AHURI

RESEARCH SUMMARY

Building climate resilience into Australian homes



What this research is about

This project defines climate-resilient housing in Australia, develops climate-ready housing guidelines (CRHG) outlining adaptation measures for a range of environmental threats, and establishes a framework for government and industry action to future-proof the nation's homes. It is part one of an AHURI Inquiry into making Australia's housing climate-resilient by 2050.

Why this research is important

Climate change is making heatwaves, bushfires, floods and storms more frequent and severe. Such events can damage or destroy homes and make them uncomfortable or unsafe. Many Australian homes are not designed for current and future climate conditions, and regulations to improve resilience are inadequate. This research provides guidelines for policy and practice to strengthen climate resilience in all homes and improve the community assets that help residents cope with climate change.

Based on

Final Report No.465: *Building climate resilience in Australian homes and households*

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At a glance

Researchers have provided resilience measures for new and existing homes to address various hazards.



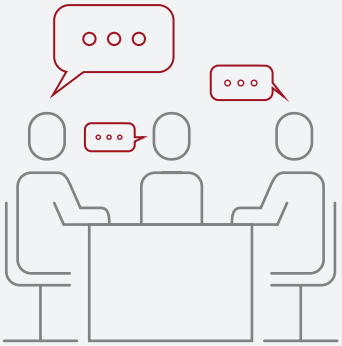
Sixty resilience measures are rated on:

- strength of evidence
- complexity
- climate events addressed
- risks they amplify.

Measures can be compared. For example, there is better evidence for storm shutters than smart windows – and shutters won't fail in a blackout.



Community resilience can be bolstered by supporting peer-to-peer learning and extending resilience hubs.



Key findings:

Defining climate-resilient housing

Three characteristics define climate-resilient housing:

1. Robustness – the home maintains structural integrity through climate events and long-term rising temperatures.
2. Protection – the home continues to protect occupant health, safety and comfort.
3. Recovery – the home can be efficiently and affordably returned to acceptable functionality after events.

Features of climate-resilient housing

Resilience relies on integrated, hazard-specific design, not single measures.

Measures to improve resilience to key climate risks include:

- **Heat-resilience** – shading, reflective surfaces, ventilation, insulation and thermal mass. Innovative measures like phase change materials may improve performance in the future.
- **Bushfire-resilience** – non-combustible materials, simple building forms and ember protection on exposed points, such as doors, windows and gutters.
- **Flood-resilience** – dry proofing, elevation or wet proofing.
- **Cyclone-resilience** – structural reinforcement, secure connections (including robust tie downs), impact-resistant elements (impact-resistant glazing and cyclone shutters) and appropriate siting (including landscaping for fencing and outbuildings to minimise debris).

Resilience measures have trade-offs

Some measures reduce exposure to one hazard but increase vulnerability to another. For example, measures to keep houses cooler during hot weather can make them colder in winter.

Therefore, measures must be assessed holistically and consider the local climate.

Climate resilience of households

Household resilience is critical for all climate hazards and varies with people's health, resources, tenure and community networks, and is strengthened through retrofits, practical preparedness, and institutional and informal support.

Insights from case studies and practitioners

Real-world case studies demonstrate:

- measures can be combined to address multiple hazards
- innovation can significantly raise resilience
- high climate resilience does not always equate to high building costs
- standards should be aligned to local conditions (for example, in southern Australia, heat is increasingly the focus, while northern regions grapple with prolonged heat, humidity and mould).

'Household resilience is critical for all climate hazards and varies with people's health, resources, tenure and community networks, and is strengthened through retrofits, practical preparedness, and institutional and informal support.'

Resilience measures in the CRHG

Measures within the CRHG are classified by innovation level (basic, established, innovative) and confidence level (low, mid, high), reflecting the maturity of available research.

Each measure is mapped against relevant climate hazards, resilience characteristic (robustness, protection, recovery) and potential for amplifying other risks. Climate-zone is also specified.

In new homes, mid-to-high levels of innovation dominate because many basic measures are already mandatory. In existing homes, basic to established measures should be prioritised.

'Policymakers should consider each resilience measure's innovation and confidence levels and tailor recommended measures to regional conditions.'

Policy actions:

Deploy measures contained within the CRHG

The CRHG provides:

- resilience measures for new homes
- resilience measures for existing homes
- existing National Construction Code (NCC)–mandated measures that apply to new builds.

Policymakers should consider each resilience measure's innovation and confidence levels and tailor recommended measures to regional conditions.

Opportunities to advance climate resilience

Five key opportunities for policy and practice to advance climate-resilient homes and households are identified:

1. Strengthen and modernise standards for new housing

Opportunities for the NCC to build climate resilience include:

- mandating basic and established resilience measures (outlined in the CRHG) for heat, bushfire, flood and cyclone risks
- expanding hazard zones based on projected climate exposures
- setting climate triggers for NCC updates
- integrating climate resilience into the Nationwide House Energy Rating Scheme (NatHERS).

2. Rapidly scale up the retrofitting of existing homes

Retrofitting homes improves safety while reducing energy hardship and disaster-related costs. This could be done via:

- states and territories setting minimum resilience standards for rental properties
- targeted incentive programs to encourage voluntary retrofit activity, such as rebates for insulation, shading, ventilation upgrades, and solar systems.
- tailoring guidance to local climate zones and housing types
- embedding 'build back better' principles in disaster recovery funding
- further developing disclosure frameworks (such as in NatHERS for Existing Homes) to flag to buyers or renters when a property falls below a minimum energy efficiency or resilience standard.

'Retrofitting homes improves safety while reducing energy hardship and disaster-related costs.'

3. Invest in household, neighbourhood and community resilience

Community knowledge sharing could be strengthened by local governments supporting peer-to-peer learning. Neighbourhood resilience could be boosted by federal, state and local government including community insights in planning, while local and state/territory government could expand tree canopy and water-sensitive design, and upgrade resilience hubs that offer safe shelter during extreme weather.

4. Build capacity to plan for future risks

Increasingly sophisticated climate risk projections provide opportunities to foster resilience, including:

- updating hazard maps and planning controls to reflect shifting risks
- incorporating multi-hazard and compounding-event scenarios into planning and regulation
- supporting energy security
- providing guidance on navigating trade-offs.

5. Build a 'living' national evidence and guidance system

A dynamic, continuously updated system, similar to living systematic reviews used in medical research, could ensure guidance on climate risks and effective responses remains current and evidence based.

Research design:

This report utilises academic and grey literature, case studies, practitioner and householder interviews and focus group discussions.

The research was undertaken in three stages:

1. development of guidelines (CRHG) for climate-resilient homes
2. testing the CRHG with case studies and specialist stakeholders
3. examining the climate-resilience experiences of households.

To cite the AHURI research, please refer to:

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