

# **SUBMISSION – NATIONAL CONSTRUCTION CODE (NCC) 2022 PUBLIC COMMENT DRAFT**



**Australian Institute of Architects**

Submission issued October 2021



**Australian  
Institute of  
Architects**

## ABOUT THE INSTITUTE

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The Australian Institute of Architects (Institute) is the peak body for the architectural profession in Australia. It is an independent, national member organisation with around 12,000 members across Australia and overseas.

The Institute exists to advance the interests of members, their professional standards and contemporary practice, and expand and advocate the value of architects and architecture to the sustainable growth of our communities, economy and culture. The Institute actively works to maintain and improve the quality of our built environment by promoting better, responsible and environmental design.

## PURPOSE

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- This submission is made by the Australian Institute of Architects (the Institute) to the Australian Building Codes Board in response to the National Construction Code (NCC) 2022 Public Comment Draft.
- At the time of this submission the National President is Tony Giannone FRAIA.
- The Chief Executive Officer is Julia Cambage.

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# 1 INTRODUCTION

The Australian Institute of Architects (the Institute) is the peak body for the architectural profession in Australia, representing around 12,000 members. The Institute works to improve our built environment by promoting quality, responsible, sustainable design. Architecture influences all aspects of the built environment and brings together the arts, environmental awareness, sciences and technology.

By combining creative design with technical knowledge, architects create the physical environment in which people live, which in turn, influences quality of life. Through its members, the Institute plays a major role in shaping Australia's future.

Architects are a key component of Australia's \$178 billion building construction sector<sup>1</sup> and there are around 13,000 architectural businesses in Australia with more than 43,000 employees. Approximately 25,000 people in the labour force hold architectural qualifications (Bachelor degree or higher) and architectural services in Australia in 2021 had revenue of \$7 billion.<sup>2</sup>

Australian architects have a worldwide reputation for creative and innovative design leadership and Australia is known for producing contemporary and breakthrough architecture. We have a well-recognised, high quality and liveable built environment. To maintain this into the future and support our burgeoning population in both urban and regional centres, we must create buildings and public spaces that are environmentally, economically and socially sustainable and culturally rich.

The Institute is committed to a net zero carbon building and construction industry by 2030, and to achieve this, we support the NCC:

- being a zero carbon ready building code as part of a transition to net zero carbon new buildings by 2030
- delivering a step change in the energy requirements in the 2022 Code, with a strong focus on residential, and a further increase in non-residential requirements
- expanding the scope of the Code and progressing complementary measures, to prepare for future sustainability challenges and opportunities, including health, peak demand, maintainability, electric vehicles and embodied carbon

## 2. THE FUNDAMENTALS

### 2.1 Climate Action Urgency

The changes proposed in the energy efficiency provisions do not appear to focus on the big issues of climate change and are far from aspirational. The benefits of moving towards more efficient homes has been missed and there are few statements about health, climate, and energy benefits. The focus appears to be on capital costs rather than the environmental and societal costs that are associated with global warming. The NCC changes should strongly aspire to improving and aligning with, a low emissions future and towards achieving carbon neutrality.

The Institute advocates a zero-carbon construction industry by 2030. The built environment accounts for 39% of all carbon emissions, globally, with operational emissions accounting for 28%. The Institute recognises that its members are positioned as major contributors to the problem of climate change - and therefore a potential major contributor to its solution.

Members are actively committing to Carbon Neutral practices<sup>3</sup> and the Institute has also completed its own “Carbon Neutral” journey. The Institute has called on the Australian Government to establish a national plan towards zero carbon buildings by 2030 that can be supported and led where appropriate by state and local government. Ideally, this can be delivered through regulation through the NCC.

The International Panel on Climate Change (IPCC) has released its AR6 report which has been couched as a “code red for humanity”. It states more clearly than ever, the need for an immediate and holistic response to reduce carbon emissions and that 2050 is too late.

Members also believe that the NCC needs to include measures for adaptation to address the climate emergency. Future scenarios need to be modelled and the provision of the NCC have capacity to be adapted and escalated as needed to address climate change. The processes for change need to become more responsive and agile to changing objectives and priorities.

## 2.2 Modelling

The focus on affordability or cost effectiveness in developing up the provisions of the NCC comes from a position of present-focussed and short term financial modelling. The Institute does not believe that we can afford the cost of the inaction today.

An alternative financial modelling method needs to be used, based on much longer range actuarial projections when it comes to climate change and its environmental impacts, as the timeline for the impacts bring costs which do not figure in today’s measurements.

Climate impacts on the environment are due to “whole of life carbon” effects, over a long timeframe. Costing should be approached similarly to whole of life economic impact. That is the cost of action or inaction today, should be set against the cost of the additional costs of energy and embodied carbon for the whole of life of the building.

We believe that the underlying cost assumptions in key areas are flawed. For instance, the full costs of gas (including connection fees, standing charges and broader environmental remediation costs) are not accounted for. The cost and efficiency assumptions for PV cells are outdated and the use of time dependent energy factors preferences fossil fuels over renewables and is not realistic or desirable. Fuel cost escalation has not been considered and the assumptions lead to gas being preferred.

Continued reliance on fossil fuels is out of date and will not meet national climate targets. Assumptions need to be reviewed, data updated and recommendations revised to forecast trends as current trends are quickly made redundant.

The Economic modelling does not adequately consider future scenarios or avoided costs. As well, the broader health impacts from increased climate change, and the cost of carbon sequestration to offset continued reliance gas and on fossil fuels are not considered. Economic modelling needs to include these costs of the future to demonstrate the value of renewable investment now.

The Institute will address this more fully in our response to the consultation regulatory impact statement.

## 2.3 Net Zero vs NatHERS ratings

The NCC proposes an increase from mandating 6\* to 7\* NatHERS energy efficiency. This is miniscule.

The ability exists now to deliver net zero emissions homes by making them energy efficient, by orienting roofs for solar access and providing photovoltaics to meet power needs. This can be done cost effectively for owners, because the additional 2% on construction costs feeding through to mortgages will be easily paid by homeowners in savings on energy costs.

Demonstrating compliance with net zero emissions eliminates the need for a reference building – the reference is simply zero emissions.

If the ABCB does not propose to mandate net zero new buildings, the minimum the change should be to a 7\* NatHERS rating as envisaged by the Council of Australian Governments (COAG) Energy Council's Trajectory for Low Energy Buildings.

Australia is overdue for better building standards. It is over a decade since the current 6-star minimum NatHERS rating was introduced. Since that time, Australia's performance has only fallen further behind comparable countries, where the energy efficiency of new buildings is typically up to 40% better than Australia.

Research by ClimateWorks Australia and ASBEC finds that delaying cost-effective improvements to energy efficiency requirements in the Code would cost \$2 billion in wasted household energy bills to 2030, while locking in 9 million tonnes of carbon emissions.

## 2.4 Electrification VS Gas

A critical element in decarbonising is the removal from the CO<sub>2</sub> producing fuels from energy/power generation. The 2022 provisions retain gas in the mix. The IPCC report makes it very clear that we cannot avoid catastrophic impacts from climate change with petrochemicals still in the mix. They need to be phased out now. This will not be easy but avoiding the issue due to the important part gas plays in our current economy will have even more expensive repercussions in years to come.

The need for gas is recognised for certain high temperature processes which are not generally related to buildings. Where these are required, the goal should be rapid transition to hydrogen gas (created from renewable electricity sources). In the NCC, electrification should be mandatory.

The NCC must mandate all electric powered buildings as this will enable and further speed development towards achieving net zero emissions. The proposed NCC 2022 must remove references to the use of instantaneous gas water heaters and move towards solar heat pump or electric hot water systems.

## 2.5 Original option 1 for regulated energy use

The original option 1 set out in both the 2019 scoping study and the 2019 outcomes report<sup>4</sup> should be re-instated for consideration. The original Option 1 incorporated on-site renewable energy (generation and storage) to the extent that the energy use of all regulated elements would be offset. Effectively, this would produce buildings that have net zero regulated energy.

The option aligns with the most important priority from 2020 –2030, which is to rapidly reduce carbon emissions. Setting zero carbon is also equitable, in that larger dwellings will need to invest in more ‘compensatory’ efficiency and renewable measures than smaller dwellings. It also must be noted that the decarbonisation of the grid by 2030 will also have an impact. It is likely the emphasis will shift back to energy efficiency because unless the dwelling is carbon neutral on-site, it will be competing for renewable energy for which there will be a greater demand and for offsets in sequestration.

As mentioned in the previous section, the current options that allow for fixed appliances utilising gas should not be under consideration.

### **3. BUILDING ELEMENTS AND OTHER ISSUES**

The Institute supports a national approach to building regulation. We also recognise that different climates will require different arrangements to achieve energy efficiency and resilience at a reasonable cost. The Institute supports the concept that each jurisdiction should be able to adjust their requirements to suit their climate and available building technologies.

#### **3.1 Reference buildings**

It is noted that reference buildings in the NCC is derived from detached dwellings and do not reflect typologies actually being constructed in many cities, particularly Sydney and Melbourne, where most new dwellings are apartments.

As noted above, if net zero emissions is adopted, there will be no need for a reference building.

#### **3.2 Ventilation, air movement and ceiling fans**

Greater clarification is needed in the use of and definition of sash and ventilation requirements.

The NCC provisions need a greater emphasis on cross ventilation and appropriately placed windows that would facilitate cross ventilation. We recommend changes to the wording by replacing the reference to ceiling fans’ to ‘permanently fixed fans’ to allow fans to also be affixed to the walls or floor standing types in appropriate climate zones.

We also recommend that additional climate zones be considered for the inclusion of fans, as discussed in section 4.1 of this submission.

#### **3.3 Thermal Bridging**

Comments in the Summary of Changes on thermal bridging seem limited to wall framing. However, it is more than this in terms of building components and should be extended to but not limited to, addressing roof framing, slabs on ground in cold climates, cantilevered external slabs connected to indoor slabs, doors and window junctions and both exposed and clad framing.

#### **3.4 Distributed energy resources (DER)**

Enabling buildings to be retrofitted with DER (PV panels, battery storage systems and electric vehicles) to Class 2, and 5 to 9 buildings is short sighted and the installation of DER should be immediate and made mandatory. This section currently promotes a ‘business as usual’ approach with minimal need to change actions.

### 3.5 Building fabric

With regard to housing provisions (DTS elemental provisions) – Part 13.2 Building fabric – We do not support the reduction of options for proposed insulation requirements as stated in the look-up tables. If a DTS pathway for building fabrics is chosen, then it is beneficial if there are more options in the look-up tables as they are simple to use and follow.

### 3.6 External walls

The proposed wall insulation requirements that focus on providing solutions based on the thermal mass of the wall, requires more explanation. It is unclear as to what is being stated. There is a reference to ‘*dominant*’ construction type when it should be referring to the ‘*most appropriate*’ construction type for the climate zone. At the very least, the explanation should be advising that the dominant construction type does not mean it is the most appropriate for the zone. Why are lightweight framed walls provided only for Climate zones 1 and 3?

### 3.7 Floors and subfloor walls

The term ‘waffle pod slab’ should be replaced with ‘insulated slab’ as there are other forms of slabs than waffle pods. The dominant waffle pod slab does not mean it is the most appropriate for the zone. We do not support waffle pod slabs as a DTS solution. Waffle pod slabs have a chequered history. They are difficult to modify and restrain the possible modification to the gardens and landscaping outside of the house.

The option of reflective foil installed under floors is not a practical option, as the orientation of the insulation will be ineffective in reflecting radiant heat. Other alternatives to consider include bulk insulation floor products or airtight membranes.

Reflective foil insulation should not be allowed. The issue to be addressed is the containment of warm moist air and resulting condensation. Building standards do need to change to ensure that tighter building envelopes needed for energy efficiency are designed so that moisture can escape.

### 3.8 Summary of Changes to Volume One by NCC Reference

- J1P4 – We recommend that it be made mandatory to install PV and EV charging equipment and energy storage equipment, as part of the performance requirement.
- J1V5 – The buildings rating should be the minimum energy star rating rather than identifying a lower limit. We would also recommend that the minimum 6-star NatHERS rating should be at least 7-star.
- We would recommend that every SOU should meet the minimum requirement of the required energy rating rather than averaging across SOU’s.
- Part J3 – We would support timber framed construction be included in the solutions for floors in Class 2 buildings.
- J4D7 – We would suggest that the building performance should be the measure rather than cost. Cost should not be the determinant factor for energy efficiency policies. Cost is not a determinant in other parts of building legislation such as safety, health and amenity or fire construction requirements.
- Part J9 – Item 1 – We would recommend that sub-metering of SOU’s should be mandatory.



- We believe that fire safety provisions for car parks where EV's are parked are sufficient, as the risk has been determined no greater than the risk that currently exists.

## **4. SET THE NCC UP FOR SUCCESS**

The following are issues that the institute believes need to be considered to ensure the changes to the NCC are successful.

### **4.1 Climate zones**

The NCC climate zones need further development as they do not reflect changing climate complexities.

In order to adequately consider human health and well-being, given the impacts of urban heat and heat stress, particularly to vulnerable communities, the NCC needs to consider more stringent provisions for thermal comfort and passive resilience in areas more impacted by climate change. This can only be done in line with a review and increase in the number of climate zones.

The proposed DTS climate zones lack sufficient nuance (for example areas of Western Sydney are in the same climate zone as areas of Melbourne). Inaccurate climate zones will lead to an inadequate climate response. Proposed climate zones need to be reviewed and updated to reflect the trend rather than the average change in climate. The zone types likewise need to be increased in number to demonstrate the difference between a static climatic zone, and a quickly evolving one.

The alternative pathway to compliance for different climate zones has not been sufficiently tested and does not appear workable. Compliance may not be achievable for applications that seek to utilise an alternate pathway. Additional testing should be undertaken on alternate pathways to ensure compliance is achievable prior to release.

### **4.2 Equity of resources**

Buildings need to be assessed in an equitable manner. To this end, the NCC should embed occupancy rates/usage to ensure the building size is appropriate for use and there is an equitable distribution of the carbon budget per person rather than per sqm. If the NCC is intending to align with intentional and national protocols, equitable allocation of a carbon budget is needed.

### **4.3 Ratings assessment and oversight**

There is a recognised problem with rigour in and resourcing of energy assessments and follow-up construction oversight.

In 2014, Swinburne University and sustainability consultants Pitt & Sherry confirmed that the value of Australia's home energy efficiency rating system NatHERS is, for the most, seriously eroded by lax and optimistic software data entry, and by material substitutions and poor construction detailing on site. These practices reduce the thermal performance of homes as built, commonly by 1.0 to 1.5 stars below their certified rating. In suburban Melbourne for example, that flaw would raise energy consumption in space heating and cooling per unit floor area by 67%.

To secure the value of a genuine step increase in star rating as proposed for NCC 2022, there needs to be a registration system for energy assessors that enables them to provide independent services.

This service must then also follow through to rigorous checks and sign-off on site by the same energy assessor (not the building surveyor) to ensure that the thermal performance designed and certified for a building has been carried through to the final constructed outcome. This sign-off would go to the building surveyor as a required compliance certificate, the same as plumbing and electrical compliance certificates do.

#### **4.4 Resilience**

The NCC needs to address passive resilience in order to assist in safeguarding human health and well-being associated with heat stress. Note: building fabric performance alone will not be sufficient. Resilience to extreme heat will rely on affordable air conditioning and potentially standalone autonomous running from PV and battery /fuel-cell storage in extreme heatwaves.

#### **4.5 Workforce development**

In practical terms the achievement of better energy efficiency standards is dependent on a workforce that can deliver those outcomes. The 2021 National Standard of Competency for Architects has strengthened the competency standard for Sustainability. The Institute has just recommended to the Australian Building Codes Board in its consultation on Continuing Professional Development on the National Construction Code (NCC) that CPD sustainability should both be mandatory in the Australian construction sector.

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<sup>1</sup> Combined housing, multi-unit apartments and townhouses, commercial and industrial and institutional building construction as noted in [Construction in Australia](https://www.ibisworld.com/au/construction-sector/) sourced from: <https://www.ibisworld.com/au/construction-sector/>

<sup>2</sup> [Architectural Services in Australia - Market Research Report updated 2 August 2021](https://www.ibisworld.com/au/industry/architectural-services/550/) sourced from <https://www.ibisworld.com/au/industry/architectural-services/550/>

<sup>3</sup> <https://www.architecture.com.au/about/carbonneutral>

<sup>4</sup> Scoping Study: Energy Efficiency NCC 2022 and Beyond, Australian Building Codes Board, July 2019 p. 11; Outcomes report Energy Efficiency NCC 2022 and Beyond, Australian Building Codes Board, December 2019 p. 3.