

# The adoption of technology to process timber products in a dynamic market

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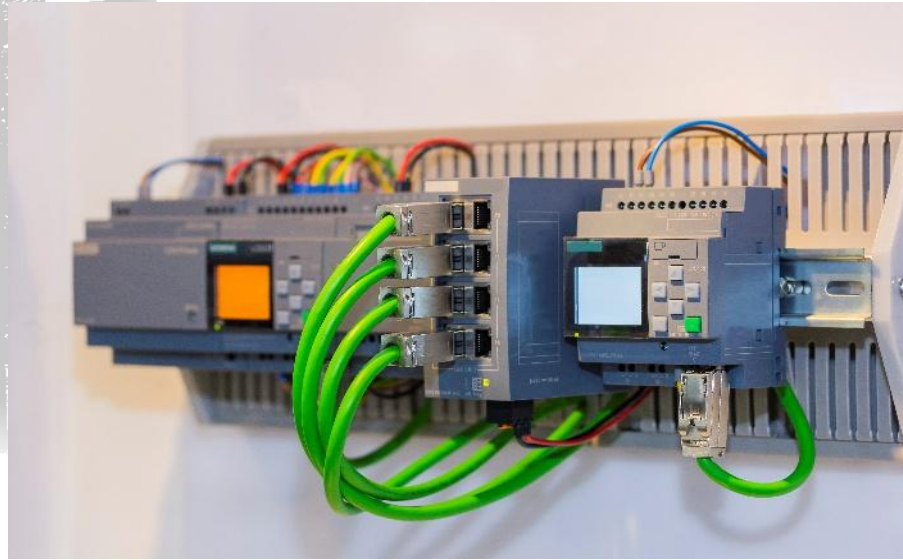
Forestry Australia Conference  
Adelaide Convention Centre  
22<sup>nd</sup> October 2025

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# The Electronic revolution

Key to change in manufacturing over the past 50 years has been the rapid development of the **programmable logic controller** (PLC)



# The Electronic revolution (cont.)

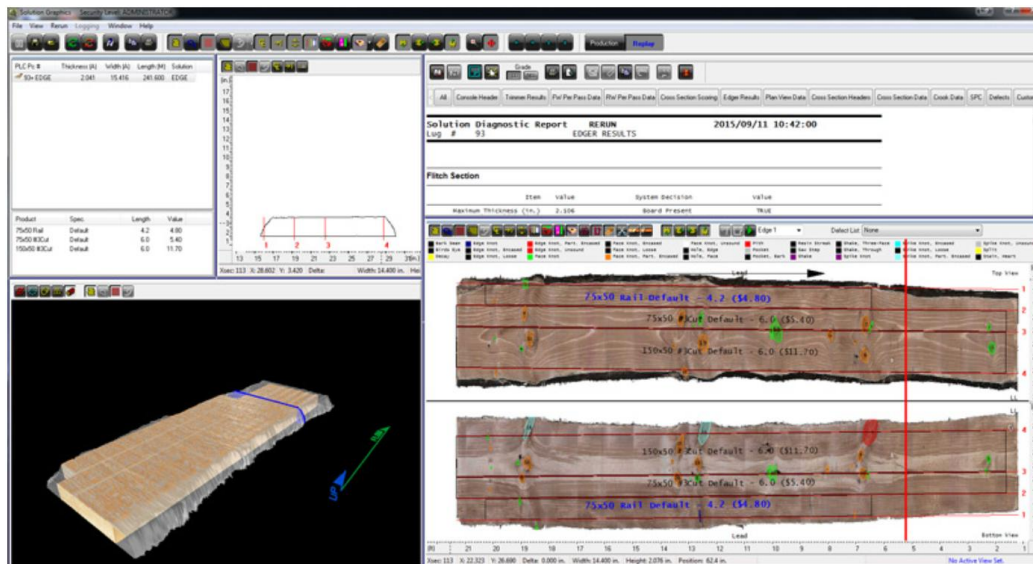
- PLCs enable switches and digital data to be controlled by programmable logic at high speed
- PLC development has enabled removal of most people from dangerous operational areas
- Incorporated with industrially robust computing, there are few limits to what can now be automated



Source: Timber Online

# The Electronic revolution (cont.)

- The more recent development of image digitisation has amplified the rate of change
- Further integration of these tools are now only limited by our imagination (and budgets)



Source: USNR

# Sawmilling technology adoption rate in Australia

- The Woods & Forests Department's upgrade of the State sawmill led the way in the 1980s (based on technologies already available in North America and Europe)
- All major softwood mills followed with continuous upgrades to improve productivity, optimisation, product segregation, materials handling and data capture & management
- These changes have supported the development of complex sawing solutions, such as single saw centre processing (like the HewSaw R200 & R250), which enable the log to be fully shape sawn (in many cases, eliminating the need for a separate log canter, profiler, gang resaw and board edger).

# HewSaw R250

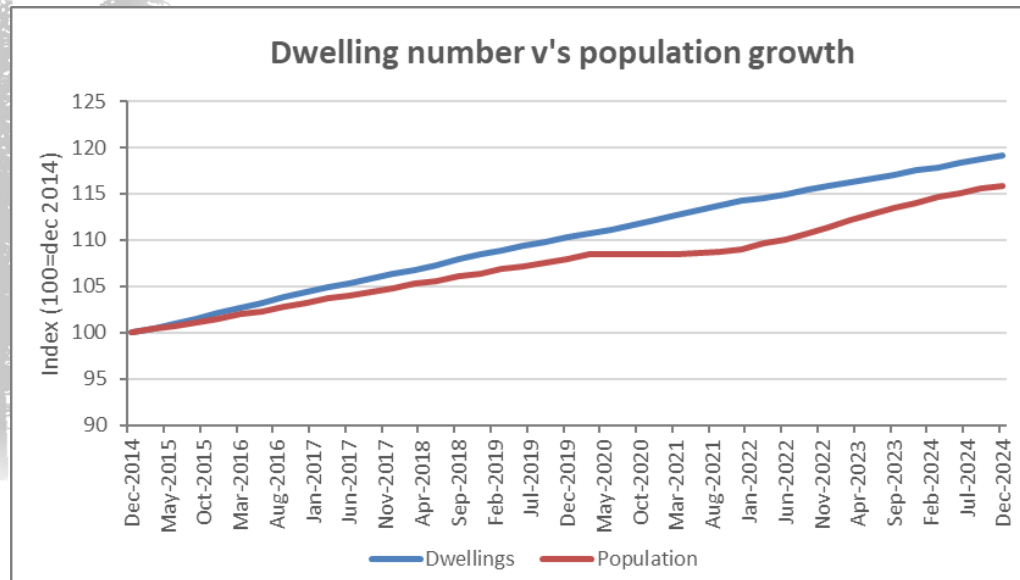


# Demand Drivers

- The current key drivers for wood-based product industries are **population dynamics** and **resource availability**
- The range of products produced is more extensive but, most can still be categorised as:
  - Structural products
  - Appearance grade products
  - Landscape products
  - Industrial products (pallets, crates and furniture carcasses)
  - Pulp and paper products
  - Panel products, and
  - Biofuel

# Population Dynamics

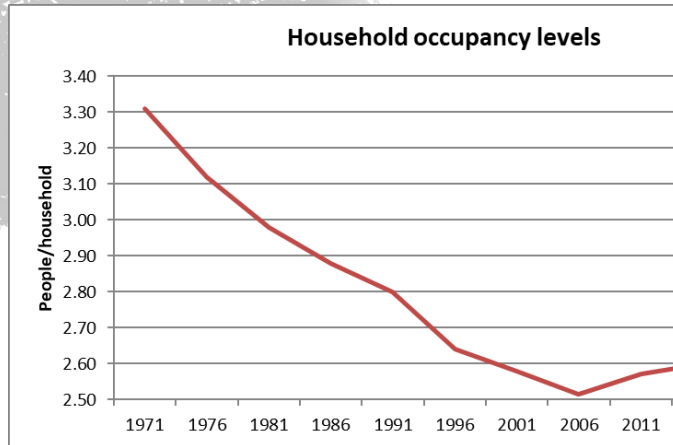
- Contrary to public opinion, dwelling numbers are growing faster than population growth
- Clearly the issue is not just population!



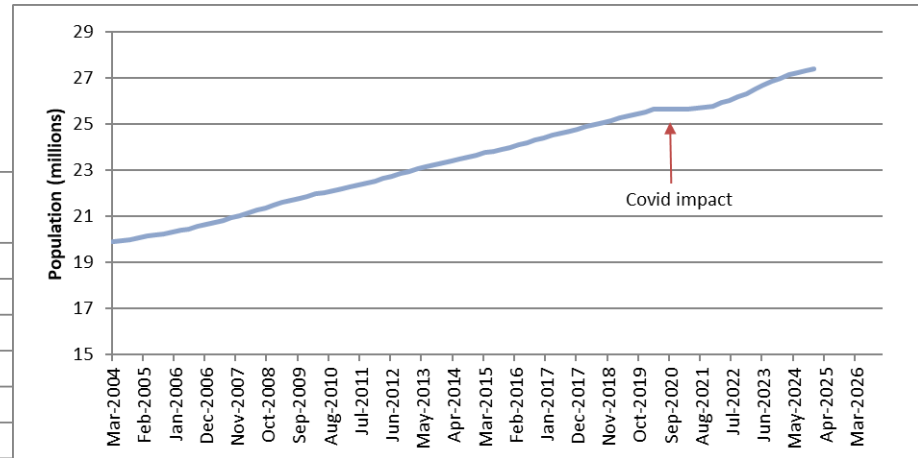
Source: ABS

# Population Dynamics

- Demand based population dynamics result from a combination of population growth and household formation
- Population has grown at a rate of 1.6% for the past 20 years
- However, occupancy has declined to 2.5-2.6 (increasing dwelling requirements)



Source: ABS

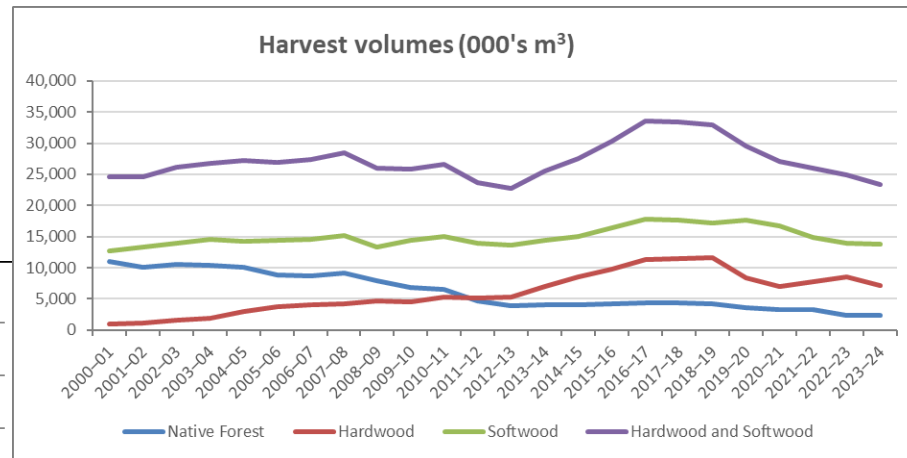
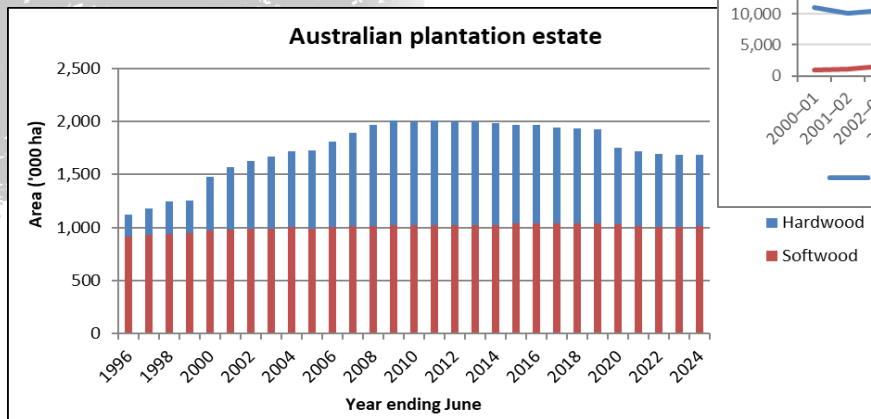


Source: ABS

- Expect an increase in the 2026 census

# Resource Availability

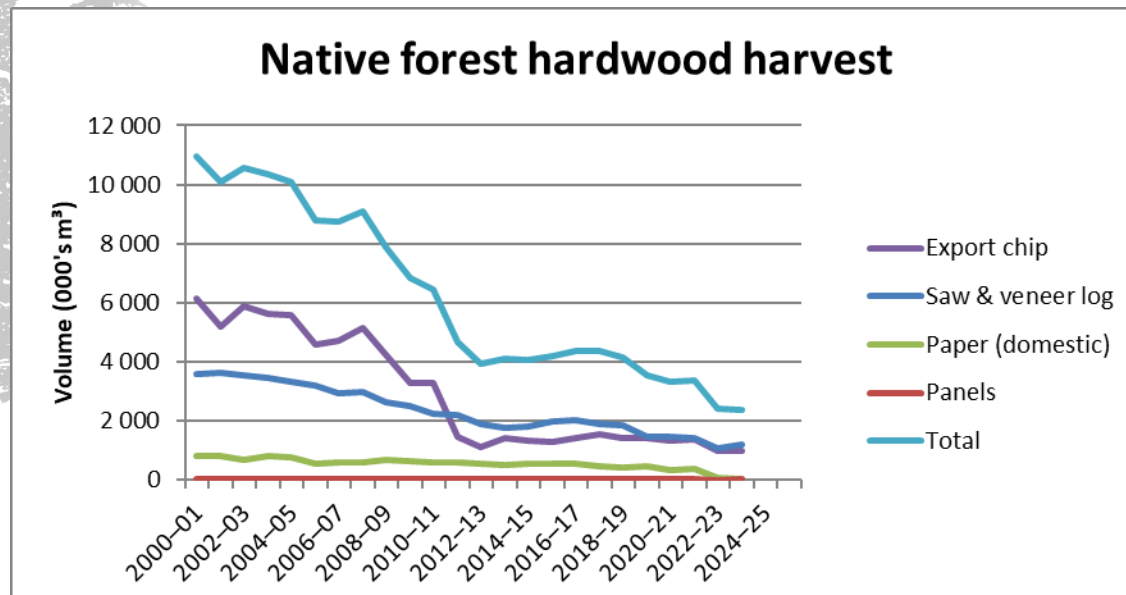
- The total plantation estate is declining along with resource availability
- The recent 5-year declining trend in plantation wood fibre is becoming evident



Source: ABARES

# Resource Availability

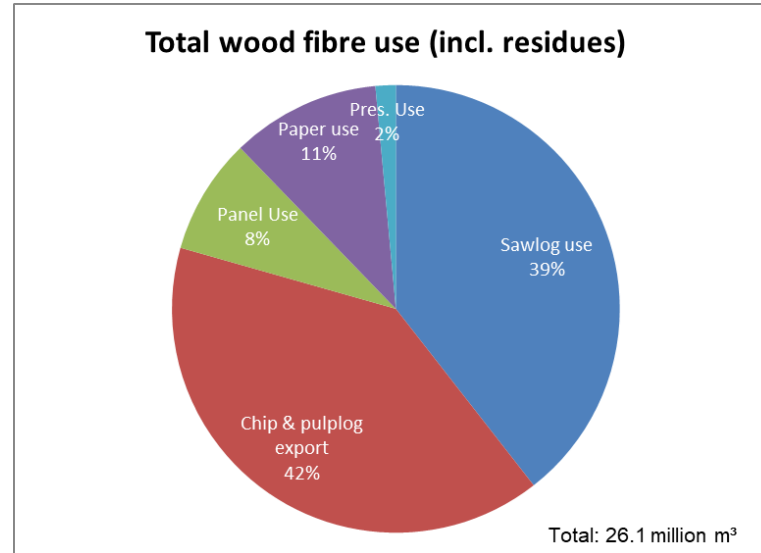
- While native forest harvesting has dropped 80% drop in the past 25 years, plantation hardwood development has partially offset its impacts.



Source: ABARES

# What our timber resources are used for

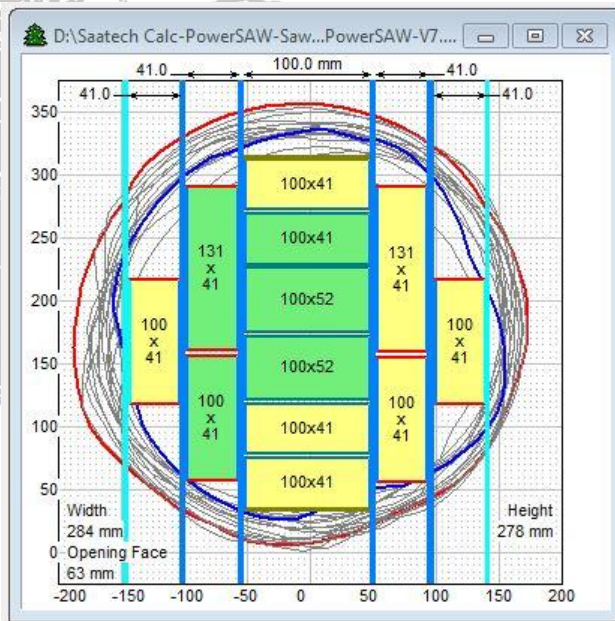
- In FY24 approx. 26.1 million m<sup>3</sup> fibre processed, incl. 2.7 million m<sup>3</sup> of residues (softwood plantations 16.0 million m<sup>3</sup>, hardwood plantations 7.4 million m<sup>3</sup> and native forests 2.7 million m<sup>3</sup>). This is down 27% from 35.9 million m<sup>3</sup> in FY19.



Source: Omega consulting

# Conversion technology - sawmilling

- Manual handling has given way to “hands off” manufacturing
- Optimisation now occurs at most levels in the greenmill:
  - **Log segregation**, using (cutting) pattern sorting



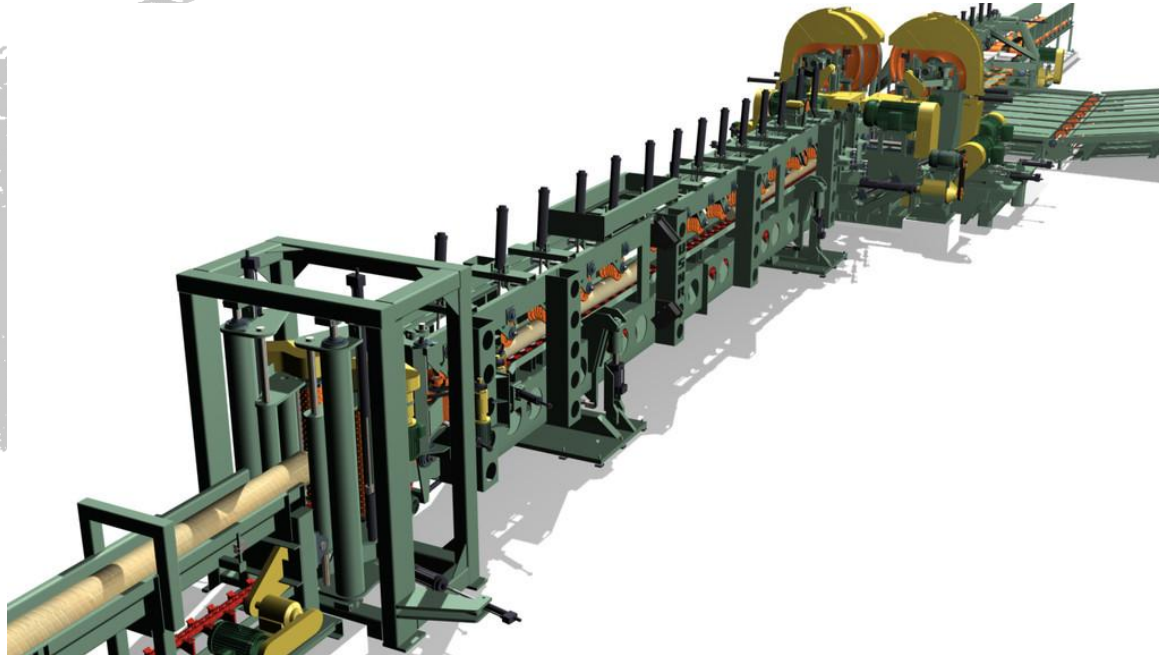
Source: SAATECH



Source: Springer

# Conversion technology - sawmilling

- **Log breakdown**, using scanned optimisation (e.g. double length infeed) to maximise recovery from log shape



Source: USNR

# Conversion technology - sawmilling

- **Cant processing**, using scanning technologies to optimise recovery by shape sawing (HSS & VSS).



Internal view of a USNR Horizontal Shape Saw, capable of curve sawing and profiling a log cant in a single pass



# Conversion technology - sawmilling

- **Edge board processing**, using optical scanning optimisation to maximise value recovery (using length, width, thickness demand solutions)



Source: USNR

# Conversion technology - sawmilling

- **Board sorting**, using optical and sonic technologies to sort boards by dimension and predicted strength categorisation



Source: TS Manufacturing



# Conversion technology - sawmilling

- **Board stacking**, using automated systems to establish stacks for optimal drying outcomes



Source: USNR



# Conversion technology - drying

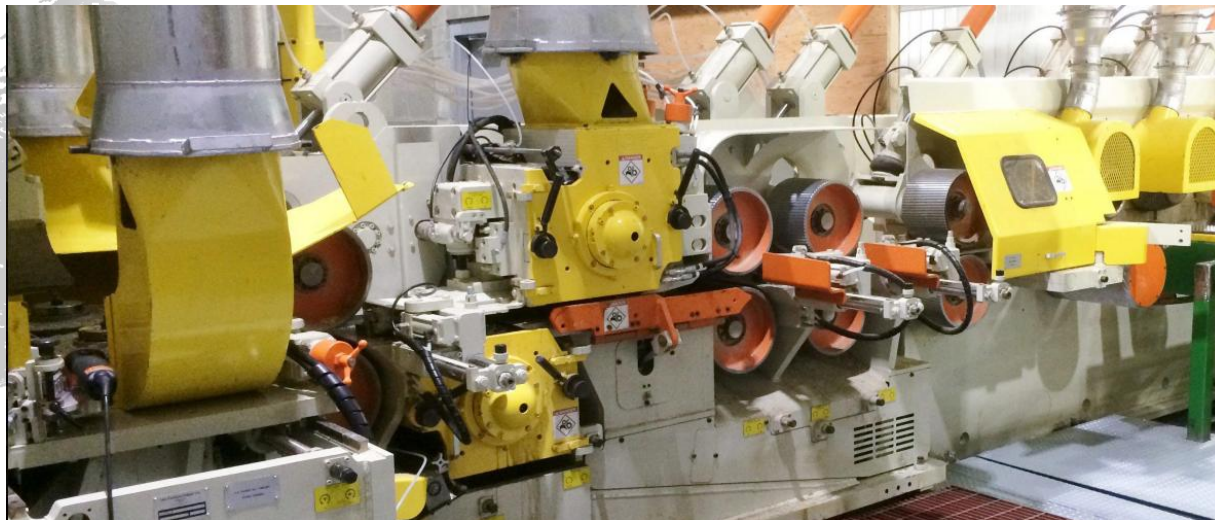
- Kiln drying is key to product performance and grade determination. It has seen radical improvements in recent years such as:
  - Optimisation of **drying times** (very high temperature drying)
  - Better management of the **drying process** (CDKs)
  - Automated **end point determination** technologies
  - Optimisation of **energy conservation** (CDKs)
  - Optimisation of **biofuel management** in heat plants
  - Utilising multiple **energy sources** to optimise drying costs



Source: American wood dryers

# Conversion technology - drymilling

- Optimisation in the drymill is mostly related to grade determination and pack construction:
  - **Moisture content** determination
  - Automatic **dimension management** in the planer



Source: High speed, self centring, pull through, Gilbert planer

# Conversion technology - drymilling

- Optical and x-ray technologies used for **grade and length determination**
- Dimensional and optical **grade sorting**
- Automated **stacking, strapping and wrapping** of finished products



Source: Lucidyne Microtec - high speed (1,350m/min.) lineal grader

# Conversion technology – panel plants

- Particleboard and MDF plants have been in the forefront of technology development, and in many ways have pioneered the technologies now used in sawmills and other processing facilities
- These facilities are world class in material handling and the adoption of robotics



Source: Siempelkamp ContiRoll press line, Borg (Oberon)

# Conversion technology – EWP processing

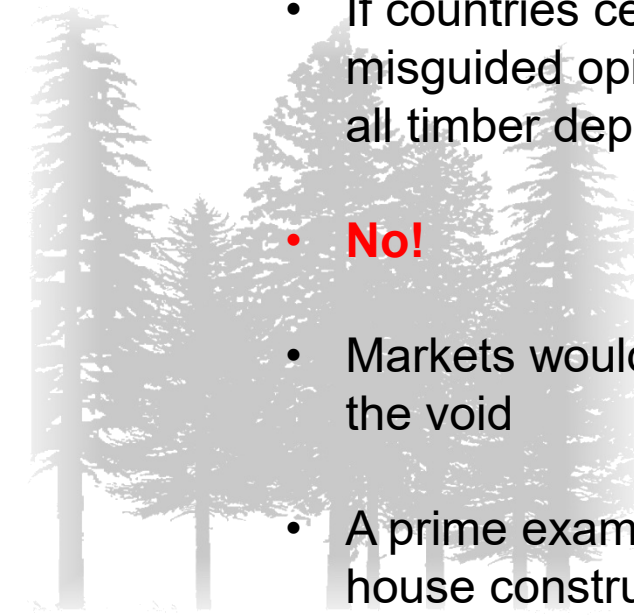
- Similarly to panel plants, plywood, LVL, Glulam, CLT and I-beam facilities all operate in environments dominated by scanning and optical optimisation technologies
- This is demonstrated in something as simple as the high-speed punch control in ice-cream stick manufacture (20+ punch cycles/second)



Source: Omega Consulting (Austicks)

# Substitution

- If countries ceased harvesting of forests under the misguided opinion of conserving carbon, would this collapse all timber dependent markets (such as housing)?
- **No!**
- Markets would simply open up for substitute products to fill the void
- A prime example of this is the rise and rise of steel framed house construction. Another is the increasing interest in composite decking products with pseudo timber grain.



# Famous last words!

Steel house frames will be a passing fad!



They now represent almost 20% of the market!

## Famous last words!

Plastic decking will never catch on. It gets too hot underfoot and bends in the heat!



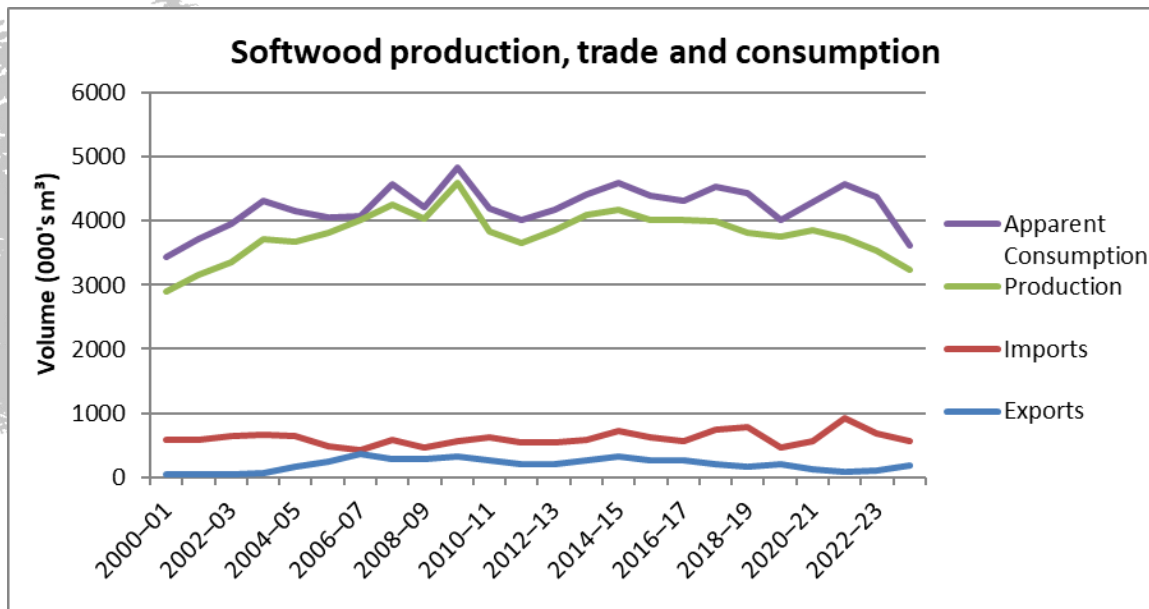
They now represent 30-40% of market with a CAGR of 15+%/year

# Substitution

- All timber products are simply a medium with imbedded credentials that need to be constantly managed
  - The basic credentials are:
    - Price
    - Ease of use
    - Performance
    - Appearance, and
    - Environmental sustainability
- For timber, environmental sustainability is naturally endowed, but requires good husbandry practices (forestry) to sustain it
- The remainder are all directly or indirectly linked to production and process technologies linked to the specific product

# Domestic manufacturing

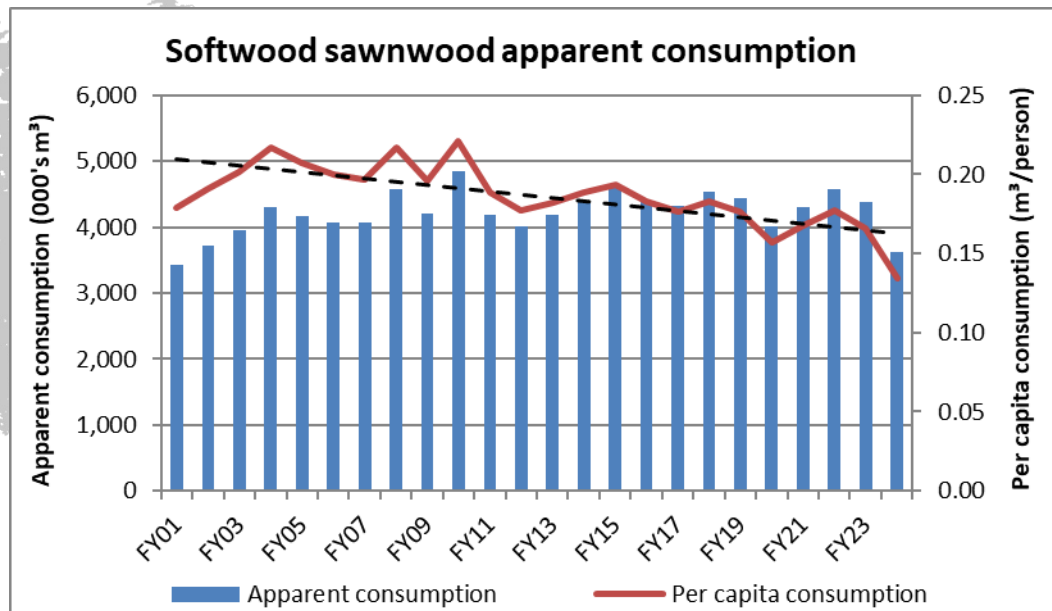
- The Australian timber market is “unlikely” to ever become self sufficient and is highly dependent on imports (softwood is currently at approx. 20%)



Source: ABARES

## Domestic manufacturing (cont.)

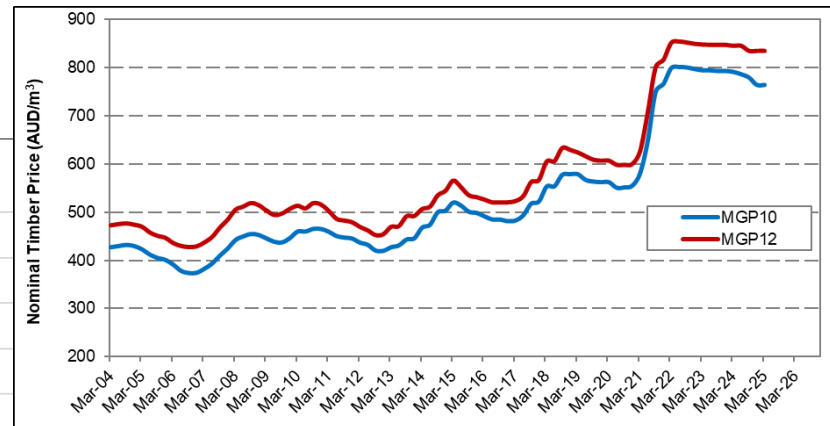
- “Unlikely” but plausible if per capita consumption in Australia continues to drop faster (2.4%) than population growth (1.6%)



Source: ABARES

# International Trade

- International availability of timber products is not guaranteed
- 2020-21 covid period saw European timber redirected to higher priced US markets, forcing Australia to respond, setting a new domestic price benchmark



Source: Indufor TMS

# Markets

- *Every market that the industry fails to satisfy will migrate to a substitute*
- Once converted, there are often few opportunities that arise to win the customer back
  - **Framing timber** now competes with **steel** (with already 20% of the market share captured)
  - **Decking boards** now competes with **composites**
  - **Weatherboards** now competes with **cement sheet** products
  - **Softwood timber flooring** and **match-lining** have died
  - **Hardwood flooring** now competes with **laminates**
  - **Landscape products** for retaining walls have lost the battle with **steel and concrete**
  - **Newsprint** has seen its markets captured by **electronic media**
  - **Printing paper** and magazine print are also diminishing

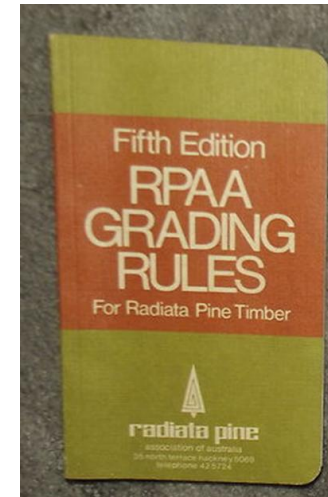


## Markets (cont.)

- On the upside, there are products that are innovatively challenging cement and steel in their traditional markets:
  - **Glulam, LVL and CLT** now compete with steel and concrete
- **Facial tissue and toilet paper** still reign supreme (but bamboo is a good substitute @ 20-100 t/ha/yr)
- Wood panel markets have seen a degree of reversion back to lower cost **particleboard** products
- **Plywood** products have held their ground in most markets
- **Roundwood products** for fencing and vine trellis have seen concrete and steel come and go
- **Pallet timbers** have seen a resurgence, but the softwood advantage has come at the expense of hardwood availability

# Marketing

- The softwood industry benefited from one of the most consequential marketing campaigns in Australia (i.e. *developing a market for a product the consumer didn't know they either wanted or needed*)
- The campaign was spearheaded by the Radiata Pine Association of Australia (RPAA) and supported by the timber drying and grading rules
- It resulted in softwood sawn products taking market share from hardwood
- In some ways it was too successful, with customers expecting a product standard that often exceeded the rules and fitness for purpose

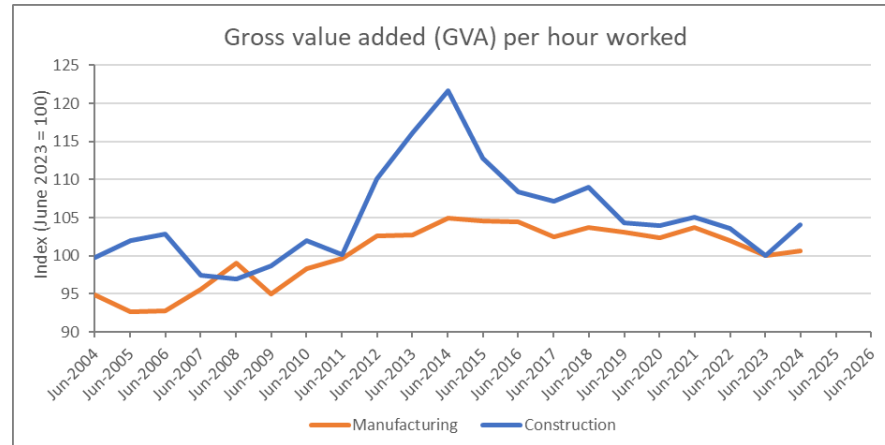


## Marketing (cont.)

- The future of the timber industry will be highly dependent on effective marketing if it is to maintain market share in current markets
- Establishing new markets that compete directly with other products must be supported by strong marketing
- Innovation within the industry has never been more important
- **Steel framing captured its 20% market share by offering a supply and erect package to builders. The timber industry still supplies truss plants, who supply trusses and wall frames to builders, who then employ carpenters and cranes to finish the erection. We have to do better!**

# Productivity

- Productivity in Australia's wood processing industry will be key to timber products remaining price competitive
- Australian manufacturing and construction sector productivity, (GVA/hr worked), has shown a steady decline over the past 10 years. Information on estimated annual log intake and employee levels in sawmills suggests that this trend is also strongly reflected in the sawmilling sector



Source: ABS

## Productivity (cont.)

- Analysis of GVA across manufacturing industries uses total site employment, potentially indicating that manufacturing sites (which include sawmilling entities) may be swapping operational labour for a larger amount of technical management and maintenance labour to support new technologies
- Whatever the cause, it emphasises the need to better manage all aspects of the product production process if we are to continue to compete with product substitutes
- The clear message is that we **need to be vigilant and ready!**

## Productivity (cont.)



# Other wood fibre processing

Sawmilling by-products and other non-sawlog forest products support pulp & paper industries along with reconstructed wood fibre product (particleboard, plywood, MDF and wood pellets) in Australia

- Particleboard manufacture has seen a significant recent investment in new facilities and technologies in Australia that will sustain this industry well into the future



Source: Oberon Review

## Other wood fibre processing

- Albioma (a French energy company) are currently converting wood residues from the Hyne sawmill at Tuan into export wood pellets. They are also scoping a facility in the Green Triangle region that will potentially process up to 500,000 gmt of wood fibre



Source: Albioma

## Other wood fibre processing

- Technology changes have impacted some paper products (such as newsprint, magazines and printing paper). However, toilet and facial tissue products still sustain limited competition.
- The pulp industry is also diverging into pallet and containerisation products that replace the current use of polymer-based products.
- Paperboard is expanding further into food packaging, replacing single use polymer products



# Where to in the future

- Almost every wood fibre-based product will continue to compete with **substitute products**, the current exceptions being facial and toilet tissues
- Timber products will maintain advantages over current substitutable products in sustainability, appearance and ease of use, but productivity needs to be addressed
- Grading technologies and EWP developments will give greater clarity and consistency to the **engineering performance of timber products**
- The challenge for timber products is to **maintain competitiveness** in its traditional markets in the face of expanding alternatives
- **Product development** in non-traditional timber markets (such as heavy construction) will result in positive outcomes for the industry (do unto others as they do unto you!)



Thank you

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