HOUSING INDUSTRY ASSOCIATION

Submission to the
New South Wales Department of Planning and Environment

BASIX Higher Standards Exhibition 2021

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ABOUT THE HOUSING INDUSTRY ASSOCIATION

The Housing Industry Association (HIA) is Australia's only national industry association representing the interests of the residential building industry.

As the voice of the residential building industry, HIA represents a membership of 60,000 across Australia. Our members are involved in delivering more than 170,000 new homes each year through the construction of new housing estates, detached homes, low & medium-density housing developments, apartment buildings and completing renovations on Australia's 9 million existing homes.

HIA members comprise a diverse mix of companies, including volume builders delivering thousands of new homes a year through to small and medium home builders delivering one or more custom built homes a year. From sole traders to multi-nationals, HIA members construct over 85 per cent of the nation's new building stock.

The residential building industry is one of Australia's most dynamic, innovative and efficient service industries and is a key driver of the Australian economy. The residential building industry has a wide reach into the manufacturing, supply and retail sectors.

Contributing over $100 billion per annum and accounting for 5.8 per cent of Gross Domestic Product, the residential building industry employs over one million people, representing tens of thousands of small businesses and over 200,000 sub-contractors reliant on the industry for their livelihood.

HIA exists to service the businesses it represents, lobby for the best possible business environment for the building industry and to encourage a responsible and quality driven, affordable residential building development industry. HIA's mission is to:

> *"promote policies and provide services which enhance our members' business practices, products and profitability, consistent with the highest standards of professional and commercial conduct."*

HIA develops and advocates policy on behalf of members to further advance new home building and renovating, enabling members to provide affordable and appropriate housing to the growing Australian population. New policy is generated through a grassroots process that starts with local and regional committees before progressing to the National Policy Congress by which time it has passed through almost 1,000 sets of hands.

Policy development is supported by an ongoing process of collecting and analysing data, forecasting, and providing industry data and insights for members, the general public and on a contract basis.

The association operates offices in 22 centres around the nation providing a wide range of advocacy, business support services and products for members, including legal, technical, planning, workplace health and safety and business compliance advice, along with training services, contracts and stationary, industry awards for excellence, and member only discounts on goods and services.

1. EXECUTIVE SUMMARY

1.1 BASIX Stringency Increases

The residential building industry acknowledges the need to build environmentally responsible housing that does not negatively impact on housing affordability and supply.

The Housing Industry Association (HIA) does not however, support the proposed BASIX stringency increases and imposing additional costs on all new houses, apartments and large home renovations arising from the design and construction implications of the proposed changes.

HIA has a number of concerns with the proposed BASIX stringency increases, and with the way the BASIX reforms have been publicly exhibited:

1. The cost-benefit analysis report demonstrates a net cost on a societal basis, and also underestimates both the capital costs and other costs to industry in implementing these reforms.
2. The cost-benefit analysis does not take into account the additional changes proposed to BASIX under the Design and Place SEPP exhibition. The interactions between the proposed SEPP changes and the stringency increases have not been adequately modelled.
3. Fully functional updated versions of the required web-tools and NatHERS software are not available during the exhibition period. Without the tools it is impossible for builders and designers to accurately begin making decisions about necessary design changes. Manufacturers and suppliers cannot begin transitioning their products and processes with confidence. This is creating a great deal of uncertainty for the industry, and threatening any chance of a smooth transition to the new requirements.
4. There is a lack of technical detail on the proposed changes and accompanying technical provisions meaning is it not possible for industry to review and comment with certainty on the necessary design and construction changes.
5. A further increases in NatHERS star rating underpinning a BASIX energy assessment will create only a marginal decrease in operational energy consumption of a home, while the resulting additional costs and complexities in design and construction will add significantly to the upfront construction cost. This is a clear case of diminishing returns for this aspect of the reform.
6. Moving to 7-stars for all of NSW climates zones does not align with the targets agreed in the national Trajectory for Low Energy Buildings, and stringency increases were not a specific target outlined in the NSW Net Zero Plan Stage 1: 2020-2030, which cited only improvements to BASIX generally.
7. Creation of multiple independent targets for individual aspects of emissions reduction will add to complexity, and prevent industry from developing optimal solutions for new homes to meet clear emissions reductions targets . This approach will not contribute to the development of a whole-of-home net emissions protocol and a single holistic target for industry.
8. There are significant design challenges for complex designs and homes on difficult blocks, where the homes already struggle to meet 6-stars, let alone achieve a 7-star performance without significant construction cost increases.
9. Tying the implementation of new BASIX targets to development applications determined after the commencement date of the legislation will create issues for construction agreements entered into in advance of DA lodgement. As has occurred for past stages of implementation of BASIX, the changes must only be applied to development applications yet to be submitted. Further, given the scope of the reform, the same approach as taken in 2004 should once again be applied; namely that the changes only apply where a home building contract has not been entered into in the last 12 months.

There are a range of other lower cost reforms that could be progressed, that would result in much lower cost impacts on affordability and build upon our current energy efficiency standards to address the goal of net zero energy (and carbon) ready buildings.

Greater efforts should be made to improve the energy efficiency of existing housing stock as a next step in reducing the emissions from the housing sector, as opposed to further adjusting existing standards for new homes that will only deliver a marginal increase on energy savings and emissions reductions already being delivered.

It is considered if these issues were adequately addressed it would in fact support the preliminary findings of the CRIS further, by revealing that the cost associated with increased energy efficiency stringency for all new Class 1 and Class 2 buildings would far outweigh the benefits.

1.2 Embodied Emissions Targets

HIA has even deeper concerns regarding the implementation of an embodied emission target for buildings and other changes to the BASIX scheme that were proposed outside of the BASIX-specific consultation under the Design and Place SEPP:

1. These additional changes have not been subject to a thorough regulatory impact assessment or cost-benefit analysis.
2. Setting the new target at the current mean performance is not a minor or insignificant change from business as usual, despite the claim as part of the exhibition materials. It is likely to have a major impact on a significant proportion of current building designs and add significantly to their construction costs.
3. The proposal contains insufficient detail, making it impossible for the building or manufacturing industries to generate a thorough understanding or assess the impacts accurately. It is not at a sufficient level for thorough public consultation process, let alone implementation.
4. There are broad concerns that the EPiC database is not suitable as a tool for carrying out specific product or building comparisons.
5. There will be significant implementation challenges created for builders, product suppliers and manufacturers, that have not been identified or addressed in the proposal.
6. This is a significant change to the technical regulation of buildings in NSW, coming at a time when several other significant reforms are underway and the industry is under extreme pressure in respect to building material supply chains. A regulatory change that impacts the selection of materials for all new homes moving forward must be considered in the context of Australia's relatively small marketplace and currently restricted access.

HIA has been directly engaging on the draft BASIX changes with a range of building product manufacturers and suppliers that will be significantly affected by these changes; and subsequent feedback from those designers, builders and manufacturers reinforces HIA's response and highlights the substantial impact these changes will have on their businesses.

Adoption of any embodied emissions targets and calculations should be voluntary in the first instance, to enable finalisation of the appropriate assessment tools and calculations, a deeper exploration of the operation and impacts of adopting a target and allowing for a more robust re-assessment at a later stage.

2. HIA KEY CONCERNS WITH PROPOSED STRINGENCY INCREASES

Through engagement with a range of builders, building product manufacturers and suppliers a number of issues regarding the BASIX stringency increases have been raised.

These concerns highlight significant technical, design and transitional challenges which add to the cost of implementing these reforms. HIA also considers that the stringency increases themselves are at a point of diminishing return with respect to the emission reduction that can be achieved compared to other options.

The underlying tools, calculations and climate models have not yet been completed and made available to industry for testing and knowledge development. This is making it even harder for industry to determine the impact and prepare.

2.1 Costs are Underestimated and Exceed Benefits

The ACIL Allen cost-benefit analysis report accompanying the BASIX Higher Standards exhibition concludes that the anticipated costs associated with the two models considered – which effectively require new homes and apartments to meet a 7-Star NatHERS rating along with higher standards for the operational energy efficiency and heating and cooling loads – would exceed benefits by a factor of three to one and six to one respectively, on a state-wide basis.

Overall, the cost-benefit analysis confirms that the change would result in a net social and economic loss to society of $884.6 million under one scenario or $1.286 billion under the second scenario, even when less tangible benefits like health impacts are factored in.

Furthermore, the cost-benefit and breakeven analysis finds it unlikely that any scenario would result in benefits exceeding costs, except in the event of a very significant increase in wholesale energy costs (between three and eight times) and/or a very significant reduction in the capital costs (a discount of around 65 to 85 per cent).

The cost-benefit analysis clearly demonstrates that both of regulatory options considered would result in a significant net cost to the community in the hundreds of millions of dollars, and as a direct consequence increase housing costs for home buyers and renters and reduced housing affordability.

The additional home building cost, home loan costs and resulting additional taxation on the dwelling, will affect every homeowner going forward, whether they see this set of requirements as their preferred approach to achieving reduced energy and emissions from their housing choice.

Notwithstanding the findings of the cost-benefit analysis, HIA holds the view that the assessment significantly undervalues the true cost of implementing the increase in operational energy stringency.

Costs relating to house redesign, internal layout changes and compromising internal room configurations, structural building changes and the specification of current industry standard building materials and products, are all underestimated.

Adapting allotment sizes, site conditions, designs, specifications and costings to meet the changes requires a significantly longer lead-in time. Client engagement, awareness and marketing time lines add to the challenges.

It is considered if these issues were adequately addressed it would in fact support the preliminary findings of the cost-benefit analysis by revealing that the cost associated with increased BASIX standards for all new Class 1 and Class 2 buildings far outweigh the benefits.

2.2 Additional Changes to BASIX Not Assessed in the Cost Benefit Analysis

Further to the above issues, other substantive changes to BASIX requirements have been proposed separately to this exhibition as part of the Design and Place SEPP exhibition. The BASIX SEPP is proposed to be rolled into the Design and Place SEPP, which includes proposals to set a cap on embodied emissions and to ban dark coloured roofs. These changes have not been factored into the BASIX increased stringency cost-benefit analysis.

Thermal performance and embodied emissions have significant interdependencies and often competing demands on the materials used in construction of the building fabric. The impacts of these changes should not be assessed independently to the stringency increases; they will have a compounding effect on the costs associated with the stringency increases. Equally, the impact of stringency changes should not be assessed without the costs associated with these other proposed changes.

The outcome of each of these proposals will have a significant influence over final house designs and the products and materials that need to be specified in the future. Significant transition times will be required to enable the building material supply chain to adjust to increased demand for lower-emission materials, with a corresponding increase in price for those materials while supply remains constrained.

2.3 Exhibition Versions of BASIX Tools Not Fully Available or Functional

The BASIX exhibition has been accompanied by the release of a supporting ‘sandbox’ version of the BASIX web-tool, but this tool is not complete or fully functional. Only the housing portion of the tool has been made available for industry, and not for apartments.

The housing tool (and apartment tool when available) is also incomplete – it does not contain the proposed embodied carbon targets, and does not include the DIY option.

It has been stated that a limited apartment tool will be available in March 2022 (after the exhibition period), and an embodied carbon tool will not be available until mid-2022 or later.

Complicating the problem further, the underlying NatHERS climate files are proposed for reform nationally to align with NCC 2022. These updates are unlikely to be available until September 2022, which also aligns with the implementation date proposed for these changes.

This means that energy assessors, and in turn builders and designers, cannot now, or until sometime after potential commencement, accurately model the homes that will be required to meet the new BASIX targets. Changes to the climate data and thermal bridging inputs will have a real impact on the outcome of NatHERS assessments for BASIX. Not having a fully operation tool means that industry and regulators do not have a complete picture of the real impact of the changes on designs or costs.

This will be further compounded by the short timeframe for industry adoption foreshadowed. At a minimum industry should be provided with 12 months from the time the NatHERS tools have been accredited with all of the elements fully incorporated, so industry can transition to the actual changes and make necessary adjustments to house designs and home building packages.

Furthermore, while a beta version of the CSIRO Accurate software has been made available on a limited basis, CSIRO has reportedly stated they are not comfortable a final version of the software will be available until September 2022. It is anticipated the other software suppliers will require several months to release updated programs, as has been observed in past, and the other programs are the current preferred options for NSW.

The design process for new buildings takes many months and for multi-unit developments could take 6-12 months depending on scale of the development.

The information currently available as part of exhibition is of little use to industry in assessing and preparing for the impacts of the proposed stringency increases.

Without access to fully functional tools, or some other means of determining accurate ratings, it is impossible for builders and designers to accurately begin making decisions about necessary design changes.

This has also made it impossible for the manufacturer and supplier chain to identify what changes would be required to their products, systems and processes, and has caused the industry to now approach the proposed BASIX reforms with a high degree of hesitance and uncertainty.

HIA is requesting that the implementation of the new BASIX reforms is delayed by at least 12 months, to September 2023, if they are to proceed.

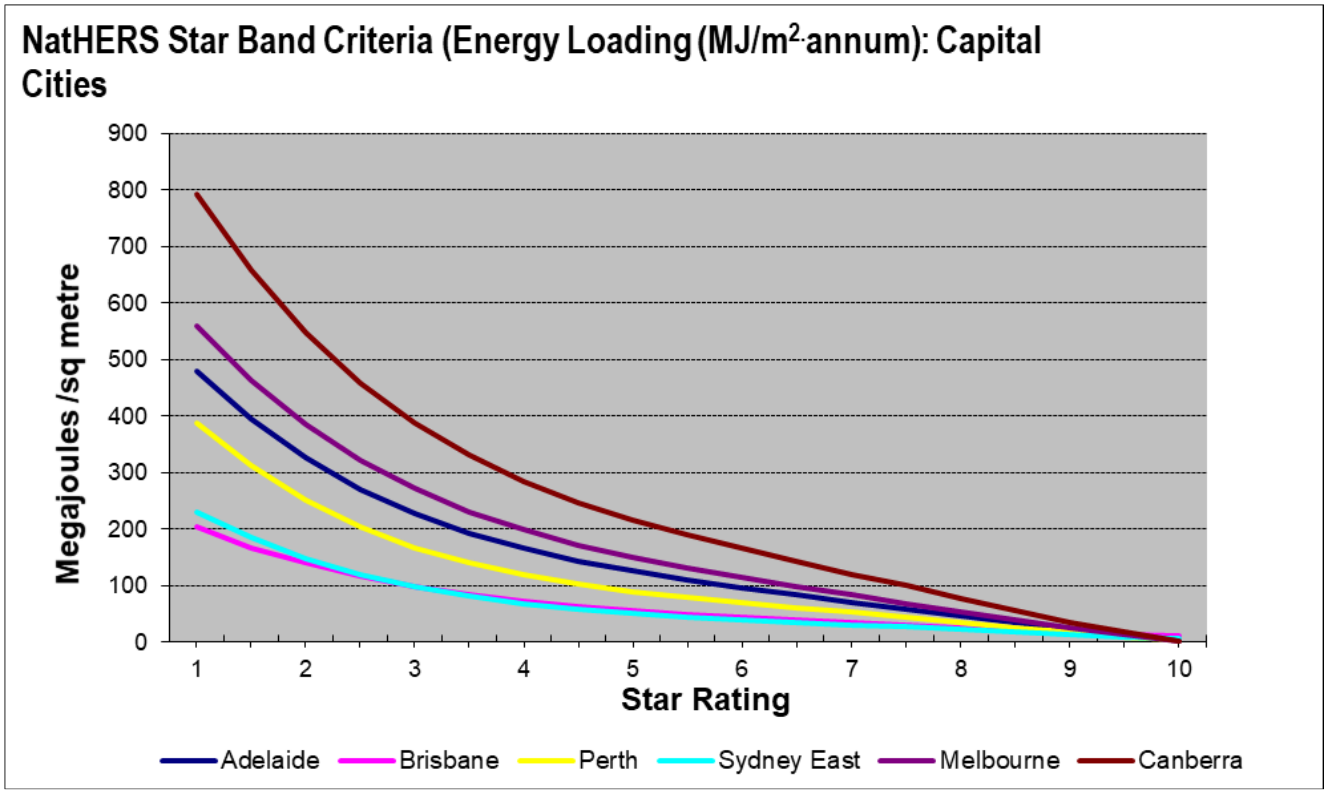
Further it is considered that a more robust public consultation period should be relaunched in September 2022, once the fully functional web-tools and underlying NatHERS assessment software updates are available. This will allow a more considered and rigorous process for analysis of changes, a more accurate cost benefit assessment to be undertaken and industry to genuinely understand what the changes will mean.

2.4 Understanding the True Meaning of Increases in 'Star Rating'

The pursuit of further changes in building fabric performance solely on the basis that the rating scheme in place has higher standards (10 stars) completely fails to align with the actual overall public policy outcome sought from the policy response.

In this regard it is important to understand the NatHERS ratings, shows that the changes proposed will offer only a marginal decrease in energy consumption, and hence emissions, as opposed to the improvements that have been delivered to date by the original and amended BASIX benchmarks for building fabric (4, to 5, to 6 stars).

This is depicted in the following chart which is based on the national climate zones and benchmarks under the NatHERS Star Band criteria.



This clearly shows the diminishing return on energy savings as the star ratings increase beyond the initial 4-star and 5-star benchmarks introduced. Moreover, the Sydney climate, being more moderate than many others in Australia, shows a relatively flat line with respect to reductions beyond 4 stars.

Clearly the reduction in energy consumption for heating or cooling a home are markedly reduced as the rating moves beyond 6 stars. This is a simple outcome of the maths and the starting point where each increment is a 10 per cent reduction of a smaller number.

This is also a case of diminishing returns at ever increasing cost and complexity for construction.

To move to 7-stars in NSW is a significantly larger construction step than for the other states. The current thermal stringency target in NSW is in effect approximately 5.5 stars. Moving to a consistent 6 stars would require the highest window glazing performance levels and insulation levels that standard walls and roof/ceiling cavities could readily and economically take based on the common construction methods in Australia.

To move even further beyond that to 7 stars there is little more that can be done to the building fabric through 'simple' additions and tweaks. It will require a range of changes to the design and significant construction changes to be achieved across all house designs in each region of NSW.

Noting that the cost-benefit analysis demonstrates that the costs of the proposed changes outweigh the benefits it is hoped that the NSW Government will now take the opportunity to revisit the approach proposed and look at a broader range of more holistic options to achieve zero energy (and carbon) ready buildings.

2.5 Differences in Approach From the National Trajectory

Notwithstanding that HIA does not support further stringency increases for the building fabric, it is important to note that the national Trajectory for Low Energy Buildings does not recommend a 7-star stringency increase across all jurisdictions/climate zones. Rather it proposed a move between 6.5-star and 7-star in the colder climate zones 6, 7 and 8.

For the other climate zones it recommended 6.5-star in climate zones 1 and 5, and 6-star in climate zones 2, 3 and 4.

Unfortunately, both the NCC 2022 provisions and now the proposed BASIX higher standards and associated cost-benefit analysis have not facilitated this approach or assessed these recommendations, instead proposing a 7-star requirement across all climate zones.

We acknowledge the exemptions for small apartment buildings and North Coast climate zones due to the outcomes of the cost-benefit report. However, given the anticipated under-estimation of costs within the report, and the societal costs outweighing benefits in all scenarios modelled in any case, HIA questions why the Government is proceeding with 7-stars for the climate zones that are contrary to the Trajectory.

Much of the concerns and issues raised above would still exist with the Trajectory settings, however, if the Government proceeds with BASIX changes in stringency a more pragmatic approach would be to align with the agreed recommendations for the thermal fabric settings being tailored for each climate zone as set out and agreed to in the Trajectory.

The NSW Net Zero Plan Stage 1: 2020-2030 itself does not include direct reference to BASIX stringency increases outside of the Trajectory, instead discussing general improvements to BASIX and the NCC, encouraging improvements and innovations in building materials, and electric-vehicle readiness.

2.6 The Challenge of Separate Targets for Discrete Elements of Emissions Reduction

In NSW there is a real opportunity to progress a new and more truly holistic approach to residential energy efficiency standards as supported by the Trajectory for Low Energy Homes of net zero 'ready' homes.

NSW is already ahead of the National Construction Code with respect to a 'whole of house' approach to residential energy efficiently. By necessity, a true 'net-emissions' approach to energy efficiency of buildings would seek to merge the different aspects of energy efficiency into one set of calculations to calculate a single rating, with a holistic target for net-emissions.

This approach would naturally allow for trade-offs and optimisations by industry to reach the desired standards, and allow for flexibility in addressing the sometimes conflicting needs of thermal performance, energy load, and other emissions sources (such as embodied emissions).

It would also allow for the setting in advance of simple, staged future targets aligned with the net-zero trajectory. This would provide clarity for industry, allowing a steady and smooth transition over time rather than periodic and costly large step-changes like the ones proposed.

Disappointingly, there appears to be a fragmentation of the approach away from holistic measures. Alongside the existing heating and cooling caps, a new lower total heating & cooling load cap is proposed. These caps operate independently of the star-rating and independently of the overall energy target.

Further, outside of this BASIX exhibition, a new element is being proposed with its own discrete targets - the embodied emissions of materials used in construction. This proposal is impossible to ignore within the context of the BASIX higher standards discussion.

Treating all of these targets independently ignores the complex interactions and interdependencies between them and inhibits industry in developing optimal solutions. Very often, gross over-compliance in one or more areas is required to satisfy another target. This would be an unfortunate and inappropriate outcome.

This situation will be further complicated if embodied carbon is introduced as a discrete target. Many of the standard approaches to improved thermal performance would require more material usage, and usage of materials with more thermal mass – which typically means higher emissions.

Simultaneously in NSW there also appears to be a move away from including additional allowances for reasonable trade-offs and offsets between elements within the BASIX system.

All of this moves NSW in the wrong direction, and away from the development of a true 'whole-of-house' net emissions rating.

HIA believes that trade-offs and offsets are in fact an inherent part of any holistic assessment, and are critical in allowing industry practitioners to achieve balanced and optimal designs, which deliver true energy efficient performance in the most cost-effective manner.

Simply shifting the benchmarks, and not fundamentally changing the approach to energy efficiency, will simply add more costs and not achieve the desired benefits. It will also do little to provide clarity for industry on how to achieve the desired trajectory moving forward.

2.7 Implications for Home Designs

There are many standard houses designs that are already struggling to achieve 6-stars and if 7-stars is introduced those house designs would need to be scrapped or may be limited to construction on certain orientations only.

This issue is not limited to volume or project homes and has a large, if not larger impact on custom built homes.

This was further demonstrated by a recent ABCB commissioned study into difficult blocks that presently struggle to meet 6-star standards and subsequently how they would meet 7-stars if changes were to proceed.

Some of the observations from the report were:

- that the Typical Houses in colder climates required significant upgrades under each difficult block scenario (with high performance double, thermally broken, argon filled, high solar gain, low e glazing required).
- specifications and upgrades required for sub optimal house designs result in an increase in cost can be observed ranging from 5 to 25%.

These challenges are not limited to project homes and equally affect custom designed houses where home owners have a specific house design in mind and are willing to pay for this outcome yet often struggle with 6-stars. Most of these designs would never achieve 7-stars no matter what insulation and glazing specification was thrown at them.

The only solution in these scenarios is for the architects to engage the energy assessor immediately at concept stage and change the way they design the home. All houses will start looking the same, squares or rectangles with no courtyards or return walls to limit exposed walls to atmosphere.

The days of large expanses of windows will be completely gone as the window to floor area ratio will need to come back to around 22% as we simply don't have window specification in the country that will allow for large windows in a custom design and still achieve 7-stars.

For apartments, the issues are equally challenging in achieving a 7-star average across the apartment building. The window to floor area ratio and therefore window/glass performance levels would add excessive costs and design challenges.

Changing over to larger sections of cladding in lieu of window/glazed facades is not likely to be a desirable outcome for apartment owners due to consumer preferences for natural light, views, overall amenity and liveability.

The cost-benefit analysis case studies for apartments need a much broader representation of case studies and examples to ascertain the real world challenges and costs that may arise.

Even without these changes to BASIX, upcoming NCC 2022 is set to be the largest single amendment introduced to the NCC since its inception. There are a range of significant amendments beyond energy efficiency that will be introduced, impacting upon both house and apartment design in NSW.

All of these changes will add complexity and stringency to buildings and will ultimately impact affordability and viability of construction projects. They will also need significant investment from industry to understand, adapt and adopt the changes into their business operations and building designs. These reforms must be rationalised and considered as a cumulative package for their overall impact on housing affordability.

2.8 Challenges for Implementation

Under the proposed implementation of the Design and Place SEPP (which will incorporate BASIX) compliance with the new requirements will continue to be required at Development Application stage. This does not align with the process undertaken between the builder and client for a typical new-home building project.

It will create issues for the prospective home owner, who will be relying on preliminary agreements and quotations provided by the builder in advance of decision to proceed with a building project. They will then proceed to DA or CDC based upon those estimates, and then sign the final construction contract on the basis of the approved DA. Where these preliminary costs have been quoted on the basis of prior BASIX targets, but the DA or CDC is not registered until after the implementation date, it could result in financing shortfalls for the project due to increased BASIX compliance costs. Meaning the owner may no longer be able to proceed with the project due to higher costs than originally assumed to gain finance.

HIA is requesting that implementation of new BASIX requirements is linked to the signing of the construction contract as occurred in 2004 and 2017, rather than to lodgement of the DA or CDC. This

approach avoided many of the potential transitional problems that will result if not managed in this way.

2.9 NCC Energy Efficiency Changes Draft 7 Stars Provisions

HIA recently made a substantial submission to the draft NCC changes to energy efficiency provisions highlighting a number of concerns in terms of the impacts, technical suitability and practical implications on the design and construction of new housing and apartments. These concerns include the following:

- Technical difficulties associated with proposed provisions
- Complexity of the changes
- Significant cost implications for the changes for homeowners
- Implications of the changes and corresponding thermal bridging changes
- Impact on standard building materials and construction practices
- Design implications of the changes
- Impacts on extensions and alterations
- The proposed increases exceeding the building fabric proposals in the Trajectory for low energy homes
- Construction, product and design transitional implications
- Added building envelope complexity
- A number of the provisions being incompatible creates contradictions with other parts of the NCC
- Increased condensation risk with the provisions with higher efficiency standards and increased wall, floor and ceiling/roof insulation provisions that will limit the ability for building to breathe, and cavities being packed with insulation and at capacity of space allowable
- Increased fire risk with the higher efficiency standards and increased wall, floor and ceiling/roof insulation provisions
- Availability of products to meet the new requirements
- Additional weight on ceilings and ceiling battens in achieving increased ceiling insulation
- Added complexity for design, assessment, approval and application of the NCC provisions and ultimately compliance challenges due to the added complexity.

Most of these issues would apply equally to the proposed BASIX changes which are proposed to reflect the parallel NCC stringency increase.

2.10 Preferred Approach to Improved Efficiency – Low Cost Reforms

HIA has identified a range of reforms that could be progressed that would result in much lower cost impacts on affordability and build upon our current energy efficiency standards to address the goal of net zero energy (and carbon) ready buildings.

Most of these reforms utilise much of the work both the ABCB, BASIX administrator and NatHERS Administrator have been progressing for NCC 2022 but adjusted to align with the current building fabric stringency setting.

The reforms that could be delivered as a package of reforms alongside NCC 2022 and include:

1. Introduce enhanced BASIX whole of home/energy usage provisions (with the building fabric set at 6-stars)

2. Introduce the thermal bridging mitigation measures for both steel and timber framing to provide a true 6-star performance
3. Combine the NatHERS house rating tools and whole of house assessment tools incorporating energy usage/building services provisions, building fabric assessment, heating and cooling loads, thermal bridging and building sealing
4. Incorporate the new NatHERS climate files into the energy rating tools
5. Introduce new enhanced detailed installation of insulation provisions as per later comments in this submission
6. Introduce the new condensation provisions and air spaces and building wall wrap permeability requirements and undertake a broader analysis of condensation risks of higher energy efficiency standards and a full cost benefit assessment of all future changes
7. Commence a review of the solar panel installation and battery storage Australian Standards and commence the development of associated NCC Deemed to Satisfy Provisions, where PVs and battery storage systems are installed in houses for future incorporation in the NCC to provide single source of truth and location for onsite installation provisions.

2.11 Greater Impact in Emissions Reduction From Existing Homes

HIA has long called for greater efforts being made to improve the energy efficiency of existing housing stock as a next step in reducing the emissions from the housing sector.

An approach that addresses the hundreds of thousands of homes built before BASIX introduced acceptable minimum standards for energy efficiency would deliver a marked improvement in emissions reductions, as opposed to making incremental and more expensive changes to standards that already do the required heavy lifting for new homes.

The Trajectory for Low Energy Homes Report noted the following in respect to existing buildings:

- *'Existing homes represent the largest potential for energy savings in the residential building sector.'*
- *'The vast majority of Australia's housing was built before the introduction of minimum energy efficiency regulations (estimated at 8-10 million homes) for residential buildings in 2005. This means existing (pre-2005) housing will continue to pose large energy costs, health and emission issues for households, regardless of standard increases in the NCC.'*
- *Based on initial modelling…. By improving the performance of existing buildings by a relatively small amount, the energy savings and benefits roughly double.*
- *For example, by improving existing housing stock by just 1 per cent could deliver an additional $1.5 billion in net present value.'*

These findings are compelling and supports the reality that there are far greater gains to be had by tackling energy efficiency upgrades in existing housing stock at this point in the transition to a low carbon economy.

HIA believes the NCC should be used as a key part of such a solution for existing housing by setting a minimum deemed to satisfy benchmark for all major renovations. In combination with the introduction of a simple and affordable pathway to introduce mandatory disclosure at the point of sale and rent, rapid change could be delivered in existing housing stock and improve the community understanding of how our homes can be used efficiently.

2.12 Broader Implications for Class 1 Buildings

Without the energy efficiency changes, NCC 2022 which will be adopted in NSW, is already set to be the largest single amendment to the code since its inception. There are a range significant amendments beyond energy efficiency that will be introduced.

These include:

- Mandatory accessible housing provisions for all new and extensions for Class 1 buildings (by some states and territories)
- More stringent condensation management provisions
- Waterproofing provisions
- Fixing and flashing requirements
- Broad range of Australian Standards changes
- NCC restructuring changes; and
- Performance Solutions changes.

All of these changes add more complexity to the code to be implemented at a single point in time. Ultimately they will collectively have a significant impact on affordability and viability of Class 1 projects. More importantly, each of these changes requires industry to understand, adapt and adopt the changes into their current business operations and their current building designs.

These changes need to be rationalized and not considered as individual reforms. They must be considered as the cumulative package of changes and an assessment of their overall impact must be made for all housing forms in NSW before the changes are implemented.

2.13 Broader Implications for Class 2 Buildings

Most new Class 2 buildings are constructed as mixed use buildings and the building and manufacturing sector are still adapting to the substantive changes made under NCC 2019 Section J. Many of the changes are only coming online now for projects meaning their substantive impacts on design and material selection are yet to be well understood.

As such prior to progressing further energy efficiency changes to both the individual apartments building fabric and higher building services (energy usage) provisions for Class 2 buildings, the NCC 2019 Section J changes should be given further time to be embedded into designs and construction.

Furthermore, there are other significant changes being proposed for Class 2 buildings under NCC 2022 which follow on from the significant fire safety and other design changes made in NCC 2019 (including mandatory sprinkler provisions and aforementioned Section J changes).

These include:

- Mandatory accessible housing provisions for all Class 2 buildings (in some states and territories)
- Significant more stringent waterproofing and weatherproofing provisions
- Further fire safety provisions changes and restrictions
- More stringent condensation changes
- EV charging future proofing and solar ready zones.

All of these provisions add more complexity, stringency increases and ultimately have significant impact on affordability and viability of Class 2 apartment projects.

These changes need to be rationalized and not considered as individual reforms. Again the cumulative impacts of these changes must be considered.

If a change for the energy efficiency of apartments is to proceed it should be staged and preferably not commence until 2025, giving time for the 2019 changes to be embedded, and time for the upgrading of NatHERS tools to be completed allowing the industry to design new apartment buildings with certainty of their cost and their inclusions well ahead of bringing those projects to market.

3. ECONOMIC ANALYSIS OF THE STRINGENCY INCREASES

HIA has performed a detailed review of the cost-benefit analysis report accompanying the BASIX exhibition. Some gaps have been identified in the cost-benefit analysis carried out, including questions related to the modelling approach taken, as well as real costs that have not been captured.

The findings of the economic analysis support the feedback we have been receiving from industry and the concerns expressed, including that the economic costs of the stringency increases have been significantly underestimated.

The overall proposal is likely to incur costs that strongly outweigh any benefits realised.

Appendix A provides a detailed economic discussion in support of these conclusions.

3.1 Summary of Concerns on Cost Benefit Analysis (CBA)

3.1.1 The CBA finds mandating 7-stars imposes net costs on the people of NSW

The CBA finds the total potential benefits of 'Option A' is $490.9 million. Total costs are $1,375.5 million. This means, even if all potential benefits are included, 'Option A' imposes net costs on the people of NSW of at least $884.6 million. Option A has a benefit cost ratio of 0.36 or below.

The less stringent 'Option B' is hardly an improvement: it imposes net costs of at least $1,286.3 million. Option B has a benefit cost ratio of 0.16 or below.

HIA supports the finding of the CBA, that the costs associated with increasing the energy efficiency requirements for new homes would significantly outweigh the benefits.

3.1.2 There is substantial evidence in the economic literature that the true impact of mandating 7-stars is likely to be worse than the results of the CBA

Notwithstanding the preliminary findings of the CBA, there are a number of concerns with the CBA that require a more detailed analysis. These concerns are supported by evidence from the Productivity Commission, other studies, and other data drawn from the economic literature. These concerns and supporting evidence are explained here.

It is considered if these issues were adequately addressed the net costs created by Option A and Option B would increase in magnitude (the net benefits would become more negative). Overall, available evidence suggests the cost of increasing the stringency of the energy efficiency requirements for all new Class 1 and Class 2 buildings would far outweigh the benefits.

HIA argues the following points:

- The cost assumptions in the computer modelling should be updated to reflect cost increases that have emerged under COVID-19. Based on ABS data and information from members, HIA recommends a 15 per cent cost upgrade.
- The cost estimates should be upgraded to account for the difference between 'computer modelled costs' and 'actual, realised costs'. Computer modelling a limited number of scenarios cannot capture the diversity of preferences, costs and constraints – for consumers and builders – across thousands of building projects across Australia. The new regulation of 7-stars causes costs to increase via the prism of these preferences, costs and constraints.

  Without information on these preferences, costs and constraints, it is difficult for computer modelling to accurately predict cost increases, and the modelling results should be adjusted accordingly. There is substantial evidence that cost increases are higher in reality than in the modelling.

  For example, the Productivity Commission notes in relation to energy efficiency standards: 'evidence is now appearing of compliance costs being much higher than expected. For example, the Victorian Government predicted the cost of a new house would rise by 0.7 – 1.9 per cent, but a recent survey shows that the average increase was 6 per cent.'

This implies that, at minimum, realised construction costs for mandated energy efficiency measures are higher than computer-modelled construction costs by a factor of 3X (6 per cent vs 1.9 per cent).

- The costs that reflect margins of retailers and wholesalers (assumed to be 10 per cent of costs in the CBA) should be included. Currently these costs are excluded and should be included in the Final CBA.
- The benefit estimates should be adjusted to reflect actual benefits (not computer modelled benefits). The actual benefits of the regulation are a function of actual behaviour of households, which is difficult to estimate in models. Expert/stakeholder consultations from an ABCB published study on energy efficiency measures concluded that realised benefits from energy efficiency standards are 49-75 per cent of modelled benefits. The benefits in the current study CBA should be adjusted down accordingly.
- The energy saving benefits to households should be removed or significantly discounted. Evidence from the economic literature says mandating 7-stars is likely to create significant costs for households: reduced amenity from smaller windows, reduced amenity from less design choice, and reduced financial capacity to undertake other projects that are preferred. These costs are not included. The CBA should include both the benefits to households and the costs to households. If the costs to households are not included, the benefits to households should be removed too. By including only the benefits the CBA likely overstates the net benefits.
- As a conservative estimate, by incorporating the above points, it is estimated that Option A imposes net costs of $5,093 million on the people of NSW, with a benefit cost ratio of 0.02. Option B is estimated to impose net costs on the people of NSW of $7,249 million, with a benefit cost ratio of 0.01.
- New regulation must be justified. The CBA must show that mandating 7-stars is an efficient way of solving a demonstrated problem.

  The first requirement of RIS guidelines is demonstrating the problem that is being solved by the new regulation. To demonstrate that mandated higher energy efficiency standards make sense, the CBA must provide evidence that there exists a barrier or a problem that stops consumers from choosing higher energy efficiency where they want to. The CBA does not provide evidence that such a barrier exists. The rating tool, the technology and the design and construction capacity exists to deliver a home owner that choose to exceed building standards with that product. Addressing market failure via regulatory tools is intended to be about the industry not being able to deliver the outcome. It is not intended to be about redressing the market not wanting the outcome or more concerningly, the market choosing not to pay more to achieve an outcome.

Benefits and costs of regulatory options ($ million)		
Item	Option A	Option B
Items reported in CBA		
Costs	-1,375	-1,537
Benefits (including all potential items)	491	250
Net benefits	-885	-1,286
BCR (ratio)	0.36	0.16
Adjustment to costs implied by literature review		
Update computer modelling assumptions for COVID-19	-203	-227
Adjust computer modelled costs to actual, realised costs*	-3,113	-4,745
Include costs associated with wholesaler, retailer margins	-519	-791
Adjustments to benefits implied by literature review		
Adjust computer modelled benefits to actual, realised benefits	-153	-78
Remove or significantly discount benefits to households, as costs to households are not included	-199	-112
Remove 'highly uncertain' and 'speculative' benefits from central case	-22	-9
HIA adjusted estimates, from literature review		
Adjusted costs	-5,210	-7,300
Adjusted benefits	117	51
Net benefits	-5,093	-7,249
BCR	0.02	0.01

* As discusssed, it possible this assumption covers various issues raised in the literature

Source: CBA on proposed changes; literature from Productivity Commission, ABCB, and other studies; and HIA analysis

4. ANALYSIS OF COST AND MATERIAL CHANGES FOR BASIX STRINGENCY INCREASES

HIA has been provided with a selection of member's projects and analysis from their energy assessors, highlighting the required design and material changes and cost breakdowns that would arise for a range of projects.

We have also performed our own analysis of a standard single storey and a standard two storey home design. Noting that the cost-benefit analysis report neglected single storey house designs in its selection of homes for analysis.

The case studies focus on cost of additional materials; the costings are based on actual costs to the builder and do not include margins/profit/overheads that will add further cost for the final home buyer.

These case studies are also overlaid with information from a range of published reports including the Trajectory report for achieving Low Energy Homes, indicating what the additional capital costs would be for requiring houses and apartments to meet 7-star building fabric requirements.

Appendix B provides details of these case studies and additional information that HIA considers should be taken into consideration in determining whether to proceed with increased energy stringency changes.

Case studies vs Cost-Benefit Analysis Report

These case studies are not exhaustive examples but provide a comparative assessment against those provided in the cost-benefits analysis report which has been used as the basis for the stringency increases.

It should also be acknowledged that some of the required upgrade changes used in these case studies, may have been able to be altered or changed to a different or alternate approach if there was building design changes, layout/orientations adjustments.

However, it is considered a more representative example in maintaining the same house design at existing NSW BASIX requirements vs the new stringency targets, to assess what the transitional impact of the changes would be.

If house re-designs are required then that would incur other additional comparable costs for re-design, re-verification, additional time by assessor in the assessment and approval and sign off and agreement time from the home buyers.

It should also be noted that neither these case studies, nor the cost-benefit analysis modelling, incorporate the impacts of embodied emissions targets and bans on dark-coloured roofing. These changes were proposed after the stringency changes were placed on exhibition, as part of a separate exhibition on the Design and Place SEPP.

Findings of case studies, literature review, and builder feedback

This analysis further supports the assessment outlined in this submission that the costs used in the CBA underestimate the upgrading costs to meet the BASIX increased stringency.

Furthermore, this analysis clearly indicates that the reported costs for upgrading buildings need to be adjusted in the cost-benefit analysis to take account of the real world costings.

This analysis also provides further support to HIA's recommendation that the costings used in the CBA should be based on a realised cost vs a modelled cost approach that the Productivity Commission recommended from their report.

Note: The costs used in the section and the cited various other reports were prepared based on the building material prices available at the time. Ongoing supply chain constraints and recent flooding are causing significant changes in construction material costs. These costs would need to be adjusted to account for the material and labour supply increases as outlined in the previous Section of this submission.

5. ISSUES WITH INTRODUCTION OF EMBODIED EMISSIONS TARGETS

In consultation with a broad range of HIA members operating in building, manufacturing and energy efficiency consultation, a range of issues have been raised in relation to the proposed introduction of an embodied emissions target as part of the BASIX reforms.

These issues include concern with a lack of thorough regulatory impact assessment and scale of the change, uncertainty regarding the integration of this requirement with the rest of BASIX and the NCC, a lack of sufficient information and supporting tools to understand the proposal, questions regarding validity of the EPiC database, and operational challenges with implementation of the proposal for both builders and manufacturers.

In general, feedback indicates the proposal is incomplete and not ready for in-depth industry consultation, let alone implementation. The proposal should be postponed until it is more fully developed, and then fully assessed in conjunction with another round of consultation.

5.1 Lack of Regulatory Impact Assessment

The proposal to introduce an embodied emissions target for buildings (and hence building materials) is a fundamental shift in the technical regulation of new homes in Australia. Such a move will have wide-reaching and significant implications across the housing industry. It will impact upon builders and the wider manufacturing and supply chain, trickling down to impact home buyers in relation to both personal choice and price. The industry as a collective will need to make significant adaptions to incorporate this proposal into 'business as usual'.

The proposal has not been subject to a thorough, public regulatory impact assessment or cost benefit analysis. Concerningly it was not assessed together with the stringency increases as part of the cost benefit analysis for the BASIX stringency exhibition despite the parallel exhibition period.

Any change of this scale must be justified via a regulatory impact statement (RIS). A lack of RIS means the potential impacts of the reforms have not been thoroughly explored, and a net benefit has not been demonstrated to justify the implementation of the target in the way it has been proposed.

It is also inappropriate to assess the impacts of an embodied emissions target separately to the other BASIX stringency reforms.

Regulation of embodied emissions from the materials used in construction will have major interactions with other requirements under both BASIX and the National Construction Code (NCC), some of which will be imposing contradictory demands. For example, a shift to higher thermal stringency targets will trigger a transition to more bulk insulation, double glazed windows, and potentially higher thermal mass materials; however all of these changes will involve higher embodied emission materials, which would then need to be offset in some other way. Effectively a 'double hit' from the reform package.

These issues will add significantly to the redesign and re-engineering costs for buildings and may in some cases force a move away from traditional building methods and materials recognised within the NCC. This will in turn incur higher consulting and compliance costs for those buildings to satisfy the requirements of the NCC; industry upskilling and re-education costs also need to be considered.

The entire system will also require ongoing investment to ensure data underlying the material emissions index and calculations are maintained and updated to remain valid, as the manufacturing industry continues to bring their emission down in line with their own business net-zero 2050 trajectories.

Prior to any further consideration of the introduction of an embodied emissions target, the above issues need to be explored in detail, and a full regulatory impact analysis conducted and provided to industry for further consultation.

5.2 Scale of Change Underestimated

During Design & Place SEPP exhibition it has been implied that the new embodied emission targets represent no change, or only a minor change from current business-as-usual. The following table was presented during one of the consultation meetings:

Dwelling type	Baseline embodied carbon - tCO_{2-e}/person	Proposed standard - tCO_{2-e}/person	% Reduction compared to BAU
Large detached house	12.9	12.5	2.5
Small detached house	12.0		0
Attached house	11.9		0
2 bedroom unit	9.6	9.4	1.6
1 bedroom unit	7.9		0

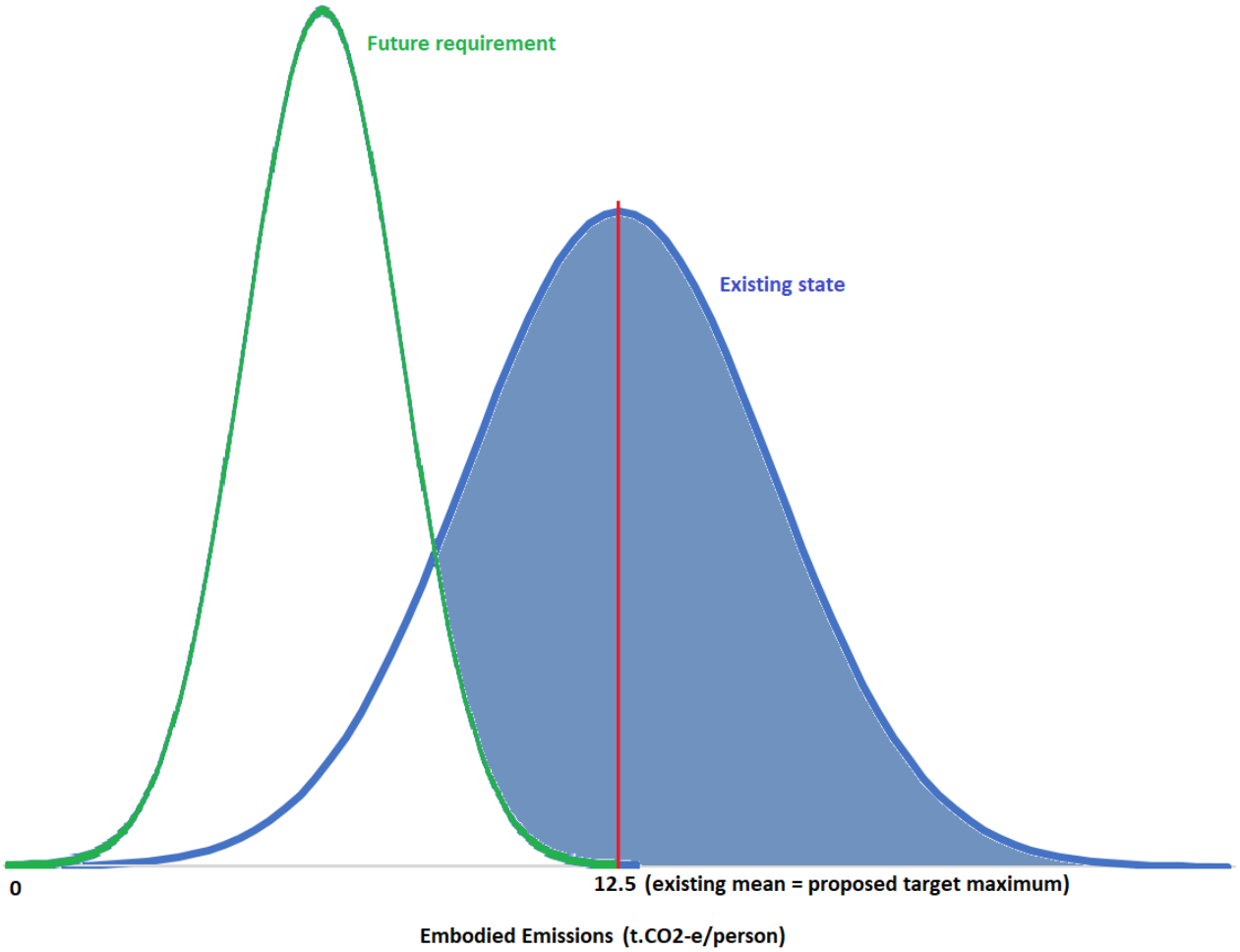
When questioned, it was confirmed:

- The baseline data represents the current mean performance for buildings in NSW, based off existing BASIX data over the last 5 years
- The new target will represent the maximum emission level allowed once the reforms are adopted
- % reduction compared to BAU represents the claimed impact
- No further detail was provided about the method for calculating the current-state, or setting the proposed targets.

Without access to the underlying data or calculations used, it is impossible to provide a precise analysis and support this target as appropriate. Simple statistics indicate that setting a target at the current mean or average is not a minor change, or no change, from the current state. In fact, doing so would affect more than 50% of the existing housing stock.

Assuming normally distributed data, and the lower limit on embodied emissions as zero, this can be demonstrated graphically (in this case using the approximate mean and future target for housing):

- The total area under a curve represents 100% of buildings
- The shaded area represents the % of buildings that would require a change to materials to comply with the new requirements.
- The required shift from right to left to sit under the new-target curve represents the scale of change required for any point in the ‘current state’ curve.



5.3 The Proposal is not Sufficiently Developed

The information put forward as part of the exhibition is insufficient in detail. It is impossible at this point for industry to develop a thorough understanding of the proposal or assess the impacts, for both building product manufacture and building design. The information provided does not allow for accurate consultation and is far from sufficient to justify implementation of the proposal.

No information or explanation was provided for:

- How the claimed existing performance data was determined and calculated?
- How the targets were set from that data?
- How the future calculation will function?
- How manufacturer life-cycle-analysis (LCA) or environmental product declaration (EPD) data will be incorporated, or fairly compared to the EPiC data; and how the underlying database will be maintained?
- What building materials would be captured within the future calculation of embodied emissions?
    - There are upwards of over 5000 individual products within a house; it is not clear to industry exactly what products will be captured within the embodied emissions calculation.

Associated tools and calculators for assessment of embodied emissions within the BASIX online tool are also unavailable. It was stated the tool will not be available until the second half of 2022.

This is insufficient time for industry to test the functionality of the tool, develop familiarity or to assess and prepare for the impacts ahead of a September 2022 target adoption date.

5.4 The EPiC Database is not Fit-for-Purpose

Consultation with industry stakeholders has raised several concerns with the proposed use of the EPiC database to set the materials emission index for a building product.

The EPiC database does not follow the globally accepted process-based standards for emissions calculation, unlike the standard LCA and EPD assessments utilised by product manufacturers. Instead it is based on a hybrid model which incorporates broad-based economic factors. This renders the EPiC database unsuitable as a tool for direct comparison between specific construction products or between buildings.

EPiC only gives a broad average emission factor for a material type. This ignores the significant time and investment manufacturers have already outlaid and continue to invest in emission reduction initiatives. It does not allow for direct comparison between similar products. It also could allow for poorly performing manufacturers to hide their emissions within the average, while better performing manufacturers will not be recognised for their investment in emissions reduction.

Utilising the EPD and LCA data, on the other hand, will allow for a true and fair comparison between different materials, including materials within the same broad material type. However, this comes with costs in both obtaining an LCA or EPD, and in maintaining and updating a database over time.

5.5 Implementation Challenges for Industry

5.5.1 Contractual implications under the proposed timeframe

With construction activity breaking records, the time between signing a construction contract and obtaining construction approval are rapidly increasing. It is likely that thousands of contracts have already been signed between clients and builders, where construction will not be approved or commenced until after September 2022.

These contracts will have been signed with the owners having selected an existing house design, which may not be viable under the new embodied emission requirements, or may cost significantly more than anticipated in the contract.

To alleviate this, any introduction of new requirements under BASIX must be tied to the signing of a new construction contract or agreement, rather than application for a development approval.

5.5.2 Operation under the building approvals process

BASIX is ordinarily applied at development approval stage, whereas other technical regulations are generally applied at the construction approval. There may be significant time between these two stages, and changes may occur either driven by the client, or the market (e.g. unavailability of specified material).

It is unclear how any design variations or product substitutions will function; and how these are to be validated against the original approved BASIX certificate for the purposes of the embodied energy requirement.

It is also unclear how materials or products used are to be validated, or who is responsible for carrying out the validation. Similar materials from different suppliers may be difficult to distinguish once installed within a building.

5.5.3 Obtaining LCA or EPD data

Manufacturers will be looking to have their products assessed under a Life Cycle Analysis to support their use. For total accuracy, the LCA should be conducted for the whole home. However a limited number of qualified professionals are available in Australia meaning this will be a costly exercise and take significant time to complete.

We have been advised that:

- Lead-time under current demand exceeds 6 months.
- Costs are between $35k-$40k for a manufacturing facility to be assessed.

- The lead-time and costs will only worsen as demand increases when the proposal is implemented.

While larger manufacturers will be able to bear these costs, they are prohibitive for smaller manufacturers who may be trying to introduce better performing and innovative products. These products will also be unfairly represented in the default EPiC database. Support must be provided for small business to assist with the transition.

On average, NSW builds 55000 new homes each year. For total accuracy and fair comparison, each one of these will need a unique and tailored assessment by an LCA professional if the homes are to be fairly compared. Should the assessment tool offer a more 'deemed to satisfy' pathway for assessment this may alleviate some of this concern, however it would need to be compared against the accuracy of the approach for those materials and buildings that exceed the target, who may be unfairly penalised by such an approach.

5.6 Volume of Reform in NSW

This is a significant change to the regulation of buildings in NSW, coming at a time when several other significant reforms are underway. Any one of the reforms will have major impact on the building and construction industry. These reforms industry include:

- NCC 2022 – the most significant amendments to the NCC since its inception, with several major revisions, 20+ new or updated Australian Standards, significant restructuring and renumbering, plus various changes across all sections of the code.
- Continued implementation and amendments to the Design & Building Practitioners Regulation for Class 2 buildings, and potential expansion to other building types.
- A complete review and overhaul of the Home Building Act and associated Acts and Regulations
- Implementation of the Design and Place SEPP, which is also introducing a range of design and technical limitations on building construction alongside the embodied emissions proposal

In aggregate the volume of change underway is having a compounding effect, placing significant strain on an industry still suffering the impacts of COVID, and material and labour supply shortages and associated cost increases.

5.7 Preferred Approach

Introduction of the embodied emissions target should be postponed until such time as all associated tools and calculators have been developed.

Once the tools and calculators have been developed, introduction should proceed on a voluntary basis to allow real-world testing and validation of the outcomes achieved by such a regulation.

This should then be followed by a full reassessment of the function and impact of the proposal, and a regulatory impact analysis assessing the impacts in the context of the broader NCC and BASIX requirements. This should then be followed by further industry consultation.

This should include assessment of where the requirements are to be applied within the building approvals process, as application at DA stage will create numerous issues.

If at that time, the regulatory impact analysis and industry consultation support the introduction of a mandatory embodied emissions target, introduction should be accompanied by an appropriate transition time to allow industry to familiarise and prepare for mandatory requirements. The implementation date should be tied to the construction contract rather than an approval stage, as occurred in 2004 and 2017.

Industry should be supported through training and education on the functionality and implications of the embodied emissions calculations for buildings.

APPENDIX A – DETAILED ECONOMIC DISCUSSION OF CBA ON 7-STARS

A.1 Productivity Commission notes the analysis of energy efficiency requires scrutiny

The 2005 Productivity Commission Enquiry Report on Energy Efficiency mandates notes:

> *'The Commission is concerned by that the analytical basis for these regulations [minimum energy efficiency standards] (computer simulations of energy loads within buildings in each climate zone) may be flawed.'*[1]

The Productivity Commission goes on to point various problems with some of the assumptions that analysts use to evaluate energy efficiency standards and concludes that it does not favour these standards as a policy to fix the problems they purport to fix.

It is considered that concerns raised by the Productivity Commission report on analytical basis of modelled energy efficiency assessments and energy loads apply equally to the analysis made in this current CBA. This is discussed in the sections that follow.

A.2 Adjust computer modelling cost assumptions to reflect cost increases in COVID-19

Building costs have risen substantially in recent months. The costs used in the CBA, were prepared prior to the current increases in building materials due to supply chain constraints and COVID-19. Moreover, they pre-date the global increases in fuel and additional local pressure on supply chains from the 2022 flooding.

For example, the ABS reports that the cost of building a house increased by 12.0 per cent from the December Quarter of 2020 to the December Quarter of 2021. The cost increase has occurred because supply is constrained from meeting surging demand.

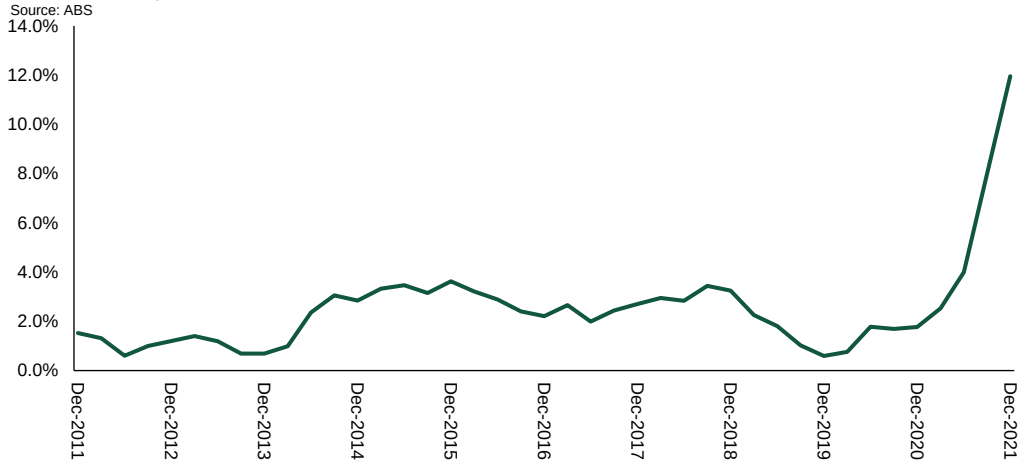
Constrained supply reflects shortages of skilled labour and international supply constraints. Surging demand is driven by low interest rates, government subsidies and a change in consumer preferences towards housing, especially detached housing, under the pandemic.

Available forecasts from building industry experts indicate costs will continue to rise in 2022. Builders consulted by HIA note that suppliers have said that cost increases will continue.

Smaller/medium sized builders consulted by HIA indicate their costs may have increased by more than this. Overall, the ABS data may represent a minimum figure for the cost increase.

The surge in costs is unprecedented in the last decade.

Annual change in House Construction Costs



It is unlikely that costs will return to "pre-COVID levels", even after supply chain issues are resolved. It is likely that at least some of the recent cost increases will be retained.

[1] Productivity Commission 2005, *The Private Cost Effectiveness of Improving Energy Efficiency,* see: https://www.pc.gov.au/inquiries/completed/energy-efficiency/report/energy.pdf, pg. 38/554

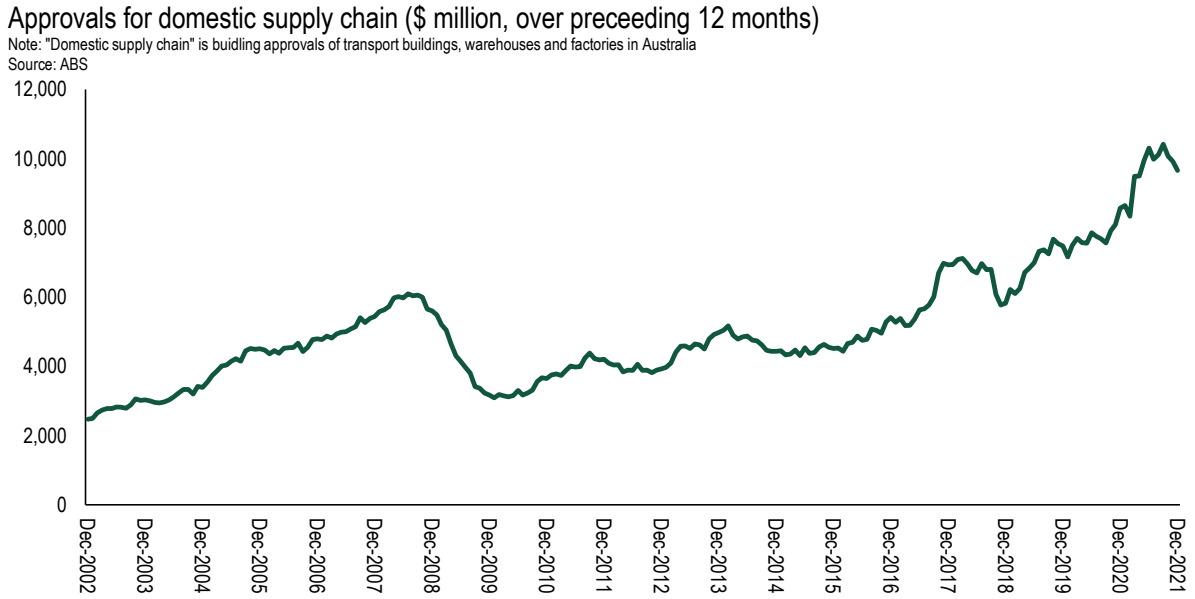
In response to COVID-19, suppliers are working to add more domestic production, storage and logistics to their supply chain.

This means in the future, supply is likely to be more reliable, but it will also be more expensive. Adding domestic facilities increases reliability because the supply chain becomes shorter. Adding domestic facilities makes supply more expensive because land, labour and energy costs tend to be higher in Australia than offshore.

Therefore, after COVID-19, the supply chain will be more expensive. This means costs will not return to pre-COVID levels (if they fall at all).

The two key pieces of evidence for this are:

> Bunnings is a key supplier to the Australian building industry. In response to supply chain disruptions, it notes it's "continued development of domestic supply chain capabilities" [2]
>
> The ABS reports a dramatic increase building approvals for transport buildings, factories, and warehouses since the start of COVID-19. At the national level, this data says that businesses are following the same strategy as noted in Bunning's Annual report: they are shifting more of their supply chain to Australia.



There is significant evidence that at least some of the recent cost increases should be treated as 'permanent' and incorporated into the modelling, going forward.

It is recommended that CBA costings should be adjusted to account for the material and labour supply increases – a representative increase of 15% is recommended for the purpose of the CBA assessment based on:

- a range of published reports on this issue
- supplier price increases lists
- industry surveys
- that the specific materials that would be required for the upgrades (glass, insulation, framing , etc.) have been the materials incurring the more significant increases

2 Bunnings 2021 Annual report, see 33/184 in: https://sitefinity.wesfarmers.com.au/docs/default-source/reports/2021---wesfarmers-annual-report.pdf?sfvrsn=9d9111bb_2

- further expected material price increases
- labour increases and availability
- on the ground feedback from builders and in particular smaller custom builders; and
- that smaller and custom builders and trade contractors do not have as great control over material prices and buying power with suppliers that larger companies for which the ABS analysis was based off.

With all of these factors combined it is considered that 15% increase is more representative increase percentage to use in the CBA to adjust for construction cost increases, than the 12% noted by the ABS report.

This is particularly relevant as when the proposals would take effect industry and homeowners would be facing these additional price increases, so basing them off pre COVID prices is not accurate or true reflection of the assessment of what the additional cost impacts would be. A recommended adjustment to the CBA is set out in the following table.

Adjust modelling assumptions for COVID-19		
	Option A	Option B
Computer modelled costs, reported in CBA	1,353	1,515
Ajdustment factor for computer modelling assumptions, due to cost increases in COVID	+15%	+15%
Computer modelled costs, adjusted for COVID-19	1,556	1,742
Implied adjsutment to net benefits in CBA, if COVID-19 impacts are included	-203	-227

Source: HIA, based on ABS data and member information

A.3 Use 'actual costs' not 'computer modelled costs'

Even if computer modelling assumptions are updated to latest data, there remains a concern that computer modelling – even if it is very sophisticated – cannot accurately capture how new regulations impact building projects in reality. For example, the 2005 Productivity Commission report noted on past energy efficiency changes and regulatory modelled costs:

> *'evidence is now appearing of compliance costs [for energy efficiency mandates] being much higher than expected. For example, the Victorian Government predicted the cost of a new house would rise by 0.7 – 1.9 per cent, but a recent survey shows that the average increase was 6 per cent.'*[3]

Another example is provided.

This implies that, at a minimum, realised construction costs for mandated energy efficiency measures are higher than computer-modelled construction costs by a factor of 3X (6 per cent vs 1.9 per cent).

Given this issue, and other problems with energy efficiency measures, the Productivity Commission notes there is a 'compelling' case for an after-the-fact review of energy efficiency measures to inform future energy efficiency reforms to use this as a true basis of assessing changes and impacts as opposed to reliance to modelled costs.

HIA raised the same concerns with both the past 5-star and 6-star changes and regulatory analysis and limitations on reliance on computer modelled assessments rather than true post implementation or after-the-fact reviews of mandated energy efficiency standards realized costs and benefits.

[3] Productivity Commission 2005, *The Private Cost Effectiveness of Improving Energy Efficiency,* see: https://www.pc.gov.au/inquiries/completed/energy-efficiency/report/energy.pdf, pg. 37/554

Therefore, following the Productivity Commission's concern on costs, it is considered that the costs provided in the CBA and supporting costs and benefits assessments report underestimate the cost of mandating a change from 6-stars to 7-stars, the equivalent of that being proposed in BASIX. An adjustment to the CBA, in line with the Productivity Commission Report is set out in the following table.

Adjust modelled costs to actual costs	Option A	Option B
Computer modelled costs, including adjustment for COVID-19	1,556	2,373
Minimum adjustment factor to convert computer modelled costs to actutal/realised costs (from Productivity Commission 2005)	3	3
Estimate of actual/realised costs	4,669	7,118
Implied adjsutment to net benefits in CBA, if computer modelled costs are adjusted to actual costs	-3,113	-4,745

Source: HIA; Productivity Commission (2005)

A.4 Remove cost saving created by the exclusion of margins

It is interpreted from the discussion on pg. 46/143 of the CBA to imply that only 90 per cent of costs are treated as 'real costs'. The CBA excludes the remaining 10 per cent of costs. A footnote explains that 10 per cent of materials costs are 'margins' or 'net profit' charged by wholesalers and retailers.

HIA disputes this approach. Margins and profits earned by retailers and wholesalers are real costs that are compensations for their time and entrepreneurial skill. Put another way: the data quoted in the CBA implies that builders (and other Australian businesses) pay a 10 per cent margin on materials to wholesalers and retailers so they do not have to incur the costs and inconvenience of sourcing, organising and stocking materials themselves. This is not a fair and reasonable assumption.

Further, wholesalers and retailers devote some of their time to understanding changes in market conditions, regulations, and supply sources, so they can offer customers better deals over time. The real cost to customers of receiving this service is the margin the supplier charges.

It is argued that it is not appropriate to exclude these costs. An adjustment to the CBA is set out in the following table.

Adjustment to construction costs to include margins ($ million)	Option A	Option B
Actual construction costs (adjusted for COVID, adjusted for actual vs modelled)	4,669	7,118
Actual construction costs, including retailer and wholesaler margins	5,188	7,909
Implied adjsutment to net benefits in CBA, if retailer and wholesaler margins are included	-519	-791

Source: HIA

A.5 Use 'actual benefits' not 'computer modelled benefits'

The 2005 Productivity Commission Report on Energy Efficiency notes: *"energy standards are not specified in terms of [actual or realised] energy consumption".*

This means the Government does not police energy use after the occupant has moved into their new home. There is no mechanism to ensure the actual energy use by the occupant matches the modelled energy use that is used to evaluate the standards.

Given this, the Productivity Commission notes: *"there appears to be serious doubts about the effectiveness of these regulations (energy efficiency mandates) in improving energy efficiency in a systematic way."*[4]

The concern that energy efficiency regulations may not change energy use significantly is the second reason why an-after-the-fact review of energy efficiency mandates for future consideration and analysis of changes and stringency increases is needed to provide a more transparent and measurable understanding of true impacts and realised benefits.

A review was belatedly undertaken in 2013 by CSIRO based on 5 star standard. A similar review has not been undertaken on 6 star homes, meaning decision makers are left to assume that the energy efficiency measures do in fact create the expected benefits.

The CIE evaluated energy efficiency measures for Commercial Buildings as part of the RIS for the NCC 2019 Section J changes. In that assessment the CIE documented various recent studies that show that actual energy savings are less than what is modelled. To deal with this issue, in the 2019 Section J RIS the CIE presented 3 scenarios for benefits:

- Realised benefits are 49 per cent of modelled benefits
- Realised benefits are 75 per cent of modelled benefits, and
- Realised benefits are 100 per cent of modelled benefits.

In that RIS, the CIE noted that consultations suggested the likely two outcomes are either scenario 1 or 2. Submissions to 2019 Section J RIS argued that realised benefits are likely to be between 49 per cent and 75 per cent of modelled benefits.[5]

The CBA presents similar scenarios, but only as sensitivity scenarios. It is considered that this CBA should adopt one of its sensitivity scenarios (realised benefits are 50 per cent or 75 per cent of modelled benefits) as its 'central scenario'.

This change would make analysis in this CBA consistent with that used in the Section J 2019 RIS and the Productivity Commission's view on realised benefits vs modelled benefits. Note, this issue of 'realised benefits' vs 'modelled benefits' applies to all benefits in the RIS.

The CBA notes it assumes there is a 'rebound effect' of 10 per cent. It is understood this assumption partially deals with issue of realised benefits vs modelled benefits. In the following table, we adjust back for the rebound effect the RIS assumes (10 per cent) and then adopt the mid-point of the two scenarios that were argued to be the most likely outcomes in the 2019 Section J RIS (62 per cent: midpoint between 49 per cent and 75 per cent).

[4] Productivity Commission 2005, The Private Cost Effectiveness of Improving Energy Efficiency, see: https://www.pc.gov.au/inquiries/completed/energy-efficiency/report/energy.pdf, pg 37/554

[5] The CIE 2019, RIS of Energy Efficiency Standards in Commercial Buildings, see: https://static1.squarespace.com/static/5df9aa078642f943ece6a0b3/t/5f589c857e871053b87e5a58/1599642806533/Final_ RIS_Energy_efficiency_of_commercial_buildings_PDF.pdf, pg 17/252

Adjust benefits to actual benefits ($m)		
	Option A	Option B
Total benefits reported in CBA (computer modelled, includes 10 per cent rebound)	491	250
Total benefits (computer modelled, without rebound)	545	278
Adjustment factor: realised benefits relative to actual benefits	0.62	0.62
Total benefits (actual or realised)	338	172
Implied adjsutment to net benefits in CBA, if modelled benefits are adjusted to realised benefits	-153	-78

Source: HIA; The CIE 2019, RIS of Energy Efficiency Standards in Commercial Buildings

A.6 Benefits to households should be removed or discounted, as the costs to households are not included

Around 60 per cent of the total potential benefits of mandating 7-stars is savings that households make on energy bills.

It is noted that even if mandating 7-stars reduces energy use for households, this does not necessarily mean the value of this benefit can be added to the CBA. Energy savings only add to net benefits if they are greater than any cost that is imposed on households from mandating 7-stars.

It is argued that energy savings to households should be removed from the CBA or significantly discounted. In essence, this is because the CBA does not include the costs that mandating 7-stars imposes on households. If the CBA includes the benefits for households but not the costs, the CBA likely overstates the net benefits of 7-stars.

This section sets out Australian government guidelines and economic literature that support this argument.

The argument that forcing households to adopt 7-stars imposes costs on households comes from four strands of the literature:

1. Other reports and analyses that suggest that mandating 7-stars would reduce window sizes, and therefore impose amenity costs on households.
2. Industry feedback that suggests mandating 7-stars would make some preferred designs unfeasible, which is costly to rework or replace.
3. Evidence that the opportunity cost of the funds used to pay for 7-stars is not measured correctly. Put another way: households have other projects they prefer to spend the money on and incur costs when they cannot pursue these other projects.
4. No evidence is presented in the CBA that mandating 7-stars solves a problem for households. There is no barrier that is preventing them from adopting 7-stars if they want to. This implies 7-stars do create costs for households. These costs offset any benefits of 7-stars, which is why many households are choosing not to voluntarily take up 7-stars.

a) Mandating 7-stars imposes amenity costs on households due to smaller windows, which are not in the CBA

A Consultation Regulatory Impact Statement (CRIS) on the costs and benefits of mandating 7-stars was published by the Australian Building Codes Board (ABCB) in 2021. This CRIS notes that homes with 7-stars tend to have windows that are 15 per cent smaller than homes with 6-stars.[6]

HIA argues that it is commonly accepted that homes with a better aspect (NE facing) are more valuable than homes with poorer aspect (South facing). This relates to the amount of natural light they receive. This implies that reducing the amount of natural light into homes (via smaller windows) is costly for households.

Further, a paper for the US Green Building Council, prepared by the University of Oregon, finds that workers in buildings with poorer ratings of light quality and with poorer views use significantly more sick leave hours. In this study, "light quality" refers to natural light quality or "daylighting." The authors introduce their study as an attempt to "place a value on windows."

The authors note the two variables (quality of natural light and quality of view) explained 6.5 per cent of the variation in sick leave use, a statistically significant result.[7] They also conclude that both of the variables, independently, significantly influence sick leave.

This implies that lower natural light quality, via smaller windows, significantly increases sick leave amongst workers. This result could be interpreted two ways. It could be that spaces with poor natural light cause people to become sick. Or it could be that people prefer to be in spaces with better natural light and will take steps to avoid spaces with low natural light. Both interpretations support the conclusion that smaller windows, caused by mandating 7-stars, will create a cost for households.

The amenity cost that mandating 7-stars will impose on households is not included in the CBA. The CBA assumes this cost to be zero.

b) Mandating 7-stars imposes design costs on households, which are not in the CBA

A mandate for 7-stars means that many potential new homes will need to be re-designed. This can include layout, material selection type, windows, wall positions etc. Mandating that households must change their home design away from their preferred design imposes a cost on households.

HIA has received feedback from a well experienced, recognised Australian energy assessor. For new homes that are built to 7-stars, the assessor notes that, in addition to changes in window size, some homes will have to be re-oriented. More fundamentally, the energy assessor notes that some home designs and home preferences are simply incompatible with 7-stars. Many home projects will have to start from scratch, with a completely different concept. This is a substantial cost which cannot be ignored. This is particularly relevant for custom homes where the home owner has a specific house design in mind.

It is argued the cost of design changes are a significant cost of mandating 7-stars, which are is not included in the CBA.

It is acknowledged that it is difficult to quantify this impact. However, it is not accurate to assume this cost is zero, as the CBA has done. HIA proposes a simple fix, which would be to increase the allowance for "small and difficult blocks". This cost item is designed to capture the large costs for certain blocks where it is very difficult to comply with 7-stars for physical reasons. The CBA could consider increasing the share of blocks that incur these costs, to account for projects where it is difficult to comply with 7 stars, given the design preferences of the owner alongside the additional design costs for volume builders to update and amend current plans.

[6] See CRIS, pg. 98/328: https://consultation.abcb.gov.au/engagement/consultation-ris-proposed-ncc-2022-residential/,

[7] United States Green Building Council, Elzeyadi of University of Oregon, see: https://www.usgbc.org/sites/default/files/OR10_Daylighting%20Bias%20and%20Biophilia.pdf

c) There is no evidence that mandating 7-stars solves a problem for households - this puts a question mark on the stated benefits

The first question a RIS should ask is: what problem is the policy trying to solve?

It is necessary for new regulatory proposal to solve a problem i.e. a demonstrated failure that requires regulatory intervention. This is so decision makers can be confident that it actually creates the intended benefits. If the regulation does not solve a problem, there is a significant risk it does not create benefits.

The CBA assumes at least 60 per cent of the benefits of changing the mandate from 6-stars to 7-stars in BASIX is savings for the households building new homes. This is a striking result. The obvious question is: if these savings were available to households, why is not everybody implementing 7-stars? And why stop there? Why not 8-stars?

The CBA does not provide any evidence or discussion of problems or barriers that prevent households from obtaining 7-star features.

It is clear from the CBA that 7-star features are available in the market. It is clear that if people think 7-star features have merit, over and above all their other priorities, they can add them to their new home. Therefore, if people are choosing not to adopt 7-star features, the CBA should be asking why are they not? Are there any costs from 7-star features that we are missing?

Building or buying a home is the second biggest decision that most of us make (after getting married). It is common sense that Australians carefully consider different options for new build homes. This includes consideration of the benefits and costs of energy efficiency features. If Australians want energy efficiency features beyond the current regulatory settings, and they are not supplied by a builder, they will find a builder that does supply them.

Saving energy and reducing electricity bills are very important issues for Australian households. According to ABS CPI data, electricity prices grew by 5 per cent per year between 2001 and 2021. This is much stronger growth than general consumer price rises in the economy (2.4 per cent per year).

Electricity bills, in one way or another, are always an important feature of Federal Election campaigns. Any policy proposal that can be construed (fairly or not) as ‘hiking electricity bills’ is treated with deep suspicion by households. The converse of this is common sense: it is likely that Australians will take measures that purport to reduce their energy bills seriously.

The only question is what does it cost? HIA argues that it is likely that households will adopt measures to reduce their energy bills, as long as they believe the costs of the measures are smaller than the value of the savings.

This means that Australians will properly consider energy efficiency measures that are transparently explained.

ABS data for the financial year 2020 reports there are around 75,000 residential building companies in Australia (around 50,000 house builders and around 25,000 multi-unit construction companies). There is great diversity amongst these businesses. Competition creates businesses that are willing and able to install the features that households genuinely prefer. Businesses that do not respond to this competitive pressure will go out of business.

This supports the argument that features that exceed current regulatory settings are not being adopted because households believe they are costly in a way that is not measured in the CBA.

The RIS guidelines require the CBA to identify, measure and include all costs that changing from 6-stars to 7-stars imposes on households. These costs must be included so that they can be offset against the benefits. HIA argues the CBA does not do this.

d) Summary of these arguments

The preferred outcome is that the CBA properly considers all benefits and all costs of mandating 7-stars. To properly include all costs, the evidence from the literature says the CBA should:

- include the cost of reduced amenity to households due to smaller windows,
- include the cost to households of using non-preferred designs, and
- include the cost to households of diverting funds away from preferred projects (this is achieved by discounting the energy savings benefits to households at the discount rate for households, around 20 per cent, not the assumed 7 per cent),

It is unlikely to be accurate to assume these costs are zero, as the CBA assumes. 7-stars features are available in the market. The fact that some households are choosing not to take them up suggests these costs are significant, and likely offset any benefits to households.

If the benefits to households are retained, but the costs to households are not included, the CBA likely overstates the net benefits. Therefore, if the costs to households cannot be measured, it is argued the most reliable approach is to remove the benefits to households or significantly discount them.

The impact of removing the energy savings benefits to households is set out in the following table.

Remove energy saving benefits to households ($m)	Option A	Option B
Energy savings benefits to households reported in CBA (computer modelled, including 10 per cent rebound)	289	163
Actual energy savings to households, adjusting for rebound effect and actual energy use	199	112
Implied adjsutment to net benefits in CBA, if energy savings to households are removed	-199	-112

Source: HIA; Productivity Commission (2005); OBPR; other noted studies

A.7 Highly uncertain benefits should be removed from the central case

The CBA notes that the benefit item: health benefits for reduced electricity and gas generation use, is "highly uncertain and speculative". It is argued that "highly uncertain and speculative" benefits should not be included in the central case. The impact of this is set out in the following table.

Remove health benefits from central case ($m)	Option A	Option B
Public health benefits reported in CBA (computer modelled, includes 10 per cent rebound)	32	13
Public health benefits (adjusting for rebound effect and actual energy use)	22	9
Implied adjsutment to net benefits in CBA, from removing health benefits as they are speculative and uncertain	-22	-9

Source: HIA

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A.8 Include carbon costs from mandating 7-stars

The regulatory change requires additional building materials to be installed in new homes. These additional materials will have to be mined from the ground, manufactured into product and transported to building sites. The financial cost of this activity should be incorporated in actual construction costs.

However, mining, manufacturing and transport are energy-intensive industries. They drive significant CO2 emissions. Mandating a change from 6-stars to 7-stars will require a number of material and construction changes – i.e. double glazing and use of insulated (waffle pod slabs) and the manufacturing and additional transport costs cause increases in CO2 emissions. This cost is not included in the CBA.

A.9 Sources of additional costs: computer model vs actual

Section 2.4 (above) notes evidence from the Productivity Commission that actual, realised costs of mandating 7-stars are likely to be above computer modelled costs.

HIA has identified the following issues with cost items in the CBA. If the CBA follows the guidance of the Productivity Commission and scales up computer modelled costs by a factor of 3 to get actual costs, it is not clear whether this adjustment would cover the following issues, or whether these issues are additional. Therefore, to be conservative, HIA notes these issues may be covered by the adjustment implied by the data provided by the Productivity Commission.

a) Include transition costs (for example re-design costs)

As noted in the CBA, for some period of time after BASIX is changed from 6-stars to 7-stars, the building industry will incur transition costs. These are costs of re-training people and the cost of re-designing manufacturing processes, supply chains and building designs, building processes and the final product (new build homes) to meet the requirements.

The CBA includes retraining costs but does not include other transition costs.

HIA has been provided with a range of feedback from members which indicates that the costs of redesign of buildings plans, specifications and re-calibration of costs for volume builders is a significant sunk cost both in terms of time and resources. HIA has received feedback from a number of energy assessor that changing from 6 stars to 7 stars will involve significant redesign of dwellings and the majority of all volume home designs. In particular, window sizes, layouts and (in some cases) orientation of dwellings will have to change.

This feedback is consistent with the feedback received from a range of volume builders that changes from 6 stars to 7 stars as the benchmark requirement will result in the need for significant changes to 90-95% of all of their standard house plans. One of Australia's largest volume builders cited that they presently have over 500 standard house plans and 95% of those plans will require changes in some form to adhere to the new requirements if approved. This is not a straightforward change and it's not a matter of only changing or adjusting the plan in many circumstances. The changes will require:

- initial re-design
- re-assessment by an energy assessor in a variety of different orientations
- this would likely involve back and forward with the initial designer and many runs through the energy rating software (which is not expected to be operational and available till 1 September 2022)
- then it is a matter of finalizing the design
- have the revised plan to the estimator and suppliers for costings of the new (or amended) plan
- a completed plan produced
- a standard specification and materials inclusions lists developed
- a scope of works and tender documentation developed for contractors and suppliers; and

- marketing and promotional material updated.

There may also be implications for these designs on:

- current display homes and the need for the subsequent houses to be built as per the display home; and
- subdivisions for which the house designs are based off for lot yield.

Further, these changes are not likely to be made until the final provisions are agreed to by Governments as it means many of the house designs would need to be scrapped and the new ones designed with the 7 star features.

Members have provided the following points to HIA.

- Energy assessment for a standard volume builder home: $220
- Energy assessment for an architecturally designed, custom build home starts at $440

In general, architecturally designed homes have more windows. The time that an energy assessor will need to spend on making all houses in all climate zones comply to 7-stars will like take them a lot more time depending on the house design and their scope of role is also broader given the whole of home components.

HIA has obtained data from Rawlinsons, a highly respected and independent quantity surveyor, on the differences in between volume builders and custom builders. Rawlinson's estimate that the unit construction cost ($cost per square metre of home construction) for a custom builder is 51 per cent higher than a volume builder.

Difference in cost base between volume builder and custom builder

	Volume builder	Custom builder
Unit construction cost ($/sqm): single storey detached home	1,473	2,230
Unit construction cost ($/sqm): double storey detached home	1,576	2,386
Cost upgrade: volume builder to custom builder		51%

Source: Rawlinsons; HIA can provide a copy of Rawlinsons report, on request

If the BASIX changes mandate that volume built homes achieve 7-stars (up from 6-stars), HIA argues that, with respect to energy efficiency measures, the government will create a situation where volume builders must behave like a custom builder for a period of time. To provide 7-star features, the volume builder must provide cost flexibility, because their normal, low-cost processes are designed around 6-star features and certainty of regulatory settings.

These costs are incurred at least until the change becomes normalised. HIA estimates this transition will take 3 years. Therefore, for 3 years, HIA argues a 51 per cent premium should be added to the costs incurred by volume builders, to adjust from 6-stars to 7-stars. Based on HIA's Housing 100 survey, in 2021/22 volume builders represented around 40 per cent of the home building market. The remaining 60 per cent of the market is made up of custom builders and multi-unit builders.

Transition costs for volume builders ($ million)		
	Option A	Option B
Total realised construction costs, adjsuted for idle capacity	5,188	7,909
Share of costs that relate to volume builder homes	0.38	0.38
Costs relating to volume builder homes	1,971	3,005
Costs incurred during transition period (3 of 10 years)	591	902
Transition costs (51 per cent premium)	302	460
Implied adjsutment to net benefits, in transition cost to volume builders are included	-302	-460

Source: HIA; Productivity Commission (2005)

b) Include additional compliance and verification costs

HIA argues the complexity of the proposed changes mean that it will be more time consuming and costly for certifiers to verify new homes comply with the code.

For the accessible housing RIS, prepared for the ABCB, the CIE estimated the additional costs of building verification of the compliance of new builds with respect to the new regulations was around $290 million.[8]

It is argued that the complexity of the required additional verification and design changes for the energy efficiency changes are comparable, if not more challenging, than the accessible housing provisions given the wide variety of house designs and that the design used for the block will be dependent on the orientation. Therefore, similar compliance costs should be included for this RIS.

c) Remove discount to costs created by "learning"

In a narrow set of circumstances, it may be appropriate to assume the cost of a new regulation declines over time due to "learning". This is where the introduction of the new regulation (itself) causes the building industry to "learn" about the requirements. This regulation-driven learning causes costs to fall.

The CBA notes that evidence on this type of regulation-driven learning is limited. The CBA notes the previous ABCB Section J energy-efficiency RIS did not include an assumption that costs decline due to learning. The primary reason cited was a lack of evidence on learning that is caused by the regulation.

The CBA notes data from CSIRO dashboard, which shows a trend decline in the capital costs for rooftop solar PVs. CSIRO project this trend to continue. Therefore, the CBA assumes the solar PV component of the costs created by the regulation falls over time.

It is accepted that the costs of the PV industry have fallen and may continue to fall. However, HIA argues this does not mean there is a 'cost reduction' that increases the net benefits in the CBA, as is assumed.

If PV costs, in general, are falling over time, this means both the costs of mandating 7-stars, and the benefits of mandating 7-stars, fall over time.

[8] See Decision RIS for accessibility standards, pg 171/398, see: https://www.abcb.gov.au/sites/default/files/resources/2021/Final%20Decision%20RIS%20accessible%20housing_PDF.pdf

General falls in technology costs reduce the costs of the regulation because it is less costly for builders and homeowners to install the PV cells. General falls in technology costs cause the benefits of the regulation to fall because there are more people who are switching anyway.

Because more people are switching from 6-stars to 7-stars, due to falling solar PV costs, there is less scope for the new mandate to cause people to change from 6-stars to 7-stars. This means the benefits of new mandate are lower.

It does not appear that the CBA has included any reduced benefits due to learning over 20 years of BASIX regulation alongside reduced costs.

Therefore, HIA argues the CBA has likely over-estimated the net benefits, by assuming that costs fall over time, but not making an offsetting adjustment to the benefits.

The most appropriate assumption for the CBA to make is to remove the cost reduction that is created by learning. This will result in both benefit and cost reductions being excluded.

d) Ensure small blocks assumptions incorporate recent trends

The CBA notes it will be more costly to incorporate a mandate of 7-stars, where dwellings are built on narrow and small blocks.

This is based on a difficult blocks report produced by AECOM for the ABCB which noted it was difficult to accurately estimate the prevalence of difficult blocks, though they cited feedback from stakeholders suggests the percentage of difficult blocks in a new housing development could be between 5-40% depending on sub-division design and orientation.

HIA would concur with the stakeholder feedback on the prevalence of difficult and challenging blocks particular in new housing estates, and infill areas where there is a growing trend to address land supply challenges and housing affordability to look at maximising the amount of dwellings that can be incorporated into new housing developments and smaller block sizes.

To try and quantify the percentage of difficult blocks the CBA cites data produced by SGS Economics and Planning that suggests highly conservative percentages of difficult and challenging blocks in states and territories. The report was not able to be reviewed or analysed on how these numbers were derived as part of responding to the CBA.

The CBA reports the SGS data indicates 8.4 per cent of homes in NSW are built on small and difficult blocks. No further data is provided.

In the 2021 accessible housing RIS, CIE cites data from SGS that around 11 per cent of houses and townhouses are built on blocks that are defined as ‘small’.

This percentage is higher than what is assumed for the energy efficiency RIS. It is accepted that the definition of ‘small and narrow’ for energy efficiency may be different from ‘small’ for accessible housing. However, at the very least, this should be clarified.

More importantly, there is clear downward trend in block size. For example, UDIA report that the median lot size across capital cities has fallen from 519sqm to 420sqm between 2009 and 2020.[9]

It seems unlikely that the proportion of “small and narrow” blocks would remain constant while block sizes are falling. It is recommended that the CBA should provide data on how the proportion of small blocks has trended over time. These insights could be incorporated into the RIS. This would increase estimated costs.

As noted above it is considered that the percentages quoted by SGS are considered to be highly conservative, as per stakeholder feedback. A move to higher portion of townhouses and buildings built boundary to boundary, a more representative yet still likely to be conservative assessment would be 15% of all new housing sites in all states would be considered difficult blocks that adversely affects solar passive design.

[9] UDIA 2021, see: https://udia.com.au/research/udia-state-of-the-land-2021/

A.10 Other costs relating to solar PV cells

There are also questions on the quality of some of the PV products being installed on buildings, as well as their installations compliance. There has been a number of reports of building fires attributed to PVs on roofs, water ingress due to installations, and PVs becoming wind driven debris in high wind events.

Nor does the CBA discuss the issue of damage due to hail events and clean up and insurance costs for replacement of PVs on roofs that has been witnessed in the past few years due to large hail storms.

The CBA does not provide a detailed assessment of these unintended and consequential impacts of higher rates of PVs installations which may outweigh any learning rate savings due to higher numbers of installations of PVs on buildings.

A.11 Concluding remarks from Productivity Commission 2005

The Productivity Commission considered all issues that are relevant to energy efficiency measures in its 2005 report. It concluded by noting that, where new regulation can be justified:

'the Commission favours light-handed regulatory responses and information provision, rather than more prescriptive and intrusive approaches: mandatory labelling can be an appropriate way of providing information, but other mandatory measures, such as minimum performance standards, may not be privately cost effective.'[10]

Regulation must be justified. To justify regulation, the first step is establishing that problems that would be solved by the regulation actually do exist. If it is not demonstrated that problems actually do exist, then new regulation cannot be justified.

[10] Productivity Commission 2005, The Private Cost Effectiveness of Improving Energy Efficiency, see: https://www.pc.gov.au/inquiries/completed/energy-efficiency/report/energy.pdf, pg. 45/554

APPENDIX B – COST AND MATERIAL CHANGES FOR STRINGENCY INCREASES

B.1 Case Study

Building Thermal Performance Assessments

HIA undertook thermal performances on the 'HIA Standard House' detached single storey three-bedroom home and the four-bedroom double storey home using NatHERS software FirstRate 5.

The assessments for both homes were carried out under NatHERS Climate Zones for Sydney.

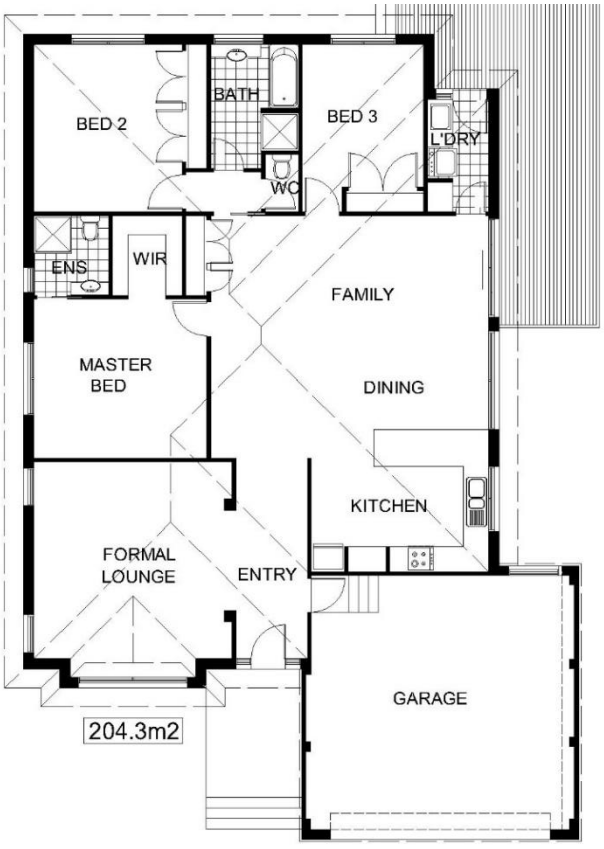
B.1.1. Single storey HIA Standard House Sydney.

The single storey home shown below is a masonry veneer design, tile roof with a slab-on-ground with aluminium framed windows and 2400mm ceiling height.

The floor area for the main house is 162.5m2 and garage 41.8m2, a total of **204.3m2.**

HIA has completed four ratings for the single storey; each rating represents the living areas (Family/Dining) facing that orientation and has provided the costings below to achieve a 7 Star rating from the base 6 Stars.

HIA STANDARD HOUSE 3 BED



HIA Single storey Standard House North			
ITEM	AREA M2	ADDITIONAL COST	COST-6 TO 7 STARS
Ceiling 1 R-5.0 Ceiling 2 R-3.0	133.50	$895.00	$895.00
Walls external R-2.5	104.10	$433.00	$433.00
Walls internal R-2.5	14.30	$71.00	$71.00
Glazing	34.00	$7,668.00	$7,668.00
TOTAL			**$9,067.00**

HIA Single storey Standard House South			
ITEM	AREA M2	ADDITIONAL COST	COST-6 TO 7 STARS
Ceiling 1 R-5.0 Ceiling 2 R-3.0 inc. garage	168.50	$902.00	$902.00
Walls external R-2.5	104.10	$433.00	$433.00
Walls internal R-2.5	14.30	$71.00	$71.00
Glazing	34.00	$7,968.00	$7,968.00
TOTAL			**$9,374.00**

HIA Single storey Standard House East			
ITEM	AREA M2	ADDITIONAL COST	COST-6 TO 7 STARS
Ceiling 1 R-6.0 inc garage	168.50	$1,839.00	$1,839.00
Walls external R-2.5	104.10	$433.00	$433.00
Walls internal R-2.5	14.30	$71.00	$71.00
Glazing	34.00	$5,647.00	$5,647.00
TOTAL			**$7,990.00**

HIA Single storey Standard House West			
ITEM	AREA M2	ADDITIONAL COST	COST-6 TO 7 STARS
Ceiling 1 R-5.0 Ceiling 2 R-3.0	168.50	$902.00	$902.00
Walls external R-2.5	104.10	$433.00	$433.00
Walls internal R-2.5	14.30	$71.00	$71.00
Glazing	34.00	$7,650.00	$7,650.00
TOTAL			**$9,056.00**

B.1.2. Double storey HIA Standard House Sydney.

The double storey home shown below is a masonry veneer design, tile roof with a slab-on-ground with aluminium framed windows and 2400mm ceiling height.

The floor area for the main house is 241m2 and garage 41m2, a total of **282m2.**

HIA has completed two ratings for the single storey; each rating represents the living areas (Family/Dining) facing that orientation and has provided the costings below to achieve a 7 Star rating from the base 6 Stars.

HIA Double storey Standard House North			
ITEM	AREA M2	ADDITIONAL COST	COST-6 TO 7 STARS
Ceiling 1 R-7.0	259.00	$2,471.00	$2,471.00
Walls external R-2.5	110.30	$0.00	$0.00
Walls internal R-2.5	53.50	$0.00	$0.00
Glazing	72.00	$9,380.00	$9,380.00
TOTAL			**$11,851.00**

HIA Double storey Standard House West			
ITEM	AREA M2	ADDITIONAL COST	COST-6 TO 7 STARS
Ceiling 1 R-7.0	259.00	$2,470.00	$2,470.00
Walls external R-2.5	110.30	$0.00	$0.00
Walls internal R-2.5	53.50	$0.00	$0.00
Glazing	72.00	$9,873.00	$9,873.00
TOTAL			**$12,343.00**

B.2 Literature Review

In addition to these case studies in undertaking a literature review of a range of recent reports and other studies on the cost impacts of upgrades required for 6 star vs 7 stars the following reports are cited:

- The Trajectory for Low Energy Homes
- The ABCB Commissioned difficult blocks report
- The Built to Perform report by ClimateWorks

B.2.1. Trajectory for Low Energy Homes assessment

Table 9 (Appendix C) of Appendix C of the report included a base building typology on base building designs and modelled the capital cost upgrades for both building fabric and regulated services upgrades.

Region	Climate Zone	Capital Costs – Thermal upgrades ($)	Capital Costs – Appliance Upgrades ($)	Total Capital Costs ($)	Annual Energy Bill Savings ($)
Darwin	1	$1,356	$1,960	$3,316	$700
Brisbane	2	$7,444	$1,960	$9,404	$511
Sydney East	5	$8,168	$1,960	$10,146	$225
Adelaide	5	$5,681	$1,960	$7,641	$237
Perth	5	$5,219	$1,960	$7,179	$310
Melbourne	6	$4,443	-$702	$3,741	$141
Canberra	7	$1,652	-$702	$950	$770
Hobart	7	$4,263	$2,533	$6,796	$349

B.2.2. ABCB Difficult Blocks Report

The ABCB commissioned AECOM to undertake an analysis of difficult blocks in Australia, to examine characteristics and challenges of site constraints in relation to achieving NatHERS 7 Star energy efficiency.

The report broke down the difference between the additional cost to build a 7 star house on a difficult site and a 6 star house on a difficult site based on a 'typical house' design.

The report noted difficult blocks have characteristics such as small areas and challenging proportions, poor solar orientation (relevant to the Climate Zone) and problematic topography.

Regardless of the percentages used, more importantly, the difficult blocks report provided a detailed costs breakdown representing the difference between the additional cost to build a 7 star house and a 6 star house on a difficult site based on the following 'typical house' design.

The costs show that there for some blocks and house designs going to 7 stars will incur substantial additional costs in excess of $16,000 not including that capital costs for the appliance upgrades/regulated energy usage provisions.

Location	NatHERS Climate Zone	Small area and challenging proportions	Small area, challenging proportions, and poor orientation (East)	Small area, challenging proportions, and poor orientation (West)	Problematic topography
Canberra	24	+$1770	+$6160	+$1950	+$1100
Western Sydney	28	+$860	+$7450	+$9250	+$16,110
Newcastle	15	+$860	+$9540	+$11,980	+$7760
Darwin	1	N/A as both Star ratings result in a decrease in cost from the baseline	N/A as both Star ratings result in a decrease in cost from the baseline	N/A as both Star ratings result in a decrease in cost from the baseline	+$17,480
Brisbane	10	+$4120	+$930	+$7890	+$16290
Townsville	5	N/A as both Star ratings result in a decrease in cost from the baseline	N/A as both Star ratings result in a decrease in cost from the baseline	N/A as both Star ratings result in a decrease in cost from the baseline	+$4190
Adelaide	16	+$2770	+$16,780	+$11,970	+$12,690
Hobart	26	-$4160	+$2460	+$2460	+$1090
Melbourne	21	+$3980	+$2760	+$2760	+$780
Ballarat	66	+$7460	+$5520	+$760	+$2060
Perth	13	+$510	+$1140	+$560	+$170
Albany	58	+$10,220	+$6750	+$5420	+$6340

B2.3 Climate Works Built to Perform Report

The CRIS as part of establishing the perceived problem notes the ASBEC/Climate Works Built to Perform report. The report which was advocating for changes to the NCC similar to the proposed Trajectory and NCC 2022 proposals.

The report noted that to include these upgrades there will be additional upfront costs for houses and apartments and the report included some indicative cost modelling on an analysis on the additional upfront costs.

The report cited the following (pg 20) additional upfront cost would be approximately:

- $6,800 for the modelled individual apartment archetype ($89 per square metre),
- $8,000 for the attached housing archetype ($63 per square metre)
- $14,000 for the detached housing archetype ($74 per square metre)

B.3 Builder Feedback

HIA sought feedback on the upgrade costs required from a range of Australia volume home builders and their advice was as follows:

The proposed changes and modelling appear to assume a window area of 22% or less would be acceptable to our customers. We haven't seen any indication this is the case, with owners typically showing preference for a lot of natural light and ventilation.

We expect this will mean significant added cost to upgrade our designs to include double glazing for a significant proportion of windows.

With the proposed changes to BASIX, to meet consumer demand for current design trends we would expect to see an increase to our contract values by circa 3.5%.

As seen across the home building sector over the past twelve months, pressure on our supply chain from both material and labour markets has resulted in home package prices increase anywhere between 15% - 25%. Coupled with rising land prices and delayed registrations, the pressure continues to mount for these first home buyers to achieve home ownership. We anticipate further price rises to the labour market throughout 2022, again applying more pressure to these aspirational home buyers.

Additionally, we have seen lead times for materials double and triple due to shortages which raises more concerns in relation to these proposed changes. Appropriate consideration needs to be made towards the implementation of the proposed new changes, to avoid even further shortages to supply, which in turn blows out our construction timeframes and applies further pressure on pricing.

Direct consultation with building material manufacturers and suppliers is needed to ensure the changes can be implemented within the timeframe without creating material supply problems.

Lastly, the cost of change for a business to implement these new proposals needs to be considered. We have dozens of individual designs that include master architectural plans, master bill of quantities and marketing collateral (both printed and digital) that require additional resources outside standard operations to make these changes.

Three separate project builders provided their costings for the upgrades required to achieve 7-stars, for a selection of the most popular standard home designs currently being delivered to the Sydney market. Four single storey and six double storey designs were modelled, and the cost increases found were:

- $6935 to $11145 for a single storey home
- $11290 to $17722 for a double storey home

This advice further supports the Productivity Commissions 2005 report analysis that the realised costs are likely to be much higher than modelled costs.

This feedback further supports the outcome of the case studies presented in this submission and in turn the literature review in that the costs indicated in the cost-benefit report for the BASIX higher standards are significantly undervaluing the true cost of implementing the higher energy efficient design requirements and that these need to be reviewed.