



**CONSERVATION
COUNCIL** ACT REGION

Submission to the Australian Building Codes Board: National Construction Code Regulatory Impact Statement

November 2021

The Conservation Council ACT Region is the peak non-government environment organisation for the Canberra region. Since 1981, we have spoken up for a healthy environment and a sustainable future for our region. We harness the collective energy, expertise and experience of our more than 40 member groups to promote sound policy and action on the environment.

We campaign for a safe climate, to protect biodiversity in our urban and natural areas, to protect and enhance our waterways, reduce waste, and promote sustainable transport and planning for our city. Working in the ACT and region to influence governments and build widespread support within the community and business, we put forward evidence-based solutions and innovative ideas for how we can live sustainably.

At a time when we need to reimagine a better future, the changes we need will only happen with the collective support of our community.

For further information please contact:

Helen Oakey, Executive Director, director@conservationcouncil.org.au.

Greater ambition is needed in the NCC

The climate emergency demands urgent action

Climate change is the most significant threat to the survival of all life on earth, and requires immediate and significant global action. The impacts of a changing climate are well upon us; increasingly severe fires, storms and droughts are forcing societies and natural ecosystems to transform the way they function. Responding to climate change requires both adaptation (actions to adjust to changes that have happened and are predicted) and mitigation (actions to avoid and minimise further emissions).

According to the IPCC's global carbon budget for a 50% chance to remain below 1.5°C of global warming (460 GtCO₂ from January 2021), the world has merely 11 years left at 2020's rate of emissions before we have used it all up.¹ Eleven years. To have a 50:50 chance of success. No government would approve a building project with a 50% chance of collapse, so we must take emissions reduction just as seriously and strengthen every tool at our disposal to urgently reduce emissions now and into the future. As one of the world's wealthiest and highest-emitting countries (per capita) and the largest exporter of coal, Australia has a clear moral obligation to take strong action to reduce emissions.

Federal climate policy is inadequate

The federal government's "Australian way" plan for net-zero emissions by 2050² is evidence that the government is hell-bent on mining, burning and exporting every molecule of fossil fuels it possibly can for as long as anyone will buy it, in open defiance of global expectations. The UN Special Advisor on Climate Change Selwin Hart called the plan "reckless and irresponsible".³ The Smart Energy Council called it "a scam".⁴

All Australian states and territories have now set targets of net-zero emissions by 2050 or sooner, but this is also insufficient—we must do more sooner, regardless of how politically uncomfortable this might appear.

Australia's buildings are wasteful

Buildings are long-lived structures, with lifespans of 50 years or more, and are responsible for both direct greenhouse gas emissions during operation and embodied scope 3 emissions during construction. Nationally, the construction sector is responsible for 18% of total carbon footprint,

¹ Hausfather Z, 2021, [Analysis: What the new IPCC report says about when world may pass 1.5C and 2C](#), Carbon Brief

² Taylor A, 2021, [Australia's plan to reach our net zero target by 2050](#), media release, Minister for Industry, Energy and Emissions Reduction, 26 October

³ ABC News ACT [Thursday 26 October 2021](#)

⁴ Smart Energy Council, 2021, [Election campaign](#)

of which 78% is scope 3 emissions.⁵ In the ACT, the building sector is responsible for 22% of direct emissions through consumption of fossil gas for heating, hot water and cooking.⁶ Additionally, the construction sector is responsible for the largest proportion of the ACT's waste going to landfill,⁷ representing wasteful construction practices, use of non-recyclable materials such as toxic timber treatments, and demolition and disposal rather than purposeful salvage, recovery and reuse of materials.

Although the trend in average floor area for new homes appears to have reversed since the peak of 247m² in 2009, Australia is still building on average some of the world's largest houses, more than double the size of France and England, and still greater than 200m² in the leading states of Victoria, ACT, Western Australia and Queensland.⁸ Although construction costs in Australian cities are generally lower per square metre than comparable European and north American cities,⁹ because of their average size, our houses can easily cost over \$200,000 to build¹⁰ and are amongst the most expensive in the world to buy at over \$8000 per square metre (average),¹¹ and still rising faster than incomes.¹²

Globally, housing comprises a quarter of humanity's ecological footprint, and total human enterprise demands 1.56 times more resources annually than the amount that Earth can regenerate.¹³ Australia ranks 14th in the world for ecological footprint per person at over 7 hectares per person compared to 1 hectare or less for people in developing nations.¹⁴ The size of our houses, the energy used to heat and run them and the amount of stuff we fill them with contribute significantly to this high consumption of resources.¹⁵ This represents a considerable disparity and injustice compared to the living conditions and resource consumption of billions of people around the world.

Every home built now that does not achieve net-zero energy consumption locks in decades of continuing emissions and unnecessary energy costs for residents. Even if individually relatively small, these emissions multiplied by hundreds of thousands of dwellings built in just the next few years¹⁶ potentially adds up to millions of tonnes of completely avoidable emissions at odds with the net-zero targets that the global community has already determined are necessary to avoid catastrophic climate change. In addition to the costs to occupants of avoidable energy consumption, inefficiencies in house construction and installation of appliances that use fossil gas can be costly for homeowners and landlords to rectify and replace down the track. These

⁵ Office of the Commissioner for Sustainability and the Environment, 2021, Scope 3 greenhouse gas emissions in the ACT

⁶ ACT Government, 2019, [ACT Climate Change Strategy](#)

⁷ ACT Government, 2011, [ACT Waste Management Strategy: towards a sustainable Canberra](#)

⁸ Curren R, 2020, [House sizes: how does Australia compare?](#), Homes to Love

⁹ Turner & Townsend, 2021, [International construction market survey 2021](#), (Figure 11)

¹⁰ Yardney B, 2021, [How much, on average, does it cost to build a house in 2021?](#), Michael Yardney's Property Update

¹¹ Craze K, 2020, [World's priciest homes: how Australian house prices compare to the rest of the world](#), RealEstate.com.au

¹² International Monetary Fund, 2021, [Latest global housing watch data](#)

¹³ WWF, 2020, [Living planet report 2020: bending the curve of biodiversity loss](#), p57

¹⁴ Global Footprint Network, n.d., [Ecological footprint of countries 2017](#)

¹⁵ Murray J & Dey C, 2011, [Canberra's ecological footprint: what does it mean?](#), University of Sydney, prepared for the Office of the Commissioner for Sustainability and the Environment

¹⁶ National Housing Finance and Investment Corporation, 2020, [State of the nation's housing 2020](#)

costs are amplified for multi-unit dwellings and apartment buildings where retrofitting for energy efficiency and electrification may be complex or even impossible. At a larger scale, the energy consumed by inefficient buildings creates unnecessary demand for energy generation and network infrastructure which has its own knock-on impacts on material resources, land use and water consumption.

The case for high ambition in the NCC

If the Australian Government refuses to curb the supply of fossil fuels, tools like the NCC are absolutely critical for the Australian community to collectively take effective action to reduce direct and embodied emissions, and demonstrate to the government that domestic demand for fossil fuels is waning. Therefore, the ABCB must set as high a level of ambition as possible for good design, quality construction and energy efficiency of all future housing stock, in particular, explicitly rule out the direct consumption of fossil fuels (ie gas) in all new buildings and renovations.

While the Conservation Council welcomes the intention of the Australian Building Codes Board (ABCB) to increase the minimum NatHERS ratings for new homes from 6 stars to 7 stars and include an 'energy budget' that sets an overall limit for energy used by fixed appliances, these improvements are long overdue and at best bring Australia into line with international standards that we have been lagging behind. Greater ambition is needed to mitigate the climate emergency and equip families with cost-effective homes that are resilient to future climate conditions. Australia needs a paradigm shift to create zero-emissions homes, not the incremental change that an increase from 6 to 7 stars would represent. Given also the inertia in Australia's construction industry and regulating bureaucracy, the ABCB needs to take this opportunity now, not wait for another review years down the track.

The experience of families trying to keep smoke out of their homes during the 2019–20 bushfires and stay cool during record heat waves demonstrates the very real and direct impact that poor quality housing has, and will continue to have, on human health and the liveability of our cities.¹⁷ Climate-resilient buildings will become more and more sought after as global warming progresses, whereas poor quality housing risks depreciating in value "as investors seek to avoid assets at risk of stranding and penalties associated with non-compliance in a fast-evolving net-zero landscape".¹⁸

The insurance industry is already factoring climate change into premiums in bushfire, flood, cyclone and coastal storm zones. More financial institutions are signing up to standards of greater transparency of sustainability and climate risks, such as those recommended by the Australian Sustainable Finance Institute¹⁹ and the Task Force on Climate-related Financial Disclosures²⁰. Investors are also increasingly looking for higher standards of environmental and social responsibility, so the sustainability and energy efficiency of buildings will become a factor in property developers' ability to secure finance. This is already affecting individuals' ability to

¹⁷ NSW Government Office of Environment and Heritage, 2015, [Heatwaves: climate change impact snapshot](#)

¹⁸ Carbon Intelligence & IPSX, 2021, [Net zero and valuations](#)

¹⁹ ASFI, n.d., [What is ASFI?](#)

²⁰ TCFD, n.d., [TCFD recommendations](#)

secure loans as banks also grapple with the systemic financial risk posed by climate change, such as NAB requiring farmers to demonstrate good natural capital management when applying for finance.²¹ Perhaps ten years ago people were not prepared to pay more upfront for sustainability, but “today, you don’t sacrifice returns for sustainability, you create returns with sustainability”.²² A high standard of climate resilience set now by the NCC could protect homeowners and property managers from financial risks associated with poor quality housing.²³

Research by Renew,²⁴ ClimateWorks Australia and ASBEC,²⁵ Rewiring Australia,²⁶ Beyond Zero Emissions and Melbourne Energy Institute,²⁷ Alternative Technology Association²⁸ and other institutions amply demonstrate the net cost savings that highly efficient homes can return to their occupants compared to the small increase in construction costs, but there is a persistent perception that these homes are too expensive to build. Research by RMIT and the CSIRO shows that more than 80% of housing built in 2016–18 was designed only to meet the minimum standard and over 98% falls “below the economic and environmental optimum”²⁹, demonstrating failure by the housing market to self-improve. There is an apparent split incentive where builders seek to minimise construction costs while it is the occupants who bear the costs of operation. It is also the people who can least afford higher energy bills who have the least capacity to pay extra upfront for more efficient construction or purchase of an existing efficient home, condemning our most vulnerable citizens to enduring energy poverty.³⁰ This split appears exacerbated for rental properties where landlords (wrongly) believe it is not worth investing in energy efficiency because only the tenants reap the benefits. However, this is a false dichotomy when there are clear benefits for builders and occupants of building high quality homes.

The simplest, most effective and most equitable way to address the perceived split incentive and achieve emissions abatement from buildings is to require builders and developers to meet much higher standards of construction through the NCC and other regulatory instruments so that every Australian has access to affordable, comfortable, healthy, energy-efficient, all-electric, climate-resilient homes. These standards also need to apply to all future building renovations, and systematic upgrades of all existing social and rental housing.

Even energy suppliers benefit from more energy-efficient homes through reduced demand peaks and the flow-on implications for network infrastructure and generation costs, where the levelised cost of energy through energy-efficiency savings is significantly lower than that of generation from fossil fuels and renewable sources.³¹

²¹ NAB, n.d., [Natural capital](#)

²² Sisson P, 2021, [As risks of climate change rise, investors seek greener buildings](#), The New York Times

²³ George S, 2020, [JLL: Green offices more likely to bring in rent premium, less likely to sit empty](#), Edie

²⁴ Renew, 2021, [Households better off: lowering energy bills with the 2022 National Construction Code](#)

²⁵ ClimateWorks Australia & Australian Sustainable Built Environment Council, 2018, [Built to perform: an industry-led pathway to a zero carbon ready building code](#)

²⁶ Rewiring Australia, 2021, [Castles & cars: savings in the suburbs through electrifying everything](#)

²⁷ Beyond Zero Emissions & Melbourne Energy Institute, 2013, [Zero Carbon Australia: Buildings plan](#)

²⁸ Alternative Technology Association, 2018, [Household fuel choice in the National Energy Market](#)

²⁹ Moore, Berry & Ambrose, 2019, [Aiming for mediocrity: The case of Australian housing thermal performance](#), Energy Policy vol 132, pp 602–610.

³⁰ Australian Council of Social Services, 2018, [Energy stressed in Australia](#)

³¹ Energy Sage, 2021, [Why your utility offers energy efficiency programs](#)

The practices and technologies exist now to build homes that have high thermal efficiency and net-zero operations, and even negative energy consumption, whilst still providing all modern conveniences and a well-being oriented lifestyle. Therefore, the Conservation Council urges the ABCB to raise the minimum NatHERS rating in the NCC to at least 8 stars, with the ambition of creating net-zero emissions buildings.

Quality housing starts with wellbeing and sustainability as core design principles

Building design must put the wellbeing of building occupants – people! – and the planet ahead of cost-savings for developers. This means putting broadly conceived sustainability and energy efficiency at the heart of all new buildings, the starting point for design, not an afterthought that can be offset by installing efficient appliances or rooftop solar panels or relying on air conditioning heat pumps to counteract incoming summer sun. A truly sustainable dwelling is also one that maximises livability for its inhabitants.

Proven passive solar design principles have been in use around the world for centuries, with orientation, shading, thermally appropriate materials, ventilation, and vegetation for air quality and cooling being crucial. These principles need to be embedded in the NCC. It is easier and cheaper to achieve a higher star rating if blocks are orientated correctly during urban planning, with housing being able to fit on blocks with their long sides facing north, or at the least, with living areas facing north. This is particularly important for estate development where project home developers have tended to orient the same standard floorplan to the street regardless of the direction of the street and the orientation of the particular block whereas flipping the floorplan to reorient living areas to the north could result in an extra star.

Solar access rules should also be implemented so buildings to the south can't be overshadowed by buildings on the northern side. A simple rectangular roof provides the easiest surface to install solar panels, rather than complex multi-directional box- or cross-gabling that breaks up a roof into small triangles. Light-coloured roofing materials can reflect heat, while flat roofs can facilitate roof gardens for additional thermal insulation.

Measurement of sustainability must include the efficient use of materials & management of waste materials. The three principles of circular economy are:

- Design out waste and pollution
- Keep products and materials in use
- Regenerate natural systems.

This means designing out materials that cannot be easily recycled or have high embedded emissions or are toxic, with a preference for sustainably-produced and renewable materials. Consideration of scope 3 embodied emissions suggests sourcing materials locally rather than transporting materials from overseas, and incorporating recycled rather than new materials.

There are a number of tools already available for estimating the carbon footprint of construction projects that the ABCB could incorporate into the NCC.³²

Other elements of design that support sustainability include reducing dwelling size (floor area per person) and its ratio to block size. The former relates to avoiding the consumption of resources in construction as well as energy consumption during operation. The latter is about ensuring outdoor space for recreation essential to mental health, providing shade trees, growing food, drying washing in the sun, incorporating permeable surfaces for rain/stormwater management, and supporting biodiversity. Smaller dwellings encourage social interaction, fewer possessions and furniture, and cost considerably less to build financially and environmentally.

Standard of living in smaller dwellings can easily be maintained through good design, particularly high ceilings and orientation of windows to access light for a feeling of spaciousness. Planning codes need to consider the relationship of building height to ceiling heights and human height. The 2.4m ceilings required by the NCC as the minimum height for habitable rooms can feel very compressed in apartment buildings with small rooms and limited light, when the average Australian man is 176cm tall and this is increasing over time.^{33,34} They also do not allow for safe installation of ceiling fans, given that a 176cm tall person can easily reach their hands higher than the typical height of a ceiling fan at 210cm. Balconies on apartment buildings also need to be designed for solar thermal efficiency, with space for cooling gardens and food production. While large glass doors allow access to the outdoors, designs should also include smaller windows for ventilation with security.

While it is critical to maximise the efficiency of the above factors for each individual dwelling or building, the development approvals process needs to consider them in the broader urban planning context. The type of building has a significant impact on the lifespan resource consumption and livability of the accommodation and the city more widely. It might seem obvious that detached suburban single-family homes require considerably more land area per person than townhouses and high-rise apartment buildings, however, taller is not necessarily better. The “courtyard” apartment buildings common in European cities – four or five storeys of apartments arranged in a square/rectangle around a central shared courtyard – have the lowest embodied carbon and total community energy demand.^{35,36,37} These low-rise buildings, like the award-winning Nightingale developments in Melbourne,³⁸ optimise shared facilities and social interaction for mental wellbeing, and balance population density and urban greenspace with access to services and public and active transport.^{39,40}

³² Office of the Commissioner for Sustainability and the Environment, 2021, Scope 3 greenhouse gas emissions in the ACT

³³ Franco E, 2016, [A century of trends in adult human height](#), eLife vol 5

³⁴ Australian Bureau of Statistics, 2018, [National Health Survey: first results](#), Table 8

³⁵ Drew C, Smith A, Fernandez Nova K & Fanning K, 2015, [The environmental impact of tall vs small: a comparative study](#), Council on Tall Buildings and Urban Habitat

³⁶ Saint R & Pomponi F, 2021, [Cities and climate change: why low-rise buildings are the future – not skyscrapers](#), The Conversation

³⁷ Sidhu J, 2021, [Paris or Manhattan: which type of city is best for reducing emissions?](#), World Economic Forum

³⁸ Paczek T, 2018, [Nightingale 1 – Australia’s most sustainable building?](#), Facility Management

³⁹ The Global Goals for Sustainable Development, n.d., [11 Sustainable cities and communities](#)

⁴⁰ The School of Life, n.d., [On how to make an attractive city](#), video

Stop using gas in buildings

The Conservation Council urges the ABCB to explicitly exclude gas appliances from the NCC rather than rely on the 'energy budget' which enables fossil gas appliances to be installed in homes if their energy consumption is offset by efficiencies elsewhere. All-electric homes are more energy-efficient, cheaper to operate, safer for residents' health,⁴¹ and emissions-free if powered by renewable energy (or will become so as the national electricity network phases out fossil fuel generation).⁴² The Conservation Council also recommends that woodburning stoves and heaters be limited to rural developments due to the air pollution impacts in urban settings.

The ACT Government has already taken the first steps to phase out the Territory's gas network by 2045, and other local and state governments are investigating doing the same, so it makes no sense to continue to allow new buildings to include gas. However, the Conservation Council's experience with property developers is that they continue to install gas to new homes despite the ACT's clear policy direction, the climate emergency and the evidence about the benefits of electrification.

The Conservation Council's experience from engaging with Canberra homeowners through our Make the Switch project⁴³ is that there is strong support for all-electric homes. This appetite for all-electric homes is also growing nationally as evidenced by the strong growth of the Facebook group 'My Efficient Electric Home', now boasting 35,000 members with hundreds more joining every week to seek and share advice about going all-electric.

The Conservation Council's experience is that any hesitancy about excluding gas from homes is due largely to persistent misleading self-promotion by the gas industry^{44,45,46,47} and builders and tradespeople who continue to recommend and install gas in the belief that customers demand it. This finding is echoed by The Australia Institute's most recent 'Climate of the Nation' survey which finds that people greatly overestimate the gas industry's importance to the Australian economy, and that merely 11% of respondents say they would not switch to electric appliances.⁴⁸ Any home using gas potentially faces increasing costs as an implied or explicit cost of carbon pollution is applied in the Australian economy in coming years and gas becomes increasingly scarce and expensive to extract.^{49,50} For the NCC to continue to allow gas to be installed in buildings effectively constitutes an ongoing, hidden subsidy for the gas industry.

⁴¹ Climate Council, 2021, [Kicking the gas habit: how gas is harming our health](#)

⁴² Rewiring Australia, 2021, [Castles & cars: savings in the suburbs through electrifying everything](#), and Parkinson G, 2021, [Electrify everything and go renewable: turns out it's much cheaper than thought](#), Renew Economy

⁴³ Conservation Council ACT Region, 2020, [Make the Switch website](#), funded by ACT Government Community Zero Emissions Grant

⁴⁴ Leber R, 2021, [How the fossil fuel industry convinced Americans to love gas stoves: and why they're scared we might break up with their favorite appliance](#), Mother Jones

⁴⁵ Mazengarb M, 2020, [Regulator rules it is misleading to claim gas is 'cleaner and greener'](#), Renew Economy

⁴⁶ Taft M, 2021, [Utility-funded propaganda book for American kids calls natural gas an 'invisible friend'](#), Gizmodo

⁴⁷ Robertson B, 2020, [Is the gas industry facing its Volkswagen moment?](#), IEEFA

⁴⁸ The Australia Institute, 2021, [Climate of the nation 2020: tracking Australia's attitudes towards climate change and energy](#)

⁴⁹ Grattan Institute, 2020, [Flame out: the future of natural gas](#)

⁵⁰ Beyond Zero Emissions & Melbourne Energy Institute, 2013, [Zero Carbon Australia: Buildings plan](#)

Developers typically pass on the cost of gas infrastructure to homeowners whether the residents want to use gas or not, with the revenue ending up in the hands of gas companies.

Conclusion

Government and community responses to the COVID-19 pandemic demonstrate that we can make rapid and previously unthinkable changes when the need is considered sufficiently dire. The update of the NCC is a key tool to abate emissions from the building sector and build resilience for the future. The Conservation Council urges the ABCB to act with ambition and urgency proportionate to the climate emergency.

The update of the NCC also needs to be supported by well-resourced independent compliance authorities and training for all construction industry professionals and associated trades, as well as public engagement through real estate agents and property managers to overcome the perception that sustainable homes are too expensive to build.

Recommendations

- Set a paradigm-changing ambition of net-zero emissions for the construction industry
- Raise the minimum NatHERS rating in the NCC to at least 8 stars for all building types, with the goal of zero emissions
- Embody passive thermal efficiency, scope 3 emissions and circular economy principles into building planning, designs and construction
- Embody climate resilience and human wellbeing considerations, including building-footprint to block-size ratio, space for shade trees, permeable surfaces, and ceiling heights, into building planning, designs and construction
- Exclude gas appliances from all new buildings and renovations
- Exclude wood burning heaters except in rural areas
- Work with state governments to establish independent compliance units with authority and powers to ensure building standards and codes are met
- Create a companion guide and engagement strategy to communicate with all stakeholders about achieving zero-emissions buildings
- Consider the broader urban planning context for socially and environmentally sustainable cities