BUILDING PERFORMANCE

Consultation submission form

Insulation requirements in housing and other buildings

Amending Acceptable Solutions H1/AS1 and H1/AS2 and Verification Methods H1/VM1 and H1/VM2

5 December 2024

MINISTRY OF BUSINESS, INNOVATION & EMPLOYMENT
HĪKINA WHAKATUTUKI

Te Kāwanatanga o Aotearoa
New Zealand Government

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Seeking feedback

How to submit this form

This form is used to give feedback on the proposed changes to insulation and energy efficiency requirements.

When completing this submission form, it helps if you add comments and reasons explaining your choices. Your feedback is valuable as it informs decisions about insulation and energy efficiency proposals for the Building Code.

MBIE needs your feedback on the H1 insulation settings review by 5:00 pm on Friday, 28 February 2025.

- Email: building@mbie.govt.nz, with subject line Building Code consultation H1 insulation settings
- Post:
  Building Code consultation H1 insulation settings
  Building System Performance
  Ministry of Business, Innovation and Employment
  PO Box 1473
  Wellington 6140

Next steps

Your feedback on this document will be collated and analysed along with all the other responses.

Following consideration of the submissions, MBIE will make decisions on the proposals to amend the acceptable solutions and verification methods for compliance with the Building Code.

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MBIE may publish copies or excerpts of submissions. MBIE will consider you have consented to this when you submitted your feedback unless you clearly specify otherwise in your submission.

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Seeking feedback

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- for contacting you about your submission.

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Your information

MBIE would appreciate it if you would provide some information about yourself. This helps MBIE understand the impact their proposals may have on different occupational groups. Any information you provide will be stored securely.

A. About you

Name:	Tommy Honey
Email address:	execdirector@nzcic.co.nz

B. Can MBIE contact you if they have questions about your submission?

☐ **Yes**

C. Are you making this submission on behalf of a business or organisation?

☐ **Yes**

If yes, please add the name of your company or organisation.

New Zealand Construction Industry Council (**NZCIC**)

D. Select your role or the best way to describe your organisation:

☐ Architect

☐ BCA/Building Consent Officer

☐ Builder or tradesperson (please specify below)

☐ Building product manufacturer or supplier (please specify the type of product below)

☐ Building resident, occupant or user (please specify below)

☐ Commercial building owner

☐ Designer (please specify below)

☐ Engineer (please specify below)

☐ Residential building owner

☐ Other (please specify below)

☐ Prefer not to say

Membership organisation

NZCIC is a not-for-profit industry association of associations in the building and construction, design and property sectors. It is the collaborative voice of the built environment industry in New Zealand and operates at the interface between government (central and local) and industry. NZCIC members are also not-for-profit organisations and peak bodies for professions involved in the delivery of our built environment – designers, and specifiers (architects, engineers, designers etc.) contractors and suppliers (manufacturers, distributors, contractors, builders, sub-contractors etc.) and a range of other building professionals (in the areas of compliance, research, surveying, and development).

Your information

NZCIC is making this submission on behalf of its members. We acknowledge that our members have a range of views on this issue and this is not a summary of our members' concerns and does not claim to be representative of all of them; however, this submission reflects the general tenor of the concerns raised by our members and, through them, the wider construction industry.

Your information

E. Personal information

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[Please insert comments here]

G. Official information

The Official Information Act 1982 applies to all submissions received by MBIE.

☐ If you would like your submission (or parts of your submission) kept confidential please tick the box and **state** your reasons and ground(s) under sections 6, 7 and/or 9 of the Official Information Act that you believe apply, for consideration by MBIE.

If you have ticked this box, please tell us what parts of your submission you would like to be kept confidential, your reasons for this, and any grounds under the Official Information Act that you believe apply.

[Please insert comments here]

Insulation in housing and small buildings

This section covers housing and small buildings. The proposals relate to ways to amend the acceptable solutions and verification methods for energy efficiency to

- Optimise insulation to better balance upfront building costs and longer-term benefits
- Improve the consistency and certainty of compliance and consenting

Optimising insulation to better balance upfront building costs and longer-term benefits

Questions for the consultation

Topic	Questions	Response
1	**The schedule method may lead to higher upfront costs and less cost-effective construction than the more flexible calculation and modelling methods**	
1-1	Do you support amending Acceptable Solution H1/AS1 as proposed to remove the schedule method? **NZCIC members *generally support* this with some opposing it.**	☐ Yes, I support it ☐ Yes, with changes ☐ No, I don't support it ☐ Not sure/no preference
1-2	Please explain your views Removing the schedule method is a step toward improving accuracy and understanding of building performance. To support this transition, MBIE must provide guidance and resources to help the industry adapt. MBIE is maintaining overall thermal envelope requirements, but concerns remain about reducing minimum R-values for specific elements, which could lead to unintended consequences. With greater reliance on the calculation method, a review is needed to ensure its effectiveness. Integrating mechanical systems, such as heat pumps, would improve calculation accuracy and better reflect real-world energy use. Transitioning to the modelling method provides the most accurate energy efficiency assessment and helps address climate change impacts. The government should clarify its intentions soon, allowing the industry to invest in this capability.	

Topic	Questions	Response
	While the schedule method should be removed for new builds, it could still serve as a guideline for small alterations and retrofits, where matching existing structures is necessary. In such cases, neither the calculation nor modelling methods may be practical. A modified schedule table could provide guidance while maintaining compliance with performance standards. Understanding the calculation method for alterations can be challenging. Commentary should be added to section 2.1.2 to clarify that it applies only to elements involved in the work, reducing complexity and ensuring appropriate specifications. There is support for a phased removal of the calculation method, as the modelling method allows for: • More accurate insulation assessments • Consideration of orientation and glazing percentage • Reduced insulation requirements and costs However, the calculation method has limitations: • It does not consider orientation, thermal bridging, or airtightness. • It ignores cooling demand and overheating risks, which are increasing. • It lacks insights into energy demand and carbon emissions. Homes must be designed for resilience, and mandatory modelling for townhouses and apartments would help achieve this. The proposal to remove the schedule method may reduce construction costs, but it does not address increased compliance costs or the long-term energy savings it provides. Whole-of-life cost analysis shows that: • It benefits homeowners and building users. • It reduces national energy consumption. The Building Code must maintain high performance standards, prioritizing building users' needs over construction convenience.	

2	**The calculation method contains restrictions to the flexibility of roof, wall and floor R-values that can lead to unnecessarily costly and complex construction in some buildings**	
2-1	Do you support amending Acceptable Solution H1/AS1 to adjust the minimum possible R-values in the calculation method as proposed?	☐ Yes, I support it ☐ Yes, with changes

Topic	Questions	Response
	NZCIC members *generally support* this (with changes) and some oppose it.	☐ No, I don't support it ☐ Not sure/no preference
2-2	Please explain your views The proposed adjustment to minimum R-values in the calculation method for roofs, walls, and floors is appropriate. Greater flexibility helps avoid costly, complex construction in cases like low-pitch roofs, skillion roofs, and small slab-on-ground floors. Since maximum permitted heat loss remains unchanged and must meet reference building requirements, overall thermal performance is unaffected. Specifying the adjusted minimum R-values directly, rather than as a percentage of the reference building, is also a suitable approach. Aligning the Reference Building's Window-to-Wall Ratio with the Proposed Building's Window-to-Wall Ratio should be considered to contribute to a better-built environment. Lowering current values would be a step backward, as the industry has worked hard to improve them. Reducing costs and construction complexity is important, but thermal performance should not be compromised, as it directly impacts energy efficiency and long-term building quality. However, key input data for the calculation method, equivalent to Table 2.1.2.2B from H1/VM2, is missing in H1/AS1. While Table 2.1.1.3 is proposed for heated systems, no equivalent exists for non-heated buildings. Additionally, R-values in Table 2-1 of the consultation document do not match Appendix A changes. BRANZ data supports retaining the schedule method and current R-values.	

3	**Where underfloor heating is only used in bathrooms, the minimum R-values for heated floors may cause unreasonable upfront costs**	
3-1	Do you support amending Acceptable Solution H1/AS1 and Verification Method H1/VM1 as proposed to reduce upfront costs and improve the cost-effectiveness of insulation by exempting building elements with embedded heating from higher minimum R-values where embedded heating systems are solely used in bathrooms? **NZCIC members generally *do not* support this with some supporting it.**	☐ Yes, I support it ☐ Yes, with changes ☐ No, I don't support it ☐ Not sure/no preference
3-2	Please explain your views	

Topic	Questions	Response
	The proposal lacks a minimum R-value for slab-on-ground floors, which raises concerns about energy efficiency. For example, in Central Otago, heat from a home's floor would dissipate into the snow-covered ground, making it neither energy-efficient nor cost-effective. The maximum percentage of floor area allowed for bathrooms should be increased, and/or the definition of ***"bathrooms"*** should be widened to be ***"bathrooms, ensuites, toilets, shower rooms, etc"***. Kitchens should also be included here, as they are often also a small heated. Embedded heating systems are typically used for comfort rather than meeting heating demand, often operating longer than other heating systems. Without proper insulation, this results in excessive energy use. The issue is further compounded by Topic 2's proposed removal of minimum R-values for slab-on-ground floors. A bathroom at the corner of a house, without under-slab or slab-edge insulation, would allow heat from the embedded heating system to radiate directly outside, leading to unnecessary heat loss and increased energy consumption. Proper insulation is essential to prevent waste and ensure long-term efficiency. This should be allowed only when the heating element is placed above the slab, under tiles, and not when embedded within the slab itself. However, it is noted that bathrooms occupy a small portion of a building's floor area, so a reduced R-value has minimal impact on overall thermal performance. Embedded heating in bathrooms operates intermittently and is often off in warmer months. The cost benefits of this change outweigh any potential thermal performance concerns.	

SQ1. What impacts from the proposals for topics 1 to 3 do you expect? These may be economic/financial, environmental, health and wellbeing, or other areas.

Research shows that replacing the Schedule Method with the Calculation Method can significantly reduce the financial cost of higher insulation standards.

This shift offers substantial savings for homeowners, both in initial construction costs and ongoing energy expenses. Proper insulation also brings health benefits, reducing strain on the healthcare system by improving indoor conditions.

Over-insulation issues typically arise when the Schedule Method is applied without considering building design efficiency or regional climate. Final amendments should address these factors to ensure insulation standards balance cost, performance, and climate suitability, optimizing both energy efficiency and occupant well-being.

The proposed changes allow for more tailored insulation solutions, providing greater flexibility for designers to achieve compliance with the Acceptable Solution.

However, additional time will be needed to assess insulation options, as the simplified schedule method will no longer be available. This may slightly increase design costs, but the potential savings in build costs and improved building performance, particularly with the modelling method, outweigh this concern.

Some architects and designers may need upskilling to assess building performance and H1 compliance, though many existing tools and resources support this transition.

By removing the schedule method, insulation costs may decrease while improving designers' understanding of thermal performance. This shift will enhance energy efficiency, leading to more reliable, efficient, and healthier buildings. Additionally, it could reduce costs by eliminating structural changes needed for excessive insulation, making compliance more practical without significant environmental or health impacts.

The proposed changes to H1/AS1 offer no long-term benefits but will lead to higher energy costs for homeowners and occupiers. Future homeowners and renters will bear the financial burden of this cost-focused approach. A long-term perspective prioritizing user benefits over construction cost savings is essential.

Predictive modelling should become the standard approach, with allowances for renovations and smaller builds. A simple way to address performance holistically is to require an early energy model to identify and resolve issues related to form, envelope, windows, ventilation, heating, cooling, and services before RMA Consent and final design decisions.

A phased approach should introduce mandatory modelling for townhouses, apartments, and commercial buildings first, followed by standalone homes. This allows the industry to focus on key market areas and develop the necessary training. Ensuring projects can demonstrate compliance with enhanced thermal standards is essential for industry buy-in. The calculation method should remain but be phased out over 24-36 months.

Standardizing modelling software across the industry is critical. Whether by establishing a baseline across various tools or developing a unified platform, consistency is key to ensuring effective application for New Zealand homes. Tools should be tailored to the specific needs of different housing types.

Predictive modelling, such as ECCHO, is effective, though individual room modelling may be necessary where overheating concerns exist. Widespread industry upskilling in modelling is

essential, yet challenging due to the lack of a unified tool and the need for training in compliance interpretation.

Despite these challenges, modelling is the best approach for evaluating building performance, with some exceptions for smaller homes. It aligns with industry best practices, and raising standards through better tools and expertise will ensure long-term benefits for both building occupants and the environment.

SQ2. Is there any support that you or your business would need to implement the proposed changes for topics 1 to 3 if introduced?

[Please type here]

SQ3. If there are other issues MBIE should consider to better balance upfront building costs and longer-term benefits of insulation in housing and small buildings, please tell us.

Insulation must be considered alongside airtightness and ventilation for long-term effectiveness. Costs extend beyond initial construction to include energy expenses and occupant health. While reducing upfront costs is important, it should not come at the expense of long-term savings and health benefits for building occupants.

The combination of improved insulation and increased airtightness poses a risk of internal moisture issues and condensation within building structures (interstitial moisture). BRANZ research highlights the complexity of this issue, emphasizing the need for further study to identify risks and solutions. Urgent action is required to ensure appropriate mitigations are included in Compliance Documents, as homeowners will ultimately bear the consequences of any failures in this area. MBIE should prioritize investigating these concerns and updating Compliance Documents accordingly.

Current H1 Acceptable Solution compliance remains relatively simple and does not fully consider installation methods and construction assemblies, particularly thermal bridging and airtightness. For instance, Acceptable Solutions for E2-compliant window installations allow window joinery to project outside the thermal envelope, significantly reducing the intended thermal performance. Addressing such details is crucial to ensure that theoretical thermal efficiency translates into real-world performance.

Additionally, the current H1 requirements fail to recognize the role of thermal mass in maintaining comfortable indoor temperatures. Passive solar design principles, which incorporate thermal mass, have a proven track record of sustaining healthy indoor temperatures with minimal external energy demands. A more comprehensive approach to compliance should acknowledge both the benefits and potential drawbacks of thermal mass in building design.

While the current Acceptable Solution insulation requirements represent progress in improving building performance and occupant comfort, they are merely an initial step. To meet modern building expectations, further enhancements in thermal performance are necessary. New Zealand must strive for buildings that maintain year-round comfort with low energy consumption, ensuring long-term durability. These improvements will contribute to better occupant health, reduced energy demands, and lower risks of building degradation in new constructions.

Focusing solely on R-values does not adequately serve New Zealand's needs. Numerous other design factors significantly impact energy efficiency and comfort, including orientation, airtightness, thermal bridging, and heat recovery ventilation. As a result, even homes that meet the high R-value standards set in H1 can still be uncomfortable and energy-intensive.

- Without explicit energy modelling and clear targets for energy use and carbon emissions, New Zealand cannot systematically reduce emissions from new buildings. Homes built today will face a fourfold increase in hot days in the coming decades.
- Failing to adopt energy modelling increases the risk of overheating homes, subjecting countless families to discomfort and higher cooling costs. Addressing these issues should be a priority for MBIE.

MBIE should review Clause G4 and its guidance on "good building design," considering orientation, shading (especially on north and west elevations), and ventilation to mitigate overheating. While

glazing affects heat gain, it cannot compensate for poor design. Expanding glazing options may help but isn't a standalone solution.

However, it is crucial to consider the long-term value of an additional one or two hours of design work over a building's 50–80-year lifespan. When implemented effectively, energy modelling can reduce operational expenses, optimize building costs, and significantly improve comfort for New Zealand families. Investing in smart design now will yield long-term benefits for both homeowners and the environment.

The discussion document showed the schedule method offers the best long-term benefit. Overheating concerns could be addressed by improving ventilation, building orientation, shading, window size, and glazing choice within the schedule method.

Consistency and certainty of compliance and consenting

Questions for the consultation

Topic	Questions	Response
4	**The modelling method includes requirements that are unclear or outdated**	
4-1	Do you support amending Verification Method H1/VM1 as proposed to clarify and update requirements for the modelling method? **NZCIC members generally support this with some opposing it.**	☐ Yes, I support it ☐ Yes, with changes ☐ No, I don't support it ☐ Not sure/no preference
4-2	Please explain your views Using the most recent and accurate NIWA weather data is essential, but its proprietary format is not compatible with all modelling tools. For instance, the Passive House Planning Package (PHPP) requires Excel-formatted data. MBIE should advocate for NIWA to provide data in formats compatible with commonly used industry tools. Any deviations from reference building specifications must be well-documented and justified. BCAs and Building Consent Officers cannot be expected to identify these deviations, as they may be difficult to detect. Solar heat gain must be carefully considered in home design. Clause H1 focuses on energy efficiency, and neglecting solar heat gain could lead to unnecessary energy use. High-performance (low G-value) glass, while reducing heat gain, may sometimes increase overall energy use depending on building location and orientation. Addressing poor design through glazing alone may not be the most effective solution.	

Topic	Questions	Response
	Proposed additional changes: • Reduce the assumed percentage of glazing in the reference building. • Require homes to meet separate targets for lower heating and cooling demand. • Allow projects to account for benefits of reduced thermal bridging, better airtightness, and heat recovery ventilation. • Clarify how glazing should be distributed in reference buildings, as there is currently no guidance. • Recommend that H1/VM1 modelling reports include likely overheating risk to ensure transparency for homeowners. However, there are concerns about BCAs verifying computer-generated solutions, ensuring correct inputs and complete information. H1/VM1 D6.1 Documentation must clarify that heating and cooling loads are required for both reference and proposed buildings. To reinforce this, "Where possible" should be removed from H1/VM1 D6.1(e) in the consultation document (page 28).	

5	**Thermal bridging from framing in walls is not adequately considered**	
5-1	Do you support amending Acceptable Solution H1/AS1 and Verification Method H1/VM1 as proposed to better consider thermal bridging in framed walls? **NZCIC members generally support this (with changes) and some oppose it.**	☐ Yes, I support it ☐ Yes, with changes ☐ No, I don't support it ☐ Not sure/no preference
5-2	Please explain your views Thermal bridging in walls causes significant heat loss and must be addressed. Amendments that provide a clearer understanding of heat loss areas and necessary insulation improvements are welcomed to enhance energy efficiency and building performance. The assumption of a minimum 38% framing fraction and the reduction of the wall R-value in the theoretical reference building for calculation and modelling methods is reasonable. However, certain construction methods, such as specific framing designs, SIP panels, and other innovations, can minimize thermal bridging through wall structures. These alternatives should be recognized within compliance assessments, with verification methods such as: • Framing design completed by the designer.	

Topic	Questions	Response
	• Producer Statement (PS3) from the pre-made frame or SIP supplier, confirming compliance with the building consent. This change lowers requirements for non-timber frame housing (e.g., SIPs, strap-and-line concrete, masonry), which often achieves closer to R2.0. To maintain performance standards, the reduction to R1.6 should apply only to standard timber frame walls, while R2.0 should be retained for all other wall types. However, it was noted that the BRANZ research showed that the existing insulation settings deliver a positive long-term cost benefit, so there is no need to reduce the R-values.	

6	**How the areas of roofs, walls and floors should be measured is unclear**	
6-1	Do you support amending Acceptable Solution H1/AS1 and Verification Method H1/VM1 as proposed to improve certainty and consistency of compliance by requiring the areas of roofs, walls, and floors to be measured using overall internal dimensions? **NZCIC members *do not* support this**	☐ Yes, I support it ☐ Yes, with changes ☐ No, I don't support it ☐ Not sure/no preference
6-2	Please explain your views The proposal to measure roof, wall, and floor areas using internal dimensions is weak, as external dimensions offer greater accuracy, higher performance, and consistency across different modelling tools. Measuring on the outside surface provides several benefits: • Ensures consistency across all modelling tools (PHPP, Design Navigator, etc.). • May eliminate the need to account for thermal bridge heat losses at wall junctions. • Requires no additional work or cost. • Has minimal impact on calculation method outcomes. This approach is inconsistent with established methodologies used by designers and creates confusion. Building certification schemes like Passive House and Homestar require external dimensions to accurately assess energy losses and gains from thermal bridges while rewarding projects that reduce them. H1/VM1 should align with best practices to prevent future discrepancies. If internal dimensions are mandated, projects certified under Passivhaus or Homestar will face higher compliance costs due to the need to re-measure and re-enter dimensions.	

Topic	Questions	Response
	Given that calculation and modelling methods use a comparative approach, both reference and proposed buildings follow the same measurement system. MBIE must provide stronger evidence that outcome inconsistencies justify this change. A preferred approach is to allow either internal or external measurements, ensuring consistency within a project. The main inconsistency would arise in reference building glazing area calculations, which could be resolved by standardizing the reference building's glazing area as a percentage (e.g., 20%) of the internal gross floor area, evenly distributed across walls.	

7	**NZS 4214 includes ambiguous instructions for determining the R-values of roofs, walls and some floors**	
7-1	Do you support amending Acceptable Solution H1/AS1 and Verification Method H1/VM1 as proposed to improve certainty and consistency of compliance by providing clearer requirements for defining the boundaries of the bridged portion of a building element when calculating its R-value using NZS 4214? **NZCIC members support this**	☐ Yes, I support it ☐ Yes, with changes ☐ No, I don't support it ☐ Not sure/no preference
7-2	Please explain your views	

8	**For some mixed-use buildings it is unclear whether H1/AS1 and H1/VM1 can be used, or H1/AS2 and H1/VM2**	
8-1	Do you support amending Acceptable Solution H1/AS1 and Verification Method H1/VM1 as proposed to improve certainty and consistency of compliance by providing clearer requirements for determining which compliance pathways can be used for a mixed-use building? **NZCIC members support this**	☐ Yes, I support it ☐ Yes, with changes ☐ No, I don't support it ☐ Not sure/no preference
8-2	Please explain your views The proposed change clarifies grey areas where there are mixed uses within a building complex.	

9	**The look-up tables with R-values for slab-on-ground floors do not cater for some common situations**	
9-1	Do you support amending Acceptable Solution H1/AS1 as proposed to make it easier for designers and Building Consent Authorities to establish whether a building complies with the H1 energy efficiency insulation provisions by enabling the use of the look-up tables for slab-on-ground floor R-values for more situations? **NZCIC members support this**	☐ Yes, I support it ☐ Yes, with changes ☐ No, I don't support it ☐ Not sure/no preference

Topic	Questions	Response
9-2	Please explain your views The proposed change provides for smaller building footprints and clarifies grey areas such as slab edge insulation that does not go around the entire floor perimeter.	

10	**The look-up table with R-values for vertical windows and doors in housing misses some common glazing types**	
10-1	Do you support amending Acceptable Solution H1/AS1 as proposed to make it easier for designers and Building Consent Authorities to establish whether a building complies with the H1 energy efficiency insulation provisions by enabling the use of the look-up table for vertical windows and doors in housing for more common types of glazing? **NZCIC members support this**	☐ Yes, I support it ☐ Yes, with changes ☐ No, I don't support it ☐ Not sure/no preference
10-2	Please explain your views The proposed change provides more options and consistency with common building materials.	

11	**Acceptable Solution H1/AS1 and Verification Method H1/VM1 include obsolete provisions and definitions, and outdated references to documents and tools**	
11-1	Do you support amending Acceptable Solution H1/AS1 and Verification Method H1/VM1 as proposed to make these documents more user-friendly and reduce the risk of misinterpretations that can create uncertainty and inconsistency of compliance? **NZCIC members support this (with changes)**	☐ Yes, I support it ☐ Yes, with changes ☐ No, I don't support it ☐ Not sure/no preference
11-2	Please explain your views This proposal improves H1/AS1 and H1/VM1 usability, reducing misinterpretation and ensuring compliance consistency. MBIE should integrate insulation requirements into a broader approach for safe, comfortable indoor environments. However, removing "for occupant comfort" from "Conditioned Space" is, ironic, given overheating – a comfort issue – drives these proposed changes.	

SQ4. What impacts from the proposals for topics 4 to 11 do you expect? These may be economic/financial, environmental, health and wellbeing, or other areas.

These proposals promote consistency in interpretation and application across building sites and BCAs, using practical, user-friendly tools like look-up tables. While regional differences (e.g., Northland vs. Southland insulation needs) should be considered, ensuring uniformity and easy compliance checks remains a strong and effective approach.

These proposals will benefit architectural designers by clarifying Acceptable Solutions, simplifying compliance determination, and ensuring consistent application. Key advantages include clearer requirements, a streamlined compliance process, and optimized buildings meeting H1 standards. However, concerns remain about BCAs' role in consent applications, as they cannot verify whether these changes are integrated into software, raising liability issues.

SQ5. Is there any support that you or your business would need to implement the proposed changes for topics 4 to 11 if introduced?

[Please type here]

SQ6. If there are other issues MBIE should consider to better support consistency and certainty of compliance and consenting for insulation in housing and small buildings, please tell us.

Ensuring there are multiple tools available to demonstrate compliance that can be readily used by Building designers, especially those using the modelling method (e.g., PHPP), need better industry support. Further education on framing reduction techniques and their importance would be beneficial.

MBIE should amend insulation requirements as part of a comprehensive approach to creating safe, healthy and comfortable indoor environments.

Transition period for residential and small buildings H1/AS1 & H1/VM1

SQ7. Do you agree with the proposed transition time of 12 months for the proposed changes to take effect?

- ☐ Yes, it is about right
- ☐ No, it should be longer (24 months or more)
- ☐ No, it should be shorter (6 months or less)
- ☐ Not sure/no preference

NZCIC members are divided on this and ***do not*** have a clear view.

Please explain your views.

A 6-month transition period is sufficient, as the proposed changes are straightforward, and most design practitioners already have the knowledge to comply. Existing tools are readily available, making a 12-month transition unnecessary.

However, MBIE's experience with past energy efficiency transitions suggests a longer period may be needed. The schedule method could be phased out in 6 months since the calculation method is well understood and can incorporate schedule-level R-values.

The calculation method, however, requires a longer transition. A minimum of 20 months is needed, with 24 months likely necessary to train the remaining industry professionals who are not yet familiar with modelling. This extended period would ensure proper adoption of appropriate modelling software and compliance with new standards.

Managing overheating and internal moisture in homes

SQ8. If you think MBIE should support building designers with designing homes that safeguard building occupants from high indoor temperatures in summer (overheating) and other potential internal moisture risks, what approach should MBIE take?

Buildings with poor design – leading to overheating, dampness, mould, and inadequate ventilation – pose serious health risks to occupants. These issues can also compromise durability, causing rot or rust, which may result in structural failures and safety hazards.

Failing to pursue high standards of health, durability, and energy efficiency is an ethical concern, as proper design ensures affordable heating and cooling for occupants.

Key considerations include:

- Preventing cold surfaces that cause condensation and mould, through thermal bridging management.
- Ensuring measurable ventilation standards in all buildings to control moisture levels, reducing the risk of structural and health-related issues.

With buildings lasting 50+ years, today's designs will shape New Zealand's energy use for decades. Less energy-efficient buildings will drive higher power demand, increasing the need for costly new energy generation. Investing in energy-efficient buildings can help defer future energy infrastructure costs.

Power costs are rising due to reduced generation and growing demand, placing a financial burden on consumers, particularly vulnerable communities. By prioritizing insulation and energy efficiency, electricity costs can be reduced or deferred, benefiting both consumers and energy

providers. This shift would also support New Zealand's Paris Agreement goal of a 51-55% emissions reduction by 2035.

Improving energy efficiency and modern construction methods have raised concerns about overheating and internal moisture, though insulation is often mistakenly blamed.

Historically, poorly insulated houses relied on solar heat to offset thermal losses. Improved insulation standards have significantly reduced these losses, but building design sometimes fails to consider solar gains properly.

To address this issue, the following measures should be considered:

- Training and guidance on designing with solar gains in mind.
- Glass specification changes to improve solar aperture requirements.
- Enhanced ventilation requirements, both mechanical and natural.
- Building airtightness regulations to improve performance.
- Local guidance on overheating, ventilation, thermal bridging, and moisture control, especially for large and complex projects.

New Zealand can leverage established international practices in energy efficiency, thermal performance, and ventilation to improve health and comfort. Aligning with these standards would also support high-quality engineering practices already in use.

Different solutions are needed for varying building sites and regions. Some may require mechanical ventilation and airtightness testing, while others benefit from passive design strategies like site orientation and window shading. MBIE should clarify that insulation, overheating, and moisture control must be considered together, not in isolation, to ensure optimal building performance.

Overheating

MBIE should play a key role in setting standards for healthy indoor environments by establishing minimum requirements and supporting industry education. To address overheating, H1 should be amended, or a new H2 clause introduced. With the potential removal of the Schedule Method, the Calculation and Modelling Methods should incorporate overheating assessments and compliance parameters.

One approach is to require separate calculations for heating and cooling loads, identifying buildings with high summer cooling demands. Orientation, shading, and ventilation should be leveraged to minimize overheating risks. While glazing impacts overheating, it cannot compensate for poor design, as improper orientation and lack of shading remain key contributors. Additionally, high-performance glazing that reduces summer heat gain may also block beneficial winter heat, increasing heating costs. Therefore, solar heat gain and insulation values must be evaluated holistically, with shading offsets for northern and western elevations.

Some argue that neither the Schedule nor Calculation Method effectively controls overheating and should be phased out. This H1 update presents a crucial opportunity to introduce overheating controls into the Building Code. A practical first step would be requiring the Modelling Method within 20 months, ensuring proposed buildings have lower cooling demands than reference buildings.

A long transition period would allow the industry time to adapt and receive necessary training in modelling software. If mandatory modelling for all homes is not feasible, an alternative would be requiring it for apartments and townhouses, which already involve larger, more professional design teams, making implementation more practical.

Clause H1 should be expanded to address overheating, a pressing issue in townhouses, which make up approximately 40% of new housing. Simple architectural solutions, such as external window shading or low G-value glass, can effectively mitigate this problem.

The initial focus should be on townhouses and apartments, ensuring they undergo proper modelling and shading analysis. Site constraints often dictate building orientation, leading to less-than-optimal sun exposure for individual units. Additionally, townhouses frequently lack cross-ventilation due to shared walls, increasing the risk of overheating.

As urban density increases, ensuring townhouses are well-ventilated and comfortable is essential. Poorly designed homes may discourage people from embracing medium-density living, which is crucial for sustainable development. To address this, all townhouses should be required to limit overheating, ensuring indoor temperatures exceed 25°C for no more than 5% of the year or maintaining a maximum cooling load of 2%.

While evaluating a building's performance, both heat loss and compliance with the reference model should be assessed. However, the current code primarily focuses on heat loss and overlooks overheating, which is particularly problematic for terrace housing. Expanding regulations to include overheating criteria would improve long-term building performance and occupant comfort.

Interstitial Moisture

Increasing insulation levels can worsen interstitial moisture issues, especially when paired with inadequate ventilation. While BRANZ research suggests the H1 5th edition changes have minimal direct impact on moisture risk in roofs or walls, it confirms potential issues under certain conditions that are not currently addressed in compliance documents.

New Zealand has widely available systems to mitigate interstitial moisture. BRANZ highlights effective solutions such as reliable heating, mechanical ventilation, and vapor control layers.

MBIE should further investigate these risks and provide clear guidance. This may involve amending existing clauses and Acceptable Solutions or introducing a new clause specifically for interstitial moisture management. Additionally, integrating specific requirements within H1 would help align with the objectives of Clause E3.2 of the New Zealand Building Code, ensuring better moisture control in buildings.

As homes and buildings become more airtight due to advancing technologies, the risk of water vapor entrapment increases. This is especially problematic in housing and multi-residential buildings where moisture levels often go unmanaged. Introducing predictive modelling would help prevent internal moisture issues, ensuring healthier living environments for occupants.

Insulation in large buildings

This section covers large buildings (other than housing). These are covered by the Acceptable Solution H1/AS2 and Verification Method H1/VM2. The proposals relate to ways to amend the acceptable solutions and verification methods for energy efficiency to

- Optimise insulation to better balance upfront building costs and longer-term benefits.
- Improve the consistency and certainty of compliance and consenting of buildings regarding insulation requirements and energy efficiency.

Optimising insulation to better balance upfront building costs and longer-term benefits

Questions for the consultation

Topic	Questions	Response
12	**The schedule method may lead to less cost-effective construction than the more flexible calculation and modelling methods**	
12-1	Do you support amending Acceptable Solution H1/AS2 as proposed to remove the schedule method? **NZCIC members generally support this (with changes) and some oppose it.**	☐ Yes, I support it ☐ Yes, with changes ☐ No, I don't support it ☐ Not sure/no preference
12-2	Please explain your views Requiring buildings to use the calculation or modelling method may reduce construction costs and improve performance. As architects, designers, and builders adopt these methods, they will gain a better understanding of how different elements affect building efficiency, leading to better-performing structures. BCAs should be engaged to establish a clear verification pathway for compliance when working data is submitted with consent applications. This would streamline the process and reduce barriers to implementing the new H1 standard. However, MBIE's discussion document highlights a potential risk of higher energy use with these methods, indicating that the underlying methodology needs review. For example, the calculation method does not account for factors like external wall orientation, window placement, or heat gain through glazing. Addressing these gaps could lead to more accurate energy use outcomes. A comprehensive review should be undertaken to ensure these methods do not unintentionally increase energy consumption. If the calculation method is eventually phased out over time, the	

Topic	Questions	Response
	industry can fully realize the benefits of complete energy modelling. However it was noted that the performance of large buildings is complex and should be assessed through calculation or modelling. There is no evidence in the consultation document justifying the removal of the schedule method for large buildings, as BRANZ analysis only examined small buildings. Applying the same methodology, insulation costs in large buildings would be offset by long-term energy savings. Increased energy costs over a building's lifespan create unnecessary financial burdens for occupiers, businesses, and energy providers.	

13	**The calculation method for large buildings does not provide flexibility for roof, skylight and floor R-values, limiting opportunities for optimising insulation**	
13-1	Do you support amending Acceptable Solution H1/AS2 to allow flexibility for the R-values of all building elements in the calculation method as proposed? **NZCIC members are divided on this and *do not* have a clear view.**	☐ Yes, I support it ☐ Yes, with changes ☐ No, I don't support it ☐ Not sure/no preference
13-2	Please explain your views The proposed change introduces a more performance-based approach to calculating thermal efficiency, allowing designers to optimize insulation. This could prevent unnecessary over-insulation in some areas, reducing costs while maintaining energy efficiency. If the schedule method is removed, increased flexibility in the calculation method will be essential to ensure a practical and accessible compliance pathway for designers. However, there is no evidence in the consultation document supporting the removal of the schedule method for large buildings. The only analysis, conducted by BRANZ, focused on small buildings. Applying the same methodology to large buildings, insulation costs would be offset by long-term energy savings. Increased energy costs over a building's lifespan create unnecessary financial burdens for occupiers, businesses, and energy providers. Ensuring cost-effective energy efficiency in large buildings is crucial to avoiding long-term inflationary impacts on operational expenses and maintaining sustainability in the built environment.	

14	**Where underfloor heating is only used in bathrooms, the minimum R-values for heated floors may cause unreasonable upfront costs**

Topic	Questions	Response
14-1	Do you support amending Acceptable Solution H1/AS2 and Verification Method H1/VM2 as proposed to reduce upfront costs and improve the cost-effectiveness of insulation by exempting building elements with embedded heating from higher minimum R-values where embedded heating systems are solely used in bathrooms? **NZCIC members generally support this with some opposing it.**	☐ Yes, I support it ☐ Yes, with changes ☐ No, I don't support it ☐ Not sure/no preference
14-2	Please explain your views Bathrooms occupy a small portion of a building's floor area, minimizing the impact of reduced R-values on overall thermal performance, especially in larger buildings. Embedded heating operates intermittently and is often off in warmer months. The cost benefits of this change outweigh any minor effects on thermal performance.	

SQ9. What impacts from the proposals for topics 12 to 14 do you expect? These may be economical/financial, environmental, health and wellbeing, or other areas.

The proposed changes allow for more tailored insulation solutions, providing greater flexibility for designers to achieve compliance with the Acceptable Solution.

- For larger buildings, specialist consultants are often engaged to assess thermal performance and heating/cooling design. These specialists rarely use the schedule method, meaning its removal will have minimal impact in such cases.
- Without a specialist, more time will be needed to evaluate insulation options, as the schedule method's simplicity will no longer be available. This may slightly increase design costs.
- However, potential savings in construction costs and improved building performance, especially when using the modelling method, outweigh these minor cost increases.
- Upskilling will be necessary for some architects and designers to adopt new assessment methods for H1 compliance. Additional education on available tools for larger buildings may be required.
- Lower insulation costs are expected compared to using the schedule method.
- Overall, these changes will enhance designers' understanding of thermal performance, leading to improved building efficiency.

Larger buildings are designed and constructed by industry professionals who make informed decisions. However, there is a balance between reducing upfront construction costs and long-term maintenance and operational expenses. Lower insulation levels may reduce capital costs for developers but will increase energy costs for occupants, businesses, and purchasers over the building's lifespan.

Rising energy costs place unnecessary financial burdens on building users and businesses. Addressing this issue is crucial for reducing long-term energy demand and supporting New Zealand's economic and environmental sustainability.

SQ10. Is there any support that you or your business would need to implement the proposed changes for topics 12 to 14 if introduced?

SQ11. If there are other issues MBIE should consider to better balance upfront building costs and longer-term benefits of insulation in large buildings other than housing, please tell us.

Recognizing thermal mass in building performance is essential, especially for larger buildings with significant internal mass. Thermal mass moderates temperature fluctuations by storing heat or coolth, reducing insulation needs and operational heating/cooling loads. This leads to lower construction and energy costs. However, increased long-term energy expenses burden occupiers and businesses, creating an ongoing inflationary cost ultimately passed on to New Zealanders indefinitely. Prioritizing efficient design can help mitigate these financial impacts.

Consistency and certainty of compliance and consenting

Questions for the consultation

Topic	Questions	Response
15	**The modelling method includes requirements that are unclear or outdated**	
15-1	Do you support amending Verification Method H1/VM2 as proposed to clarify and simplify requirements for the modelling method? **NZCIC members generally support this with some opposing it**.	☐ Yes, I support it ☐ Yes, with changes ☐ No, I don't support it ☐ Not sure/no preference
15-2	Please explain your views There is a need for consistency, clarity and simplicity in the building compliance framework. H1/VM2 is a science-based document, so it should be regularly reviewed and updated to reflect latest evidence-based data and best practices in thermal performance modelling.	

Topic	Questions	Response
	For commercial buildings, H1/VM2 requires HVAC system simulation, despite it not affecting compliance with H1 insulation provisions. While H1.3.6 sets energy efficiency standards for HVAC, H1/VM2 is not a compliance pathway for these requirements, making this simulation unnecessary for insulation compliance assessments. The removal of HVAC systems within VM2 is supported, as commercial buildings must comply with VM3. HVAC modelling is unnecessary for VM1 or VM2 since both proposed and reference buildings assume the same COPs, ensuring consistency. Compliance is based on comparing combined heating and cooling loads, independent of HVAC systems. However, VM3 applies only to commercial buildings, excluding communal residential (hotels, retirement villages, hospitals) and communal non-residential (schools, churches, museums). For VM1 (small buildings), temperature limits should be applied before introducing air conditioning, ensuring efficient energy use and maintaining compliance with H1 requirements. It was noted that this proposal is inconsistent with the proposal to remove the schedule method.	

16	**The schedule method does not adequately limit heat losses and gains from skylights in large buildings**	
16-1	Do you support amending Acceptable Solution H1/AS2 to introduce a limit on the skylight area in the schedule method in H1/AS2 (in case MBIE does not proceed with the proposed removal of the schedule method from H1/AS2)? **NZCIC members generally support this (with changes)**	☐ Yes, I support it ☐ Yes, with changes ☐ No, I don't support it ☐ Not sure/no preference
16-2	Please explain your views The removal of the schedule method as a compliance pathway is necessary; however, if it is determined that it be retained then there would need to be a more performance-based approach to calculating thermal efficiency enabling designers to optimise insulation.	

17	**Thermal bridging from framing in walls is not adequately considered**

Topic	Questions	Response
17-1	Do you support amending Acceptable Solution H1/AS2 and Verification Method H1/VM2 as proposed to better consider thermal bridging in framed walls? **NZCIC members generally support this (with changes) and some oppose it.**	☐ Yes, I support it ☐ Yes, with changes ☐ No, I don't support it ☐ Not sure/no preference
17-2	Please explain your views The assumption of a minimum 38% framing fraction and the reduction of wall R-values in the reference building for calculation and modelling methods is reasonable. However, construction methods like specific framing designs and SIP panels can reduce thermal bridging. Compliance assessments should account for these innovations with verification methods, such as: • Framing design completed by the designer. • Producer Statement (PS3) from the pre-made frame or SIP supplier, confirming compliance with the building consent. However, lowering reference R-values to account for a higher assumed timber fraction will effectively reduce R-value requirements for non-timber walls. Many commercial buildings use non-timber framing systems, making this change significant. The revised R-values remain difficult to achieve with standard 90mm framing at a 38% timber fraction, requiring non-conventional approaches. Instead, R-values should remain unchanged, while implementing the 38% timber fraction assumption for proposed buildings. This approach slightly increases requirements for timber framing but remains reasonable, as the calculation method allows flexibility elsewhere. The target R-values already exceed what standard 90mm timber framing can achieve, ensuring balanced compliance.	

18	**How the areas of roofs, walls and floors should be measured is unclear**	
18-1	Do you support amending Acceptable Solution H1/AS2 and Verification Method H1/VM2 as proposed to improve certainty and consistency of compliance by requiring the areas of roofs, walls, and floors to be measured using overall internal dimensions? NZCIC members ***do not*** support this	☐ Yes, I support it ☐ Yes, with changes ☐ No, I don't support it ☐ Not sure/no preference
18-2	Please explain your views	

Topic	Questions	Response
	Measuring roof, wall, and floor areas using internal dimensions is inaccurate. External dimensions provide better accuracy, performance, and consistency across modelling tools. Benefits of measuring external dimensions: • Ensures consistency across all modelling tools (e.g., PHPP, Design Navigator). • Reduces the need to account for thermal bridge heat losses at wall junctions. • Requires no extra work or cost. • Minimally impacts calculation method outcomes. To align with industry standards, dimensions should be measured consistently with other widely used calculation tools.	

19	**NZS 4214 includes ambiguous instructions for determining the R-values of roofs, walls, and some floors**	
19-1	Do you support amending Acceptable Solution H1/AS2 and Verification Method H1/VM2 as proposed to improve certainty and consistency of compliance by providing clearer requirements for defining the boundaries of the bridged portion of a building element when calculating its R-value using NZS 4214? **NZCIC members support this**	☐ Yes, I support it ☐ Yes, with changes ☐ No, I don't support it ☐ Not sure/no preference
19-2	Please explain your views This will provide clearer requirements for defining the boundaries of the bridged portion of a building element, improving accuracy and consistency.	

20	**For some mixed-use buildings it is unclear whether H1/AS1 and H1/VM1 can be used, or H1/AS2 and H1/VM2**	
20-1	Do you support amending Acceptable Solution H1/AS2 and Verification Method H1/VM2 as proposed to improve certainty and consistency of compliance by providing clearer requirements for determining which compliance pathways can be used for a mixed-use building? **NZCIC members support this**	☐ Yes, I support it ☐ Yes, with changes ☐ No, I don't support it ☐ Not sure/no preference
20-2	Please explain your views This change will lead to improved clarity and flexibility being sought by the industry.	

Topic	Questions	Response
21	**The look-up tables with R-values for slab-on-ground floors do not cater for some common situations**	
21-1	Do you support amending Acceptable Solution H1/AS2 as proposed to make it easier for designers and Building Consent Authorities to establish whether a building complies with the H1 energy efficiency insulation provisions by enabling the use of the look-up tables for slab-on-ground floor R-values for more situations? **NZCIC members support this**	☐ Yes, I support it ☐ Yes, with changes ☐ No, I don't support it ☐ Not sure/no preference
21-2	Please explain your views This change addresses a common issue for designers and provides clarity for BCAs.	
22	**Acceptable Solution H1/AS2 and Verification Method H1/VM2 include obsolete provisions and definitions, and outdated references to documents and tools**	
22-1	Do you support amending Acceptable Solution H1/AS2 and Verification Method H1/VM2 as proposed to make these documents more user-friendly and reduce the risk of misinterpretations that can create uncertainty and inconsistency of compliance? **NZCIC members support this**	☐ Yes, I support it ☐ Yes, with changes ☐ No, I don't support it ☐ Not sure/no preference
22-2	Please explain your views This change will improve clarity for users of H1	

SQ12. What impacts from the proposals for topics 15 to 22 do you expect? These may be economical/financial, environmental, health and wellbeing, or other areas.

These proposals will help architectural designers better understand Acceptable Solutions, simplifying compliance assessment. Benefits include a more efficient approval process and optimized buildings that meet H1 requirements, ensuring improved performance and streamlined design evaluations.

However, there is a concern with the long term additional inflationary cost being imposed on New Zealand.

SQ13. Is there any support that you or your business would need to implement the proposed change if introduced?

[Please type here]

SQ14. If there are other issues MBIE should consider to better support consistency and certainty of compliance for insulation in large buildings other than housing, please tell us.

To ensure consistency and certainty in compliance, MBIE should:

- Engage with BCAs to establish a clear pathway for verifying compliance of calculation and modelling methods in consent applications.
- Review Calculation & Modelling Methods to prevent unintended increases in energy use.
- Educate designers on tools suitable for larger buildings to support compliance with calculation and modelling requirements.
- Recognize thermal mass in compliance assessments, as it helps reduce insulation, heating, and cooling costs in large buildings.
- Incorporate construction methods that minimize thermal bridging in wall framing and establish verification procedures.
- Amend insulation requirements as part of a comprehensive strategy to create safe, healthy, and comfortable indoor environments.

Transition period for large buildings H1/AS2 & H1/VM2

SQ15. Do you agree with the proposed transition time of 12 months for the proposed changes to take effect?

☐ Yes, it is about right

☐ No, it should be longer (24 months or more)

☐ No, it should be shorter (6 months or less)

☐ Not sure/no preference

NZCIC members are divided on this and ***do not*** have a clear view

Please explain your views.

No, it should be shorter (6 months or less)

- The proposed changes are relatively straightforward and easy for most practitioners to understand.
- A 6-month implementation period should be sufficient, assuming commonly available tools are accessible for demonstrating compliance.
- If commonly available tools require specialist knowledge, a 12-month transition period may be necessary.

No, it should be longer (24 months or more)

- MBIE's experience with previous energy efficiency transitions suggests a longer transition period is needed.
- The schedule method can be phased out in 6 months since:
  - The calculation method is already well understood.
  - The schedule method can be implemented within the calculation method by setting all proposed building R-values at or above schedule levels.
- The calculation method should be phased out over a longer period:
  - Minimum of 20 months.
  - 24 months is likely needed to train the remainder of the industry (those not already using modelling software).

Thank you

Thank you for your feedback. MBIE really appreciates your insight because it helps us identify the needs of New Zealanders and your thoughts on energy efficiency and insulation in buildings.

If you have anything else you would like to tell MBIE about energy efficiency in the Building Code, please leave your feedback below.

[Please type here]