MASTER BUILDERS
AUSTRALIA

7 November 2021

Mr Neil Savery
Chief Executive Officer
Australian Building Codes Board
224 Bunda St
Canberra ACT 2600

Dear Ms Savery

Re: National Construction Code 2022 Consultation Regulation Impact Statement (CRIS) for a proposal to increase residential building energy efficiency requirements

Housing construction sector stakeholders have consistently argued the costs in increasing energy stringency requirements for housing will be significant. Master Builders therefore supports the findings of the Consultation Regulation Impact Statement (CRIS) that determine proposed changes will have a negative cost to society.

Master Builders also considers these findings provide a conservative response that have understated the costs of proposed reforms. The reasons for this are explained further in the letter and relate to the following:

1. Inadequate analysis of the rebound effect
2. Absence of analysis on moisture risk
3. Disparities in building cost estimates
4. NatHERS thermal bridging software deficiencies
5. Regulator and compliance system risk

Master Builders whilst supporting the objective of net zero ready buildings also acknowledges that risks involved with a regulatory shift need to be clearly established and quantified for reforms to be effective. The CRIS plays an important part in establishing this risk.

The CRIS quite rightly has focussed its evaluation on construction methods proposed in the Code but could have evaluated a broader scope.

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The model evaluated is a 7-star NatHERS thermal rating, 4.5 star GEMS rating for heating and cooling appliances, instantaneous gas water heater and 4 watts per m^2 of lighting. The CRIS quantifies a net cost to society as being more than $2 billion from this compliance pathway.

The CRIS noted that to breakeven would require a significant increase in wholesale energy costs (3 times) and reduction in capital costs (70-80%).

It also stated that the difference between the reduction in retail and wholesale energy costs and avoided network investment in reality will be transferred to others in the community.

These findings alone should send a signal to government that more work needs to be done before introducing further energy efficiency stringency increases into the National Construction Code (NCC).

To add to this point, the report endorsed by COAG Energy Ministers, the *COAG Energy Council Trajectory for Low Energy Buildings* identified that if improvements were not found to be cost effective, they should be reconsidered.

Limitations in the CRIS

As previously raised, there are five areas that Master Builders considers are not effectively evaluated in the CRIS. These areas are discussed in more detail under their respective headings.

1. Inadequate analysis of the rebound effect

When households reduce the amount of energy used in running their home, less money is spent on energy bills. The financial savings which result from this can be used in a variety of ways, many of which could produce higher carbon emissions. For example, a household may decide to use the proceeds of lower home energy bills to fund other carbon-intensive activities, like a holiday involving long-haul flights. This is one example of what is called the rebound effect. The rebound effect occurs when lower energy usage in one area results in higher energy demand elsewhere. In the CRIS, a 10 per cent rebound effect is assumed to apply. However, several pieces of research quoted in the CRIS suggest that the rebound effect could actually be as high as 30 per cent. Had a higher rebound effect been factored into the CRIS, the BCR would have ended up being even lower.

2. Absence of analysis on moisture risk

The accumulation of moisture in buildings contributes to mould, health and structural problems associated with tighter building sealing and inadequate ventilation. Master Builders is concerned that the cost of these issues is not effectively evaluated in the CRIS. The CRIS acknowledges the problem but notes it's the subject of further work being done by the Australian Building Codes Board (ABCB).

In its submission to the ABCB's *Energy efficiency: NCC 2022 and beyond scoping study* several years ago, Master Builders raised the need for the integration of condensation, thermal and appliance energy reforms in the one RIS process to get a more complete picture of cost impacts.

We are starting to see more defect problems emerge with 6-star homes built over the last decade. This is making people question the value in further energy stringency increases for residential buildings and undermine confidence in the current reform process.

Feedback from Master Builders members is that $30,000 is a very modest estimate of structural rectification to a "typical" 180m² small house. How widespread structural problems are is unclear, only time will tell, as it can take 5 to 7 years for structural matters to materialise, so a wave of 6 star failures may still be hidden. Known broad-scale historical failures in a jurisdictions like New Zealand, has cost in the order of $45 billion. 20 times the upper "cost benefit" figures provided in the CRIS.

If this cost impact was applied to 10 per cent of new housing stock, it would add an extra $335 million a year to the cost of building energy efficient homes. This assumes that an average of 111,700 new detached houses are built per year (a volume equivalent to the average in the 10 years up to 2020).

3. Disparities in building cost estimates

The CRIS identifies that the net impact on individual dwellings from the cost of compliance is greater than the lifetime energy savings.

Cost for individual dwellings have been evaluated that show a substantial variation between jurisdictions and climate zones for Class 1 and Class 2 residential buildings. In gross/net terms the cost is $5,000/$2,000 per dwelling.

Concerns have been raised by building industry experts, specialising in energy efficient housing construction, that the cost of construction has been undervalued in the CRIS.

Construction business, Living Building Solutions (LBS), provides examples of what this looks like for a typical Class 1, brick veneer home that represents the majority of building stock in South Australian Climate Zones 5 and 6. LBS has specified current standard construction techniques to convey the impact of changes compared with the status quo for four case studies. More detail from LDS is attached for reference.

The CRIS identifies additional dwelling construction costs in these zones as being $1,250 and $1,969 whereas cost increases identified in the LDS case studies range between $5,000 and $18,000 depending on the compliance pathway chosen and use of timber or steel. LBS also notes that on average, changes will result in cost increases of between $50-160 m².

4. NatHERS thermal bridging software deficiences

Master Builders is concerned that modelling does not effectively account for thermal bridging costs that we understand are not in NatHERS software and therefore not used in CRIS modelling. If this is the case, the BCR is likely to be lower.

5. Regulator and compliance system risk

Costs incurred by governments to administer and communicate policy changes have been considered in the RIS whilst the cost of regulatory compliance system failures is not factored in CRIS evaluation of the proposed NCC provisions.

The COAG Energy Council Trajectory for Low Energy Buildings report acknowledges that the Shergold Weir *Building Confidence* report found that jurisdictions and industry bodies have been facing growing challenges in ensuring effective compliance with and enforcement of the NCC. In particular, the report noted these challenges were attributed to a lack of training, mandatory accreditation and auditing/compliance checking by regulators and that the NCC itself was also considered to be excessive in its complexity.

Building Ministers have commissioned work on the cost-benefit of implementing *Building Confidence* report reforms that are designed to improve compliance and enforcement of the NCC. This report in early consultation with industry stakeholders estimated defect costs annually are in the billions.

Whilst Building Ministers delay progress in implementing Shergold/Weir *Building Confidence* report reforms, the introduction of new reforms continue to be compromised and contribute to defect challenges facing the building and construction sector. The risk of compliance system failures should therefore be factored into NCC policy reform cost-benefit modelling until regulatory system improvements are delivered.

Thank you for the opportunity to comment on the CRIS and Master Builders would be happy to meet with you should you need to discuss anything further.

Yours sincerely

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Chief Executive Officer

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MEMORANDUM

To:	Master Builders SA	**Date:**	08 October 2021
Attention:	Andrew Cronin	**LBS No.:**	-
From:	Joshua Mollison	**Client No.:**	-
Project:	-	**Revision:**	A
Subject:	NCC 2022 Residential Energy Efficiency requirements		

1.0 Introduction

This Memorandum has been developed to provide feedback to the Master Builders South Australia on the proposed changes to Part H6 outlined in the NCC 2022 Volume 2 Draft Public Comment.

In order to gauge an understanding of the impact of the proposed changes, LBS has assessed typical project homes that represent the majority of new housing stock in South Australia against prescriptive compliance methods under Part H6. The typical project homes key characteristic are outlined below, and the assessment methods used are highlighted in Black & Bold in the Figure 1 NCC Hierarchy.

Project Home Characteristics:

- 3 Bedroom + 2 Bathroom (115m^2-130m^2)
- CSOG
- Brick Veneer
- Timber & Steel Frame
- Climate Zone 5 & 6

Figure 1 - NCC Hierarchy

2.0 Summary of changes

Outlined below is synopsis of the proposed changes:

- Quantification of Performance Requirements
  - Building Fabric (Specification 44)
  - Services (Energy Usage) – Benchmark ≤ 70% Class 1 | 100% Class 2
- A general alignment with Deemed-to-Satisfy Provisions (DtS) H6D2 (7 Stars).
- 6 Stars -> 7 Stars
  - Updated climate data + heating & cooling caps
- Updated DtS Provisions
- Updated Verification Method – Verification using a reference building
- New glazing calculator for Class 1 | 2
- New Verification Method – Class 2
- Incentive for completion of Air Permeability Testing

Figure 1 outlines the NCC Compliance Hierarchy for Energy Efficiency, within this hierarchy are the Performance Requirements. The Performance Requirements are the legally binding section of the NCC. LBS raises concern over aligning the entire Energy Efficiency Requirements with the non-legally binding DtS Provision H6D2 (7 Stars). It would make more sense to develop the Performance Requirements and then align DtS Provisions with the Performance Requirements.

3.0 Findings

LBS has assessed typical project homes that represent the majority of new housing stock in South Australia against prescriptive compliance methods under H6. LBS has not considered DtS Elemental Provisions as a viable compliance method under NCC 2022 and therefore this assessment method has been excluded from the data.

When assessing for compliance LBS has specified current standard construction techniques to convey the impact on current status quo (E.g. no thermal bridging mitigation or slab insulation).

Table 1-4 outline the building specification requirements for two compliance pathways under NCC 2019 and the least cost compliance pathway for a steel & timber frame construction under NCC 2022.

On average the proposed changes result in a cost increase of $50-160/m^2 when compared to compliance with NCC 2019. In Case 4 compliance with standard construction techniques could not be achieved and LBS had to specify under slab insulation.

A change in construction techniques could reduce the increase in glazing specification requirements. These construction techniques could include but are not limited to:

- Thermal bridging strategies for steel frame construction
    - Not a wide variety of products available that currently meet both meet the R-value requirements and fit in typical construction assemblies (e.g. wall cavity)
- Slab insulation

Table 1 – Case 1 | Climate Zone 5 | Front Door South

Component	NCC2019 - Star	NCC2019 - VURB	NCC2022- Steel - VURB	NCC2022- Timber - VURB
Infiltration:	-	-	-	-
Roof ins:	-	-	-	**Reflective**
Roof sa:	Any	Any	**≤0.64**	**≤0.64**
Ceiling ins:	R5.0	R5.0	**R5.0**	**R5.0**
Wall ins:	R2.5	R2.5	**R2.5**	**R2.5**
Wall sa:	Any	Any	**≤0.7**	**≤0.7**
Floor:	-	-	-	-
Glazing U-Value:	6.70 (5.00 Kit/Liv 21.48)	6.70 (5.00 Kit/Liv 21.48)	**3.50**	**5.00**
Glazing SHGC:	0.70 (0.60 Kit/Liv 21.48)	0.70 (0.60 Kit/Liv 21.48)	**0.46**	**0.45**
Build sealing:	-	-	-	-
Ceiling fans:	-	-	-	-
Cost	-	-	**$ 8,700**	**$ 5,600**
	-	-	-	-
Upgrades	*Single glazing Comfort Plus to Kit/Liv 21.48*	*Single glazing Comfort Plus to Kit/Liv 21.48*	*Double glazing Comfort Plus to all glazing*	*Single glazing Comfort Plus Ntrl to all glazing*

Table 2 – Case 2 | Climate Zone 5 | Front Door North

Component	NCC2019 - Star	NCC2019 - VURB	NCC2022- Steel - VURB	NCC2022- Timber - VURB
Infiltration:	-	-	-	-
Roof ins:	R1.3 blanket	-	***R1.3 blanket***	***Reflective***
Roof sa:	Any	Any	***≤0.64***	***≤0.64***
Ceiling ins:	R5.0	R6.0	***R6.0***	***R5.0***
Wall ins:	R2.5	R2.5	***R2.5***	***R2.5***
Wall sa:	Any	Any	***≤0.7***	***≤0.7***
Floor:	-	-	-	-
Glazing U-Value:	6.70 (5.00 Kit/Liv 21.48)	6.70 (5.00 Kit/Liv 21.48)	***3.50***	***5.00***
Glazing SHGC:	0.70 (0.60 Kit/Liv 21.48)	0.70 (0.60 Kit/Liv 21.48)	***0.46***	***0.45***
Build sealing:	-	-	-	-
Ceiling fans:	-	-	-	-
Cost	-	-	***$ 9,900***	***$ 5,700***
	-	-	-	-
Upgrades	*Single Glazing Comfort Plus to Kit/Liv 21.48*	*Single Glazing Comfort Plus to Kit/Liv 21.48*	*Double glazing Comfort Plus to all glazing*	*Single glazing Comfort Plus Ntrl to all glazing*

Table 3 – Case 3 | Climate Zone 6 | Front Door South

Component	NCC2019 - Star	NCC2019 - VURB	NCC2022- Steel - VURB	NCC2022- Timber - VURB
Infiltration:	-	-	-	-
Roof ins:	R1.3 blanket	-	**R1.3 blanket**	-
Roof sa:	Any	Any	**Any**	**Any**
Ceiling ins:	R5.0	R6.0	**R6.0**	**R6.0**
Wall ins:	R2.5	R2.5 + R2.0 Int	**R2.5 + R2.0 Int**	**R2.5**
Wall sa:	Any	Any	**Any**	**Any**
Floor:	-	-	-	-
Glazing U-Value:	6.70 (4.20 Kit/Liv)	4.20	**2.60**	**3.10**
Glazing SHGC:	0.70 (0.60 Kit/Liv)	0.60	**0.55**	**0.56**
Build sealing:	-	-	-	-
Ceiling fans:	-	-	-	-
Cost	-	-	**$ 14,700**	**$ 10,200**
	-	-	-	-
Upgrades	*Double glazing to Kit/Liv 21.48*	*Double glazing to all glazing*	*Double glazing Thermally broken to all glazing*	*Double glazing Comfort Plus to all glazing*

Table 4 – Case 4 | Climate Zone 6 | Front Door North

Component	NCC2019 - Star	NCC2019 - VURB	NCC2022- Steel - VURB	NCC2022- Timber - VURB
Infiltration:	-	-	**-**	**-**
Roof ins:	R1.3 blanket	-	**R1.3 blanket**	**-**
Roof sa:	Any	Any	**Any**	**Any**
Ceiling ins:	R5.0	R5.0	**R6.0**	**R5.0**
Wall ins:	R2.5 + R2.0 Int	R2.5	**R2.5 + R2.0 Int**	**R2.5**
Wall sa:	Any	Any	**Any**	**Any**
Floor:	-	-	**R1.0**	**-**
Glazing U-Value:	6.70 (3.10 Kit/Liv)	1.90	**6.70 (3.10 Kit/Liv)**	**1.90**
Glazing SHGC:	0.70 (0.56 Kit/Liv)	0.52	**0.70 (0.56 Kit/Liv)**	**0.52**
Build sealing:	-	-	**-**	**-**
Ceiling fans:	-	-	**-**	**-**
Cost	-	-	**$ 9,800**	**$ 18,600**
	-	-	-	-
Upgrades	*Double glazing Comfort Plus to Kitchen/Meals/Living*	*Double glazing Thermally Broken Comfort Plus to all glazing*	*Double glazing Comfort Plus to Kitchen + Slab insulation*	*Double glazing Comfort Plus Thermally broken to all glazing*

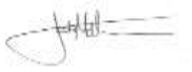
4.0 Summary

Whilst LBS supports an increase in energy efficiency requirements and expects an increase in construction cost to coincide with this, we question the viability and structure of the proposed changes. The format and complexity of the proposed changes will present challenges to the industry. LBS has received feedback from both architects and building certifiers/surveyors expressing their concern about the complexity of the proposed changes. Certifiers / surveyors have particularly raised concern over their confidence / ability to sign off on DtS elemental provisions reports and Performance-based Reports (due to complexity).

Additional Comments:

- Regulatory Impact Statement does not convey a positive cost benefit for the public or individual homes
- Only steel framing penalised for thermal bridging. Timber frame and other construction techniques result in thermal bridging, why has only steel frame been penalised?
- DtS Elemental Provisions overcomplicated and rigid
    - Goes against the intent of DtS – an assessment method that can be used and interpreted by multiple stakeholders (architects, planners, certifiers)
- Mandating Wafflepod in cold climates when using DtS Elemental Provisions? Why mandate a product in lieu of an R-value? In addition, Wafflepod cannot be used in majority of South Australia's climate zone 6 regions due to soil conditions.
- Aligning the entire Energy Efficiency Requirements with a non-legally binding DtS Provision H6D2 (7 Stars)
- Can the housing sector currently absorb another cost increase in construction costs?

Regards,



Joshua Mollison
Director