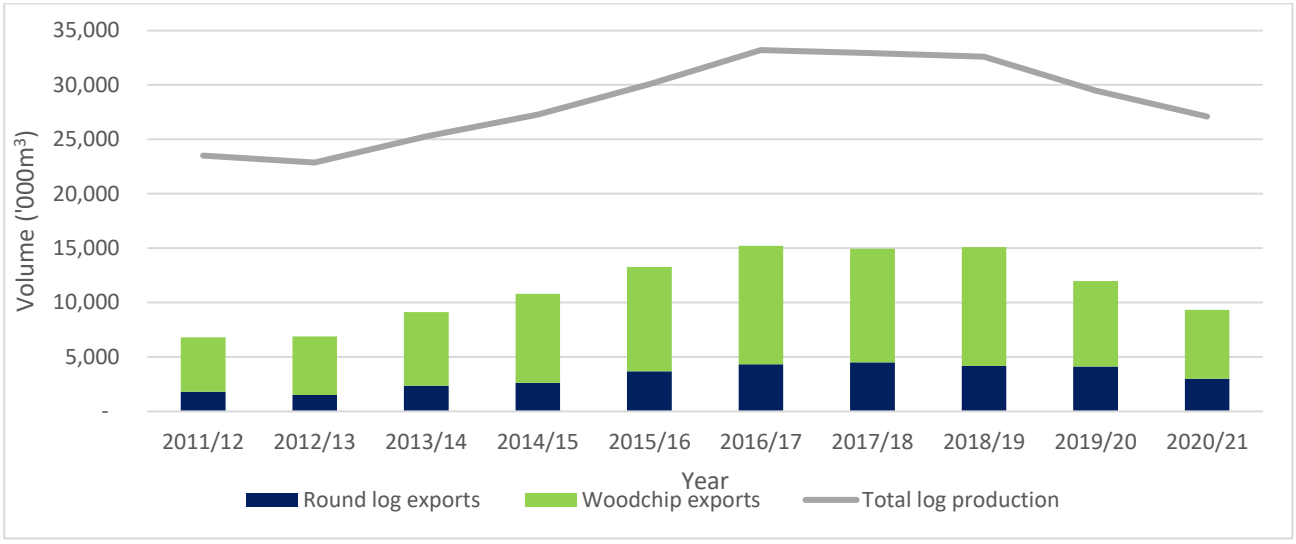

Figure 5: Proportion of log production exported as round logs and woodchip, 2011/12 to 2020/21 (Source: ABARES, 2021)

Hardwood plantation

Achieving large scale solid wood production from hardwood plantations can be considered somewhat the *Holy Grail* for Australia's forest and wood products sectors. Currently, there are 711,000 hectares of hardwood plantations in Australia which in 2020/21 produced 6.3 million m^3 of logs for woodchip production (most of which is exported for pulp and paper manufacture) and 0.68 million m^3 of sawlogs, veneer and other logs (for both domestic processing and export as round log). Most of the hardwood plantation estate is managed on short rotations (usually up to 15 years) which do not typically produce logs suitable for sawmilling. The hardwood plantation estate is dominated by two species, *Eucalyptus globulus* (Tasmanian blue gum) and *Eucalyptus nitens* (shining gum), which comprise 75% of hardwood plantations and 30% of total plantation area in Australia. Other important hardwood plantation species, particularly in the sub-tropical and tropical climatic zones, include *Acacia mangium*, *Eucalyptus pilularis* (Blackbutt), *Eucalyptus cloeziana* (Gympie messmate), *Eucalyptus grandis* (flooded gum) and *Corymbia maculata* (spotted gum), among others (Legg *et al*, 2021; Daian *et al*, 2022). Figure 6 shows the distribution of hardwood plantation species by National Plantation Inventory (NPI) region, clearly demonstrating the dominance of Tasmanian blue gum and shining gum, with *Acacia mangium* (Northern Territory) and blackbutt/flooded gum (northern NSW) the next most important species by area. Several of these other species (for example, blackbutt, flooded gum and spotted gum) are routinely managed on longer rotations with the aim of producing logs for solid wood processing, including sawlogs, veneer logs and poles, although volumes available for processing are quite small.

In recent years there has been a noticeable shift in focus by a small number of sawmillers towards plantation grown hardwood in the southern states, particularly Tasmania and Victoria. These are typically sawmills which have traditionally relied on native forest timber harvested primarily from the public forest estate and are increasingly challenged by the availability and security of this traditional source of log input. Equally, there are many hardwood sawmilling enterprises that are highly resistant to change and unwilling to shift towards plantation grown fibre.

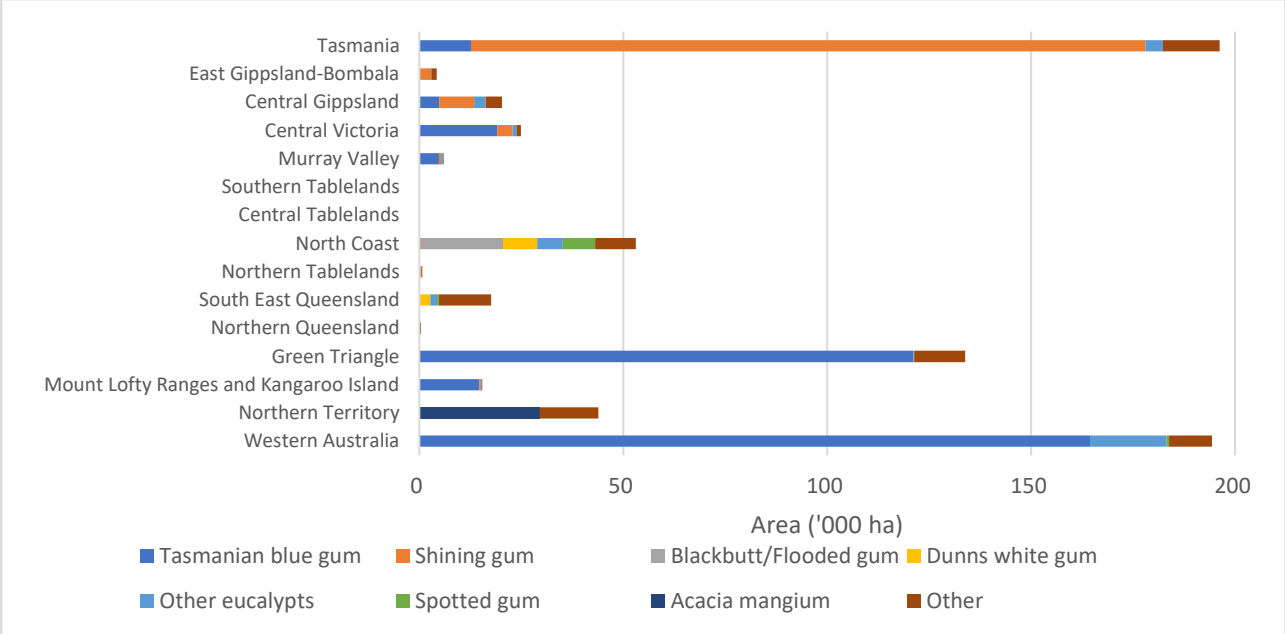

Figure 6: Distribution (area) of hardwood plantation species by National Plantation Inventory region (Source: ABARES, 2022)

There is justification for this resistance, given the very different wood properties exhibited by fast grown, young plantation eucalypts when compared with logs from older, slower growing native forest trees. Usually that means that plantation wood needs to be processed in different ways, such as veneering, finger-jointing, laminating or other more advanced engineering and manufacturing processes. Forrester *et al* (2013) note that "*Compared to industrial eucalypt plantations for pulpwood, those managed for solid wood in Australia are in an earlier state of development. This is related to current market maturity and the need to develop wood-processing industries based on this resource that can pay prices for saw and veneer logs that recover the cost of the additional silviculture that is required, relative to pulpwood production.*" (pp8). However, as discussed below, while wood properties might be a problem, there is nevertheless a continued reduction in both the total availability of native forest resource, and the size of logs produced from native forest harvesting.

While it is important to recognise the additional costs, which must be recovered, if hardwood plantations are managed for solid wood production, there is a significant body of research which demonstrates the availability of silvicultural and management approaches which can be applied to eucalypt plantations to improve their solid wood production capability (e.g., Forrester *et al*, 2013). Another important consideration is that solid wood processing techniques for small diameter plantation grown eucalypts are necessarily different than for large diameter native forest eucalypts, particularly because of the challenges with growth stresses in younger, smaller diameter logs (although these challenges can also arise for small diameter logs sourced from native forest operations). Consequently, traditional native forest sawmilling quarter-sawing strategies are generally not suitable (Washusen, 2013). However, sawmills that are already employing successful alternative sawing strategies for small diameter native forest logs are likely to be more successful and several actors are currently actively sourcing and processing hardwood plantation sawlogs.

In Tasmania, the shift to longer rotation hardwood plantations with a focus on sawlog production is reasonably well advanced but there are further and substantial opportunities to expand this. There is also a significant opportunity, based on existing scale, to consider doing the same in the Green Triangle and southwest Western Australia. While there may exist opportunities in northern New South Wales and south-east Queensland, in these regions plantation management is already focused on solid wood production so

enhancement is likely to be focused towards any potential improvements in silviculture and will be much smaller in scale with respect to increased sawlog production in the short term.

Native forest

Native forest sawlog production has reduced by 35% since 2011/12 (refer to Figure 7), continuing a longer term trend which has seen production reduced by 60% since 2001/02. Over the next decade the trend will continue, particularly due to the planned cessation of public native forest harvesting in Western Australia by 2024 and Victoria by 2030 forecast reductions in Queensland public native forest production and continued downward pressure in New South Wales and Tasmania. It is realistic to observe that, at this point, the only public native forest opportunities to increase sawlog output are for regrowth forests in Tasmania.

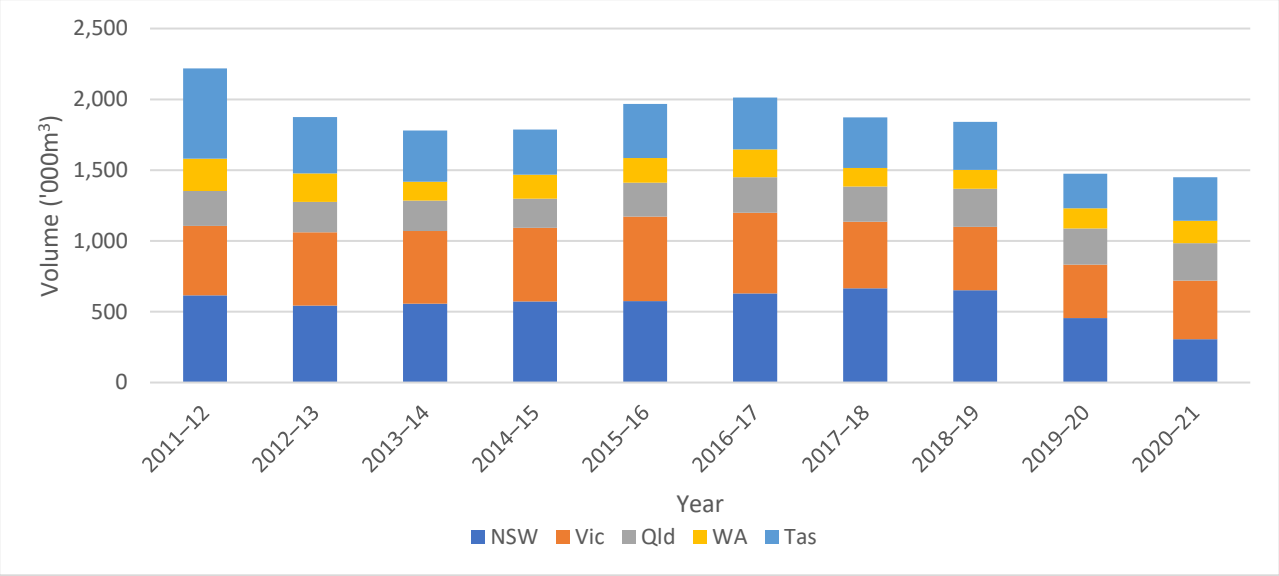

Figure 7: Native forest sawlog and veneer log production 2011/12 to 2020/21 (Source: ABARES, 2021)

There are significant levels of private native forest harvesting in specific regions (namely northern Tasmania, north-east New South Wales and south-east Queensland). This resource is viewed as increasingly important for supplementing or replacing reduced public native forest harvesting levels. Reliable data about the production of timber from privately owned native forests in Australia is difficult to source. However, it is accurate to state that in these key regions, private native forest timber constitutes a significant proportion of total native forest timber harvest. Parsons (1999) noted that about 2.5 million m^3 of logs were harvested annually from private native forests in the eastern states (including Victoria). However, that was dominated by private native forest harvesting in Tasmania, which has declined considerably from a high of 2.5 million m^3 in 2000 to 276,000 m^3 in 2021 (Private Forests Tasmania, 2021). Lewis *et al* (2020) estimate that 58% of all native forest timber production in Queensland is from private property and about 56% of the total in northern New South Wales. Stakeholder surveys undertaken by the NSW Department of Primary Industries in 2017 indicate that the figure for northern New South Wales is about 275,000m^3 annually, or 38% of total native forest production[3] at that point. However, ABARES[4] (2021) statistics indicate that total native forest removals have declined in New South Wales from 980,000m^3 to 400,000m^3 between 2017 and 2021. That is

[3] https://www.dpi.nsw.gov.au/forestry/private-native-forestry accessed 24/08/2022

[4] Australian Bureau of Agricultural and Resource Economics and Sciences

due to the reduction in public native forest harvest, so it is likely the proportion from private land has increased. Anecdotal evidence suggests that private native forest harvest levels in Victoria are probably less than 30,000m^3 annually, and even lower in Western Australia and the Northern Territory. There is no private native forest harvesting in South Australia.

Based on this evidence, it is estimated that nationally current private native forest harvest levels are between 730,000m^3 and 890,000m^3 annually. Nevertheless, ABARES reported total native forest removals (including public forests) of 3.328 million m^3 in 2021. That means that private native forestry contributes up to 25% of all native forest harvest nationally and by 2030, private native forest could therefore contribute more than 40% of total native forest timber production levels.

Table 1: Estimated private native forest production levels (2021 and 2030) compared to total production (ABARES, 2021; author analysis)

	Total annual native forest production ('000m^3)		**Estimated annual private native forest production ('000m^3)**	
Jurisdiction	2020/21 (ABARES)	2030 (estimated)	Low	High
NSW	400	400	275	330
Vic	916	15	15	30
Qld	289	250	168	220
SA	0	0	0	0
WA	415	0	0	0
Tas	1,308	1,300	276	276
NT	0	0	0	0
ACT	0	0	0	0
Total	3,328	2,050	734	886
Percentage (2030)			**36%**	**43%**

The focus on private native forest is important because in many cases these areas are silviculturally degraded or in need of silvicultural treatment to improve productivity. In Tasmania, there is increasingly a market for logs produced from silvicultural treatment (thinning from below) which provides a revenue stream for this activity (on both public and private land). Figure 8 and Figure 9 show a recent private property regrowth thinning operation near Upper Blessington in Tasmania, and sawlogs and pulplogs produced from the operation, which was undertaken on a block that was previously clearfelled in the 1970s and once earlier, probably prior to World War II. The residual stand comprises higher quality stems, at a basal area of around 12m^2/ha (50% of pre-thinning basal area), which will grow into a sawlog crop over the next decade or so.

Figure 8: Private native forest regrowth thinning, Ben Nevis, Tasmania (Greenwood Strategy, 2022)

Figure 9: Sawlogs (left) and pulp logs (right) produced from private native forest thinning operation, Ben Nevis, Tasmania (Greenwood Strategy, 2022)

In New South Wales and Queensland, the forests have a very different management history which includes routine application of diameter limited harvesting (thinning from above, with stems below about 40cm diameter retained) and a complicated interface with grazing and burning. Further, harvesting favours preferred species and can result in changes to the species distribution within stands (see Figure 10). The markets are also very different, with few low-grade log product opportunities available in the absence of pulpwood markets. There is, therefore, little incentive for landowners to engage in costly silvicultural interventions which can improve forest health and commercial productivity (refer to Figure 11).

Figure 10: Spotted gum - ironbark forest in southern Queensland, showing increasing retention larger ironbark and suppressed spotted gum growing stock (Greenwood Strategy, 2022)

Figure 11: Degraded and suppressed spotted gum-ironbark forest in southern Queensland which has been subject to several diameter limited harvesting events since mid-20th century, as well as grazing and related regular fire (Greenwood Strategy, 2022)

That said, the private native forest resource in northern New South Wales and south east Queensland is significant in scale, generally comprises desired species and private native forest harvesting is actively supported and encouraged by both state governments. There are also well established markets for sawlogs.

However, in addition to improving medium term sawlog production capacity, well designed and executed silvicultural strategies have the potential to substantially improve ecosystem services outcomes and the carbon sequestration capacity of degraded or growth limited stands. This presents a potential opportunity to engage in stand improvement activities which deliver increased sawlog availability in the medium term, whole also providing on-farm and broader environmental benefits.

Population and housing construction

Forecast population growth

The Australian Bureau of Statistics (ABS) projected in 2017 that population would reach between 31 and 33 million people by 2035, and between 34 and 41 million people by 2050[5], from a base of 25 million. That represents 6 to 8 million (24-32%) increase by 2035 and a 9 to 16 million (36-64%) increase by 2050 (refer to Figure 12).

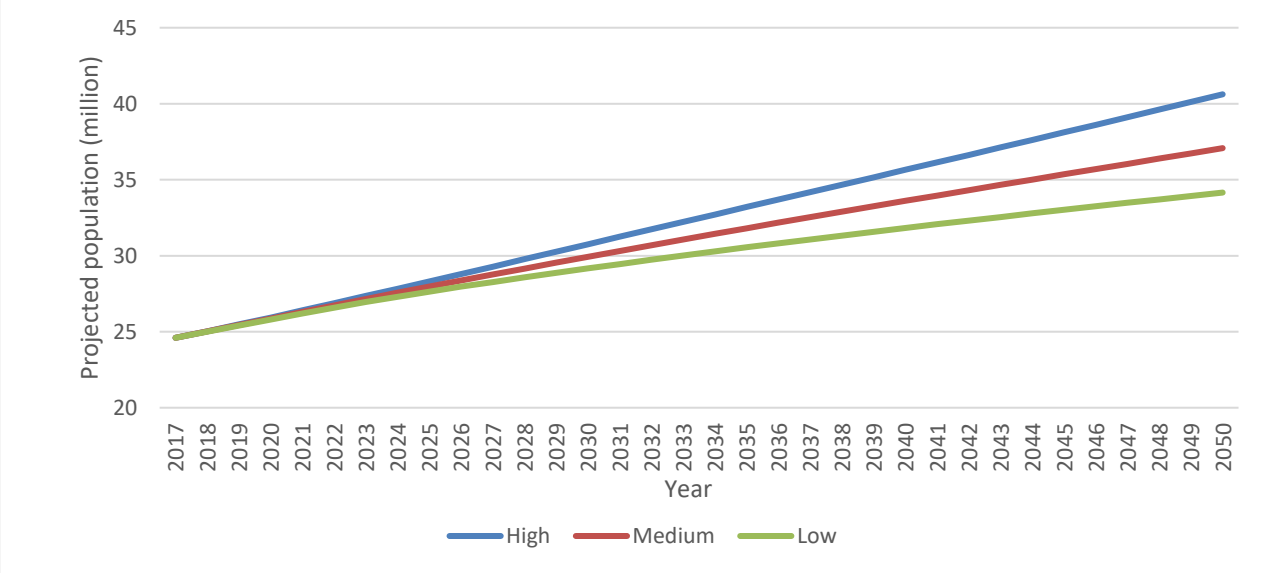

Figure 12: Projected Australian population growth to 2050 (Source: ABS, 2017)

Population, new construction and wood use

Historically there is a demonstrable but weak relationship between total new dwelling construction and population growth (refer to Figure 13). The relationship for new house (freestanding) is somewhat stronger. However, both in both cases there are likely to be other influencing economic factors. For example, the Reserve Bank of Australia's cash rate rose from 4.25% to 7.25% between 2002 and 2008, coinciding with a period of generally declining commencements. The Global Financial crisis in 2009 coincided with a steep reduction in commencements, followed by a steep rise when the Rudd Government intervened with economic stimulus measures. The period from 2011 until 2020 has been characterised by lower interest rates, coinciding with a steady increase in commencements. CCOVID-19 resulted again in a steep decline, followed by a steep increase when the Morrison Government introduced economic stimulus measures.

[5] ABS 2017 population projection https://www.abs.gov.au/statistics/people/population/population-projections-australia/2017-base-2066 (accessed 26 January 2023)

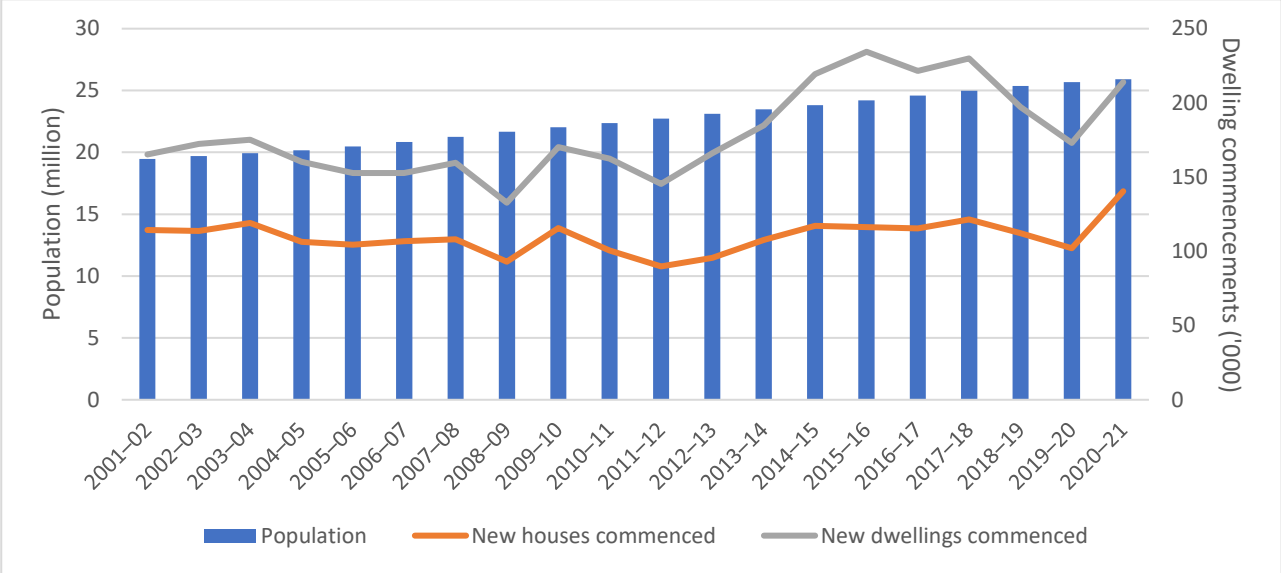

Figure 13: Population and new dwelling commencements (2001/02 to 2020/21)

By contrast, there is a much stronger trend between population and per capita wood consumption and, of concern to the forest and wood products sector, it is a downward trend (refer to Figure 14).

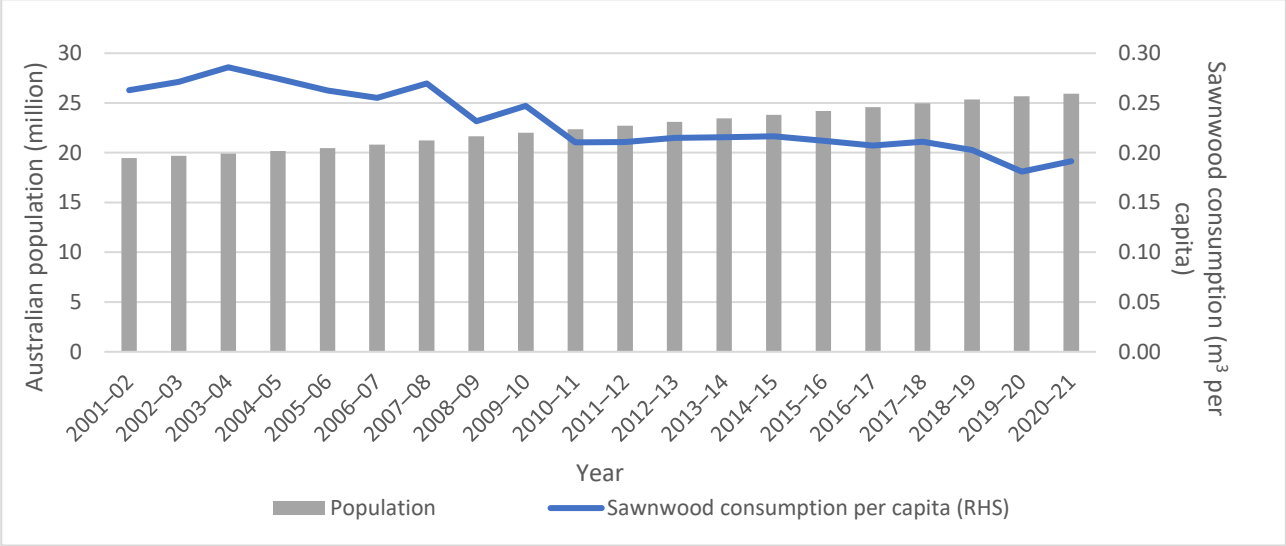

Figure 14: Sawn timber consumption and population growth (Source: ABS, FWPA)

Since 2009 there has also been a somewhat negative trend in the relationship between new dwelling commencements and wood consumption (refer to Figure 15). Total sawn timber use per dwelling peaked between 2008 and 2012. Interestingly, while new dwelling commencements spiked in 2020/21, timber use per dwelling dived. This raises two questions. First, does it mean that builders are using timber less or more efficiently in new house construction? Second, if builders are not using timber, then what are they using?

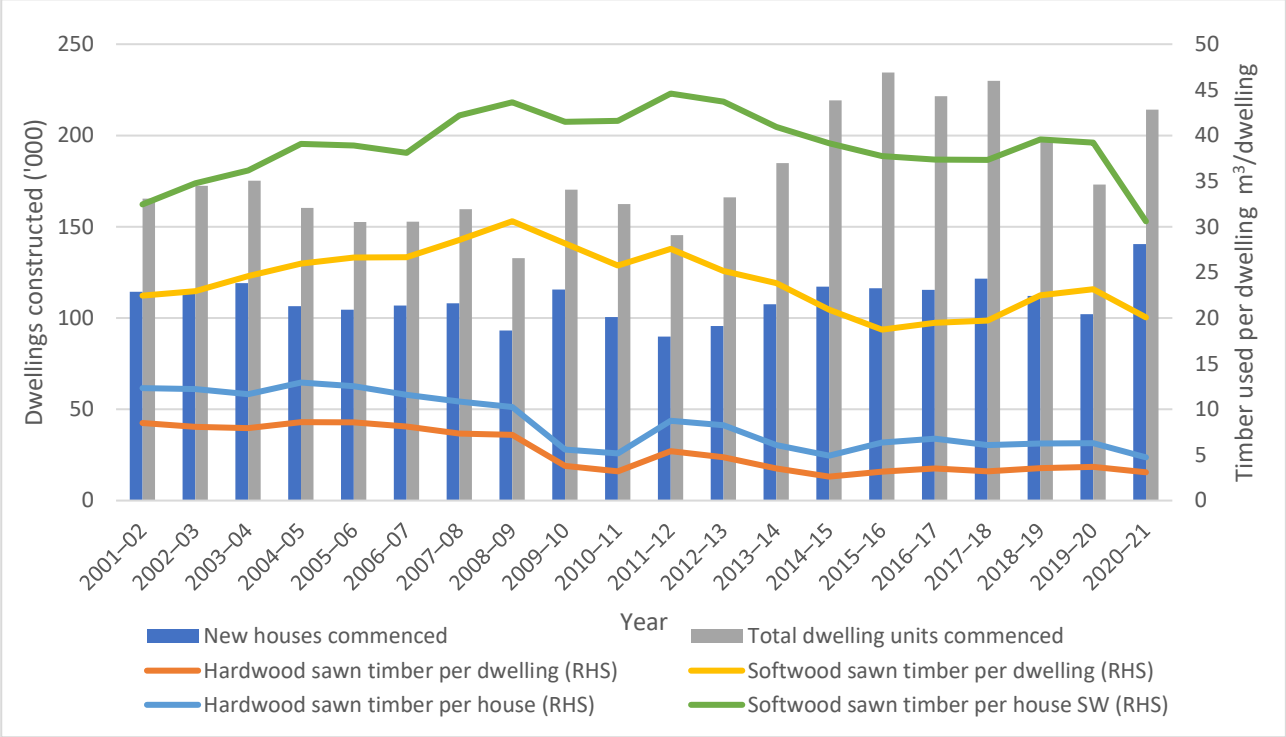

Figure 15: Per dwelling sawn timber use and dwelling commencements (Source: ABARES 2021)

Substitution of building materials

In considering these two questions, it is important to note that timber is still the dominant structural (load bearing) house construction material (refer to Figure 16), representing 74% of the national market. However, the completion rate of detached homes is slowing[6], potentially because of limitations in building materials availability.

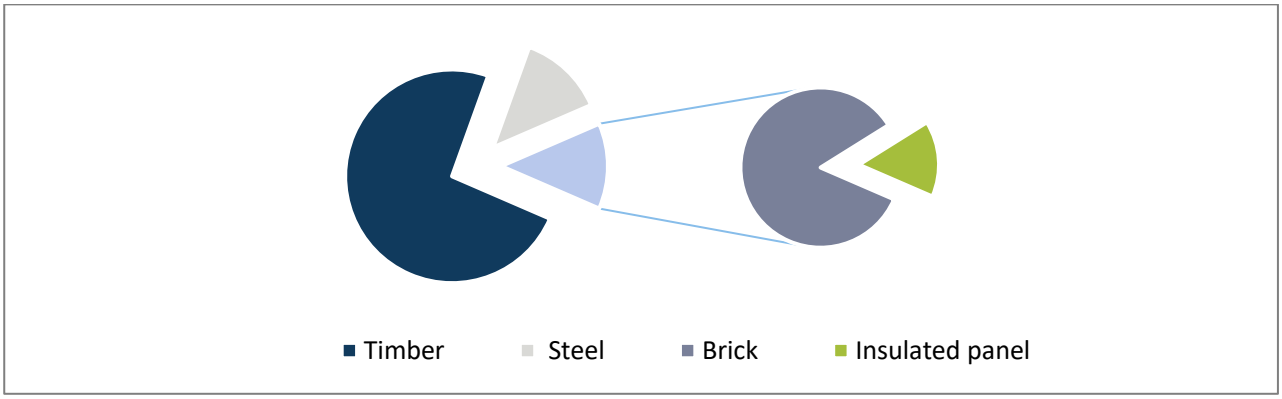

Figure 16: Market share of housing construction materials in Australia (Source: Australian Construction Insights, 2018)

Inevitably, challenges in the availability of a key building material will prompt a shift to alternatives. Certainly, the market share of non-timber load-bearing construction materials has increased. Greenwood Strategy

[6] https://fwpa.com.au/what-s-the-story-with-housing-construction-cycles-how-long-until-my-house-is-built/, Accessed 15 May 2023

(2021) identified that the traditional market of 1-2 storey housing is increasingly challenged by steel framing and, to some extent, other options as well and that volume housing contractors no longer see timber as the "go-to" solution. Materials selection decisions are driven by accountability to cost, supply chain reliability, production efficiency, compatibility with digital technology and other performance criteria. Fabricators are not necessarily aligned purely with timber, with some offering steel and timber as almost interchangeable framing options. Builders consider efficiency to be the top priority in choosing between construction materials, determined by availability, price variability and product specification variability, all characteristics which contribute to timber framing being perceived as a riskier choice.

In this context, timber framing is still strongly preferred for detached and Class 1 and 2 attached dwellings in Australia (Australian Construction Insights, 2018), as demonstrated in Figure 17.

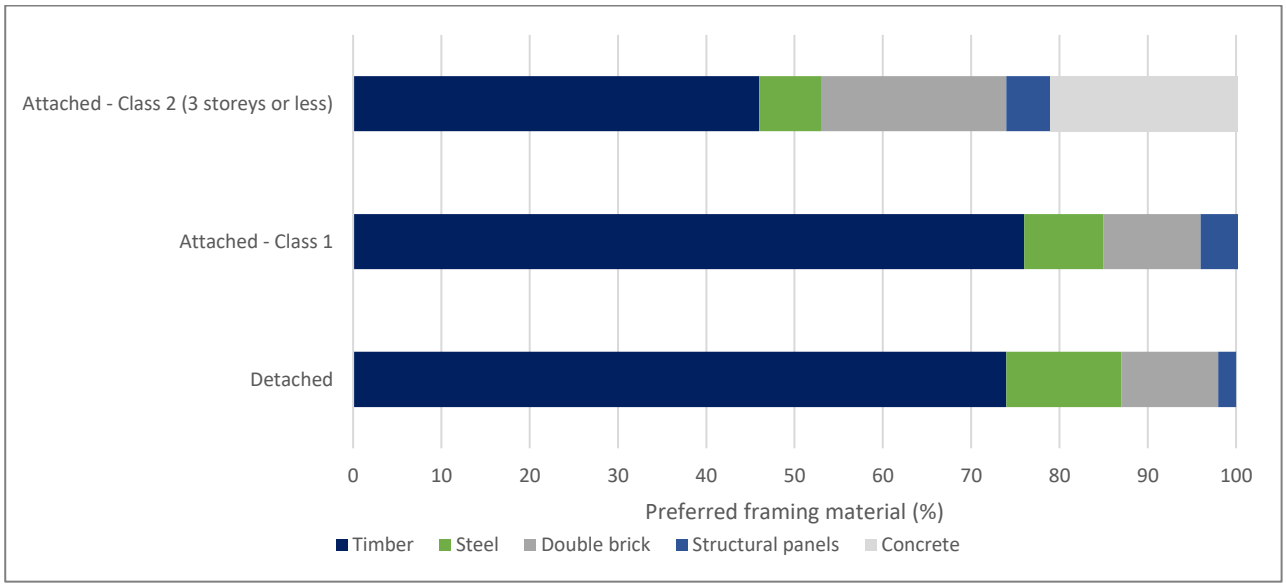

Figure 17: Preferred framing material for Australian homes (Source: Australian Construction Insights, 2018)

However, the proportion of dwellings built using timber frame construction reduced in all three categories between 2016 and 2018, as shown in Figure 18. Further, a significant proportion of businesses involved in home construction consider it to be easy or very easy to change to another framing material – that is, there are few barriers to change. These observations, when combined, suggest that there are ongoing challenges to the preference of timber in dwelling construction, particularly when considering the dramatic reduction in timber use for Class 2 attached dwellings over a short period of time.

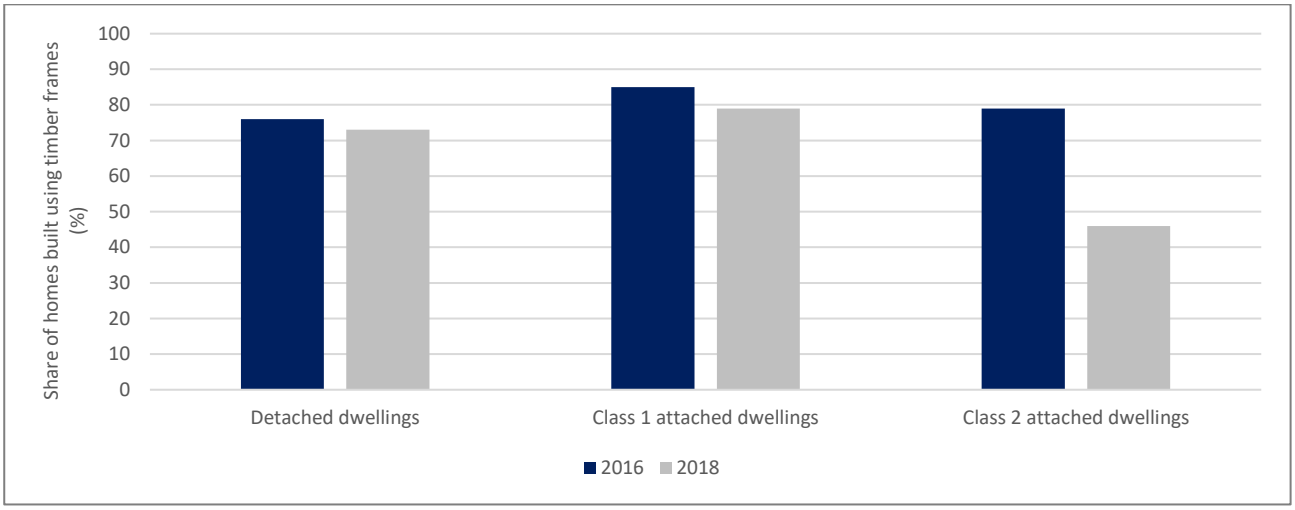

Figure 18: Change in proportion of dwellings constructed with timber framing between 2016 and 2018 (Source: Australian Construction Insights, 2018)

Medium and long term implications

Ultimately there are two major implications of the current and forecast supply/demand imbalance for Australia's forest and wood products sector:

1. Australia will need increase its reliance on imported sawn wood and wood-based construction materials, and therefore its exposure to potentially volatile and unreliable global supply chains.
2. The construction industry will likely increase the substitution of alternative and less sustainable (non-timber) building materials which could see a major contraction of wood-based industries in Australia.

In relation to the first point, increasing reliance on imports will expose the Australian economy to significant fluctuations in both the supply and price of goods and services. During the pandemic Australia witnessed robust growth in demand for all building materials, including wood products. However, the spike in demand was not met by an increase in supply. Importantly, timber prices rose dramatically with the pandemic and are not expected to decrease in the short to medium term. COVID-19 also had a significant influence on global logistics, particularly sea freight. Exacerbating this issue, Australia relies heavily on transport cost differentials as a competitive trade advantage, due to an overstock of sea freight containers and China's harsh trade sanctions have worsened the problem. While it is not the sole concern, disruption to global supply chains has played a key role in the current situation.

With respect to the second point, if there is a concerted shift to alternative structural building materials, as outlined in the previous section, there is a real risk that the dominant market position maintained by timber framing will be significantly and permanently reduced in favour of alternatives, particularly steel. This is despite the obvious sustainability advantages of timber.

ASSESSMENT OF OPPORTUNITIES

Where and what?

Table 2 presents a heat map of opportunities to improve short and medium term sawlog production by National Plantation Inventory (NPI) region and forestry type (softwood and hardwood plantation and public and private native forest).

Table 2: Opportunities heat map by National Plantation Inventory region

NPI region	Softwood plantation	Hardwood plantation	Public native forest	Private native forest
Northern Territory				
Northern Queensland				
South East Queensland				
Northern Tablelands				
North Coast				
Central Tablelands				
Southern Tablelands				
Murray Valley				
East Gippsland – Bombala				
Central Gippsland				
Central Victoria				
Mount Lofty and Kangaroo Is				
Green Triangle				
Tasmania				
Western Australia				

The key opportunities (green shaded cells) have been determined to occur in southeast Queensland and north coast New South Wales (private native forestry), the Green Triangle (hardwood plantations), and Tasmania (hardwood plantations, public native forestry and private native forestry). The yellow shaded cells represent regions and species where there are opportunities but they are constrained by lack of processing capability (e.g., hardwood sawmilling in Western Australia, limited ability to easily increase processing capacity (e.g., softwood processing in Gippsland and the Murray Valley) or other factors. Orange and red shaded cells indicate regions where opportunities do not exist or are significantly hampered by economic and infrastructure factors.

The role of silviculture

Silvicultural regimes are typically designed to meet the objectives of the forest grower keeping in mind the suitability and capability of the forest type to meet those objectives. In Australia, softwood plantations have been established and grown over a very long period of time with primary purpose of producing sawlogs for the domestic construction industry. Softwood plantation silvicultural regimes (along with tree-breeding programs) have been designed and refined with this specific purpose in mind. By contrast, the majority of Australia's hardwood plantations have been established since 1990 with the specific aim of producing logs for woodchip production and silvicultural regimes developed accordingly. There are, however, important exceptions to this, including large areas of shining gum plantations in Tasmania and a mix of durable eucalyptus species in north-east New South Wales and south-east Queensland. Native forestry is somewhat more complex and varies considerably in silvicultural intent depending on the history of the forest, location, wood properties and growth characteristics of the species present and the availability of markets.

Hardwood plantations

Rotation length

Hardwood pulpwood plantations are usually grown on rotation lengths between 10 and 15 years, generally with no silvicultural interventions following initial establishment. Eucalypt plantations grown for solid wood production need to be grown over longer rotations, for two key reasons: (i) to ensure log size is sufficient for solid wood processing; and (ii) to maximise the development of desirable wood properties for solid wood processing. The optimal rotation length varies considerably with species, climate, site quality and other silvicultural interventions (e.g., thinning and pruning).

Wood *et al* (2009) calculated that rotation length should be extended to between 17 and 28 years for shining gum and Tasmanian blue gum plantations in Tasmania, with variability driven by site quality and thinning and pruning status, in order to optimise net present value for harvestable sawlogs. By contrast, Maraseni *et al* (2009) calculated that spotted gum plantation rotation length in south-east Queensland is optimal at age 31.

The decision to increase the rotation length of a hardwood plantation and shift the silvicultural and production focus from pulpwood to solid wood comes at a price. That price includes the increase in silvicultural interventions, such as non-commercial thinning and pruning, and the negative effect of longer rotations on net present value.

Processing, markets and price

The ability to convert eucalypt plantations from short rotation pulpwood to long rotation solid wood production requires the presence of appropriate processing capacity, markets for a full range of log products and a market price for saw and/or veneer logs which justifies the impact on net present value of increasing the length of the rotation. In Tasmania, the first two criteria are demonstrably fulfilled, especially for *E. nitens*. It is less clear that prices for sawlogs are sufficient to justify the shift. In Victoria (Green Triangle) none of the criteria have yet been demonstrably satisfied. However, private property eucalypt plantation logs are

currently being transported from Tasmania to Gippsland for solid wood processing and it is therefore not inconceivable that *E. globulus* logs could be harvested and transported from the Green Triangle to Gippsland for processing and advanced manufacturing on the same basis. Again, the question remains whether the price is sufficient to justify a shift from 15 year rotations to something closer to 30 years.

Assessment of potential

Northern Tasmania and south west Victoria are the focus areas for potential to increase hardwood plantation rotation length to shift from pulpwood to solid wood production. In northern Tasmania there is an estimated 156,000 ha of eucalyptus plantation (Greenwood Strategy, 2020) and in the Green Triangle, 142,000 hectares (Greenwood Strategy, 2022), a total of about 298,000 hectares. In both regions, a significant proportion of those plantations are located within a reasonable economic haulage distance of major processing and exporting facilities.

ABARES has published data which indicates the potential productivity of eucalypt sawlog regimes in Tasmania. However, data are not available for the Green Triangle. In Tasmania, it is assumed that eucalypt plantations with an average mean annual increment (MAI) of 20m^3/ha/yr will produce 150m^3/ha of sawlog and 170m^3/ha of pulplog at a clearfall age of 25. For the Green Triangle it is assumed that a MAI of 17m^3/ha/yr would apply on a rotation length of 30 years and that 30% of clearfall volume would be sawlog (clearfall volume of 120m^3/ha sawlog and 280m^3/ha pulplog).

Assuming that 10% (29,800 hectares) of the estate could readily be converted from short to long rotation over a ten year period, that represents an annualised increase in sawlog production of 404,400m^3 at maturity, with Tasmanian production increases commencing within 16 years (2038) and Green Triangle within 18 years (2040). An alternative approach could be to convert the area over a shorter period of time and bring forward the sawlog production.

An important question is whether it would be possible to bring forward sawlog production by converting slightly older plantations (older than 9 or 10 years). The critical consideration is the extent to which older plantations are capable of responding to silvicultural intervention (thinning) to generate a sufficient growth response for future sawlog production.

Native forests

Location and forest type

There are two main regions that warrant focus: Tasmania and the region encompassing north coast New South Wales and southeast Queensland. There are significant differences between these two broad regions with respect to forest types, silvicultural characteristics, management history, land tenure and economic factors (such as available markets and haulage distance).

For example, in northern Tasmania there is a significant even-aged regrowth forest resource on both public and private land that has resulted from clearfall harvesting in the 1970s and 1980s. It is dominated by ash (*E. delegatensis* and *E. regnans*) and other light, temperate species (such as *E. obliqua* and *E. viminalis*). These forests respond well to thinning from below, a silvicultural intervention that can bring forward future sawlog production.

In north coast New South Wales and southeast Queensland, by contrast, the opportunities for silvicultural stand improvement occur predominantly on private land, with production dominated by spotted gum (*Corymbia maculata*) and various ironbark species with blackbutt (*E. pilularis*), mahoganies and a variety of other durable wood species also harvested. Many of these forests have a long history of selective harvesting which targets preferred species and larger diameter trees. In addition, there is often a strong interface with cattle grazing and managed fire, all of which have contributed to widespread forest quality issues (i.e.,

commercially and ecologically degraded forest). In many cases, returning these forests to commercial productivity requires costly interventions which are not readily justified by a short term revenue stream (Lewis *et al*, 2020).

Processing, markets and price

In Tasmania there is considerable and competitive market demand for both pulpwood and sawlogs that means silvicultural activity can be undertaken commercially. In New South Wales and Queensland, markets are well established for sawlog and other high value products. However, there are limited markets for lower grade logs.

External benefits

An important outcome from active management of these forests is the on-farm and external environmental benefits which derive from improving forest structure and health. These include improved ecological function and diversity, management of soil and water and increased carbon sequestration capacity in healthier, growing forests.

Assessment of potential

In Tasmania there is an estimated 144,000 hectares of commercially viable and harvestable regrowth forest on private land, with an estimated 21.9 million m^3 standing volume (Wilson & Tys, 2020). On public land, the estimated area is about 63,000 (clearfell regeneration between 1960 and 2010) with an estimated standing volume between 15 and 18 million m^3. There is currently an active regrowth thinning program on both public and private land which is generating pulplog and sawlog, as well as bringing forward future sawlog production. The program involves thinning from below, removing about half the basal area and about 40% of the standing volume. Harvested logs comprise small sawlog (10%) and pulplog (90%). It is conservatively assumed that public forest standing volume averages 250m^3/ha and private forest standing volume averages 200m^3/ha for medium and high quality stands. Assuming that 10% of the private forest is made available for harvest over the next ten years, that represents an additional 115,200m^3/yr (11,520m^3 sawlog and 103,700m^3 pulplog). Similarly, assuming the public land program is undertaken over ten years, an additional 600,000m^3/yr of log could become available (60,000m^3 of sawlog and 520,000m^3 of pulplog). In addition to the immediate increase in log (including sawlog) production, the regrowth thinning program will result in bringing forward future sawlog production. Extrapolating these assumptions, the average retained stand will have a standing volume of 150m^3/ha for public forest and 120m^3/ha for private forests. The current expectation is that these stands will be grown on for a further 10 to 15 years, at an average MAI of 1m^3/ha/yr. It is expected that at harvest they will produce a higher ratio of 50% sawlog to 50% pulplog. It is therefore possible that by the mid-2030s, an additional 500,000-600,000m^3 of sawlog could be produced annually from these thinned stands.

In New South Wales and Queensland the opportunity to improve future sawlog production is quite different and relates to silvicultural interventions to improve the condition of degraded forests. Lewis *et al* (2020) undertook a comprehensive assessment of the private native forest resource in the region, estimating a total area of approximately 2.6 million hectares of potentially harvestable private native forest. The report specifically notes that, while much of this area is in a degraded condition, if there is an economic justification for silvicultural intervention, productivity can be improved. It is estimated in the report that an investment in silvicultural treatment of 100,000 hectares could generate an increase in annual sustainable yield of 91,000m^3, between 20-25% over current estimated harvest levels. The report modelled net present value for various silvicultural operations and objectives. Importantly, it identified that financial incentives at around $30/ha/yr to assist landowners to engage professional and expert assistance would be financially viable at a 5% discount rate.

Options for silvicultural intervention

Conversion of hardwood plantations to long rotation

Process and requirements

Projects to convert short rotation to long rotation plantations are recognised in Schedule 2 of the Carbon Credits (Carbon Farming Initiative-Plantation Forestry) Methodology (the plantation forestry method) under Australia's Emissions Reduction Fund (ERF). Australian Carbon Credit Units (ACCUs) can be earned for the difference in carbon accumulation between the baseline (short rotation) scenario and the additional carbon stored by switching to a long rotation. There are specific eligibility requirements, including:

1. The plantation must be in or within 100km of a National Plantation Inventory (NPI) region (refer to Figure 19).
2. The plantation must fall within a specified zone in relation to rainfall (refer to Figure 20).
3. The current species must be recognised as a short rotation species (including *E. nitens* and *E. globulus*).
4. The new species must be recognised as a long rotation species (currently does not include *E. nitens* and *E. globulus*) or have an undefined rotation which means that the project proponent must be able to demonstrate that the species has been grown and harvested as a long rotation species within 100km of the project area (likely for *E. nitens* in Tasmania, possible for *E. globulus* in Tasmania and Victoria).
5. An independent financial assessment must be undertaken to demonstrate that a long rotation would not have been viable in the absence of ERF.

Another potential barrier currently is the fact that the additionality rules in the plantation forestry method do not allow for ERF participation where the project can be funded by another government program.

Preliminary analysis and quantification

Preliminary industry analysis indicates the cost of converting from a short rotation pulpwood plantation to a long rotation solid wood regime is about $2,000/ha. Schedule 2 projects which have been successful in ERF auctions have delivered about $1,250/ha for ACCUs (based on $16.94/ACCU during Auction 13). The most recent ERF auction (Auction 14) $17.35 per ACCU, which would improve ERF returns to approximately $1,300/ha. That leaves a gap of about $700/ha.

As identified earlier, the hardwood plantation estate in Tasmania and Victoria is about 298,000 ha. Conversion of 10% of that estate to long rotation plantations over a ten year period would deliver an estimated annualised increase in sawlog production of 404,400m^3 by the mid-2040s (approximately 4.5% increase on current sawlog production). Applying the current differential between ERF auction value and silvicultural costs of $700/ha, if Commonwealth and/or state government support was available for this transition, the annual cost would be about $2.1 million, which would reduce if the ERF auction returns for ACCUs continues to rise.

What is required to make it happen?

This report details three potential interventions which are aimed to facilitate a significant shift from short to long term hardwood plantations:

1. Species eligibility: It is imperative that industry be provided confidence that *E. nitens* and *E. globulus* in Tasmania and Victoria, as a minimum, are eligible species for long rotation plantations under Schedule 2 of the plantation forestry method.
2. Additionality: it is important to ensure that any additional incentive is excluded from the current additionality exclusions related to Government program funding.
3. Program funding: an incentive, in the form of a government subsidy to bridge the gap between ACCU price and the costs to convert to long rotation is required at up to $2.5 million annually.

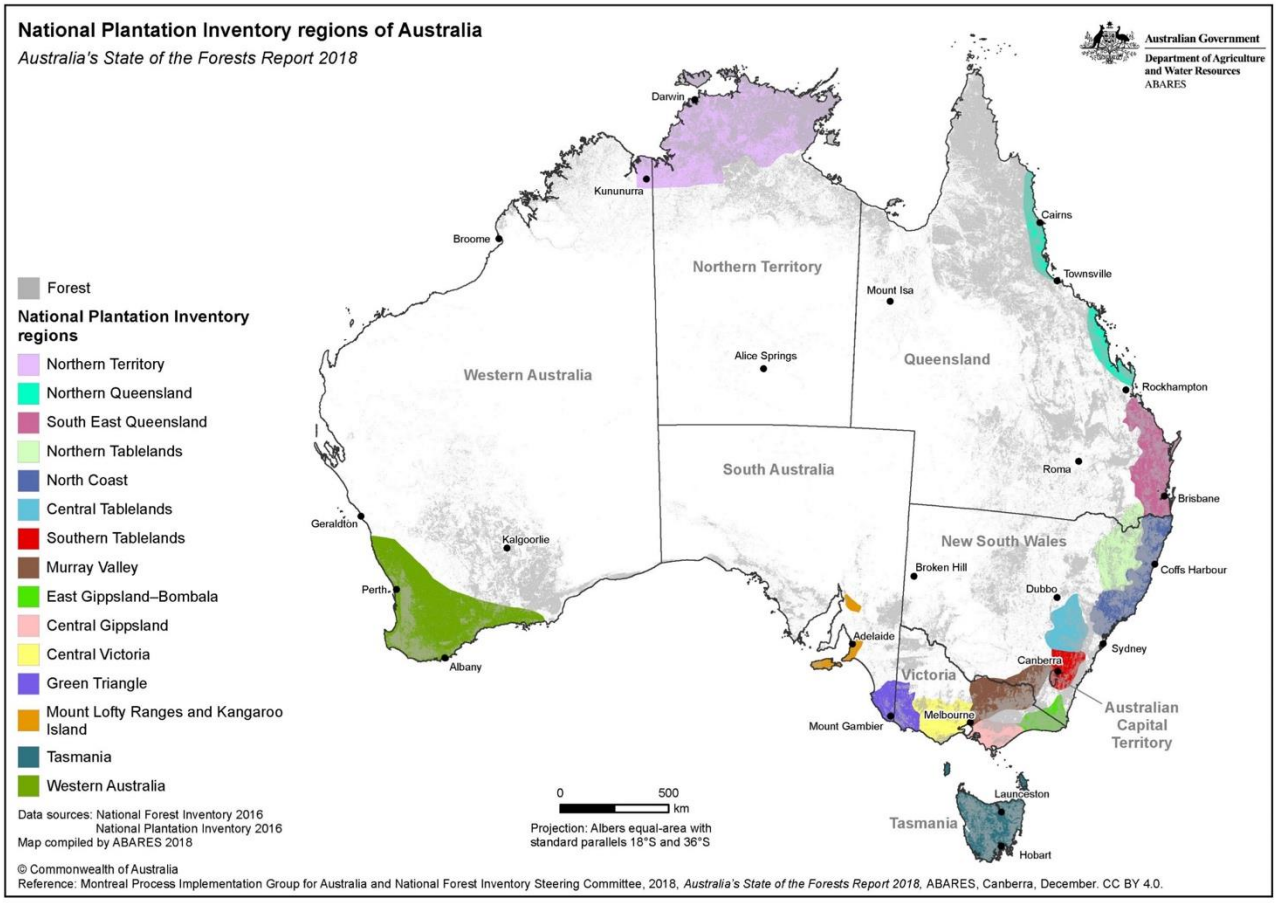

Figure 19: National Plantation Inventory regions

Recommended structure

It is proposed that a dedicated fund be established with agreed criteria against which forest owners can make a determination about the suitability of plantations for rotation conversion and apply for the incentive. These criteria could include species, productivity, scale and proximity to processing facilities and infrastructure. It is reasonable to expect that forest owners would need to demonstrate the viability of the proposed project and justify the exact level of financial support.

Economic rationale

The proposed program would be capable of supporting the construction of up to 25,000 new dwellings annually at maturity, or up to 250,000 over a ten year period. It would create an additional 10-15 direct jobs in forest management, harvest and haulage and a further 20-30 indirect employment opportunities through the supply chain. It would also provide significant opportunity for expansion of domestic processing capacity in both Tasmania and Victoria.

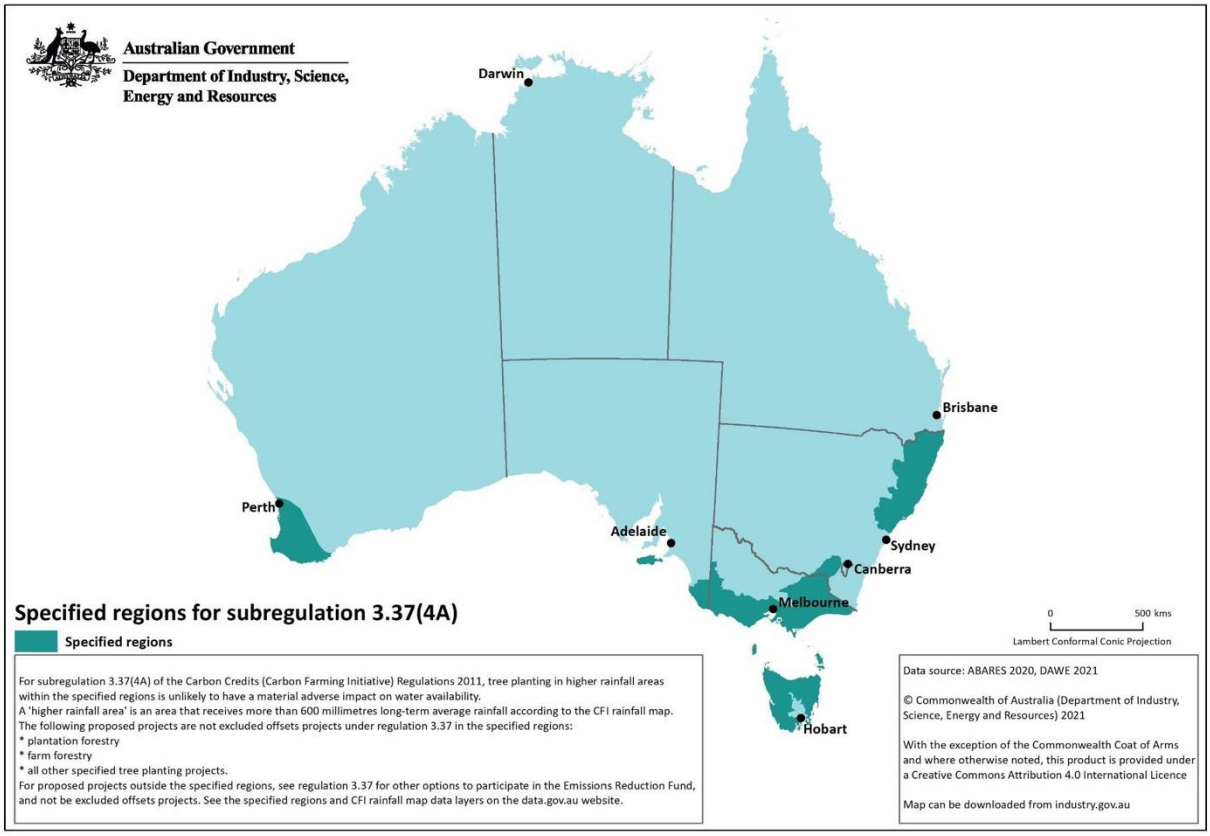

Figure 20: Specified rainfall zones

Native forest timber stand improvement

Tasmania

The immediate focus for timber stand improvement relates to native forest stands which were clearfelled between 1960 and 2010. A sizeable are of forest (approximately 210,000 ha) has been identified on public and private land which is suitable and viable for timber production. Through the application of regrowth thinning regimes, this estate is capable of producing an additional 71,000m^3/yr of sawlog over the next ten years, assuming that 10% of the private native forest estate is available and the public forest regrowth is thinned over a ten year period. In addition, the result of regrowth thinning will be to develop a future sawlog rich forest resource which will be available from the mid-2030s and can produce an additional 500,000-600,000m^3/yr of sawlog.

While much of the area addressed above can be managed on a commercially viable basis, there are more marginal areas (either further from market or in a more degraded condition), particularly on private property, where regrowth thinning would deliver both increased future sawlog availability as well as short term ecological and environmental improvements which are of benefit to the whole community. The estimated cost of treating these areas is about $750/ha. Assuming that a further 10% of the private forest estate could be accessed in this category, the estimated annual cost of treatment would be in the order of $1.1 million.

That investment would deliver improved future productivity, adding up to 150,000m^3 annually in future sawlog production, as well as delivering immediate benefits with respect to forest and ecosystem health.

(Note: There is also an opportunity to explore support for active management of special species timber, specifically blackwood (Acacia melanoxylon) which is addressed in a Tasmania specific case study.)

Queensland and New South Wales

Active silvicultural intervention to improve stand productivity and condition in private native forests has the potential to deliver an additional 91,000m^3/yr in sustainable sawlog production across 100,000 ha of treatable forest. It offers the additional benefit of improved forest health and productivity outcomes which benefit the entire community. Lewis *et al* (2020) have assessed that an incentive to engage in active timber stand improvement, through an annuity of $30/ha/yr (up to $3 million annually) would be sufficient to encourage a large number of private native forest owners to participate.

Native forest thinning and ERF participation

Thinning overstocked and/or degraded forests to improve productivity has the effect of significantly improving the capacity of those forests to accumulate and store carbon in growing trees and harvested wood products. Thinning is likely to result in a growth response which delivers as much as a ten-fold increase in MAI (from about 0.1m^3/ha/yr to 1m^3/ha/yr). Under the current ERF arrangements, actively managed commercial native forests are not eligible for participation. However, there is a strong argument for the including these activities in the ERF where it can be demonstrated that commercial thinning is also delivering a wider range of desirable environmental outcomes when compared to no management.

What needs to happen?

In order to deliver a combined outcome of improved timber production capacity and ecological and environmental gains, there is a need for Government incentives to support forest owners to undertake the required silvicultural interventions. There already exists a model for this in the form of Queensland's Land Restoration Fund (QLRF) which applies a natural capital accounting model to determine the value of active interventions in improving long term environmental outcomes. The QLRF aims to supplement ERF auction returns for vegetation-based carbon projects to ensure financial viability. However, commercial native forest operations are not currently eligible to participate in the ERF. There is a strong argument that commercial native forest silviculture projects which can also demonstrate tangible forest health and ecosystem outcomes should be eligible for ERF participation.

Incentive program structure

It is proposed that a dedicated fund be established that provides incentives to forest owners to undertake active forest management where it can be demonstrated that the project will deliver tangible forest health and ecosystem improvement outcomes, measured against an agreed natural capital accounting methodology, and where forest owners would not undertake the activity in the absence of Government support (because of financial viability barriers). Criteria for participation could include environmental benefits, likely future commercial productivity improvements, scale and proximity to processing facilities and infrastructure. It is reasonable to expect that forest owners would need to demonstrate the viability of the proposed project and justify the exact level of financial support.

Economic rationale

There are both direct and indirect economic benefits that accrue from providing incentives for the active management of regrowth forests where it would otherwise not be viable to do so. The actions outlined in this section would create direct employment in forest management, harvest and haulage of up to 20

additional people, and a further 40 jobs along the supply chain. They would also support and maintain increased processing capacity and contribute to construction of an additional 10,000 to 15,000 dwellings annually. Indirect economic benefits accrue from short term improvement in environmental outcomes and longer term maintenance of forest and ecosystem health. That includes the opportunity benefit that results from not requiring more expensive environmental improvement actions in the future.

DISCUSSION AND RECOMMENDATIONS

The analysis undertaken for this report has demonstrated that there are opportunities to support short to medium term actions which can deliver up to 650,000m^3 per year of additional sawlog production by the mid-2030s, which otherwise would not be commercially viable. This represents an increase over current sawlog production of about 7%. Importantly, the proposed actions (conversion of hardwood plantations from short to long rotation and active silvicultural management of regrowth native forests) would deliver important and tangible environmental benefits for the whole community, including increased accumulation and storage of carbon, improved forest health and improved ecosystem function. The authors have developed a series of recommendations which could be considered by Governments as part of future incentive programs to support the broader aim of increasing sawlog supply. The recommendations are based on the consultant's analysis and do not necessarily represent the position of the Hub.

Proposed recommendations to support the silvicultural intervention programs outlined in this report include:

1. Emissions Reduction Fund rules:
   a) Ensure that *E. nitens* and *E.globulus* are recognised as eligible long rotation species in Tasmania and Victoria.
   b) Ensure that the additionality exclusion for government program funded projects is relaxed for long rotation conversion projects.
   c) Ensure that actively managed regrowth native forests are eligible for ERF participation where additional and tangible forest and ecosystem health benefits can be demonstrated.
2. Long rotation plantation forestry fund:
   Establish a dedicated long rotation conversion fund of up to $2.5 million annually for ten years, for eligible plantations with agreed criteria addressing species, productivity, scale and proximity to processing facilities and infrastructure.
3. Forest health restoration fund:
4. Establish a forest health restoration fund of up to $4 million annually for ten years to support active silvicultural management of regrowth native forests on private land where additional and tangible forest and ecosystem health benefits can be demonstrated and the activity would not be viable without financial support. Criteria for participation to be determined through the application of an appropriate natural capital accounting method and monitoring.

This paper is supported by a detailed case study for Tasmania.

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