Adaptation of the Current World's Best Practice into an Australian DTS Code Change

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Forest & Wood Products Australia

Mass Timber Project – Adaptation of The Current World's Best Practice into an Australian DTS Code Change

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Executive Summary

Mass timber construction is expanding rapidly worldwide due to its lower embodied carbon, speed of construction, structural capability, and architectural appeal. In Australia, however, the National Construction Code (NCC) Deemed-to-Satisfy (DTS) provisions have not kept pace with international practice, particularly in relation to exposed mass timber in taller buildings. This has created uncertainty for designers, consultants, regulators, and fire authorities, often forcing projects to rely on complex Performance Solutions or to avoid exposed timber altogether.

This project represents stage one of a multiple-stage project to obtain a regulatory code change for the DTS fire design of exposed mass timber. The project examined international codes, standards, and research to establish an evidence base for an Australian Industry Standard that could support future NCC reform. The review focused on Australia, the United States, New Zealand, the Netherlands, Canada (British Columbia), and England. Across all jurisdictions reviewed, exposed mass timber is regulated through explicit height limits, controls on the extent of exposed timber, mandatory sprinkler protection, and increasing levels of encapsulation as building height and risk increase.

The United States provides the clearest model for reform. The 2021 and 2024 International Building Code amendments introduced new mass timber construction types supported by transparent performance objectives and extensive large-scale compartment fire testing. These provisions demonstrate that exposed or partially exposed mass timber can be permitted safely when matched with appropriate controls, including sprinkler reliability, fire-resistance requirements, and limits on exposed timber area. The Netherlands and British Columbia provide additional examples of robust, evidence-based approaches tailored to local fire service capability, regulatory structure, and building practice. New Zealand and England also demonstrate risk-based approaches that restrict prescriptive pathways as height, occupancy complexity, and consequence increase.

The project also undertook preliminary stakeholder engagement with regulators, fire services, certifiers, and building industry bodies. Feedback was broadly supportive, subject to the development of a technically rigorous draft standard. Stakeholders consistently indicated that any future DTS pathway for exposed mass timber would need to be strongly justified by evidence and carefully calibrated to Australian conditions, including local fire service capabilities, building classifications, fire resistance level requirements, and product standards.

The findings of this project confirm that reform is achievable. International evidence shows that prescriptive pathways for exposed mass timber can be developed without compromising fire safety, provided they are supported by conservative limits and clear performance intent. Rather than pursuing a direct NCC amendment at this stage, the preferred pathway is to develop a standalone Industry Standard through the FWPA Standards Development Program, with the goal of future referencing in the NCC.

This project has therefore established a clear foundation for the next phases of work: drafting the Industry Standard, refining the technical justification for Australian application, and continuing engagement with key stakeholders.

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Introduction

The National Construction Code (NCC) Deemed-to-Satisfy (DTS) provisions impose unclear fire-safety compliance requirements for mass timber buildings, particularly for exposed timber elements and for structures exceeding eight storeys. This regulatory framework has resulted in building practitioners either pursuing complex, conservative Performance Solutions or foregoing the use of mass timber construction entirely; either way, the building's standout signature, exposed mass timber, is typically covered or excluded.

Uncertainties surrounding fire dynamics/performance of exposed mass timber buildings and high-rise timber compartments have created significant barriers to market adoption. These technical challenges have effectively constrained the widespread implementation of exposed mass timber construction in taller buildings in Australia.

To address these challenges, this mass timber construction project proposes synthesising existing international research, current and proposed international mass timber building codes, and practical Australian experience to develop a comprehensive guidance framework for an Industry Standard. This initiative will be conducted in four stages, as summarised below.

- Stage One - Data Collection and Initial Stakeholder Engagement
- Stage Two - Draft Standard Development
- Stage Three – Regulator, Justification and Stakeholder Engagement
- Stage Four: Industry Standard call up to the NCC

This report covers Stage One activities, being the data collection and initial Stakeholder engagement, broken down into the following:-

- Consolidate the Evidence Base:
    - Exposed Mass timber International Codes and Standards review
    - Experimental work that influenced Codes and Standards
- Develop Implementation Framework:
    - What is the basis/nature of each Code/Standard?
    - What is permitted in each case?
    - Limitations to the validity of research/Codes?
    - How do these translate to the Australian case?
    - Develop a framework for Australian Code targets, including justification and validations as needed.
    - Undertake initial stakeholder engagement

Methodology

The Stage One project is further developed into three tasks:

Task 1: Data Collection, Collation and Review

- Review International Codes and Standards (US, Canada, Future Swedish, Future Dutch and other if available)
- Review experimental work and other available data/evidence that influenced Codes and Standards changes
- Any other relevant test evidence

Task 2: Report on What is Established/Permitted Under Each Code/Standard

A report outlining the following:

- The basis of each overseas code/standard.
- The prescriptive provisions of each overseas code/standard
- Requirements and limitations associated with each code or standard
- How these provisions translate to the Australian context

Task 3: Stakeholder Engagement

- Commence direct critical stakeholder engagement, i.e. fire brigades and regulators, building associations, certifiers, etc.

Results

The following discusses the findings from the three tasks undertaken by this project.

Task 1 - Data Collection, Collation and Review.

A report, prepared by Halliwell Fire Science, titled *NCC Mass Timber - Proposal for Change – Stage 1 Research Report,* constitutes the first stage of a structured research program that will propose changes to the Deemed-to-Satisfy (DTS) provisions of Australia's National Construction Code Volume One, Building Code of Australia Class 2 to 9 buildings (NCC) as they relate to exposed mass timber construction. The program is driven by the rapid and near-exponential growth in mass timber construction globally, fuelled by the material's lower carbon footprint, aesthetic appeal, structural versatility, and speed of construction, and by the recognition that Australian building regulations have not been meaningfully updated in this area for a decade.

Mass timber products, including Cross-Laminated Timber (CLT), glued-laminated timber (GLT, glulam), Laminated Veneer Lumber (LVL), and nailed-laminated timber (NLT), have dramatically expanded the technical feasibility of constructing tall, predominantly timber buildings. As these structures become taller and more complex, fire safety considerations become correspondingly more critical. Most building codes internationally were developed before this construction trend emerged and do not adequately address the fire safety challenges that exposed mass timber introduces, particularly in multi-storey buildings. This report reviews six jurisdictions - Australia, the USA, New Zealand, the Netherlands, Canada (British Columbia), and the United Kingdom (England), and measures that currently regulate or provide guidance for mass timber construction, with a focus on fire safety, and draws lessons relevant to updating the Australian regulatory framework.

Australia

The NCC is a performance-based building code. Compliance can be achieved either through the prescriptive DTS provisions, which, if followed, are deemed to satisfy the Performance Requirements; or through a Performance Solution, which requires a site-specific fire engineering analysis demonstrating that the Performance Requirements are met. In practice, the vast majority of buildings in Australia are designed using the DTS pathway.

Mass timber provisions were introduced into the NCC in 2016 with the concept of Fire-Protected Timber (FPT), which allowed encapsulated mass timber structural elements to substitute for non-combustible materials in buildings where non-combustibility was otherwise required. This was initially targeted at residential and commercial buildings and was subsequently extended to all building classifications in NCC 2019. Under NCC 2025, the DTS provisions allow FPT in buildings of all classifications with an effective height of not more than 25 m (measured to the top-most floor), provided sprinkler protection is installed throughout.

The objective of FPT encapsulation is to prevent or significantly delay ignition of the timber structure so that the building's fire response approximates that of a non-combustible building. The mass (massive) timber prescriptive requirement specifies that the temperature at the interface between the fire-protective covering and the timber must not exceed 300°C during a standard fire resistance test for a period defined by the application. These requirements are supported by a risk assessment that concluded sprinklers combined with encapsulation provide a sufficient level of safety; however, this conclusion has limits of applicability, particularly as building height increases and evacuation time grows.

United States of America (USA)

The USA has a long history of heavy timber construction, and this heritage informed the development of new mass timber provisions in the 2021 International Building Code (IBC). The IBC is developed by the International Code Council and adopted, in varying versions, across all 50 states.

Recognising that multi-storey mass timber buildings were already being approved at the local level without IBC support, the International Code Council established an Ad Hoc Committee on Tall Wood Buildings (TWB) to investigate proposed changes. The Committee comprised a broad range of stakeholders, including fire officials, architects, engineers, and fire protection experts. Its work was underpinned by a series of large-scale compartment fire tests conducted at the Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF) laboratory, which were the largest such tests of mass timber compartments at the time.

The 2021 IBC introduced three new construction types. Type IV-C, broadly analogous to traditional heavy timber construction but with a required two-hour fire resistance rating, permits fully exposed timber in buildings up to 9 storeys for office use. Type IV-B allows partial exposure of mass timber, up to 20% of the ceiling or 40% of all walls, in sprinkler-protected buildings up to 12 storeys, with the remainder of the timber structure protected with fire-rated gypsum board providing 80 minutes of protection in furnace test conditions. Type IV-A requires full encapsulation, three layers of 15.9 mm Type X gypsum board or equivalent, and permits buildings up to 18 storeys, with a required three-hour fire resistance for the structural frame. Both

Type IV-A and IV-B buildings exceeding 36 m in height must have a second independent water supply for sprinklers. Refer to Figure 1 for a summary of the allowed buildings.

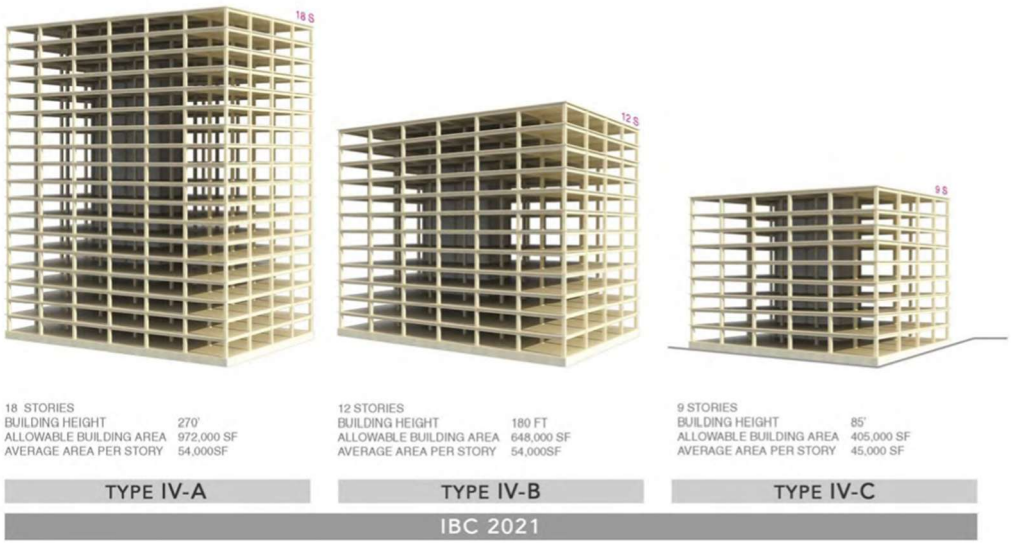

Figure 1: International Building Code summary of Mass Timber Prescriptive Solutions (Image credit: WoodWorks US)

Key performance objectives underpinning these provisions included: structural survival through complete fuel burnout without reliance on sprinkler activation; no unusual radiation exposure to adjoining properties; reliable suppression systems proportional to building height; and egress systems providing adequate protection throughout the design escape time, plus a factor of safety.

The 2024 IBC introduced a further relaxation, allowing the complete ceiling to be exposed in Type IV-B construction, supported by additional compartment fire testing conducted by the Research Institutes of Sweden (RISE) using CLT compliant with the ANSI/APA PRG 320 product standard.

New Zealand

New Zealand operates a performance-based building regulatory system. Compliance can be demonstrated via the prescriptive Acceptable Solution (C/AS2), the Verification Method (C/VM2), or an Alternative Solution (performance-based design). In recent years, fire safety concerns have become a significant obstacle to mass timber uptake, largely due to the absence of specific provisions in the compliance documents for the challenges posed by multi-storey mass timber construction.

To address this, an industry group, including fire engineering experts from research, consultancy, and academia, as well as representatives from the timber industry, the Ministry of Business, Innovation and Employment (MBIE), and Fire and Emergency New Zealand (FENZ), developed interim guidelines titled "Fire safety in multi-storey mass timber structures – Recommendations to Supplement C/AS2 and C/VM2."

These guidelines apply to buildings with escape heights between 4 m and 25 m. Below 4 m, normal design provisions apply without additional recommendations; above 25 m, case-by-case consideration is required. The guidelines introduce four categories of permitted exposed mass timber area, ranging from unlimited (Category WU) for low-rise sprinkler-protected buildings, to none (Category W0, full

encapsulation) for taller unsprinklered buildings, with permitted exposure reducing as building height increases. Minimum fire resistance requirements are also specified, typically 60 minutes for sprinklered buildings. For taller buildings using the Verification Method, fire severity calculations must account for the additional fuel load from exposed timber surfaces, including during the fire's decay phase.

The Netherlands

The Netherlands is developing NTA 6125, a Netherlands (Dutch) Technical Agreement prepared by Arup, RISE, and the Netherlands Organisation for Applied Scientific Research (TNO) on behalf of the Dutch government. It provides supplementary fire safety requirements for mass timber buildings. The approach is notable for its explicit grounding in the fire service's capabilities and limitations, as defined in Dutch standards.

The NTA document categorises buildings by height into four tiers, with different measure packages prescribed for each. A key principle is that as building height increases, the ability of the fire service to intervene externally diminishes, external firefighting is considered ineffective above 20 m, and the fire safety measures must compensate accordingly. Pre-accepted solutions are currently limited to buildings with upper floor levels no higher than 35 m; buildings above this height require a performance-based risk assessment.

The NTA introduces protection levels that define the maximum permitted area of exposed mass timber and the required fire protection for encapsulated surfaces, ranging from 107–180% of the floor area exposed with 60 minutes of protection, up to full encapsulation. These limits are predominantly based on published compartment fire test data.

Canada (British Columbia)

British Columbia (BC) has been selected as the Canadian case study due to its leadership in mass timber construction. The BC Building Code (BCBC) 2024 permits encapsulated mass timber buildings of up to 18 storeys with a 70-minute encapsulation rating, 12 storeys with a 50-minute rating (with limited partial exposure permitted), and generally fully exposed mass timber for office buildings up to 9 storeys. All buildings with encapsulated mass timber must be sprinkler-protected.

Encapsulation performance is assessed using the Canadian standard CAN/ULC-S146, which defines failure as the point at which the average temperature at the encapsulation-to-timber interface exceeds 250°C. The height expansion to 18 storeys was supported by a comparative assessment between the 2021 International Building Code (IBC) and the 2020 National Building Code of Canada, together with relevant fire research and product standards, which concluded that the IBC provisions could generally be adopted within the Canadian framework with appropriate modifications.

United Kingdom (England)

In England, the regulatory landscape for mass timber has been significantly shaped by the aftermath of the Grenfell Tower fire. Approved Document B (ADB), which provides prescriptive guidance for fire safety in buildings, now explicitly states that its guidance is not appropriate for non-standard conditions, and large timber buildings are specifically identified as falling into this category. Irrespective of the material used, compliance with the guidance does not guarantee compliance with the

underlying Building Regulations 2010, and detailed evidence-based justification is required for mass timber buildings.

Industry guidance from organisations, including the Structural Timber Association (STA), assigns consequence classes to buildings based on occupancy type, height, and population, and prescribes compliance routes accordingly. For lower-consequence class buildings, such as low-rise offices and residential buildings, guidance-based compliance routes that reference codified structural fire engineering methods are considered appropriate. For higher-consequence-class buildings, performance-based design is required. Maximum heights for guidance-based compliance are specified by occupancy: 18 m for offices and mercantile uses, and 11 m for residential and hotel uses.

Summary and Next Steps

The comparative analysis reveals that every jurisdiction reviewed has explicit, justified height limits for exposed mass timber in its prescriptive provisions. Each international jurisdiction has taken a different approach, reflecting differences in regulatory frameworks, fire service capabilities, research investment, and stakeholder influence. While the specific requirements of any one code cannot simply be transposed into the Australian context, the collective body of research, testing, and code development provides a strong evidence base for informed updates to the NCC DTS provisions.

Task 2 Justification for Mass Timber in Building Regulations: A Country-by-Country Analysis

Australia

Australia's justification for incorporating mass timber into the NCC DTS provisions was driven primarily by the timber industry's desire to expand the commercial use of timber in mid-rise residential and commercial buildings. The 2016 amendment, introducing Fire-Protected Timber (FPT), was supported by a risk assessment commissioned by Forest and Wood Products Australia, which concluded that the combination of sprinkler protection and encapsulation of the timber structure provides a level of safety equivalent to that of non-combustible construction. The underlying logic was that if the timber is prevented from igniting during a credible fire event, specifically by keeping the timber/encapsulant interface below 300°C for a defined period, the building would behave in fire in a manner broadly comparable to a steel or concrete structure.

The justification for the existing exposed mass timber provisions is notably less deliberate. Under the NCC's Type A and B construction provisions, columns, beams, floors, and roofs are not explicitly required to be non-combustible. This results in exposed mass timber being technically permitted in these elements to any height. It has often been incorrectly assumed that the NCC provision ‘supports other parts' provisions that would pick up these elements for Type A and B buildings and require them to be non-combustible. However, this is not the case in all scenarios.

United States of America (USA)

The USA provides the most thoroughly documented justification of all jurisdictions reviewed. The 2021 IBC changes followed a structured and transparent process led by the International Code Council's Ad Hoc Committee on Tall Wood Buildings

(TWB), a multi-disciplinary body of 18 members including building officials, fire chiefs, architects, engineers, and fire protection specialists.

The Committee established explicit performance objectives as the foundation for the new construction types. These objectives required that buildings incorporating mass timber should:

- Resist structural collapse under reasonably credible, complete burnout scenarios without relying on sprinkler activation;
- Not expose adjacent properties to unusually high radiation risk;
- Not present unusual fire department access challenges;
- Protect occupants during their full evacuation time plus a safety factor; and
- Use highly reliable suppression systems, with reliability proportional to building height and risk of collapse.

The justification was supported by a large-scale compartment fire testing programme conducted at the Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF) laboratories, which, at the time, was the most extensive international mass timber compartment fire testing programme ever undertaken. These tests examined encapsulated, partially exposed, and unprotected CLT with sprinkler protection, providing empirical data on fire behaviour under different exposure and protection configurations.

New Zealand

New Zealand's justification for developing mass timber guidelines was largely reactive, driven by the recognition that fire safety concerns had become a significant practical obstacle to mass timber construction. Three specific concerns were identified as recurring obstacles raised during building consent processes:

- Large areas of exposed structural timber substantially increase the fire load in a compartment.
- Charring may continue after a fire appears to be extinguished, presenting a risk of reignition.
- Timber begins to lose structural strength at temperatures below 100°C, indicating that even modest fire exposure can compromise load-bearing capacity.

These concerns were generating inconsistent responses from consent authorities, creating commercial uncertainty for developers and designers. The absence of any specific mass timber provisions in the existing New Zealand Building Code’s (NZBC) Acceptable Solution (C/AS2) and Verification Method (C/VM2) meant that authorities had broad discretion to demand additional justification, even for compliant designs.

The technical basis of the guidelines drew on international research and large-scale compartment fire testing, including work published in the globally developed book "Fire Safe Use of Wood in Buildings: A Global Design Guide" (2022). The height limits and exposure area categories were calibrated to reflect the increased evacuation time and structural demands of taller buildings.

The Netherlands

The Netherlands provides perhaps the most technically rigorous justification, grounded explicitly in a critique of existing Dutch regulations and an assessment of where those regulations would fail for mass timber construction.

The regulatory impetus came from a motion passed by the Dutch House of Representatives in April 2021, which called for an examination of whether building regulations needed to be amended to ensure adequate fire safety for new and renewable building materials, including timber. This was followed by a formal literature review and, from October 2023, the development of the Draft NTA 6125.

Canada (British Columbia)

British Columbia's justification for expanding mass timber height permissions to 18 storeys rested on a comparative assessment of the 2021 IBC and the 2020 National Building Code of Canada (NBCC), supported by relevant research, large-scale fire test data, and industry standards, as documented in a Forestry Innovation report published in November 2023.

The comparative assessment identified key differences between the two codes and demonstrated that, with appropriate Canadian-specific modifications, the research base underpinning the 2021 IBC mass timber provisions, the ATF compartment fire tests, the ANSI/APA PRG 320 delamination testing programme, and the Ad Hoc Committee's performance objectives was sufficiently applicable to the Canadian context. The shared research basis between the NBC and IBC development processes was cited as a key factor supporting transferability.

The concept of encapsulation as a design strategy was justified on the basis that it effectively removes the timber structure from the fire equation: if the encapsulation prevents the timber from igniting, the building behaves in fire as a non-combustible structure, enabling direct comparison with steel and concrete construction. This logic mirrors the approach taken in Australia's FPT provisions and in the Type IV-A category of the US IBC.

Sprinkler protection is mandatory for all encapsulated mass timber buildings under the BCBC, reflecting the view that the reliability of suppression systems must increase in proportion to building height, evacuation time, and the potential consequences of structural failure.

United Kingdom (England)

England's regulatory framework does not offer a prescriptive pathway specifically designed for mass timber. The justification for mass timber use instead flows through industry-developed guidelines, principally from the Structural Timber Association, Arup, and Timber Development UK, which provide structured pathways to demonstrate compliance with the Building Regulations 2010.

The underlying justification in these guidelines is risk-proportionate. Consequence classes are assigned based on building type, height, occupancy, occupant vulnerability, and the level of fire safety engineering required, which scales with consequence. For low-consequence buildings, i.e., small, low-rise, with short evacuation times and accessible to external fire service intervention, the guidelines justify the use of exposed or partially encapsulated timber by reference to standard fire resistance periods and codified calculation methods, as set out in Eurocode 5

Part 1-2: Structural fire design. For medium- and high-consequence buildings, full encapsulation is justified on the basis that it causes the structure to behave as non-combustible; alternatively, a performance-based demonstration of post-burnout self-extinction is required.

Task 3: Stakeholder engagement

This task summarises preliminary stakeholder discussions. Face-to-face meetings were held with representatives from seven key organisations:

- Australian Building Codes Board (ABCB)
- Housing Industry Association (HIA)
- Master Builders Australia (MBA)
- Queensland Fire & Emergency Services (QFES)
- Building and Plumbing Commission of Victoria (BPC)
- Australian Institute of Building Surveyors (AIBS)
- Australian and New Zealand Council for Fire and Emergency Services (AFAC)

Additional input was sought from three practising fire safety engineers with direct experience in mass timber building design and fire modelling.

Overall Response

The general response from stakeholders was positive and supportive in principle, with one dissenting view. The dissenting stakeholder argued that a DTS provision is not appropriate for exposed mass timber buildings, given the number of variables involved, and that Performance Solutions should always be required. The project team's response was that well-drafted standards routinely accommodate natural variability, citing precedents such as, AS 4055 (wind loads) and AS 3959 (bushfire construction) and that an Industry Standard would set conservative limits for typical buildings while preserving the Performance Solution pathway for more complex cases.

The consistent message from all other stakeholders was that support would follow, provided the provisions were technically justified, and that final positions would be reserved until a draft of the Industry Standard was available for detailed review.

Discussion

The comparative analysis of international regulatory frameworks reveals a consistent set of underlying safety principles, even where the specific prescriptive requirements differ considerably. Across all jurisdictions, regulators have converged on several core controls: mandatory sprinkler protection, limits on exposed timber surface area proportional to floor area, encapsulation requirements scaled to building height, increased structural fire resistance for vulnerable elements, requirements for CLT, and explicit height limits beyond which prescriptive pathways are unavailable.

The United States provides the most thoroughly documented model code for the Australian reform effort. The process that produced the 2021 International Building Code (IBC) mass timber provisions was notable for its multi-disciplinary governance, its explicit and transparent performance objectives, and its grounding in large-scale compartment fire testing. The ATF laboratory fire tests, at the time the most extensive mass timber compartment fire testing programme conducted globally, provided the empirical foundation for the three new construction types: Type IV-A (fully encapsulated, up to 18 storeys), Type IV-B (partially exposed, up to 12 storeys), and Type IV-C (fully exposed, up to 9 storeys). The 2024 IBC further relaxed exposure limits in Type IV-B buildings, supported by additional RISE testing, demonstrating that the regulatory framework is designed to evolve as the evidence base grows. The performance objective of structural survival through complete fuel burnout without reliance on sprinkler activation represents a conservative and defensible benchmark that Australian standards development could usefully adopt.

The Netherlands' NTA 6125 offers a different but equally instructive model: rather than building upward from existing non-combustible construction precedent (as the US approach did), it began by identifying precisely where existing Dutch building regulations were inadequate for mass timber and why. The findings need to be reviewed in light of Australian differences, which allow the use of combustible linings and require higher fire resistance, as well as Australia's own fire service capabilities and intervention timeframes.

Canada’s British Columbia approach demonstrates that regulatory progress can be achieved through comparative assessment rather than requiring entirely new domestic testing programmes. The BCBC 2024 expansion to 18-storey encapsulated mass timber buildings was justified by demonstrating the applicability of the IBC research base to the Canadian context, with appropriate modifications. Given Australia's significantly higher fire resistance level (FRL) requirements compared to the IBC baseline, which provides an inherent additional safety margin, a similar comparative assessment approach is likely to be viable for the Australia context.

Stakeholder Engagement: Conditional Support and Key Concerns

The preliminary stakeholder engagement conducted as part of Task 3 yielded a broadly positive response that, together with the technical findings, provides a solid platform for developing an Industry Standard. The engagement with seven key organisations, the ABCB, HIA, MBA, QFES, BPC of Victoria, AIBS, and AFAC, as well as practising fire safety engineers, revealed that support is conditional rather than unconditional, and that the conditions are both reasonable and achievable. The consistent theme across stakeholders was that technical justification would be decisive. This aligns strongly with the approach taken in this project: rather than

seeking regulatory change on industry advocacy grounds alone, the project is investing in the evidence base that regulators and fire services will require before extending their endorsement.

The decision to develop an Industry Standard through the FWPA Standards Development Program, rather than pursuing a direct NCC amendment, has also been strategically considered. It reduces the number of NCC clause changes required, follows the ABCB's established protocol for referenced documents, and provides a vehicle for incorporating the nuanced technical requirements that a code change alone might struggle to accommodate.

The Path Forward

This project has achieved its primary objectives: it has established a comprehensive evidence base from international regulatory and research sources, characterised the current Australian regulatory position and its deficiencies, and initiated productive engagement with the key stakeholders whose support will be essential for the eventual success of a DTS code change. The foundation for Stages Two through Four is now in place.

The development of a draft Industry Standard in Stage Two must be firmly anchored in the evidence base compiled in this project, particularly the US IBC process, with its transparent performance objectives, grounding in large-scale fire testing, and demonstrated adaptability to evolving research findings. At the same time, the standard must be calibrated to Australian conditions: Australia's fire service capabilities and intervention limitations, its building classification system, its fire resistance requirements, its construction industry practices, and its product standards all differ in ways that will require deliberate adaptation rather than direct transposition of overseas requirements.

Stakeholder engagement must continue and deepen throughout Stage Two and beyond. Ultimately, this project has the potential to deliver a durable regulatory framework that allows Australia's construction industry to realise the full potential of mass timber while maintaining, and in some respects improving upon, the fire safety outcomes that the NCC is designed to achieve. The international experience demonstrates convincingly that this is achievable.

Conclusion

This project represents Stage One of the Mass Timber Code Change project has established a clear, well-evidenced foundation for reforming the Deemed-to-Satisfy provisions of Australia's National Construction Code as they relate to exposed mass timber construction. The findings confirm that the need for change is both technically compelling and practically achievable, and that the international regulatory community has already generated a substantial body of research, testing, and code development that Australia can draw upon with confidence.

The comparative international review demonstrates that every jurisdiction examined has grappled with substantially the same challenge and arrived at workable solutions. The United States, through the 2021 and 2024 International Building Code amendments, provides the most thoroughly documented model: multi-disciplinary governance, transparent performance objectives, and large-scale compartment fire testing as the empirical foundation for prescriptive height limits and exposure categories. The Netherlands' NTA 6125 offers a rigorous critique-based methodology, grounding its requirements in an explicit analysis of where existing regulations fall short for mass timber. British Columbia demonstrates that comparative regulatory assessment, rather than entirely new domestic testing, can justify significant expansions in permitted building height.

The preliminary stakeholder engagement conducted under Task 3 yielded broadly supportive responses from regulators, fire services, and building industry bodies. The consistent message that endorsement would follow a technically rigorous draft Industry Standard validates the project's evidence-first approach and confirms that a viable pathway to NCC referencing exists. The decision to develop a standalone Industry Standard through the FWPA Standards Development Program, rather than pursuing a direct NCC amendment, is well-suited to the complexity of the subject matter and consistent with the ABCB's established protocols.

Stage One has delivered what it set out to achieve: a consolidated evidence base, a clear characterisation of the Australian regulatory position and its deficiencies, and the initiation of productive engagement with the stakeholders whose support is essential.

Recommendations

Regulatory Reform

- Develop a standalone Industry Standard through the FWPA Standards rather than pursuing direct NCC amendment

Technical Standards

- Establish explicit height limits for exposed mass timber tied to building class, fire protection level, and element type
- Adopt the 2024 IBC as the primary international reference point for the Industry Standard

Fire Safety Provisions

- Mandate sprinkler protection for all exposed mass timber buildings above defined thresholds
- Set limits on exposed timber surface area calibrated against compartment fire test data

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The findings and opinions expressed are those of the researchers and do not necessarily reflect the views of FWPA, DAFF, or any stakeholder organisation consulted during the project. Participation in stakeholder engagement does not constitute endorsement of the report's findings or any proposed NCC changes.

This report is intended to inform the development of an Industry Standard and does not constitute legal, engineering, or fire safety advice. International regulatory frameworks are described for comparative purposes only; overseas provisions cannot be transposed directly into the Australian context without further technical justification and adaptation.

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