Natural Hazards Research Australia

Investing in cheaper, cleaner energy and the net zero transformation

Natural Hazards Research Australia submission to the Productivity Commission's *Investing in cheaper, cleaner energy and the net zero transformation* interim report

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Australian Government

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We acknowledge the Traditional Custodians across all the lands on which we live and work, and we pay our respects to Elders both past, present and emerging. We recognise that these lands and waters have always been places of teaching, research and learning.

Photo: Nathaniel Chang, Unsplash

Submission

Natural Hazards Research Australia (the Centre) is the nation's premier research centre for natural hazards resilience and disaster risk reduction. The Centre works closely with federal and state and territory government agencies to deliver a strategic research agenda and actively promote research utilisation across Australia.

The Centre undertakes research that promotes resilience to the impacts of natural hazards and reduces disaster risk, to support the needs of a variety of critical stakeholders – including government, emergency services, industry and communities.

The Biennial Research Plan 2025-27 outlines the Centre's research direction, user driven model and extensive research portfolio relevant to safety, resilience and sustainability.

Investing in cheaper, cleaner energy and the net zero transformation

Climate-related hazards pose significant risks to Australian homes and businesses including from floods, cyclones, severe storms, heatwaves and bushfires. Research concludes that risk associated with climate related hazards is worsening in part due to climate change, but also due to expanding urban development.

In the future we will likely experience:

- widening impacts across societal, environmental, infrastructure and financial systems
- compounding impacts far greater than the sum of individual disasters
- more people living in an almost constant state of either preparation or recovery
- greater complexity of disasters as urban systems become more interconnected and infrastructure is transformed, leading to cascading and unforeseen impacts
- rising insurance unaffordability in high-risk areas
- increasing impacts on physical and mental health
- changing vulnerability due to trends such as decarbonisation
- greater species and habitat loss in the natural environment
- increased natural hazards disruption at a national scale, necessitating greater need for Commonwealth Government support.

For these reasons, it is right not only to progress sound policies that mitigate climate change, but also to adapt to the worsening risks posed by climate extremes — many of which are already locked in and will occur regardless of future emissions reduction. It is critical to influence behaviours and to incentivise action and investment to improve the resilience of Australian homes and businesses.

Risk information

A risk-based approach that informs multiple integrated local adaptation strategies tailored to the local community context is essential.

Risk transparency is crucial; however, climate-related risk information can be difficult for households and businesses to find and interpret. A central repository of climate-related risk information at the address level as recommended in the interim report could support potential home buyers and renters determine where to live.

Developing such a repository would require significant investment. For example, the availability of flood risk information is a major challenge and would require enhancement as information created through local

government flood studies lacks consistency across regions, is not available for all flood-prone areas or does not consistently consider climate projections.

It is important that the communication of risk is personalised to individual circumstances. Where possible, information should be made available:

- across all hazards
- at the address level
- for all event probabilities, including the largest events possible, and
- consider future climate projections.

There must be a commitment to regularly update the information to maintain public trust and confidence.

Online tools should be complemented by initiatives in local communities such as flood height markers on electricity posts or buildings to remind community members of likely flood heights and mandatory disclosure of risks to potential buyers and renters.

It is essential that community members can easily understand risk information, however, often this is not the case. For example, language such as the 1 in 100-year Average Recurrence Interval flood is often misinterpreted as occurring at one-hundred-year intervals. The Centre is undertaking critical research that will aid in the communication of flood risk information.[1]

Ultimately, information provided should improve understanding of the likely consequences of an event if it was to occur. Advanced technologies, including augmented reality, that would allow the consequences of a possible event to be visualised within an individual's home or business offer future risk communication enhancements. For example, visualising the height of a possible flood could help identify parts of a home that might be damaged.

Governments too could benefit from understanding the true costs of climate-related disasters that are often measured only in direct financial losses for example insurance claims and infrastructure damages. There is an opportunity to better measure and consider the full costs of disasters considering intangible impacts including broader social costs.[2]

Resilience Star Rating System

A Resilience Star Rating System for every home and business in Australia may encourage households and businesses to adopt resilience measures, though would need time to socialise and be accepted at the population level. Considerations include:

• A Resilience Star Rating System could be mandatory for all new residential and commercial properties informing occupiers of risks and resilience measures.

- To address existing building stock, government could regulate that an assessment consistent with the Resilience Star Rating System detailing resilience measures implemented be disclosed at the time a property is sold or leased. California now requires sellers in areas of high wildfire risk to affirmatively state if any qualifying retrofit work has been completed.[3]
- Other incentives for owners of existing properties to adopt a rating, which if they were to take action to improve their rating might include:

[1] Natural Hazards Research Australia's Communicating flood risk project.
[2] Natural Hazards Research Australia's Understanding intangible flood costs and impacts project, Natural Hazards Research Australia.
[3] California real estate: Home sellers now need to disclose fire risks. (2025, September 8). Bloomberg. Available from: https://www.bloomberg.com/news/articles/2025-09-08/california-real-estate-home-sellers-now-need-to-disclose-fire-risks

  - insurance discounts for hazards such as flood, storm, cyclone and bushfire
  - reductions in their air-conditioning costs in the case of extreme heat.

- As well as collecting information about the physical attributes of a structure and various resilience measures, ratings should consider features surrounding a structure for example landscaping and garden design in the case of bushfire and extreme heat risk.[4]
- Ratings should avoid encouraging potential externalities such as house raising as in some instances reducing risks of physical damage may increase risks to life as building occupants may choose not to evacuate thinking they are safe from rising floodwaters.
- Ratings for individual properties will need to be maintained over time, with careful consideration to factors such as:
  - Maintenance of resilience measures by households and businesses, noting that these can deteriorate if not effectively maintained.
  - Changes in community-wide mitigation investments that would impact resilience at a community scale would need to be accounted for at an individual asset level.
- Without regulation for a Resilience Star Rating System, barriers to widescale adoption across existing properties would include:
  - Fears that ratings may negatively impact property values or insurance premiums.
  - Impacts of the risk not being fully appreciated, for example research following the New South Wales and Queensland 2022 floods found that despite some flood awareness within communities the likelihood of direct impacts was greatly underestimated.[5]
  - Limited interest and capacity to adopt. Research indicates that existing levels of community preparedness are variable with substantial portions of some communities unprepared. These research findings reflect that there would be different preparedness behaviours that would impact the uptake of a Resilience Star Rating System self assessment. For example, after the 2022 floods in New South Wales and Queensland more than half of those surveyed planned to stay and/or repair their property to its previous condition, around a quarter were planning to make improvements to reduce flood impacts and around a fifth were planning to leave – to sell or relocate.[6]
  - Even if property owners adopt a resilience star rating barriers to implementing resilience measures would still exist. Simply being aware of a risk does not translate directly to implementing resilience measures due to:
    - The efficacy of recommended resilience measures not being perceived as justifying investment.
    - Affordability of resilience measures for households to implement.[7]
    - Little ability for the occupier to implement resilience measures as they rent the property.[8]

[4] Ondei S, Price OF and Bowman DM (2024). Garden design can reduce wildfire risk and drive more sustainable co-existence with wildfire. *npj Natural Hazards*, *1*(1), p.18.
[5] Taylor M, Miller F, Johnston K, Lane A, Ryan B, King R, Narwal H, Miller M, Dabas D, and Simon H. (2023), Natural Hazards Research Australia, Melbourne. [Available Online]
[6] Ibid
[7] Gee K Gissing A (2021) Heat smart: building resilience to heatwaves in Western Sydney. The *Australian Journal of Emergency Management*, 36(4), 5-7.
[8] Ibid

- Physical ability to implement and maintain resilience measures.[9]

Actions to drive investment in housing resilience

Research supports the interim report's focus on retrofitting of existing housing stock and embedding climate risk in planning and zoning decisions:

1. **Retrofitting of the existing housing stock**: Strategies that encourage the retrofitting of existing building stock are required. Like the conclusions of the interim report, our research has concluded there are significant benefits of investing in retrofitting of high-risk homes.[10],[11] It would be anticipated, however, that benefits of retrofitting would differ by region as the probability of different climate-related disaster severities varies by geography.

   As noted in the interim report, property owners need evidence-based information on resilience measures that is easy to understand and implement. Too often information made available to property owners is hazard specific and contains long lists of recommended actions. Information provided, however, should also consider multi-hazard scenarios and provide a targeted list of actions in order of potential efficacy and effort (cost). Communication strategies should be particularly mindful of low-income households who may not be able to afford to implement all recommended measures.

   To encourage adoption of resilience measures consideration should be given to:

   - Subsidies and/or interest-free payment plans for households.
   - Encouragement of insurance companies to offer discounts to incentivise proactive household implementation of resilience measures.
   - Embedding build back better provisions in insurance policies to enable properties to be rebuilt or repaired to a more resilient state.

   Lessons on program design can be drawn from retrofitting programs for cyclone in Northern Australia and floods through the Resilient Homes Fund in New South Wales and Queensland.

2. **Embed climate risk in planning and zoning decisions.** Australian communities must adopt strategies that ensure future development is appropriate in a changing climate. There is a need nationally for policies to incentivise development in areas of low natural hazard risk and consider the future impacts of climate change.

   We already know from research how to build homes and infrastructure that is more resilient to natural hazards. Policies and other regulatory mechanisms that mandate construction practices to ensure resilience to climate-related hazards in a warmer climate are essential, particularly where risks to public safety exist.

Governments, however, should also focus on additional measures to address the resilience of housing, including:

1. **Buy-backs of high-risk homes to eliminate risk.** People may not be able to live where they live now. The elimination of risk entirely is only possible by removing houses and infrastructure from areas at risk of natural hazards. Major buy-back schemes, including in major cities, are now being implemented to relocate homes from floodplains, but not for the first time in Australia, and the efforts will not be without difficulties. Voluntary buyback programs are expensive, disruptive and rely

[9] Ibid
[10] Dale K, Maqsood T and Wehner M (2021) , Bushfire and Natural Hazards CRC, Melbourne [Available Online].
[11] Ginger J, Parackal K, Henderson D, Wehner M, Ryu H & Edwards M (2021, Bushfire and Natural Hazards CRC, Melbourne [Available Online]

on willing sellers. Not everyone will want to move. Ideally, such programs must be planned well before a major disaster strikes so that communities can decide their future (read more here).

2. **Investment in disaster mitigation to reduce risk.** It is not possible to eliminate all climate-related natural hazard risk, so reducing risk through integrated mitigation approaches, considering the current and future risk profiles of communities, continue to be key.

3. **Work better with natural landscapes** including incorporating First Nations knowledge, to be open to how the environment can play a vital role in disaster risk reduction. For floods we can reforest catchments and restore wetlands. Both options will likely lower the risk of smaller floods and offer co-benefits such as better air and water quality, and improved carbon capture (read more here).

Though accountabilities for these measures are shared across all levels of government, local government often lacks the capacity to effectively address climate-related risk. Future plans should consider how local government will be supported to implement future resilience and climate adaptation measures.

Natural Hazards Research Australia research

The Centre's user-driven research projects offer opportunities to provide further evidence that is useful and useable in the context of urban resilience. The Centre has currently committed funding to 92 projects, with further research investments planned. Examples of current research projects relevant to the interim report include:

- *Evaluating the Resilient Homes Fund.* This research is evaluating Queensland's Resilient Homes Fund, addressing four dimensions of resilience (physical, financial, social, and emotional) by assessing buy-back, retrofit and house-raising, to demonstrate the success factors and lessons learnt.
- *Integrated solutions for bushfire-adaptive homes*. This research is providing a better understanding of the bushfire failure rates of homes built to modern construction standards; investigating what physical building material, housing designs or additional safety measures would best reduce failure rates; and exploring which social levers can be used to influence and support communities to better protect homes from bushfires.
- *Multi-hazard resilient buildings*. This research aims to review current building standards and guidance in relation to multi-hazards across Australia with a particular focus on New South Wales. The project aims to analyse existing building requirements and building guidelines for bushfire, flood, coastal erosion, inundation, sea-level rise, heatwaves, tsunami, storm, landslide, cyclones, earthquakes, drought and tornadoes across Australia. The project will also consider national and international best practice standards for building and construction to address multiple hazards and identify gaps and opportunities for improvement.
- *Effectiveness of land use planning flood controls on buildings*. This research will develop a baseline understanding of the implementation of planning flood controls to new buildings and modifications in New South Wales over the last 10 years, to help refine flood planning systems and processes.

The Centre maintains the Australian Disaster Resilience Index. The index is useful in understanding the comparative resilience of communities to inform prioritisation of risk reduction measures (read more here).