Victorian Forest Products Association

Legislative Council Environment and Planning Committee Inquiry into Built Ecosystem Climate Resilience

VFPA Submission

16 April 2024

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About VFPA

VFPA is the peak industry body representing the forestry products value chain in Victoria from those producing our sustainable wood fibre to those processing wood fibre into an extensive range of value-added products loved and used by Victorians every day.

Victoria's Forest Products Industry

The Victorian forest products industry produces a mix of hardwood (eucalypt) and softwood (pine) wood fibre supplied from private native forests and plantations. Victorian forest products are manufactured into a wide range of timber products such as traditional sawn and engineered wood products, cardboard, posts and poles, firewood, wood chips for landscaping, to sawdust used in the animal industries. All parts of the harvested tree are used to its highest value use – there is simply no waste.

Not all wood fibre is substitutable. Softwood is important for the construction sector, along with posts, poles, and a range of engineered wood products. Blue gum plantation wood is primarily chipped and exported for a range of high value manufacturing purposes. Research is also underway to determine how to use blue gum in the construction sector. Hardwood is valued for its durability and appearance traits and is used for home fit outs (stairs, floor, windows and furniture) and for exterior purposes across a wide range of both private and public assets.

There is no waste from processing, with residual wood fibre used to run drying kilns or for energy to power the processing site. Even post-harvest debris (or slash) serves several purposes, including the supply of nutrients[1], browsing protection for the new seedlings (especially deer), and could be harvested for production of bioenergy. This debris may also be refuge for small animals and/or provide a food source.

With over 5000 known uses for forest products, wood is simply an essential part of life and the ultimate renewable. Wood is beautiful and functional, renewable, biodegradable, and recyclable. Wood is used for new homes, buildings, furniture, architectural joinery, cardboard, toiletry and sanitary products, and fuel for green energy. The application of technology and innovation are expanding the uses of wood fibre to clothing, batteries, bioplastics, glass, nano-paper, batteries and transistors, and it can even be used in space for small near-earth satellites or cube-sats.

[1] nitrogen, potassium, phosphorous, calcium and magnesium

Introduction

The Victorian Forest Products Association (VFPA) welcomes the opportunity to make a submission into the risks to, and resilience of, Victoria's built ecosystem from climate change. VFPA understands that the Legislative Council's Environment and Planning Committee will evaluate Victoria's preparedness to mitigate and adapt to these challenges for the built environment (the full terms of reference are included at Appendix 1).

The Intergovernmental Panel on Climate Change (IPCC) suggests that resilience is:

> *"the ability of a system and its component parts to anticipate, absorb, accommodate, or recover from the effects of a hazardous event in a timely and efficient manner, including through ensuring the preservation, restoration, or improvement of its essential basic structures and functions."* (Intergovernmental Panel on Climate Change, 2012)

The building and construction sector is a significant contributor to global emissions – responsible for 21 per cent of global greenhouse gas emissions and despite an overall reduction in energy intensity of 3.5 per cent, overall energy demand and emissions had risen by one per cent over 2021 levels (United Nation's Environment Program, 2024) (UNEP). Consequently, the gap between the current state and the desired decarbonisation in the building and construction sector is increasing (United Nation's Environment Program, 2024).

The accepted pathways for built ecosystem resilience are to reduce the carbon emissions arising from the construction of new buildings, the renovation of existing building stock and end-of-life disposal and reducing the (mostly energy) emissions during the operation of buildings. These pathways must be augmented with decarbonisation of the electricity grid in parallel.

The estimated annual emissions from Australia's construction materials industry are 30-50 million tonnes (Clean Energy Finance Corporation, 2021). Replacing 50 per cent of traditional building materials with engineered timber can reduce an industrial building's embodied carbon by as much as 13 per cent and by 11 per cent in office and mixed-use buildings (Clean Energy Finance Corporation, 2021, pp. 49-50). Thus, the use of timber in Victoria's built ecosystem is integral to mitigating carbon emitted in the construction of buildings, reducing the ongoing operating costs as well as improving the resilience of buildings to extreme weather events. The use of timber delivers a wider range of benefits beyond carbon adaptation and mitigation – and why those building and those living and working in timber buildings have a strong preference for timber.

Forestry has a significant role to play in the move to a net-zero carbon future. Research shows that plantation trees store on average 30.3 t CO_2 per hectare each year compared to environmental plantings of 7.7 t CO_2 per hectare per year (Ximenes, et al., 2012). Carbon is sequestered in trees and the subsequent harvested timber products for the life of that product. This results in each single storey house containing 12.09 m^3 wood sequestering 22.2 t CO_2-e while each two-storey house sequesters 37.4 t CO_2-e, and a mid-rise commercial building can store 2,280 tonnes of carbon.

Recommendation 1: That the Victorian Government incentivises maximising the use of timber as an essential tool to reduce embodied and operating carbon in the built ecosystem.

This Inquiry will be important to determine whether Victoria is on track to achieve decarbonisation in the built ecosystem – and whether the sector is indeed resilient to the vagaries of climate impacts. The inquiry builds on the decision of Building Ministers who have "acknowledged the importance of decarbonising the building sector" and committed to a new round of industry dialogues to support this work (Department of Industry, Science and Resources, 2024). The outcome of this dialogue could provide further input into the Inquiry.

This submission will focus on "built ecosystem", i.e. the buildings and structures where we live and work, as a subset of the built environment.

The Built Ecosystem

The built ecosystem is responsible for a quarter of all greenhouse gas emissions (GHG) and 37 per cent of all energy related emissions (Boland, Lekhwani, Reiter, & Sjödin, 2023). Thus it is notable that globally, governments are turning their attention to the impact from, and to, our built ecosystem from climate change. The International Panel on Climate Change (IPCC) has agreed to produce a Special Report on Climate Change and Cities as part of its 7th Assessment cycle (due late 2029). While some years away, this report should be a useful future guide to inform public and private sector strategies for climate resilience.

Resilience in the built ecosystem

The IPCC emphasises the importance of resilience in both building operations and the materials to withstand climate impacts (United Nation's Environment Program, 2024). Existing buildings face increased risk of overheating while buildings in flood prone areas are vulnerable to impacts to property values, insurance costs and community resilience, and poor building practices can contribute to maladaptation (United Nation's Environment Program, 2024).

While this Inquiry is focussed on resilience, it is useful to understand the role of adaptation, mitigation and resilience as different climate change strategies (Table 1). An adaptation strategy aims to reduce the impacts, mitigation seeks to reduce the cause, while resilience is the capacity to cope with, and withstand, the effects (essentially both adaptation and mitigation).

Table 1 Types of carbon strategies

Strategy	Adaptation	Mitigation	Resilience (Adaptive Capacity)
Time dimension	Short term	Long term	Long term with a focus on immediate changes
Policy actions	Procedures, vulnerability studies, risk assessments, infrastructure protection	Renewable policies, carbon sequestration, carbon off-setting	Incremental changes, new infrastructure design
Policy goals	Reduce the impact of climate change	Reduce the causes of climate change	Create policies that both reduce immediate impacts but help to achieve long term goals
Levels of governance	Local and regional	National and international	Coordination between local and national/international
Critical stakeholders	Infrastructure operators, industry, community experts	Policy makers, industry, experts	All stakeholders involved in the governance of adaptation and mitigation
Success indicators	Difficult to quantify	Reduced emissions	Withstand and recover from events Net zero infrastructure
Role of politics	Depoliticised and technocratic	Highly politicised	Highly politicised during exogenous events

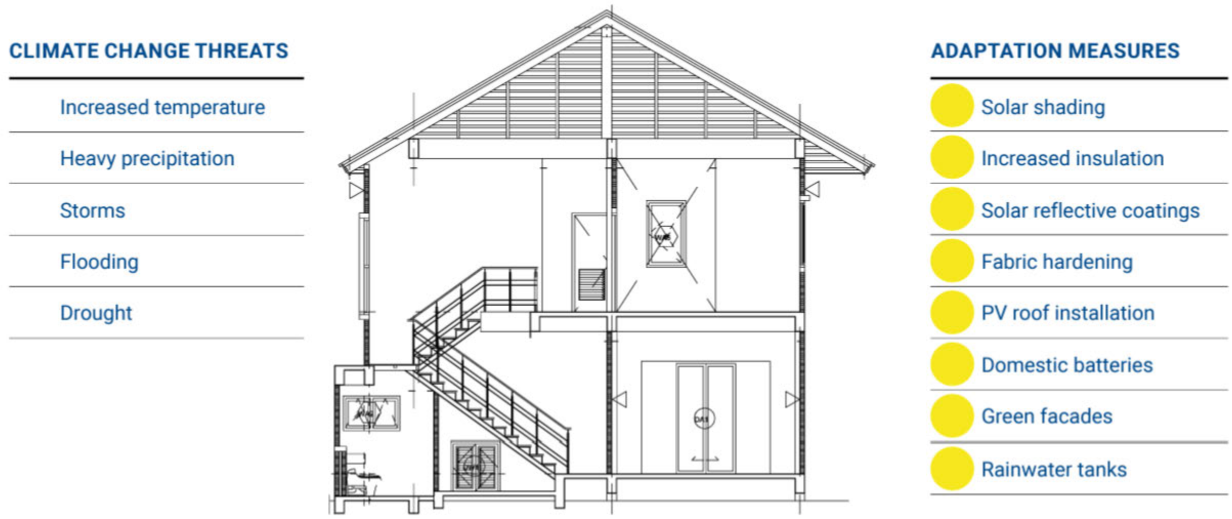
(Source: adapted from Kelly-Pitou, et al., 2017)

Resilience is critical to survive and thrive in our built ecosystems (Chubb, Bennett, Gorring, & Hatfield-Dodds, 2022) and is the capacity of structures to survive and recover from chronic stresses and acute shocks that may be experienced (AECOM Australia Pty Ltd, 2021). Built ecosystem resilience will need to increase to ensure that buildings are safe, reliable and healthy shelters during extreme events while avoiding locking in emissions in inefficient and unsafe structures (United Nations Environment Program, 2021). To achieve this, the built ecosystem needs to:

- Halve emissions by 2030 by
    - Achieving bet zero operational carbon in all new buildings
    - Ensuring energy efficiency retrofit (renovation) is well underway
    - Reducing embodied carbon by 40 per cent, and
- By 2050 all new and existing assets net zero across the whole life cycle. (United Nations Environment Program, 2021)

Resilient buildings are key assets in dealing with extreme events, reduce stress on the energy grid and enhancing survivability during power outages (United Nation's Environment Program, 2024). Thus energy efficiency is a crucial strategy to enhance climate resilience in the built ecosystem (Figure 1).

Figure 1 Climate change threats and adaptation measures



(Source: United Nation's Environment Program, 2024)

Emissions in the Built Ecosystem

Cities run on energy and urban populations around the world are expected to double by 2050, with the built-up area projected to more than triple, accounting for over 70 per cent of global carbon emissions (Ang, Berzolla, Letellier-Duchesne, & Reinhard, 2023). Similarly, Victoria's population is expected to increase to between 9.3 and 13.8 million by 2071 (Australian Bureau of Statistics , 2023) – an increase of between 41-109% over 2022 levels. Most of this population will be in metropolitan Melbourne and housed through higher residential intensification policy rather than expansion of Melbourne's land area.

Buildings are responsible for 21 per cent of global energy emissions (United Nation's Environment Program, 2024): 34 per cent from the energy consumed while the building is in use (operational carbon) and 37 per cent from the processing of building materials and the construction process (embodied carbon) (United Nation's Environment Program, 2024).

The carbon footprint of a building is the sum of a building's operational emissions and embodied carbon across its lifecycle and can vary greatly between high and low performing buildings. Therefore mitigation of emissions in both the construction (i.e. embodied carbon) and operation (operational carbon) of the built ecosystem is critically important.

Decarbonisation Pathways

In Australia, the construction sector is responsible for 18 per cent of our carbon footprint and this is expected to double by 2050 unless we change the way we build (Ottenhaus, 2022). The construction sector's major emissions arise from burning of fossil fuels for energy and the use of carbon-intensive materials (cement and steel). Construction emissions are called embodied emissions and are expected to account for half of the entire carbon footprint of new construction between now and 2050 (World Green Building Council, 2019). Of this, the substructure, superstructure and façade accounts for about two thirds of the emissions. Thus is it important that the construction industry focus' attention on building design, building materials and solutions. Without decisive action, new buildings across the world will increase carbon emissions at a global average of 0.7 per cent per year (Zhong, et al., 2021). For operating (mostly heating and cooling) emissions during a building's life, the IPCC estimates that the energy use of existing residential buildings can be reduced by 50-70 per cent.

The pathways to achieving net reductions are also dependent on increasing the renovation (or retrofitting) rate of existing buildings from one per cent to five per cent and for all construction to be carbon neutral by 2040 for both operational and embodied carbon (Ang, Berzolla, Letellier-Duchesne, & Reinhard, 2023). Retrofitting can be categorised into:

- structural hardening or protecting against event damage and flood risks
- resource conservation measures by reducing the amount of energy a structure uses, such as solar shading, natural ventilation, green roofs, improving insulation and night-vent colling, and
- improving energy supply efficiency, e.g. renewable energy and batteries. (United Nation's Environment Program, 2024)

Recommendation 2: To accelerate retrofitting aimed at reducing operational emissions, that the Government implements initiatives to increase the renovation rate for existing buildings.

Mitigation Opportunities

Mitigation options in the built ecosystem are outlined in Table 2. The options broadly cover intensification of use, extending the life of buildings, building design, construction material options, waste recovery and energy efficiency.

Intensification, waste recovery, energy transition and production efficiency do not require trade-offs as these do not have negative impacts on energy use during occupation (Zhong, et al., 2021). Research notes that lifetime extension is a concern due to the lower building standards (historically) and the impacts to operational emissions, while lightweight design considered only avoiding material overuse through improved design and technological developments (Zhong, et al., 2021).

Table 2 Mitigation options to reduce GHG emissions to 2060

Strategies	Description
M1—More intensive use	20% lower area per person compared to 2050 baseline
M2—Lifetime extension	Up to 90% lifetime extension (depending on the region and average lifetime) by 2050
M3—Lightweight design	19% reduction in aluminium and steel, 10% in concrete by 2050
M4—Material substitution	10% more timber buildings by 2050
M5—More recovery	Maximum recycling and reuse rates estimated by 2050 (recycling: 90% steel, 95% aluminium, 93% copper; reuse: 15% steel and concrete)
M6—Energy transition	An energy transition consistent with the SSP2-RCP2.6
M7—Production efficiency increase	Efficiency increases of material production via manufacturing improvements and process-switching (for example switching from hydrometallurgy to pyrometallurgy processes for copper production)

(Source: Zhong, et al., 2021)

Opportunities for value generation

The pathways to achieving net reductions are dependent on increasing the renovation rate (including roof top solar) from one per cent to five per cent and for all construction to be carbon neutral by 2040 for both operational and embodied carbon (Ang, Berzolla, Letellier-Duchesne, & Reinhard, 2023). One of the challenges identified by Ang, *et al* was that while many cities recognise the urgency to reduce carbon emissions in the built ecosystem, local governments struggled to define clear technology pathways. In addition, the need to decarbonise both the built ecosystem and the electricity grid in parrallel – something that Victoria is doing through its current investment in renewable energy. As the private sector is a significant investor in the built ecosystem, identifying opportunities to deliver value is critical through decarbonisation of the sector (Table 3).

Recommendation 3: That the Victorian Government explores opportunities to incentivise value generation for decarbonisation pathways.

Table 3 Built ecosystem decarbonisation solutions

Solution type	Solution
Industrialise production of green materials	Low-carbon cement and concrete Green steel Low carbon insulation Low cost engineered wood
Industrialise production of energy efficient building tech	Low cost, high efficiency heat pumps
Deliver efficiency energy and electrification upgrades	Energy upgrade solutions and installation services
Design and engineer green and cost-effective structures	Green and cost-effective solution designs
Electrify on-site construction	On-site equipment charging services
Minimise waste and maximise speed with off-site builds	Off-site modular construction solutions to minimise waste
Validate and certify low carbon actions and solutions	Validation of green assets and projects Certified green materials and solutions Green-solution professionals
Finance the green transition	Energy optimisation upgrades Transitioning financing Green insurance Transforming existing real estate and infrastructure to be more sustainable

(Source: adapted from Boland, Lekhwani, Reiter, & Sjödin, 2023)

The role of timber in built ecosystem

Over the course of the 20th century, the built ecosystem moved towards emissions intensive materials and away from renewable materials such as wood. Victoria's residential sector is a major driver of energy emissions across Scope 1 and 2 followed by manufacturing and commercial services (Department of Energy, Environment and Climate Action, 2022). Thus the challenge to limit global warming to below 2°C will only be achieved if both embodied (construction phase) and operational emissions in the built ecosystem are reduced dramatically.

With around half the dry weight of trees made up of carbon (Figure 2), Victoria's forestry and wood products sector emerges as a key player to achieve net zero in the built ecosystem:

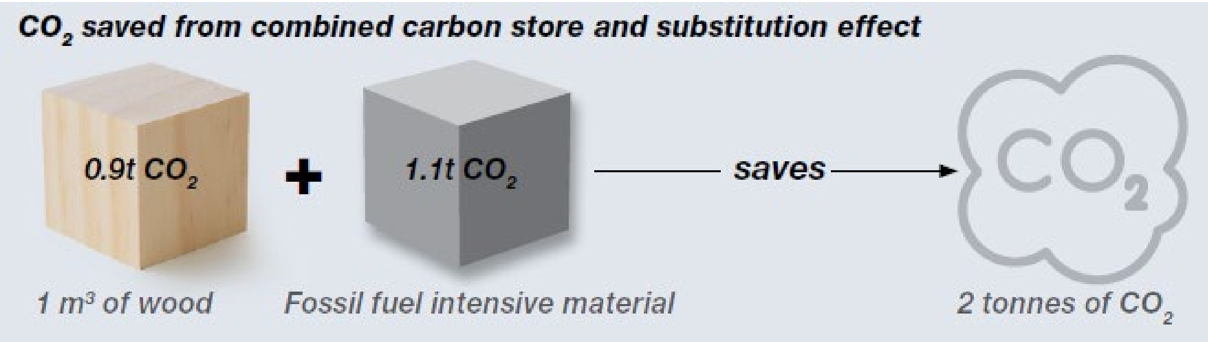
> *After experimentation and speculation for decades, **the only pathway known** to science that has the **immediate capacity to remove GHG (CO_2)** from the atmosphere **at scale is photosynthesis**.* (Chubb, Bennett, Gorring, & Hatfield-Dodds, 2022)
>
> and
>
> *Trees are without a doubt the best carbon capture technology in the world.* (The Pennsylvania State University, 2023)

Figure 2 Carbon in softwood and hardwood

(Source: Davies & Mitchell, 2023)

Using steel and concrete remains a major component of built ecosystem emissions compared to timber. Substituting timber for these emissions intensive inputs will reduce emissions in the built ecosystem (Figure 3) (Appendix 2).

Figure 3 Effect of substitution on carbon emissions in the built ecosystem



(Source: Davies & Mitchell, 2023)

An example of the substitution effect is the Bundoora Student Accommodation complex (Figure 4), which utilised 4,640 m^3 cross laminated timber (CLT) wall and floor panels and glue laminated timber (GLT) beams. This resulted in a reduction in embodied carbon of 7,500 t Co_2-e and a 76 per cent lower Global Warming Potential compared to the corresponding concrete-based design (Davies & Mitchell, 2023).

Figure 4 La Trobe University's Bundoora Student Accommodation

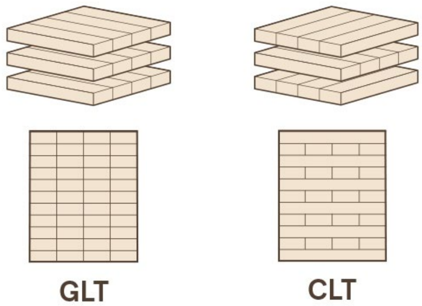
(Source: New student accommodation underway, News, La Trobe University)

Timber frame construction is robust and resilient when subjected to adverse and extreme conditions, including those associated with extreme events (Forest and Wood Products Australia, 2024). In Australia, a typical one-storey dwelling contains 22 t CO_2-e while each two-storey dwelling contains 37 t CO_2-e. Thus maximising timber in residential dwellings can provide substantial carbon sequestration and mitigation advantages over cement and steel, lowering both embodied and operating carbon emissions.

The development engineered wood products (EWPs) like GLT and CLT has been instrumental in the move towards greater use of timber, particularly in medium and high-rise buildings, and had led to a construction efficiency revolution through increasing prefabrication and modular housing opportunities[2]. CLT and GLT are thin pieces of timber glued together to make a super strong larger piece and have been available in Australia for decades. The difference between the two is the direction of gluing the timber:

- GLT: timber pieces are layered and glued on each other in the same direction resulting in increased strength ideal for structural beams and columns, and
- CLT: Timber pieces are glued at a 90-degree angle resulting in strength in both directions, giving similar characteristics to concrete (Timberlink, 2024) (Figure 5)

Figure 5 CLT and GLT layers



(Source: Hyne Timber, 2024)

EWPs are increasingly being used because of cost effectiveness, liveability (biophilia), ease and efficiency of construction, fire and seismic performance, insulation properties, strength to weight ratio, consistency of performance, sustainability, durability and demand for built ecosystems that are energy efficient, sustainable and carbon positive (Timberlink, 2024 and Hyne Timber, 2024). In addition to CLT and GLT, EWPs include:

- Wood panels such as particle board, MDF, plywood and OSB
- Flooring systems such as I-joists and girder trusses
- LVL – laminated veneer lumber
- NLT – Nail laminated timber, and
- DLT – dowel laminated timber.

While EWPs have traditionally been used in the housing sector, these are now being used in buildings higher than eight stories ("mass – or tall – timber buildings") as a way of minimising both embodied and operational emissions. Currently the world has 203 tall timber buildings either proposed, under construction or completed. While Australia has only 10 per cent of the world's

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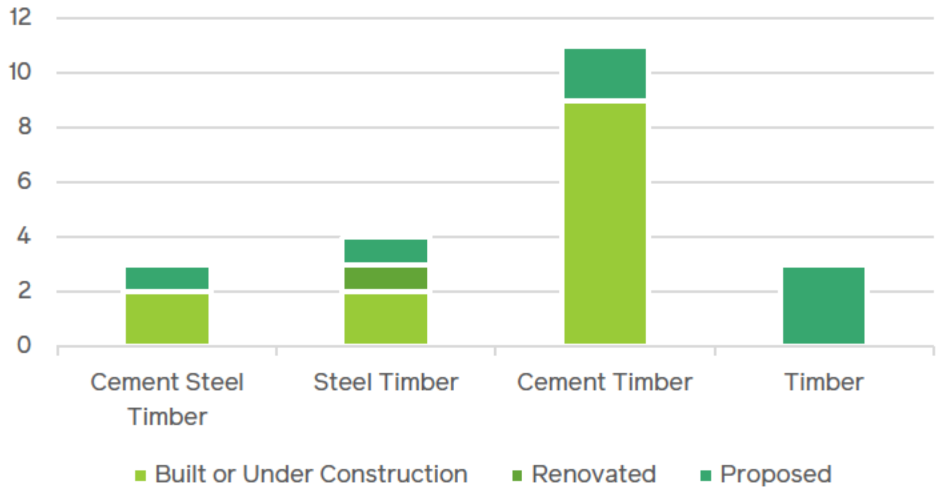
[2] Construction time taking 12 weeks rather than a year [The future is prefabricated: Prefabrication and modular construction (latham-australia.com)]

tall timber buildings built, under construction or proposed (Safarik, Elbrecht, & Miranda, 2022), it is soon to be home to the world's two highest timber structures (Council on Tall Buildings and Urban Habitat, 2024). Engineered wood is used in mass timber building either solely or in combination with steel and concrete (i.e. hybrid structures). Concrete timber structures comprise nearly half of the world's tall buildings (92), followed by timber (47), concrete steel timber (15), steel timber (17) and proposed unknown/other (32) (Council on Tall Buildings and Urban Habitat, 2024).

Of the tall buildings that are complete, under construction, renovated or proposed in Australia, all are hybrid buildings dominated by concrete timber (Figure 6) primarily for commercial purposes (15) over residential (7) (Council on Tall Buildings and Urban Habitat, 2024). The proposed C6 residential development in Perth is set to be the tallest timber hybrid structure in the world at 50 floors and 183.5 m.

Figure 6 Australia's tall buildings by structural type, number



(Source: Council on Tall Buildings and Urban Habitat, 2024)

The use of timber in high rise buildings is driven by the confluence of the need to reduce carbon emissions, decrease the consumption of non-renewables, and to create healthier and more liveable urban environments (Ilgin, 2024). Clearly, the private sector is leading the way with $1.2 trillion in real estate assets under management committed to halving emissions by 2030 (Chatham House, 2022). In contrast, much of the political agenda, including in Victoria, is focussed on reductions to, and improvements in, energy efficiencies (Chatham House, 2022), and decarbonisation of electricity grid.

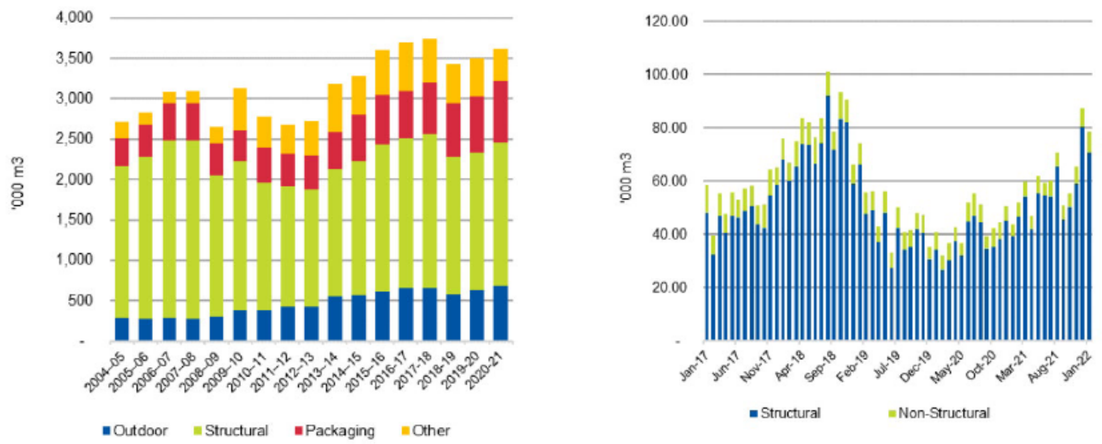
More recently, attention has turning to embodied carbon, including the design for, and construction of, low carbon buildings across both residential and high-rise structures while delivering improved resilience in Victoria's built ecosystem.

Recommendation 4: That the Victorian Government refocusses its priorities to increasing the use of timber in public infrastructure and to the policy and program changes to incentivise renovation of existing buildings.

Challenges to increasing the use of timber

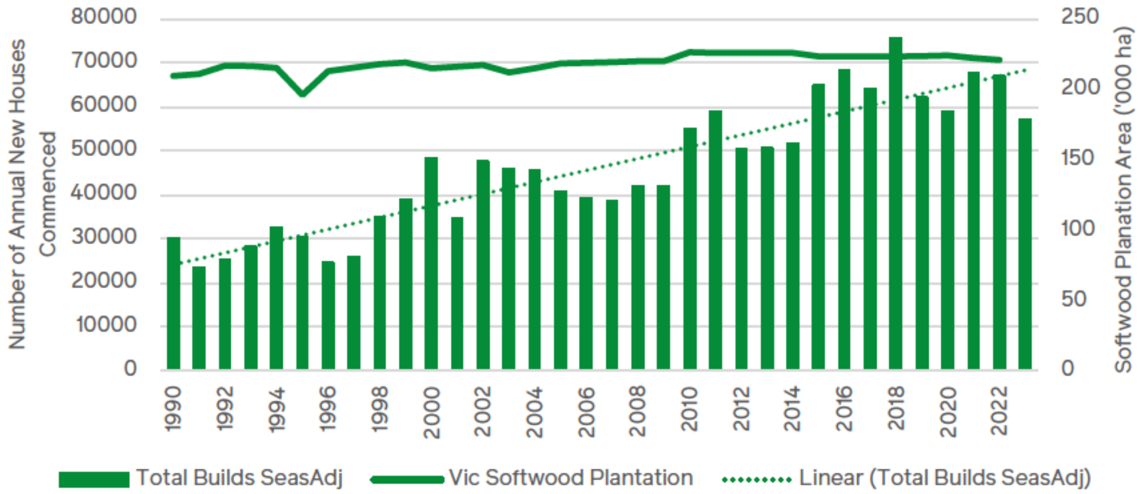
Australia's domestic and imported supply of softwood (the main construction timber) is dominated by structural timbers for housing (Figure 7). However, Victoria (and more widely Australia) is not self-sufficient in softwood. Victoria's softwood estate has been relatively static while at the same time, there has been a doubling of new housing builds in the 30 years it takes to grow a pine tree to sawlog maturity (Figure 8). Given the lack of sovereign supply, Victoria is dependent on imports from other jurisdictions and from overseas to meet local demand requirements with around 40 per cent of Australia's softwood imports arriving at the Port of Melbourne.

Figure 7 Domestic (left) and imported (right) softwood applications



(Source: IndustryEdge, 2022)

Figure 8 New residential builds compared to the softwood estate, Victoria, 1990-2023



(Source: data sourced from ABARES Forest and Wood datasets and ABS Housing statistics)

With new production facilities like XLAM at Wodonga and NeXTimber in South Australia, Australia is now self-sufficient in local production of softwood-based EWPs. The industry is investing in R&D into the use of plantation hardwood (shining gum and blue gum), including in combination with softwood for new LVL/GLT applications.

With over $4 million investment in R&D, ASH at Heyfield uses advanced manufacturing of native hardwoods (plantation nitens) for construction-based EWPs that also decarbonises the construction industry[3]. ASH has completed 71 major projects with nearly every tier one builder and many smaller jobs in every jurisdiction excepting the Northern Territory. This includes government projects such as Bendigo's GovHub (Figure 9), Gippsland's Performing Arts Centre

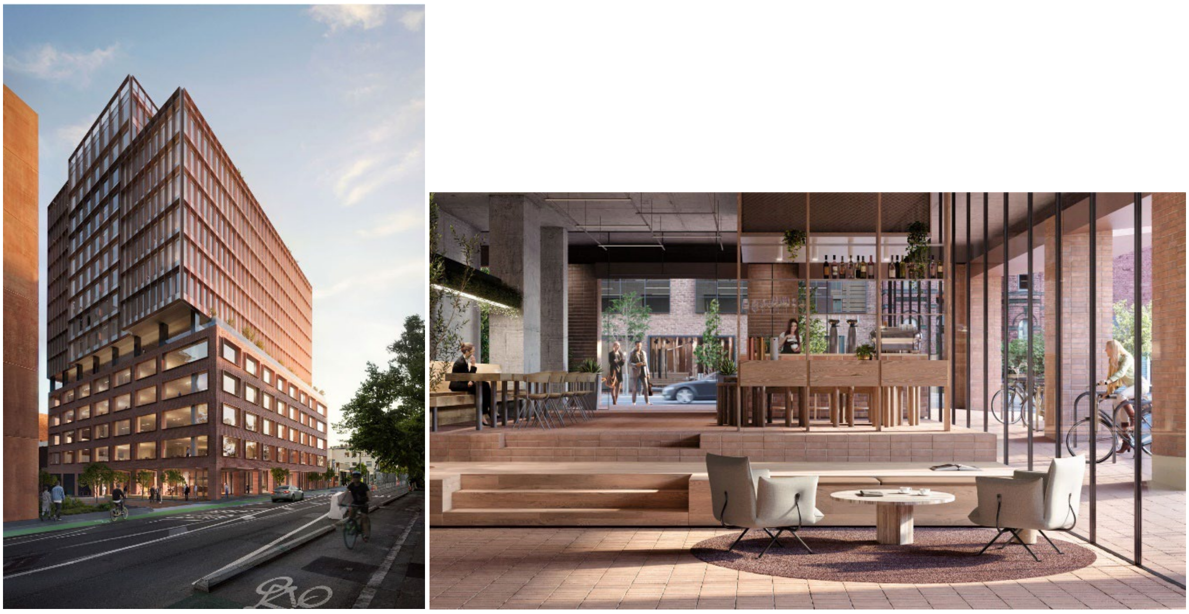
[3] See Victoria Wood case study Decarbonising the construction industry

and T3 at Collingwood[4] (Figure 10), along with mid-rise housing developments (Figure 11). T3 Collingwood was designed with the environment in mind, optimising energy efficiency and timber design, resulting in a 34 per cent reduction in embodied carbon, a 2,850-tonne reduction in CO_2 emissions compared to standard concrete design and targeting carbon neutral operations (Hines, n.d.).

Figure 9 Galkangu-Bendigo GovHub

(Source: Galkangu - Bendigo GovHub | Icon)

Figure 10 T3 Collingwood



(Source: Experience a different kind of world today)

[4] See Victoria Wood case study Elevating Collingwood's Landscape: T3 – a timber innovation

Figure 11 Mid-rise housing solutions

(Source: ASH)

Global demand for timber will outstrip supply four to one by 2050 and Australia will need to increase imports to bridge the implied domestic supply gap (IndustryEdge, 2022). Thus any risks to domestic softwood production will only exacerbate supply uncertainty and volatility. The increasing incidence of extreme bushfires exposes the softwood estate to destruction resulting in short – and longer – term impacts to the timber supply and manufacturing capability (e.g. through the closure of sawmills). Depending on the maturity of the plantation, some trees may be salvageable.

The Victorian plantation sector spends around $20 million annually on bushfire prevention, suppression and recovery activities. In addition, this year the industry is investing in a network of fire detection cameras (supported by AI and machine learning) in the Green Triangle region. Protecting the long-lived high value plantation estate is critical and the reason why the VFPA has called on the Victorian Government to invest $10 million in the 2024 May budget to expanding the technology across Victoria.

Recommendation 5: That the Victorian Government invests in a smoke detection network across Victoria's plantation regions.

Increasing the use of timber is widely accepted and encouraged to reduce embodied and operating emissions in the built ecosystem. Victoria's *Local Jobs First Act 2003* (Vic) (the "Act") and policy supports both jobs and local content[5] for public projects. VFPA suggests the inclusion of a high requirement for timber to reduce embodied and operational emissions and improve the resilience of the built ecosystem as an important regulatory outcome.

Recommendation 6 That the Local Jobs First Act 2003 is amended to include minimum requirements for the use of timber in public projects and infrastructure.

Further Reading

- https://www.woodsolutions.com.au/resilient-timber-homes
- https://fwpa.com.au/news/aussie-designers-lead-the-way-in-resilient-timber-home-design/

[5] Local content is defined as Australia and New Zealand

- https://fwpa.com.au/tool/fwpa-carbon-guides-social-media-assets/
- https://fwpa.com.au/report/practical-measures-to-build-climate-and-disaster-resilience-at-the-local-regional-and-national-level-as3959-and-timber-construction/.

Appendix 1

On 4 October 2023, the Legislative Council agreed to the following motion:

That this House requires the Environment and Planning Committee to inquire into, consider and report, by 30 June 2025, on:

a. the main risks facing Victoria's built environment and infrastructure from climate change and the impact these will have on the people of Victoria

b. how the Victorian Government is preparing for and mitigating the impacts of climate change on our built environment and infrastructure

c. the barriers facing Victoria in upgrading infrastructure to become more resilient to the impacts of climate change, including barriers in rebuilding or retrofitting infrastructure, including but not limited to, issues relating to insurance and barriers faced by local government

d. the adequacy of the current Victorian planning system as it relates to its adaptation to, preparation for, and mitigation of climate change impacts

e. what more could be done to better prepare Victoria's built environment and infrastructure, and therefore the community, for future climate disaster events, and

f. whether further inquiries or investigation may be needed into other aspects of climate change adaptation and climate disaster preparedness in Victoria, noting that climate change will have far-reaching impacts on all aspects of Victorian life, including but not limited to biodiversity, human health, primary production, industry, emergency services and more, and that while these areas may overlap with the matters covered in this inquiry, they may also warrant further investigation in their own inquiries.

Appendix 2

Victorian
Forest
Products
Association

CARBON BENEFITS OF WOOD PRODUCTS

"TREES TAKE SUNLIGHT AND TURN IT INTO CARBON THROUGH PHOTOSYNTHESIS AT NO COST AND ARE THE ONLY TECHNICALLY FEASIBLE AND COST-EFFECTIVE OPTION TO GET TO NET-ZERO" (DIANA GIBBS)

About 50% of the dry weight of wood is carbon. Over time, the ability of trees to absorb carbon decreases, meaning new plantings are important.

Every year, 4.7 million t CO2-e is stored in our built environment from sawn softwood harvested from Victorian pine plantations.

We remove more carbon from the atmosphere than we emit: Locally grown and processed wood has an average negative carbon footprint of -819 kg CO2 per m^3. This includes harvest, haulage, processing, drying, and packaging.[1]

Existing building policies overlook wood's carbon storage benefits:
i. Each two-storey house sequesters around 37 t CO2-e (single-storey: 22.185 tCO2-e)[2]
ii. Wood products continue to store carbon during their lifespan.
iii. Maximising the use of wood products in typical houses could result in a net saving of around 30 t CO2-e per house.

Choosing wood makes sense for builders: timber is typically cheaper than steel. Wood also has lower GHG emissions in extraction and manufacturing than bricks, aluminium, and concrete; substituting wood for non-wood products therefore reduces GHG emissions.

Transitioning to bio-based products is essential for reaching sustainable development goals; forestry residues can be used for bioenergy, e.g., biofuel, displacing the use of fossil fuels.

Initiatives and policies could include:
1. Promoting the optimal use of harvest and processing residues, including incentives for novel bioproducts and bioenergy
2. GHG Accounting methods for emissions trading where the full value of carbon in forests and wood products is included
3. Building rating schemes that assign value accurately to both the physical carbon storage and the substitution benefit
4. End-of-life schemes that promote the most favourable emissions reduction outcome for the various wood products

Sources:
[1] https://fwpa.com.au/wp-content/uploads/2023/09/Forests-Plantatation-Wood-Products-and-Australias-Carbon-Balance-.pdf
[2] https://fwpa.com.au/how-much-wood-in-an-average-house-14-58-m3-

References

AECOM Australia Pty Ltd. (2021). *Future in focus: Resilience in the built environment.* Green Building Council Australia. Retrieved March 14, 2024, from https://gbca-web.s3.amazonaws.com/media/documents/fif-resilience-in-the-built-environment--final-interactive.pdf

Ang, Y. Q., Berzolla, Z. M., Letellier-Duchesne, S., & Reinhard, C. (2023, April 4). Carbon reduction technology pathways for existing buildings in eight cities. *Nature Communications, 14*(1689). Retrieved March 7, 2024, from https://www.nature.com/articles/s41467-023-37131-6

Australian Bureau of Statistics . (2023, November 23). *Population Projections, Australia*. Retrieved from Australian Bureau of Statistics : https://www.abs.gov.au/statistics/people/population/population-projections-australia/latest-release

Boland, B., Lekhwani, S., Reiter, S., & Sjödin, E. (2023). *Building value by decarbonising the built environment.* Washington: McKinsey & Company.

Chatham House. (2022, December 21). *Decarbonising construction: the potential of cross-laminated timber*. Retrieved from Chatham House: https://accelerator.chathamhouse.org/article/decarbonizing-construction-the-potential-of-cross-laminated-timber

Chubb, I., Bennett, A., Gorring, A., & Hatfield-Dodds, S. (2022). *Independent Review of ACCUs.* Canberra: Department of Climate Change, Energy, the Environment, and Water. Retrieved February 29, 2024, from https://www.dcceew.gov.au/sites/default/files/documents/independent-review-accu-final-report.pdf

Clean Energy Finance Corporation. (2021). *Australian buildings and infrastructure: Opportunities for cutting embodied carbon.* Sydney: CEFC. Retrieved from https://www.cefc.com.au/media/ovrkk5l3/australian-buildings-and-infrastructure-opportunities-for-cutting-embodied-carbon.pdf

Council on Tall Buildings and Urban Habitat. (2024). *The Mass Timber Database*. Retrieved from Tall Timber Centre: https://talltimbercenter.com/buildings

Davies, A., & Mitchell, S. (2023). *The role of wood products in zero carbon buildings.* Melbourne: Wood Solutions by Forest & Wood Products Australia. Retrieved from https://fwpa.com.au/tool/fwpa-carbon-guides-social-media-assets/

Department of Industry, Science and Resources. (2024, March 22). *Building Ministers' Meeting: Communique March 2024*. Retrieved from Department of Industry, Science and Resources: https://www.industry.gov.au/news/building-ministers-meeting-communique-march-2024

Forest and Wood Products Australia. (2024). *Reslient Timber Homes*. Retrieved from Wood Solutions: https://www.woodsolutions.com.au/resilient-timber-homes

Hines. (n.d.). *T3 Collingwood*. Retrieved from T3 Collingwood: https://t3collingwood.com.au/

Ilgin, H. E. (2024). High-Rise Residential Timber Buildings: Emerging Architectural and Structural Design Trends. *Buildings, 14 (1): 25*. Retrieved March 14, 2024, from https://doi.org/10.3390/buildings14010025

IndustryEdge. (2022). *Outlook for Australian Forestry & Timber Products.* Gellong: IndustryEdge.

Intergovernmental Panel on Climate Change. (2012). *Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation.* Cambridge and New York: Cambridge

University Press. Retrieved March 19, 2024, from https://www.ipcc.ch/site/assets/uploads/2018/03/SREX_Full_Report-1.pdf

Ottenhaus, L. (2022, August 15). *Tall timber buildings are exciting, but to shrink construction's carbon footprint we need to focus on the less sexy "middle"*. Retrieved from The Conversation: https://theconversation.com/tall-timber-buildings-are-exciting-but-to-shrink-constructions-carbon-footprint-we-need-to-focus-on-the-less-sexy-middle-188143

Safarik, D., Elbrecht, J., & Miranda, W. (2022). *State of Tall Buildings 2022.* Chicago: Council on Tall Buildings and Urban Habitat. Retrieved March 14, 2024, from https://www.ctbuh.org/resources/papers/4530-Journal2022_IssueI_StateofTallTimber+TBIN.pdf

The Pennsylvania State University. (2023). *How Forests Store Carbon*. Retrieved from College of Agricultural Sciences, PennState Extension.

Timberlink. (2024). *What is CLT and GLT?* Retrieved from Timberlink: https://timberlinkaustralia.com.au/news/what-is-clt-glt/

United Nations Environment Program. (2021). *2021 Global Status Report for Buildings and Construction: Towards zero-emissions,efficient and resilient buildins and construction sector.* Nairobi: United Nations Environment Program. Retrieved from https://globalabc.org/sites/default/files/2021-10/GABC_Buildings-GSR-2021_BOOK.pdf

United Nation's Environment Program. (2024). *Global Status Report for Buildings and Construction: Beyond foundations: Mainstreaming sustainable solutions to cut emissions from the buildings sector.* Nairobi: United Nations Environment Programme (UNEP) and Global Alliance for Buildings and Construction (GlobalABC). Retrieved March 18, 2024, from https://wedocs.unep.org/bitstream/handle/20.500.11822/45095/global_status_report_buildings_construction_2023.pdf?sequence=3&isAllowed=y

World Green Building Council. (2019). Bringing Embodied Carbon Upfront. London.

Ximenes, F., George, B., Cowie, A. L., Kelly, G., Williams, J., Levitt, G., & Boer, K. (2012). *Harvested forests provide the greatest ongoing greenhouse gas benefits. Does current Australian policy support optimal greenhouse gas mitigation outcomes?*

Zhong, X., Hu , M., Deeetman , S., Steubing, B., Lin, H. X., Hernandez, G. A., . . . Behrens, P. (2021, October 21). Global greenhouse gas emissions from residential and commercial building materials and mitigation strategies to 2060. *Nature Communications, 12*(6126). Retrieved from https://doi.org/10.1038/s41467-021-26212-z

Victorian Forest Products Association

The Victorian Forest Products Association (VFPA) is the primary industry organisation representing the timber and wood fibre sector in Victoria. This encompasses businesses engaged in the cultivation, managing, and harvesting of our ecologically sustainable Victorian forests. VFPA's members include timber processors, pulp and paper manufacturers, and enterprises involved in value-adding throughout the supply chain.

www.vfpa.com.au enquiries@vfpa.com.au [redacted]