Australian Government
Productivity Commission

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Investing in cheaper, cleaner energy and the net zero transformation

Inquiry report

No. 113 | 10 December 2025

Acknowledgment of Country

The Productivity Commission acknowledges the Traditional Owners of Country throughout Australia and their continuing connection to land, waters and community. We pay our respects to their Cultures, Country and Elders past and present.

About us

The Productivity Commission (PC) is the Australian Government's independent research and advisory body on a range of economic, social and environmental issues affecting the welfare of Australians. Its role, expressed most simply, is to help governments make better policies, in the long-term interest of the Australian community.

The PC's independence is underpinned by an Act of Parliament. Its processes and outputs are open to public scrutiny and are driven by concern for the wellbeing of the community as a whole.

For more information, visit the PC's website: www.pc.gov.au

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10 December 2025

The Hon Dr Jim Chalmers MP
Treasurer
Parliament House
CANBERRA ACT 2600

Dear Treasurer

In accordance with section 11 of the *Productivity Commission Act 1998*, we have pleasure in submitting to you the PC's final report for the *Investing in cheaper, cleaner energy and the net zero transformation* inquiry.

Yours sincerely

Barry Sterland
Commissioner

Martin Stokie
Commissioner

Terms of reference

I, Jim Chalmers, pursuant to Parts 2 and 3 of the *Productivity Commission Act 1998*, hereby request that the Productivity Commission ('the Commission') undertake five inquiries to identify priority reforms under each of the five pillars of the Government's productivity growth agenda and formulate actionable recommendations to assist governments to make meaningful and measurable productivity-enhancing reforms.

Background

Productivity growth is the key driver of real wage growth and rising living standards over the long term but has been slowing around the world since the mid-2000s. Australia's productivity growth in the decade to 2020 was the slowest in 60 years.

Several long-standing factors have contributed to the productivity slowdown, including reduced dynamism and competitive pressures, and slower diffusion of technological innovations. Australia also faces new and emerging opportunities and challenges from the changing nature of our economy, including population ageing, rising demand for care and support services, technological and digital transformation, climate change and the net zero transformation, and geopolitical risk and fragmentation. How well we position for and respond to these changes will have a significant impact on our future productivity.

In 2023, the Government set out five pillars for a broad and ambitious productivity growth agenda, and it has already progressed significant reforms under each pillar of this agenda. It is now tasking the Productivity Commission to identify the highest priority reform areas under each of the five pillars which have potential to materially boost Australia's productivity growth going forward, and the measurable impact of these reforms where possible.

Scope of the inquiries

The Commission will conduct five inquiries to identify and report on priority reforms in each of the areas under the Government's five pillar productivity growth agenda. Specifically, these are priority reforms which enhance productivity through:

a. Creating a more dynamic and resilient economy
b. Building a skilled and adaptable workforce
c. Harnessing data and digital technology
d. Delivering quality care more efficiently
e. Investing in cheaper, cleaner energy and the net zero transformation

The Commission should have regard to other current and recent reviews of relevance to Australia's productivity performance including the Treasury Competition Taskforce, the National Competition Review and the House Economics Committee inquiry into promoting economic dynamism, competition and business formation; and the objectives and priorities outlined in the Intergenerational Report, the Employment White Paper, the Economic and Fiscal Strategy, the Measuring What Matters statement, and the Government's legislated emissions reduction targets.

The inquiries should identify prospective areas for reform in the coming years, recognising the findings of recent reviews and taking into account Government reforms and reform directions.

Process

The Commission should engage widely and undertake appropriate public consultation processes, including inviting public submissions. The Commission should engage actively with Commonwealth, and state and territory governments.

The Commission's advice should clearly convey the importance of the reform opportunities identified, including quantitative analysis of the measurable benefits of the priority reforms where possible. This could include the long-run economic impacts on GDP and other measures of economic progress and national prosperity, the benefits accruing to Australian households including distributional impacts where possible, or other outcomes such as improved quality of services or living standards. This analysis should be presented in a way which acknowledges and manages the measurement challenges impacting some important reform areas.

The Commission should publish an interim report for each inquiry in the middle of 2025 that includes preliminary actionable recommendations for productivity-enhancing reforms under the relevant pillar. The final reports for these inquiries should include advice on reform implementation, including implementation feasibility and risks, and be provided to Government within 12 months of receipt of this request.

The Hon Jim Chalmers MP
Treasurer

[Received 13 December 2024]

Disclosure of interests

The *Productivity Commission Act 1998* specifies that where Commissioners have or acquire interests, pecuniary or otherwise, that could conflict with the proper performance of their functions they must disclose those interests. The Commissioners working on this report have no interests requiring disclosure.

Acknowledgments

In undertaking this inquiry, the Productivity Commission has benefited from engagement with individuals, industry, not-for-profit organisations, peak bodies, consultants and researchers, and with officials from Australian, state and territory government departments and from regulatory agencies.

Through commissioned consultancies, RepuTex Energy and Aurora Energy Research modelled the potential effects of some of the PC's recommendations for reducing the cost of meeting emissions targets. Their findings are published alongside this inquiry report. The Commissioners express their appreciation to staff at the Department of Climate Change, Energy, the Environment and Water who refereed this work.

XDI (Cross Dependency Initiative) provided the hazard and physical risk analytics that underpin the PC's modelling of the potential reduction in extreme-weather related damage to housing assets from greater resilience measures.

The Commissioners would like to thank everyone who contributed their views and expertise to the inquiry.

The Commissioners would also like to express their appreciation to the staff who worked on this report – Assistant Commissioner Lou Will, who led the inquiry, and other team members including Jared Boorer, Sebastian Broadhurst, Debasish Das, Krystal Ha, Frances Lamb, Max Oss-Emer, Julian Parise, Yiani Petroulias-Romios, Sean Sutton and Bowen Tan. Our thanks are also extended to Anna Heaney, Paul Gardner, Carmela Chivers, Cristy Alevizos, Matthew Muir, Yvette Goss and Tracey Horsfall for project support.

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Executive summary

Reducing emissions from greenhouse gases is an important national priority. Minimising the cost of meeting Australia's emissions targets will free resources for other uses. And speeding up approvals for new energy infrastructure will support decarbonisation across the economy. Even if emissions decline, we face significant climate-related risks – addressing barriers to private investment in adaptation will mitigate them.

To achieve net zero at least cost, governments should support and expand market mechanisms, addressing policy gaps and remove overlaps. They should also ensure emissions-reduction incentives are jurisdiction and technology neutral: this could reduce the cost of building and operating generation and storage infrastructure in the National Electricity Market by 8% from now to 2040 for the same emissions outcomes. Priorities for action include:

- introducing a national, market-based policy to drive electricity sector decarbonisation after 2030
- expanding the Safeguard Mechanism. Assuming a constant emissions-reduction target, this could reduce the annual average costs of abatement measures by nearly 10% over the period from 2031 to 2035
- phasing out fuel tax credits for on-road heavy vehicle operators, reducing barriers to adopting low-emissions technology for heavy vehicles and phasing out the fringe benefits tax exemption for electric vehicles.

Policies should be regularly assessed with the aim of aligning emissions-reduction incentives across sectors.

Development of energy infrastructure is taking too long – faster approvals would bring significant benefits. A one-year acceleration for new wind farms and key transmission could cut electricity bills by 7% over a decade.

Recent reforms to national environment laws – including to introduce national standards, facilitate regional planning and make offsetting more efficient – should speed up approvals. Improvements in regulatory practice are also needed. A well-resourced 'strike team' should focus on high-priority energy projects and a Coordinator-General should work proactively across governments and industry to keep approvals on track and break through roadblocks.

Over the years ahead, boosting our resilience to the impacts of climate change will lower costs to the economy, society and the environment. We need to create the foundations for effective adaptation now.

Housing needs particular attention. Extreme weather could cause up to $744 billion (in present value terms) in damage to Australia's detached and semi-detached homes by 2100. Early adaptation, such as smarter land-use planning and retrofits to existing homes, could help reduce these costs by as much as $240 billion.

Better information is key. The Australian Government can support action by leading the development of a climate risk database (which will benefit households, businesses and governments) and a resilience rating system for housing accompanied by guidance on how to act. Building on this foundation, governments should work together on a national coordinated strategy for housing resilience – agreeing clear goals for improving resilience over the coming decades and providing targeted support where required. Planning reforms to ensure new homes are located in lower-risk areas will be integral to ensuring the future stock is climate-resilient. To ensure progress, the Australian Government should strengthen national adaptation monitoring and reporting through an expanded role for the Climate Change Authority.

Recommendations

Reducing the cost of meeting emissions targets

Recommendation 1.1
Introduce a policy to drive electricity sector decarbonisation

The Australian Government should introduce a national emissions-reduction policy for the electricity sector. This policy should be market-based, and a potential candidate could be modelled on the Safeguard Mechanism. The chosen policy would be a complement to the Electricity Services Entry Mechanism (ESEM) recommended by the National Electricity Market review.

If firming auctions are prioritised under the ESEM, the Australian Government should implement an interim emissions policy for firming projects.

Governments should phase out technology- and state-specific incentives for reducing emissions in the electricity sector. Net zero-related industrial policy should be rigorously assessed based on the presence of significant market failures and whether support is likely to reduce the overall cost of Australia's abatement task.

Recommendation 1.2
The Safeguard Mechanism should cover more industrial facilities and carbon leakage provisions should be improved

The Australian Government should lower the Safeguard Mechanism threshold so that it covers more industrial facilities. The Safeguard Mechanism review scheduled for 2026-27 should determine the new threshold but favour broadening the scheme as much as possible. The review should also consider whether the lower threshold would introduce inefficiencies such as uneven coverage in some sectors and whether the inclusion of new facilities should be phased in. If the review identifies no major concerns, reducing the threshold from 100,000 tonnes to 25,000 tonnes of carbon dioxide equivalent per year would be reasonable.

If the Australian Government introduces a border carbon adjustment, it should phase out trade-exposed, baseline-adjusted status for Safeguard Mechanism facilities.

Recommendation 1.3
Phase out fuel tax credits for on-road heavy vehicle use; phase out EV subsidies

To address the emissions policy gap in on-road heavy vehicle use, the Australian Government should phase out access to fuel tax credits for fuel used in heavy vehicles travelling on public roads. To avoid policy overlap, access should be retained for Safeguard Mechanism facilities.

At the same time, government should work with the heavy vehicle sector to ensure regulatory arrangements and infrastructure support least-cost decarbonisation. This will mainly mean ensuring regulations and infrastructure are not a barrier to the adoption of zero-emission heavy vehicles.

The Australian Government should phase out the exemption of electric vehicles from the fringe benefits tax, and state and territory governments should phase out the exemption of electric vehicles from vehicle stamp duty and registration discounts.

The Australian Government should also assess the suite of policies that would most cost-effectively support emissions reduction in the light vehicle sector. This should include reviewing the merits of exempting 'commercial vehicles' from fringe benefits tax and the luxury car tax.

Recommendation 1.4
Assess and align policies against a benchmark and improve transparency

The Australian, state and territory governments should improve the transparency of emissions-reduction policies by consistently including estimates of their cost-effectiveness in impact analyses. The estimates should routinely be assessed against agreed national target-consistent carbon values.

The Australian Government should:

- commission an independent agency with relevant expertise to develop national target-consistent carbon values. These values – estimates of the implied carbon prices needed to meet Australia's emissions targets – should be used consistently as policy benchmarks across government and in regular reporting on the cost-effectiveness of emissions-reduction policies
- design and evolve policy settings to be broadly aligned with these carbon values.

To support achieving net zero in 2050 at as low a cost as possible, the Australian Government should:

- continue to develop policies to extend emissions-reduction incentives to new sectors. The costs associated with any new policies to reduce emissions in areas such as agriculture and household gas should align with the target-consistent carbon values
- continue work to ensure Australian Carbon Credit Units (ACCUs) are high integrity and seek to integrate ACCUs into every national emissions-reduction policy in the long term so that hard-to-abate emitters face consistent incentives.

Speeding up approvals for new energy infrastructure

Recommendation 2.1
Set up a specialist 'strike team' for priority projects

The Australian Government agency responsible for approvals under the *Environment Protection and Biodiversity* Conservation *Act 1999* (Cth) should establish a strike team to assess priority renewable energy projects. The strike team should:

- be adequately resourced to efficiently assess all priority projects
- integrate environmental and clean energy expertise
- be issued with clear expectations, tools and escalation procedures
- work with state and territory counterparts to reduce duplication and share information and expertise.

Recommendation 2.2
Appoint a Coordinator-General for priority projects

The Australian Government should appoint within a central agency an independent infrastructure Coordinator-General. For priority clean energy projects, the Coordinator-General should:

- work with relevant regulators across all levels of government to track the progress of all approvals needed to start construction
- work proactively with industry and governments to investigate and help break through roadblocks
- report on progress to relevant Australian Government Ministers and the Energy and Climate Change Ministerial Council
- provide advice based on objective criteria about the composition of the National Renewable Energy Priority List.

Recommendation 2.3
Consider if the energy transition needs more weight in approval decisions at next EPBC Act review

The next review of the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) should consider, in light of progress against clean energy targets and the objectives of the 2025 reforms, whether the Act should be amended to ensure the needs of the energy transition are taken into account when assessing energy projects that impact matters of national environmental significance.

Addressing barriers to private investment in adaptation

Recommendation 3.1
Improve access to climate risk information through a national database

The Australian Government should develop and maintain a central, publicly accessible national multi-hazard climate-risk information database. In developing the database, the Australian Government should coordinate with relevant federal, state and territory and local organisations to ensure alignment and integration of existing data sources where appropriate. The database should provide granular, accessible and actionable information on climate risk to the public, builders, insurers and governments.

Recommendation 3.2
Develop a nationally consistent climate resilience rating system for housing

The Australian Government should lead development of a nationally consistent climate resilience star rating system for housing. The rating system should:

- be outcome-based, with ratings reflecting potential cost of damage from climate hazards
- account for location-specific climate hazards and property characteristics
- be supported by practical guidance material so that households, builders and insurers can identify cost-effective upgrades to improve a property's resilience.

Development of the rating system should:

- build on existing work undertaken in this area
- integrate over time with the Nationwide House Energy Rating Scheme (NatHERS)
- learn lessons from NatHERS to accelerate development and implementation of the rating system.

Recommendation 3.3
Improve resilience through a national strategy for housing resilience

The Australian Government should work with state, territory and local governments to establish a national strategy to improve the resilience of Australia's housing stock over coming decades. The strategy should be supported by cost-effective actions to:

- improve households' access to climate risk information and their capacity to understand and use it
- embed climate risk in planning and zoning reforms
- facilitate resilience retrofits of the existing housing stock, particularly in high-risk areas
- improve coordination of public and private-investment to deliver measurable improvements in neighbourhood and precinct-level resilience.

Actions should consider the needs of vulnerable households and communities and align with critical investment and renewal decision points. Actions should proceed only where benefits exceed costs, based on impact assessments that carefully consider the full range of economic, social and environmental costs and benefits.

Recommendation 3.4
Expand the Climate Change Authority's role in national climate change adaptation policy

The Australian Government should legislate to provide the Climate Change Authority with responsibility to review and advise on national climate change adaptation policy. As part of this function, the Climate Change Authority should conduct:

- progress reviews of the National Adaptation Plan and National Climate Risk Assessment every two years
- other reviews of national climate change adaptation policy if requested by the Australian Government Minister responsible for Climate Change or by the Parliament
- research on climate change adaptation, including identifying opportunities to improve adaptation policy and practice.

About this inquiry

As a contribution to global efforts to mitigate the effects of climate change, Australia has committed to a 2035 emissions-reduction target of 62% to 70% below 2005 levels, and to achieving net zero by 2050 (Bowen 2025).

Clean energy will underpin decarbonisation, so achieving these targets will require significant investment in clean energy infrastructure. Expected retirements of coal plants make this task even more urgent. Australia will need to install thousands of wind turbines, millions of panels for solar farms, new transmission lines and substantial storage capacity.

Whatever the trajectory of global emissions, Australia is expected to experience a harsher climate. Reflecting that, resilience to the impacts of climate change should be a growing policy focus. Governments are taking action to help Australians adapt to the effects of climate change, but the policy problem is growing over time, and addressing it will require substantial action from governments and society over the decades ahead.

Given these challenges, it is imperative that governments choose the most efficient and cost-effective policies to support both the net zero transformation and adaptation. If we can use fewer resources to achieve the outcomes we need, productivity, living standards and community wellbeing stand to grow by more than would otherwise be the case.

Our areas of focus

Through Australia's Productivity Pitch (PC 2025a) and other forms of consultation, inquiry participants identified many topics this inquiry could have looked at. We could not tackle them all. After considering the potential payoffs, ease of implementation and whether work on the topic was already underway elsewhere in government, we opted to provide advice on three reform areas.

Reducing the cost of meeting emissions targets

Australian, state and territory governments have a wide range of policies to help reduce emissions. We focused on emissions-reduction incentives in the electricity, industrial and transport sectors. Combined, these sectors produce 78% of Australia's gross emissions (DCCEEW 2025a, pp. 17, 48).

The costs of existing policies vary markedly. Some run to less than $100 per tonne of carbon dioxide emitted; others to as much as $20,000 per tonne (PC 2023a, p. 14). And there are policy gaps – activities that face no incentive to reduce emissions and are not contributing to national efforts to bring emissions down.

Enduring, broad-based market mechanisms are the best way to reduce carbon emissions. Governments have made progress on adjusting policy settings towards this goal – through reform of the Safeguard Mechanism, for example – but providing more consistent and comprehensive incentives to reduce emissions would help us reach net zero at a lower cost.

Speeding up approvals for new energy infrastructure

Building new energy infrastructure is critical to delivering reliable, affordable energy and to efforts to decarbonise the economy.

Energy projects must comply with important environmental, cultural heritage and other regulatory requirements, but slow and uncertain approvals processes are contributing to significant and costly delays.

Efforts are being made across multiple levels of government to speed up the approvals process. Recent reforms to national environment laws promise to both expedite approvals and better protect the environment. Focusing regulatory efforts on high-priority energy projects can build on these reforms.

Faster decisions for new energy infrastructure would bring forward emissions reductions, reduce costs for developers, attract investment and translate into lower costs for consumers than would otherwise be the case. These benefits would support productivity growth.

Addressing barriers to private investment in adaptation

The adaptation task is a significant and long-term policy challenge. Action will be needed across the environment, society and economy, and from all of us: households, businesses and governments. Rather than considering the entire arc of action required, which is beyond the resources of this inquiry, we focus primarily on the challenges to adapting housing – but action to help households will also help businesses and governments.

Where people live and the way their homes are built will directly impact how Australians are affected by climate change. There are opportunities to adapt. But households (and businesses and governments) can find it difficult to make well-informed decisions about investing in climate resilience. Better information is an essential foundation for adaptation across the nation. People often lack trusted and easily accessible information on the risks they face and on worthwhile investments in resilience. The changing nature, long time horizons and innate uncertainty of physical climate risks complicate decision-making. And those making investments often do not experience all the benefits and costs of their action or inaction.

Resilient homes would be able to better withstand natural disasters and shield Australians from the effects of higher temperatures, contributing to lower reconstruction costs, a healthier, more productive population and a better quality of life. They should be a major policy goal.

Our approach

In this busy policy space, we scoped this inquiry to both take into account, and avoid duplicating, other important work, including:

- in relation to the cost of meeting targets: the National Electricity Market wholesale market settings review; the Net Zero Plan and the electricity and energy, transport, industry and resources sector plans; and the upcoming reviews of the Safeguard Mechanism, the New Vehicle Efficiency Standard and the Australian Carbon Credit Unit scheme
- in relation to planning and approvals processes: the Samuel Review (2020), the Community Engagement Review (Dyer 2023) and the First Nations Clean Energy Strategy (DCCEEW 2024b)
- in relation to adaptation: the National Climate Risk Assessment and National Adaptation Plan.

1. Reducing the cost of meeting emissions targets

Summary

- **Reducing emissions from greenhouse gases is an important national priority. Minimising the cost of meeting Australia's emissions targets will free resources for other uses.**
- **Governments should create consistent and comprehensive market-based incentives to reduce emissions.**
  - As part of this effort, governments should take a technology neutral approach to reducing emissions where possible, fill gaps where no incentives to reduce emissions exist and eliminate policy overlaps.
- **The Australian Government should introduce a national, market-based policy to drive electricity sector decarbonisation.**
  - A national emissions-reduction policy would complement the recommendations of the National Electricity Market (NEM) review. A policy based on the Safeguard Mechanism should be considered.
  - If support for firming generation is prioritised, the Australian Government should develop an interim policy covering the emissions from any new fossil fuel-based generators.
  - Taking a technology neutral approach and building new generation and storage infrastructure wherever it is most valuable could reduce costs by 8% between now and 2040 relative to current policy.
- **The Safeguard Mechanism, which provides an effective incentive to reduce 80% of Australia's heavy industry emissions, can be improved by being expanded to cover more industrial facilities.**
  - Lowering the threshold to 25,000 tonnes of CO_2-e per year from 2031 could reduce annual average costs of abatement measures by nearly 10% and yield gross benefits of around $900 million from 2031 to 2035.
- **The Australian Government should phase out fuel tax credits for fuel used in heavy vehicles for travelling on public roads, for entities not subject to the Safeguard Mechanism.**
  - At the same time, government should work with the heavy vehicle sector to ensure regulatory arrangements and infrastructure support least-cost decarbonisation.
- **With the New Vehicle Efficiency Standard in place, Australian, state and territory governments should phase out electric vehicle-specific exemptions and discounts to eliminate policy overlaps.**
- **To support the achievement of Australia's emissions targets at the lowest possible cost, the Australian Government should task an independent agency to develop national target-consistent carbon values.**
  - Australian governments should assess and align emissions reduction policies against this benchmark.
  - Governments efforts to ensure supply of high-integrity offsets will be critical to least-cost emissions reduction.

Reducing carbon emissions is an important national priority. It will contribute to global efforts to lessen potential damage from climate change and help realise Australia's international climate commitments, including the goal of net zero emissions by 2050. But reducing emissions has costs. While many clean technologies and energy sources are cheaper than alternatives, in some cases it is more expensive to use a clean product or production method than an emissions-intensive one.

Governments should aim to reduce emissions at the lowest possible cost to households, businesses and taxpayers. This will free up resources for other uses, enabling higher productivity growth, living standards and community wellbeing than would be possible otherwise.

Consistent and comprehensive incentives to reduce emissions are central to this task. They encourage emitters to seek out the lowest-cost emissions-reduction options and to develop new, clean technologies. Yet not all sectors are covered by incentives, some policies provide inconsistent incentives and, in other cases, multiple incentives overlap.

In this inquiry, the Productivity Commission (PC) builds on existing policies aimed at reducing emissions. Our recommendations align with many of the benefits conferred by a broad-based, enduring, national carbon price – a policy supported by many, including the PC (2008, 2011, 2023a, p. 16).

Emissions-reduction incentives are necessary but not sufficient to achieve net zero. The pace of the transformation needed will require governments to play a range of other roles. These include: supporting research and development; designing and regulating markets; helping businesses build their capacity to measure and reduce emissions; addressing behavioural gaps; enabling access to complementary infrastructure; and helping communities adjust to change. Carefully targeted and stewarded policies, focused on aspects of the transformation that broad-based incentives cannot address, will ensure a smoother transition to net zero. These other roles of government are important but are not the focus of this inquiry, which is as follows.

1. **Focus on reducing emissions, not how they are reduced**. Emitters should get the same benefit from reducing emissions regardless of how they do it. If policies favour some options, emitters may pursue them because they attract a reward, not because they are the cheapest way to reduce emissions.
2. **Fill gaps.** Where no emissions-reduction incentives exist, governments should, if feasible, extend existing policies or create new ones that achieve similar effects. Gaps raise the cost of meeting economy-wide emissions targets. All emitters with lower-cost options to reduce emissions should be incentivised to act. Incentives that are broader based will achieve targets with lower overall costs.
3. **Eliminate overlaps**. An activity should not face multiple incentives to reduce emissions. Overlapping incentives create the risk that emitters will choose options because they are strongly incentivised to do so, even if they are more costly than necessary for consumers or taxpayers.

This chapter outlines how governments can minimise the costs of achieving emissions targets in electricity, heavy industry and transport. Together, these sectors accounted for 78% of gross emissions in 2024-25.[1] The chapter highlights key priorities to fill major gaps in emissions-reduction incentives and sets out an approach for more consciously aligning sectoral emissions-reduction policies over time.

[1] PC calculations based on data from DCCEEW (2025a, pp. 17, 48). In this report, heavy industry emissions includes emissions from three categories in Australia's National Greenhouse Gas Inventory: fugitive emissions, emissions from industrial processes and stationary energy emissions (minus scope 1 emissions from the buildings sector).

Incentivise emissions reductions in electricity after 2030

The electricity sector needs multiple policies to address its multiple objectives

Australia's emissions targets will not be met without decarbonising the electricity sector but there is no national policy in place to bring this about over the long term. The Renewable Energy Target (RET) expires in 2030, and the last auctions for the Capacity Investment Scheme (CIS) will be run in 2027.

In large part, decarbonising the electricity sector means decarbonising the National Electricity Market (NEM), and much of the following discussion focuses on this market. But the lack of national emissions-reduction policy post-2030 will also affect non-NEM grids, and we discuss options to address this that are relevant to all jurisdictions later in the chapter.

The *Review of market settings in the NEM to follow the CIS* (NEM review) was tasked with recommending 'future market settings to promote investment in firmed, renewable generation and storage capacity in the NEM' (Nelson et al. 2025, p. 226).

The PC is supportive of the review's direction for improving the functioning of the NEM's energy-only market and associated derivative markets. The PC also supports, in-principle, the review's proposal to take a more market-aligned approach to promoting investment in bulk zero emissions energy, shaping and firming assets[2] using the Electricity Services Entry Mechanism (ESEM). The value of positions taken by the ESEM could be significant, and strong governance arrangements will be needed (PC 2025i, p. 7).

The ESEM is intended to address what is known as the 'tenor gap', which the NEM review identifies as the major barrier to new investment. The term describes the 'mismatch between the long-term contracts needed by sellers to finance capital-intensive assets (often 10 to 30 years) and the short-term contracting of buyers (typically three to seven years)' (Nelson et al. 2025, p. 11).

Other policy gaps are also likely to constrain the achievement of reliability and national emissions-reduction objectives. The NEM review draft report highlighted that emissions policy uncertainty is a barrier to investment in fossil fuel-based firming assets (Nelson et al. 2025, p. 191). At the same time, if fossil fuel-based generators' emissions are not constrained in the future this will jeopardise the achievement of a net zero electricity sector.

ESEM firming auctions would rightly be open to gas but we need to reduce climate policy uncertainty for projects and limit their emissions over time

While renewables and storage will meet most of Australia's electricity demand in the future, gas will play 'a critical role in firming renewables through the transition and should be considered eligible through the ESEM' (AEMO 2025b, p. 7). The firming auctions proposed under the ESEM would include gas-based technologies (Nelson et al. 2025, p. 161).

But the absence of an emissions policy for the electricity sector creates a barrier to investment. As Squadron Energy submitted to the NEM review, 'Even where contracted under the ESEM an emissions-intensive

[2] In this report, references to 'shaping' or 'firming' assets align with the descriptions used in the NEM review: shaping assets move electricity to the time of day it is needed, and firming assets are 'Long-duration dispatchable capacity to deliver extra energy as needed' (Nelson et al. 2025, p. 11).

firming project would continue to be fully exposed to uncertain costs associated with changes in emissions policy' (Squadron Energy 2025, p. 9).

The NEM review draft report noted that several energy generators have indicated that 'clarity in relation to emissions targets from firming generation would be a pre-requisite for future investment, to provide certainty for investors' (Nelson et al. 2025, p. 191). This may reflect an expectation that governments will step in at some point to limit plants' net emissions in order to meet national and international commitments.

To address this barrier to investment, the NEM review recommended that governments 'clarify how their greenhouse gas emissions targets apply to projects procured to provide firming services' (Nelson et al. 2025, p. 191). Introducing an emissions policy to drive long-term decarbonisation would reduce investor uncertainty and, potentially, the prices at which gas firming projects would contract under the ESEM. This is because without an emissions policy in place, firming projects bidding into ESEM auctions would presumably include a risk premium, increasing the cost of meeting reliability objectives.

The absence of an emissions policy also means that gas-powered generators would lack an incentive to optimise their generation to meet both reliability and emissions outcomes. In addition, there would be no incentive to develop zero- or lower-emissions firming technologies and assets that can compete with carbon-intensive firming assets.

The Institute for Energy Economics and Financial Analysis highlighted this gap as the 'overinvestment risk for high-emissions assets' and recommended that the NEM review 'consider how to ensure that emissions-intensive generators are called on to produce power as little as possible' (IEEFA 2025, pp. 7, 16, emphasis removed).

The ESEM would be more efficient if paired with a dedicated emissions-reduction policy

To align with the National Electricity Objective, the ESEM would contract in line with governments' emissions targets and policies (Nelson et al. 2025, p. 167).

If the ESEM is the only means of meeting any renewable and emissions targets beyond 2030 it would need to contract for higher volumes and at higher prices than if it were only focused on managing tenor risk. This will increase the balance sheet risks of the ESEM.

- ENGIE Australia & New Zealand has argued that 'if ambitious emissions targets require the ESEM to create an ongoing oversupply in the market, the contracts offered through the ESEM will need to cover proponents' long run costs, although their resale value will inevitably be depressed' (2025, p. 4).
- Similarly, Alinta Energy has argued that meeting government emissions targets through the ESEM 'will necessitate oversupply and an associated level of subsidisation' (2025, p. 3).
- Iberdrola Australia has argued that new investments desired by governments 'may be "out of the money" in the near-term, and therefore require greater revenue support over the period of the ESEM contract to achieve a positive [net present value]' (2025, p. 3).
- The AEMC has argued that relying on the ESEM alone to support investment in renewable capacity renewable capacity 'would result in a greater financial liability' for the mechanism (2025c, p. ii).

This suggests that electricity sector decarbonisation could be addressed more efficiently by pairing the ESEM with a policy that more directly and efficiently targets emissions reduction. Reeve et al. (2025, p. 14) have also made this point.

Such a policy would also allow the ESEM to focus on efficiently addressing tenor risk for those participants unable to address this through market arrangements, reducing both balance sheet and market risks.

A national, complementary policy would also provide an emissions-reduction incentive in non-NEM jurisdictions post-2030.

Options for a national emissions-reduction policy for the electricity sector

A range of policies could be used to reduce emissions in the electricity sector. Carbon taxes and cap-and-trade schemes have positive attributes but in line with the approach being taken in this inquiry, there are merits in building on existing policies where possible. This would suggest examination of the RET and the Safeguard Mechanism as a starting point.

The AEMC has proposed extending and modifying the RET to underpin demand for renewables (2025c, p. 5). Under the AEMC's proposal, this would be paired with procurement of renewable energy guarantee of origin contracts for difference as part of the ESEM's contracting for bulk renewable energy, one of the options proposed in the NEM review draft report (Nelson et al. 2025, p. 234).

One disadvantage of a policy that targets renewable output or capacity rather than emissions is that it would not account for the fact that fossil fuel-based generators differ in emissions intensity, as well as other market characteristics. For example, decisions about when to retire existing coal and gas plants should be influenced by a range of factors, including technical life, the timing and cost of major maintenance, and their value to the grid. A least-cost emissions-reduction policy would make emissions a part of that calculus. At present, there is little relationship between coal plants' emissions intensity and their announced retirement dates. But if the value of emissions reduction is recognised, it would be better – all else being equal – for more emissions-intensive plants to retire earlier. Hence, while continuing and expanding the RET should be on the table given it is relatively efficient and well understood, it should be considered alongside policies that more directly incentivise emissions reductions.

Choosing a national emissions-reduction policy for the electricity sector will naturally include considering changing how electricity is treated under the Safeguard Mechanism because it already notionally applies to the sector. The PC has previously recommended applying the Safeguard Mechanism to electricity at the facility level (2023a, pp. 22–23). Reeve et al. (2025, pp. 29–30) argue that applying a baseline-and-credit policy like the Safeguard Mechanism to the electricity sector has the potential to efficiently incentivise emissions reduction.

The 2026-27 Safeguard Mechanism review could be tasked with considering expansion to the electricity sector, but it may be better to consider this issue separately. Multiple policy options will need to be considered for the electricity sector, and even if a baseline-and-credit scheme is preferred, it may be better to keep this separate from the Safeguard Mechanism, at least at first, to avoid risks of uncertainty and disruption in the carbon credit markets that support that policy.

Whatever emissions-reduction policy is introduced for the electricity sector, it must integrate with other electricity sector policies and be consistent with Australia's emissions targets. This means it will need to complement reforms arising from the NEM review and the range of policies and agreements already in place to support new investment or manage the exit of coal plants across the country. To be consistent with Australia's emissions targets, the policy should give fossil-fuel assets an incentive to reduce emissions and similarly incentivise zero and very low emissions technologies. Over time there will be a residual of hard-to-abate emissions in the sector, associated with the need for firming assets, suggesting the phase in of options to draw on Australian Carbon Credit Units (ACCUs) or similar high-integrity offsets to meet net emissions targets.

An interim emissions policy for firming projects may be needed

The ESEM will likely need to prioritise firming auctions to ensure reliability, given existing and potential measures to incentivise new renewable capacity and manage coal retirement. Several submissions to the NEM review made this point.

> The firming service requirement should be established before other services, as it is most crucial to reliability. (Australian Energy Council 2025, p. 4)

> The NEM requires major investment in firming and long-duration capacity to balance increasing intermittent renewable penetration. (CleanCo Queensland 2025, p. 8)

> We suggest establishing the firming service requirement before the other services, noting this will be the most crucial to reliability. (Alinta Energy 2025, p. 4)

If firming auctions are prioritised, the Australian Government should implement an interim emissions policy for firming projects. As noted above, emissions policy uncertainty is a major barrier to investment in gas-powered generation. And while the Australian Government should introduce a dedicated emissions-reduction policy for the electricity sector, which would address this uncertainty, it will take time to work through the details: it will require broad engagement, and need to occur in parallel with the detailed design work required to implement recommendations of the NEM review.

Firming auctions will be more effective if project proponents know in advance how their emissions will be treated. Squadron Energy have proposed that 'it is timely and sensible for government to provide a consistent approach to the management of emissions for peaking infrastructure' (2025, p. 9).

A number of approaches could be taken for an interim emissions policy. The NEM review draft report noted that in New South Wales, firming infrastructure operators holding a Long-Term Energy Service Agreement must have an annual emissions intensity lower than the state average, and from 1 January 2036 they must achieve net zero emissions via offsets sourced within New South Wales (Nelson et al. 2025, p. 191). AEMO (2025b, p. 7) and Origin Energy Limited (2025, p. 20) have proposed emissions thresholds or limits for firming services. Squadron Energy have proposed:

> … a stepped phase out approach that requires emission intensity to be reduced or increasingly offset … This would provide the certainty needed for investors along with a mechanism to incentivise [gas-powered generators'] time limited use given costs in offsetting continue to ratchet towards a defined date. (2025, p. 9)

Whatever interim policy is introduced, affected projects should have the option of migrating to the broader electricity sector emissions reduction policy when it is introduced.

In implementing the ESEM, phase out targets that increase costs and ensure that any support is proportional and targeted

Policies to support emissions reduction or new clean energy generation should be designed to achieve national objectives at least cost. To the extent possible, technology- and state-specific targets should be avoided or phased out over time or transitioned into national policy mechanisms.

The proposed ESEM would procure in line with the National Electricity Objective, including any Australian, state or territory government targets set out in the *Targets statement* (Nelson et al. 2025, p. 167). Some jurisdictions have targets for renewable penetration, and some have technology-specific targets, like the Victorian Government's objective of two gigawatts of offshore wind capacity by 2032 (AEMC 2025a, p. 4). Where these technologies require more support than bulk energy and shaping generally, they would be

procured through an 'amended approach' (Nelson et al. 2025, p. 151). This could plausibly take the form of running separate auctions for specific technologies.

Targets for specific technologies can increase costs. Modelling undertaken for the PC suggests that the NEM could achieve rates of renewable penetration consistent with current state targets at 4% less total cost over the period 2026 to 2040 by removing targets for specific technologies (Aurora Energy Research 2025).[3] This is equivalent to a saving of around $4 billion dollars. The result is driven by the fact that the cost of offshore wind is estimated to be around 45–85% higher than that of onshore wind (Graham et al. 2025, p. 96).[4]

There may be a case for supporting individual technologies that provide innovation spillovers that can reduce overall abatement costs over time (PC 2025d, p. 28). Subsidies for particular technologies can, in theory, reduce their costs over time and make emissions reductions cheaper in the future. However, such support should be provided only if there is strong potential for learning-by-doing spillovers that create benefits exceeding the initial costs.

In general, if the ESEM adopts an 'amended approach' for higher-cost technologies, any additional costs should be funded through government budgets rather than by consumers, in line with how other innovation-related support tends to be funded. Even where justified, policies supporting individual technologies should include 'off-ramps', under which support either transitions into broad-based and technology-neutral ESEM procurement or is discontinued.

Procurement based on state-level renewables targets are also likely to raise costs and should be phased out as the ESEM matures. Different jurisdictions have different degrees of comparative advantage in renewable energy. Modelling undertaken for the PC suggests that the NEM could achieve rates of renewable penetration consistent with current state targets at 8% less total cost over the period 2026 to 2040 by removing technology- and state-specific targets (Aurora Energy Research 2025).[5] Achieving a NEM-wide renewables target at least cost requires locating generators wherever is most cost-effective.

Introducing a national emissions reduction policy, as recommended in this inquiry, would reinforce such an approach within the NEM and nationally – it would incentivise emissions reduction and clean energy to be located according to their cost effectiveness in achieving national emissions targets, and allow the ESEM to focus on addressing the tenor risk issue that is the focus of its design.

[3] These figures are given in 2024-25 dollars and calculated using a 7% discount rate. The modelling is based on comparing the costs of building and operating generation and storage infrastructure in the NEM under a scenario aligned to AEMO's 2024 *Integrated system plan* and a scenario that achieves the same NEM-wide renewable energy share of generation but does not impose Victoria's offshore wind targets as constraints in the modelling. The modelling does not include analysis of a 'do nothing' scenario regarding government renewable energy targets. Such analysis would still need to reflect the costs of replacing Australia's ageing coal fleet, but likely at slower timelines relative to what is consistent with government targets.

[4] This calculation is based on a comparison of the 'High' and 'Low' estimates of the levelised cost of onshore and offshore wind in 2024 in the latest GenCost report (Graham et al. 2025, p. 96).

[5] These figures are given in 2024-25 dollars and calculated using a 7% discount rate. The modelling is based on comparing the costs of building and operating generation and storage infrastructure in the NEM under a scenario aligned to AEMO's 2024 *Integrated system plan* and a scenario that achieves the same NEM-wide renewable energy share of generation but does not impose Victoria's offshore wind targets or state-specific renewable energy targets as constraints in the modelling.

Recommendation 1.1
Introduce a policy to drive electricity sector decarbonisation

The Australian Government should introduce a national emissions-reduction policy for the electricity sector. This policy should be market-based, and a potential candidate could be modelled on the Safeguard Mechanism. The chosen policy would be a complement to the Electricity Services Entry Mechanism (ESEM) recommended by the National Electricity Market review.

If firming auctions are prioritised under the ESEM, the Australian Government should implement an interim emissions policy for firming projects.

Governments should phase out technology- and state-specific incentives for reducing emissions in the electricity sector. Net zero-related industrial policy should be rigorously assessed based on the presence of significant market failures and whether support is likely to reduce the overall cost of Australia's abatement task.

Improve incentives in heavy industry

Heavy industry contributes substantially to Australia's emissions. In 2024-25, 30% of gross emissions came from heavy industry.[6] Ensuring that the right policy settings are in place in this sector will be critical to achieving Australia's emissions targets at least cost.

Policy settings are good, but could be better

The Safeguard Mechanism is an efficient policy

The main policy incentivising emissions reduction in heavy industry is the Safeguard Mechanism. The scheme covers industrial facilities emitting more than 100,000 tonnes of CO_2-e each year (DCCEEW 2025m). It also covers parts of transport and waste, as well as the electricity sector, although in practice it does not constrain electricity sector emissions – the settings for electricity should be re-examined by the Australian Government (recommendation 1.1).

The Safeguard Mechanism creates effective abatement incentives because it is market-based. Each year, facilities are assigned a baseline – a volume of annual emissions. If their direct emissions exceed their baseline, they must acquire either Safeguard Mechanism Credits (SMCs) or ACCUs, each representing one tonne of CO_2-e. If their direct emissions fall below their baseline, they can create SMCs and sell them to facilities that need them (DCCEEW 2025m). In 2025, the Climate Change Authority found that emissions covered under the Safeguard Mechanism are 'declining consistently with legislated Safeguard outcomes' (CCA 2025a, p. 2).

Incentives to reduce emissions will get stronger over time. Between now and 2030, baselines at most facilities will decline by the standard rate of 4.9 percentage points each year (before adjustment for

[6] PC calculations based on data from DCCEEW (2025a, pp. 17, 48). Heavy industry emissions were calculated by summing fugitive emissions, emissions from industrial processes and stationary emissions minus emissions from buildings. Stationary emissions from 'agriculture, forestry and fishing' were included in heavy industry, even though a subset of this category could be classed as part of the agricultural sector.

production levels).[7] All else equal, this will cause the price of credits to increase. The more above-baseline facilities there are, the more demand these facilities will have for SMCs and ACCUs, pushing up the cost of these credits and giving facilities a greater incentive to reduce emissions on site.

Maintaining access to high-integrity ACCUs will be critical

The ability for facilities to comply with their obligations by buying ACCUs is a strength of the Safeguard Mechanism. It enables emissions reduction elsewhere in the economy if that is less costly than on-site emissions reduction.

In response to concerns about the integrity of ACCUs, the Australian Government commissioned an independent review of the ACCU Scheme (Chubb et al. 2022). ACCUs have also been examined by the CCA (2023a) and the Australian National Audit Office (2024). The Australian Government is implementing the recommendations made by the independent review and the CCA (DCCEEW 2025g), and the CCA is again reviewing the scheme (CCA 2025b). Some inquiry participants argued that the Chubb Review recommendations should be implemented quickly to promote ACCU supply (Greencollar, sub. 225, pp. 2–3; KLC, sub. 149, p. 5; Veolia, sub. 80, p. 2). ACCUs must represent genuine reductions in atmospheric carbon. A well-functioning ACCU Scheme will ensure that investment continues to go into developing new ACCU projects, increasing credit supply and reducing the cost of achieving net zero.

Looking ahead, the use of ACCUs by Safeguard Mechanism facilities should remain unrestricted so that the scheme continues to encourage low-cost emissions reduction across the economy.

There is room to improve the Safeguard Mechanism

It does not cover some heavy industry emissions

While the Safeguard Mechanism is efficient, the 100,000 tonnes threshold creates an emissions policy gap. Facilities outside the scheme have limited or no incentive to reduce emissions, meaning they forego potential low-cost opportunities to reduce emissions; facilities covered by the scheme face a disproportionate burden.

Current carbon leakage provisions could make long-term emissions reduction harder

Carbon leakage occurs when the costs of complying with domestic policies drive businesses to shift emissions-intensive production to other countries. Either domestic producers relocate to jurisdictions with less stringent climate policies or they are outcompeted by imports from those jurisdictions.

The Australian Government reduces the risk of carbon leakage from Safeguard Mechanism facilities by giving some facilities ‘trade-exposed baseline-adjusted’ (TEBA) status. The decline rate that determines how these facilities’ baselines evolve is lower than the standard rate of 4.9 percentage points per year (DCCEEW 2025m); this reduces their compliance costs.

Over the long term, TEBA provisions will limit heavy industry’s ability to contribute to Australia’s emissions targets. To achieve our 2035 and 2050 emissions reduction targets, incentives to reduce emissions will need to get stronger over time, because the national emissions budget will get smaller. However, the TEBA system makes it harder to lower baselines and thus to strengthen incentives.

[7] Baselines are ‘production-adjusted’, meaning that they vary according to production levels. Each Safeguard Mechanism facility’s baseline is determined by taking its production level and multiplying this by an emissions intensity factor and an ‘emissions reduction contribution’ – the latter declining according to the baseline decline rate (DCCEEW 2025m).

Some policies potentially overlap

Several state and Australian government policies potentially overlap with the Safeguard Mechanism.

- The NSW Environment Protection Authority (EPA) has proposed that facilities holding an Environment Protection Licence, and with more than 25,000 tonnes of scope 1 *and* scope 2 CO_2-e per year must prepare climate change mitigation and adaptation plans (2025b, pp. 5–6).[8] NSW EPA guidelines indicate these plans should prioritise on-site abatement and NSW-based offsets, seek to reduce both scope 1 and scope 2 emissions, and take into account the NSW Government's emissions reduction goals (NSW EPA 2025a, pp. 15–18).
- The New South Wales Government provides grant funding to help high-emitting manufacturing and mining reduce their emissions (NSW Government 2025).
- The Queensland Government supports resources firms to reduce emissions through the Low Emissions Investment Partnerships grant program (Queensland Treasury 2025).
- The Australian Government's Hydrogen Production Tax Incentive provides production subsidies for renewable hydrogen fuel (ATO 2025a).

The extent to which these policies overlap the Safeguard Mechanism is not clear. Some may complement it because the facilities they support may be below the Safeguard Mechanism coverage threshold or because they create technology and adjustment benefits. In the case of Queensland, however, the program's 'initial focus' is mines that are Safeguard Mechanism facilities (Queensland Treasury 2025).

The Hydrogen Production Tax Incentive could be viewed as a near-term emissions-reduction policy. However, the Australian Government has emphasised the potential for the scheme to deliver learning-by-doing benefits (Treasury 2024, pp. 17–19), so it could also be justified on innovation grounds.

Improve incentives to reduce emissions in heavy industry

Lower the Safeguard Mechanism coverage threshold

The Australian Government should address the lack of coverage of smaller emitters by lowering the Safeguard Mechanism coverage threshold. By creating a broader base, a lower threshold would help reduce the cost of achieving Australia's emissions targets.

A new threshold of 25,000 tonnes of CO_2-e per year – a reasonable level, as discussed below – would meaningfully broaden the Mechanism. In 2023-24, 267 industrial facilities, most from heavy industry, emitted between 25,000 and 100,000 tonnes of CO_2-e per year (unpublished data from the Clean Energy Regulator). Collectively, they produced 13 megatonnes of CO_2-e emissions (table 1.1) – roughly equal to all annual emissions from the thermal coal sector (RepuTex Energy 2025, p. 17).

[8] Under the proposed guidelines, the regulations would apply to any facilities emitting over the 25,000 tonne threshold in any year over the previous three financial years (NSW EPA 2025b, p. 6).

Table 1.1 – Lowering the threshold would significantly increase emissions coverage

Industrial facilities emitting less than 100,000 tonnes of CO_2-e per year, 2023-24

	25,001–100,000 tonnes	50,001–100,000 tonnes	75,001–100,000 tonnes
Number of facilities in range	267	103	40
Emissions in range (megatonnes of CO_2-e)	13.0	7.3	3.5
Emissions in range as a share of national gross emissions (%)	2.5	1.4	0.7

The table includes facilities covered by the National Greenhouse and Energy Reporting scheme, except for grid-connected electricity facilities, facilities that produce legacy landfill emissions and facility aggregates.

Source: Unpublished data from the Clean Energy Regulator and PC calculations based on data from DCCEEW (2025i).

Lowering the threshold would not just bring in new facilities – it would also ensure that currently covered facilities retain emissions-reduction incentives once they drop below 100,000 tonnes of CO_2-e per year. When facilities start emitting at below-threshold levels, their incentives are diluted: they can continue to create SMCs for up to 10 years (DCCEEW 2025m), but they no longer need to buy credits. The need to preserve the emissions-reduction incentives of current facilities was noted by the Carbon Market Institute (qr. 53, pp. 2–3). Modelling commissioned by the PC suggests that 52 facilities could fall out of the scheme by 2035 if the 100,000 tonnes remains in place (RepuTex Energy 2025, p. 15).

The potential gross benefits from lowering the threshold (that is, before factoring in any additional administrative costs) could be substantial. Modelling commissioned by the PC shows that lowering the threshold to 25,000 tonnes of CO_2-e per year (while holding the total emissions abatement target constant) would decrease the average annual cost of abatement measures over the period 2031 to 2035 by about 10% (RepuTex Energy 2025, p. 21). For an emissions budget consistent with the economy-wide 2035 emissions reduction target, this would yield gross benefits of $914 million.[9]

The gross benefits from lowering the threshold are driven by opportunities for cheaper abatement in the newly captured facilities. By 2030 – the earliest point from which the Government should consider lowering the threshold – covered facilities will have already been encouraged to pursue their lower-cost, on-site emissions-reduction options. Facilities not currently covered would not yet have faced the same incentive. Spreading the emissions reduction task across more facilities reduces the total economy-wide cost.

Several inquiry participants expressed support for lowering the Safeguard Mechanism threshold or considering this option as part of the review of the scheme scheduled for 2026-27 (CMI, sub. 207, p. 4; CPD, sub. 188, p. 4; Fortescue, sub. 216, p. 3; QCC sub. 128, p. 3).

Lowering the coverage threshold would create administrative costs for newly included facilities. Inquiry participants argued that the Safeguard Mechanism can impose a significant compliance burden, in part because reporting must be done at the asset operator level, which may not neatly align with businesses' organisational and ownership structures (Origin Energy, sub. 215, p. 3; ATA, sub. 192, p. 16). Smaller companies may also have fewer resources to manage increased administrative and regulatory burden (AFPA, sub. 224, p. 4). However, if the threshold were set at 25,000 tonnes per year or more, the additional costs for newly included facilities may not be as high, since facilities emitting more than 25,000 tonnes of

[9] The modelling assumes new facilities immediately enter the scheme in 2031 and face the same emissions reduction contribution in 2031 as existing facilities. These are simplifying assumptions and may not represent actual policy implementation. Phasing in new facilities and adjusting the emissions reduction contribution they face would deliver similar benefits over a longer period. The $914 million saving is calculated using a 7% discount rate.

CO_2-e annually are already required to measure their emissions under the National Greenhouse and Energy Reporting Scheme (CER 2025).

A lower threshold could also create administrative costs for the Australian Government. New production variables would potentially need to be defined because a new threshold could bring in facilities in industries not currently covered (DCCEEW 2023, p. 10). The review of the Safeguard Mechanism should weigh these costs, and the administrative costs to industry, against the benefits of lowering the threshold.

The size of the potential gross benefits suggests there is a strong case for lowering the Safeguard Mechanism coverage threshold. The detail and timing of changes should be determined by the 2026-27 review, but the review should favour broadening the scheme as much as possible after 2030 to unlock the benefits of cheaper emissions reduction. The review should consider whether phasing in the inclusion of new facilities is warranted, as well as whether the lower threshold would introduce inefficiencies such as uneven coverage in certain industries. If the review identifies no major countervailing considerations, a reasonable new threshold would be 25,000 tonnes of CO_2-e per year.

The Australian Government should flag any changes to the coverage threshold well in advance. This would enable businesses to consider the impacts of the changes on investments they might be considering as part of plant investment cycles. Planned changes to the threshold should be flagged as soon as possible after the 2026-27 review is finished.

If a border carbon adjustment is introduced, phase out TEBA provisions where appropriate

The Carbon Leakage Review gives the Australian Government a chance to address the issues created by the TEBA system, at least in part. The review's most recent consultation paper noted that the risk of carbon leakage from imports could be addressed by a border carbon adjustment applied to imports (DCCEEW 2024a, p. 9). The adjustment would be applied to emissions-intensive imports from countries without equivalent domestic emissions-reduction policies that compete with output from Safeguard facilities.

An adjustment at the border, calibrated to match the emissions reduction incentives of the Safeguard Mechanism, would reduce the risk of carbon leakage. Overseas facilities in places without equivalent policies would only be able to succeed against domestic competitors by using cleaner technology. Similarly, domestic firms would have less incentive to send production offshore because they would still pay a carbon price at the border.

If a border carbon adjustment is introduced, the Australian Government should remove TEBA provisions for facilities that produce commodities covered by the policy (PC 2024b, p. 4). While the impacts were not modelled, this change would further widen the base of the Safeguard Mechanism and could be expected to reduce overall costs. TEBA provisions could be phased out, in line with the introduction of any border carbon adjustment, to help relevant facilities make an orderly transition. Several inquiry participants supported this approach (AGL Energy, sub. 231, p. 4; EY Australia, sub. 196, p. 5; Wesfarmers, sub. 274, p. 22).

Address any policy overlap

The NSW EPA requirements disproportionately incentivise abatement and offsets in New South Wales even if they may not be the most cost-effective forms of emissions reduction. If the Safeguard Mechanism threshold is lowered, these requirements should be removed as they would be duplicative.

Over time, policies that are warranted primarily because they support jurisdiction-specific emissions targets or technology development should either be merged into broad-based emissions-reduction incentives such as the Safeguard Mechanism or be discontinued. As outlined in the PC's paper setting out guardrails for

modern industry policy, policies that support technology development are only likely to be justified if they create local knowledge spillovers, support is proportionate and off ramps are built in (2025d, pp. 28–35).

Regular reviews of policies to improve technology development will help determine whether those technologies:

- are on a pathway to cost-effective emissions reduction and therefore will obtain the necessary commercial impetus from broad-based emissions-reduction incentives
- are not delivering on their ambition and are tying up resources that could be redeployed to more valuable uses.

Recommendation 1.2
The Safeguard Mechanism should cover more industrial facilities and carbon leakage provisions should be improved

The Australian Government should lower the Safeguard Mechanism threshold so that it covers more industrial facilities. The Safeguard Mechanism review scheduled for 2026-27 should determine the new threshold but favour broadening the scheme as much as possible. The review should also consider whether the lower threshold would introduce inefficiencies such as uneven coverage in some sectors and whether the inclusion of new facilities should be phased in. If the review identifies no major concerns, reducing the threshold from 100,000 tonnes to 25,000 tonnes of carbon dioxide equivalent per year would be reasonable.

If the Australian Government introduces a border carbon adjustment, it should phase out trade-exposed, baseline-adjusted status for Safeguard Mechanism facilities.

Fill gaps and eliminate overlaps in transport

Filling the emissions policy gap for heavy road transport

The transport sector was responsible for 19% of gross emissions in 2024-25 (DCCEEW 2025a, p. 18).

Most emissions from aviation and rail are captured under the Safeguard Mechanism (PC 2025g, p. 23), and the New Vehicle Efficiency Standard (NVES) will reduce emissions from light vehicles, but there is an emissions policy gap for heavy vehicles, which account for nearly a quarter of all transport emissions (table 1.2).

To address this gap, our interim report recommended that the Australian Government introduce an emissions-reduction incentive for heavy vehicles. This recommendation received broad support in submissions (PC 2025h, pp. 6–7).

Table 1.2 – Heavy vehicles account for a quarter of transport emissions

Share of transport emissions by vehicle type, 2024-25

	Planes	Trains	Automobiles		Other
			Light	Heavy	
Share of sector emissions (%)	10	4	60	23	3

'Other' includes motorcycles, domestic navigation and other transportation.

Source: DCCEEW (2025a, p. 52).

Reducing heavy vehicle emissions will need action on multiple fronts, and different policies create different incentives

The *Net Zero Plan* highlighted electrification as the major abatement opportunity for heavy vehicles, complemented by use of low-carbon liquid fuels (LCLFs) or hydrogen where electrification is not feasible (DCCEEW 2025b, p. 121). Battery swapping and range extending technologies, along with productivity and efficiency improvements, will also have roles to play (DITRDCSA 2025a, p. 28).

Given the range of potential approaches to abating emissions from heavy transport, it is important that the emissions-reduction incentive facing the sector is technology neutral. That is, it is important the incentive avoids biasing toward particular ways of reducing emissions, which risks inefficient market outcomes over time. A technology-neutral policy that lets heavy vehicle operators reduce emissions in the way that best suits their circumstances will support least-cost decarbonisation. Ampol submitted that 'this flexibility is recommended to ensure that all viable technologies, whether emerging or established, are given equal opportunity to contribute to emissions reduction' (sub. 283, p. 2).

Developing new technologies or rolling out established ones to reduce heavy vehicle emissions may require regulatory changes or some form of policy support, which should be implemented as a package with appropriate phasing. For example, it will be important to ensure that regulations and infrastructure are not a barrier to the adoption of zero-emission heavy vehicles. In November 2025, Treasurers updated the National Competition Policy Federation Funding Agreement Schedule to include 'heavy vehicle reforms to boost productivity and increase the uptake of electric heavy vehicles' (Chalmers 2025b). The PC has been commissioned to provide advice on a heavy vehicle reform package that aims to support the uptake of zero-emission heavy vehicles through measures including changes to mass limits and curfews, and removing barriers to the availability of charging infrastructure (PC 2025f, pp. 11–12). These and other changes will be needed to complement an emissions-reduction policy.

Our interim report identified five policy options to incentivise emissions reductions in heavy road transport:

1. including a carbon component in a future road user charging scheme
2. applying the Safeguard Mechanism to fuel wholesalers' downstream emissions
3. increasing the rate of fuel excise paid by users of heavy vehicles
4. a targeted policy for LCLFs
5. a targeted policy for low-emissions vehicles.

The options vary in how they would drive decarbonisation, with some more technology neutral than others, and they have different advantages and disadvantages, including in relation to implementation (table 1.3).

Options 1 through 4 have several commonalities. Each of these options:

- could allow surrender of ACCUs (or SMCs, under option 2) as a compliance pathway. Expanding demand in carbon markets would require phasing to avoid contributing to 'boom–bust' dynamics (EY Net Zero Centre 2025, p. 49)
- would require LCLF Guarantee of Origin (GO) certificates. The Australian Government has already indicated the GO Scheme will be expanded to LCLFs (DCCEEW 2025e)
- would require modifying the Safeguard Mechanism to avoid double counting of emissions
- would introduce an operational incentive, but not a purchase incentive. Compared with the light vehicles segment, operational incentives may be more effective for heavy vehicles because heavy vehicle buyers are more sensitive to changes in ongoing use and ownership costs.

Considering the advantages and disadvantages of each option, the PC proposes a gradual increase in the rate of fuel excise paid by heavy vehicles (option 3). This change would incentivise all emissions-reduction pathways and

draw on existing regulatory architecture. While taxes on business inputs are generally considered economically inefficient, there is a 'well-known exception … for goods that generate externalities and therefore justify corrective, Pigovian taxes or subsidies' (Mankiw et al. 2009, p. 17). Carbon-based fuel is such a good.

Several submissions supported introducing a targeted policy for LCLFs, often in the form of a low-carbon fuel standard (LCFS) and possibly as part of a suite of policies.[10] While some policy support for LCLFs may be warranted, using an LCFS to incentivise emissions reduction throughout the heavy vehicle sector would be inconsistent with least-cost decarbonisation (box 1.1).

Table 1.3 – Not all policies are created equal

Advantages and disadvantages of different emissions policies for heavy vehicles

Option 1: Include a carbon component in a future road user charging scheme

- This option would involve levying a charge on heavy vehicle operators to reflect their carbon emissions.
- It will likely never be feasible to directly monitor individual vehicles' emissions or fuel use, so their emissions would need to be estimated based on distance travelled and a model-specific emissions factor.
- Using LCLFs or purchasing ACCUs should in principle allow operators to reduce their liability, but to do this they would need to be able to surrender LCLF GO certificates or ACCUs as a compliance pathway. Options to comply via arrangements through retailers would be important to reduce the substantial administrative burden that could arise if this was the responsibility of thousands of operators.
- This option would be contingent on the future development of a road user charging scheme.

Option 2: Apply the Safeguard Mechanism to fuel wholesalers

- Under this option, fuel wholesalers would be subject to the Safeguard Mechanism based on the emissions associated with downstream use of the fuel that they supply.
- This option would leverage existing regulatory architecture but would bias toward LCLF use because wholesalers' only way of reducing downstream emissions is reducing the emissions intensity of fuel they sell.
- Without additional administrative complexity, it would not be possible to differentiate between fuel used in on-road heavy vehicles and other fuel uses, including in light vehicles.
- Fuel wholesalers could surrender LCLF GO certificates, SMCs or ACCUs where they represented a lower-cost abatement option.

Option 3: Increase the rate of fuel excise paid by users of heavy vehicles

- This option would involve increasing fuel excise rates or restricting access to fuel tax credits.
- This option can incentivise all decarbonisation pathways, making this option technology neutral.
- This option would leverage existing regulatory architecture.
- Fuel wholesalers could surrender LCLF GO certificates or ACCUs where they represented a lower-cost abatement option.

Option 4: A targeted policy for low-carbon liquid fuels

- Supply- or demand-side measures could be employed to increase use of LCLFs.
- In either case, this option biases toward LCLF use as an emissions-reduction pathway.
- If applied as a low-carbon fuel standard, fuel wholesalers could surrender LCLF GO certificates or ACCUs where they represented a lower-cost abatement option

[10] For example: ACCI (sub. 197, p. 3), ALRTA (sub. 249, p. 3), ARA (sub. 160, p. 7), AFPA (sub. 224, p. 5), Australia Post (sub. 155, p. 2), BCA (sub. 229, p. 5), bp Australia (sub. 200, p. 3), CMI (sub. 207, p. 5), EFF (sub. 238, p. 2), NatRoad (sub. 164, p. 4).

- A variant of this type of policy would also provide credits for actions that reduce emissions other than use of LCLFs. California's LCFS, for example, provides credits for electric vehicle (EV) charging and use of hydrogen (California Air Resources Board 2025). This makes the policy more technology neutral, but at the cost of administrative complexity.

Option 5: A targeted policy for low-emissions vehicles

- This could take the form of a heavy vehicle-equivalent of the NVES or a subsidy for the purchase of electric or lower-emission vehicles.
- Unlike the other options considered here, this would create no operational incentive to reduce emissions.
- Developing such a policy could take up to 10 years based on international experience (NatRoad, sub. 164, p. 4).

Box 1.1 – Should Australia introduce a low-carbon fuel standard?

A low-carbon fuel standard would be a costly and technologically prescriptive way of reducing heavy vehicle emissions.

The Australian Institute of Petroleum submitted that replacing fossil diesel with renewable diesel would entail marginal abatement costs of $630 to $740/tonne (sub. 58, p. 14). This high cost of abatement is due to both the cost of LCLFs, and the fact that the emissions intensity of renewable diesel is 19–43% that of fossil diesel.

By increasing the cost of fuel, an LCFS would indirectly encourage electrification, but in a costly and inefficient way. In contrast to a carbon charge, which prices every tonne of carbon emissions and ensures the cheapest ways to reduce emissions are taken up first, an LCFS would subsidise the use of LCLFs, which still produce carbon emissions. An LCFS can be made more technology-neutral – for example, California's LCFS credits EV charging and use of hydrogen – but this brings additional administrative complexity.

Australia will likely need to scale up use of LCLFs in hard-to-electrify parts of heavy road transport. Specific policies towards LCLFs should largely be evaluated in the context of technology policies to assist in reaching national emissions objectives, rather than providing the ongoing decarbonisation incentive for the sector. In this vein, EY Australia submitted that a policy targeting LCLFs would:

> appear to provide complementary transitional support for technology deployment and external economies of scale. While a case can be made for these measures, they should not be considered as an alternative to the more foundational measures canvassed under Options 1, 2 and 3. (Sub. 196, p. 5).

Support for emerging technologies can potentially be justified on the basis of lowering long-term costs or addressing market failures (for example, where local knowledge spillovers lead to inefficiently low investment). But support should be proportionate and include clear exit strategies (PC 2025d, p. 28).

Any policy aimed at scaling up LCLF use would need to carefully explore the inter-relationships between different use cases for LCLFs, for example the impact on supply chains and demand for bioenergy resources. The *Transport and infrastructure net zero roadmap and action plan* stated that sustainable aviation fuel (SAF) 'is the primary pathway to decarbonise aviation' (DITRDCSA 2025a, p. 34, emphasis removed) and Sydney Airport submitted that 'with no scalable short-term alternative to liquid fuels, [sustainable aviation fuels are] vital to supporting decarbonisation in the aviation sector' (sub. 89, p. 1).

These and other matters will need to be considered as part of the regulatory impact analysis of the cost and benefits of potential demand-side measures for LCLFs (DITRDCSA and DCCEEW 2024, p. 13), which should specifically address the considerations outlined in the PC's guardrails for modern industry policy research paper (2025d).

Increase the effective rate of fuel excise to create a technology-neutral incentive targeting emissions from on-road heavy vehicle use

Several submissions supported some version of option 3 and some highlighted how access to fuel tax credits (FTCs) dulls emissions-reduction incentives.[11] The Australian Trucking Association submitted that if option 3 is pursued, it should be done by reducing the value of FTCs (ATA, sub. 192, p. 14).[12]

Many of these submissions focused on access to FTCs for off-road use, particularly in the mining sector. While this sector is the largest claimant of FTCs (ATO 2025b, excise - table 4), around 90% of its emissions are captured under the Safeguard Mechanism.[13] That is, the vast majority of the sector already faces an emissions-reduction incentive. Fortescue (sub. 216, p. 9) submitted that access to FTCs for off-road use 'completely undermines' the Safeguard Mechanism, but the strength of the Safeguard Mechanism should be addressed through changes to the Safeguard Mechanism rather than via creation of overlapping incentives. Safeguard Mechanism policy settings will be considered as part of the 2026-27 review.

For off-road fuel use that is not covered by the Safeguard Mechanism – including in agriculture – there are policy gaps that will need to be filled, and this should be done in the context of sectoral emissions reduction strategies, according to the principles outlined below in relation to recommendation 1.4. The PC's recommendation is restricted to on-road heavy vehicle use.

Phase out access to FTCs for on-road heavy vehicle use

There are multiple ways to increase the effective rate of fuel excise, but only one that would directly address the on-road heavy vehicles emissions policy gap with minimal overlap.

- Increasing fuel excise rates would not impact on-road heavy vehicle users. FTCs are calculated by subtracting the heavy vehicle road user charge (RUC) from the rate of fuel excise: an increase in the rate of excise is 'cancelled out' by a parallel increase in the value of heavy vehicle operators' FTCs. Increasing fuel excise rates would, however, directly impact other buyers of fuel, including light vehicle owners.
- Introducing a carbon charge on fuels using the current fuel excise system would not discriminate between on-road heavy vehicle operators and other users of diesel, including light vehicles. (This option is discussed further below in the context of road user charging reforms.)
- Several submissions supported the Climate Energy Finance proposal to cap FTC claims at $50 million per annum per consolidated corporate entity (Pollard and Buckley 2025). This would impact the biggest claimants of FTCs, many of whom are likely already subject to the Safeguard Mechanism, but it would create no new emissions-reduction incentive for most on-road heavy vehicles.

Phasing out access to FTCs for on-road heavy vehicle users would directly target the identified emissions policy gap. And this change would be relatively simple administratively because the fuel excise system already treats on-road heavy vehicles in a bespoke way through the heavy vehicle RUC.

[11] For example: ANMF (sub. 184, p. 6), ACTU (sub. 266, p. 7), EFF (sub. 238, p. 2), EY Australia (sub. 196, p. 5), Fortescue (sub. 216, pp. 6–9), Office of Kate Chaney (sub. 141, p. 12), SEC (sub. 117, pp. 2–3).

[12] Option 3 is not the ATA's preferred policy for reducing heavy vehicle emissions. Their preferred approach would include a voucher program for electric and green hydrogen-fuelled trucks, an LCFS and regulatory and infrastructure changes to address road access issues for high productivity and low emission vehicles (sub. 192, p. 1). But the ATA does provide suggestions on how option 3 should be implemented *if* it is pursued. Their suggestion to reduce the value of FTCs aligns with recommendation 1.3. Their suggestions that the value of FTCs should be reduced for both on- and off-road uses and that the reduction should align with the value of ACCUs does not align with recommendation 1.3 (sub. 192, p. 14).

[13] This would increase to around 98% if the Safeguard Mechanism threshold were reduced to 25,000 tonnes (PC estimates based on unpublished CER data).

For 2025-26, the excise rate on diesel is 51.6c/litre and the heavy vehicle RUC is 32.4c/litre, so on-road heavy vehicle users can claim FTCs worth 19.2c/litre. They end up effectively paying a reduced rate of fuel excise equal to the heavy vehicle RUC.

Our interim report noted that the heavy vehicle RUC provides an 'incidental, limited incentive' to reduce emissions (PC 2025g, p. 23). The incentive is incidental, in that the heavy vehicle RUC, along with registration fees, is intended to ensure heavy vehicle users are charged for the construction and maintenance costs created by their road use, not to incentivise emissions reduction (NTC 2025, p. 2). The incentive is limited in that it is too low. Heavy vehicles operating on public roads damage roads and produce carbon emissions – they currently only face a price for the former.

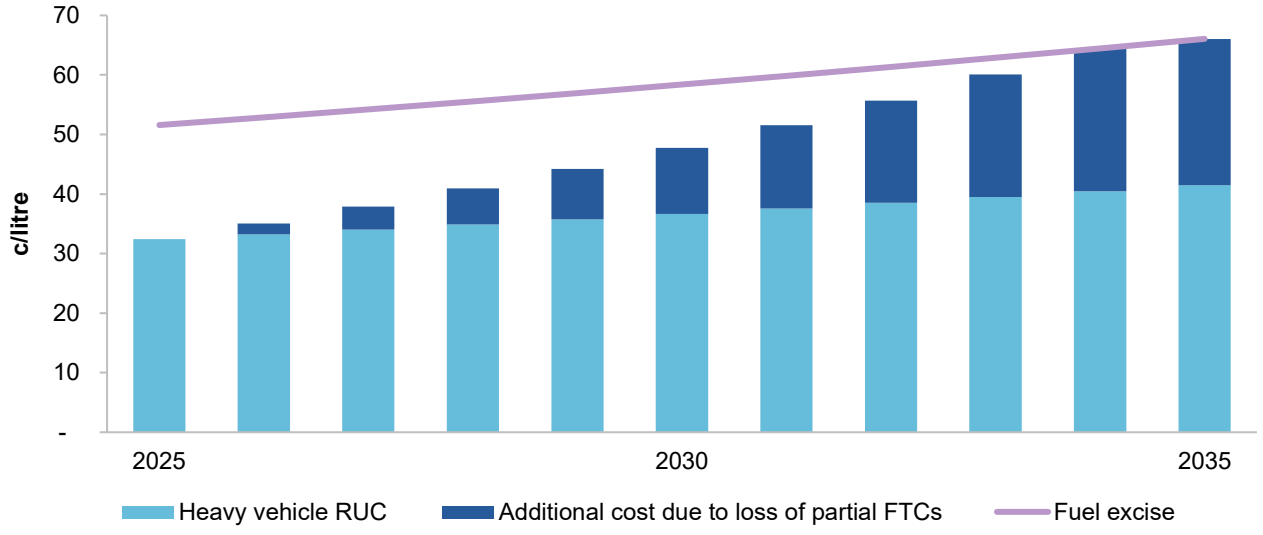
Implementation, phasing and complementary policy

The reduction in the value of FTCs for on-road heavy vehicle use should be phased in over a number of years, and be based on the emissions intensity of diesel and a target-consistent carbon value (TCCV, recommendation 1.4).

Figure 1.1 shows what a 10-year phase-in might look like. The starting point and growth rate of TCCVs underpinning the figure align broadly with the marginal abatement incentives in Treasury modelling to support the *Net Zero Plan* (Treasury 2025, p. 17). Under this scenario, on-road heavy vehicle users would pay the full rate of fuel excise from 2034.[14] It is assumed that the value of FTCs cannot go below zero.

Figure 1.1 – Under our proposal, on-road heavy vehicles would end up paying the full value of fuel excise

Stylised projection of a phased-in reduction in the value of FTCs claimable for on-road heavy vehicle use



The figure is based on the following assumptions: TCCV starts at \$65/t CO_2-e in 2025 and grows at 5%, heavy vehicle RUC starts at 32.4c/litre and grows at 2.5%, fuel excise starts at 51.6c/litre and grows at 2.5%. The additional cost due to loss of partial FTCs in each year is calculated by multiplying the emissions intensity of diesel (0.00268/t CO_2-e) by the relevant year's TCCV and a phase-in factor. The phase-in factor goes up by 10 percentage points each year, starting at zero (that is, the change phases in over 10 years under these settings).

[14] Unless heavy vehicle users want to claim FTCs for powering auxiliary equipment, they would no longer need to make FTC claims at all, reducing administrative burden.

Removing FTCs for on-road heavy vehicle use would have a modest impact on households. The Grattan Institute previously recommended removing FTCs for on-road heavy vehicle use and reducing the value of off-road FTCs, and estimated these changes would increase supermarket prices by 0.35% (Terrill et al. 2023, p. 4). The changes recommended here are less extensive so would likely have a smaller impact.

Governments will need to implement a range of complementary measures to ensure that heavy vehicle operators can access the technologies and infrastructure needed to reduce emissions. NatRoad submitted that 'policy and incentives need to target specific barriers and market failures, of which there are several that are slowing decarbonisation of heavy vehicles' (sub. 164, p. 3). Submissions highlighted a range of measures that governments may need to consider.

- The ALC recommend 'early, targeted investment in charging and refuelling infrastructure along priority freight corridors' (sub. 95, p. 2). The Queensland Farmers Federation recommend such investment too, 'with clear commitments to accessibility for rural communities' (sub. 91, p. 6).
- The ATA submitted that improving road access for high productivity and zero emissions vehicles could reduce emissions by 13.3 million tonnes CO_2-e between 2026 and 2050 (sub. 192, p. 8).
- Western Sydney University Urban Transformations Research Centre submitted that governments should publish a corridor infrastructure plan 'mandating minimum heavy-duty charging and hydrogen refuelling on priority freight routes, synchronised with grid upgrades and planning reforms' (sub. 48, p. 3). The Energy Futures Foundation recommended designating 'Green Freight Corridors' as 'nationally significant infrastructure under a coherent National Charging and Refuelling Plan, unlocking federal coordination for charging hubs, mass/dimension allowances, and streamlined grid connections' (sub. 238, p. 3).

The 2026 review of the National Electric Vehicle Strategy is one place to address these broader issues for heavy vehicles. The first strategy, released in 2023, rightly focused on light vehicles given their contribution to emissions but it would be timely for government to update the strategy to focus on heavy vehicles.

Future reforms to road user charging should keep emissions reduction in mind

Removing access to FTCs for on-road heavy vehicle use would create a stronger emissions-reduction incentive than the status quo but it is also limited. The emissions-reduction incentive would never be greater than the difference between fuel excise and the heavy vehicle RUC.

Nevertheless, reducing on-road heavy vehicles' access to FTCs would be an administratively straightforward and technology neutral way to directly target a large source of emissions.

If road user charging is reformed, however, this would be an opportunity to introduce more enduring and broad-based emissions-reduction incentives for all vehicles.

Momentum has been building to reform road user charging, for both heavy and light vehicles. The National Heavy Vehicle Charging Pilot completed phase 3 trials in 2024 (DITRDCSA 2025b). And Treasurers have agreed to 'A statement to guide further work on a road user charge for electric vehicles' (Chalmers 2025b). As this work progresses, governments should ensure road users face an emissions-reduction incentive that reflects the emissions associated with using fossil fuels.

A RUC could include a carbon component, and this is one of the options we considered for creating an emissions-reduction incentive for heavy vehicles. However, recapping table 1.3, including a carbon component in a RUC would need to address implementation challenges associated with measuring or imputing the amount and emissions intensity of fuel used by different vehicles.

Alternatively, the fuel excise system could be reformed to target emissions. It can fairly be said that 'the current tangle of fuel excise, fuel tax credits and the virtual road user charge for heavy vehicles comes from a century of patch-ups' (Willox 2025). Excise rates are not currently based on different fuels' emissions

intensities, and the system's credits and remissions are similarly unrelated to the emissions impact of fuel use. But with a separate, dedicated road user charging system in place, fuel excise settings could be simplified and adjusted to create a broad and consistent emissions-reduction incentive.

Phase out EV subsidies and assess settings for light vehicles

Several policies aim to incentivise the uptake of light EVs. Zero-emissions cars are exempt from fringe benefits tax (FBT) (ATO 2024). Some EV owners in the Northern Territory receive stamp duty discounts (NT Government 2025). Some state and territory governments also provide registration discounts (NT Government 2025; VicRoads 2024). As of 2025, the supply of low-emissions light vehicles is promoted through the New Vehicle Efficiency Standard (NVES).

NVES is an efficient policy

Under the NVES, importers of new passenger cars and light commercial vehicles must ensure that the vehicles they supply on average meet certain emissions intensity standards. In 2025, a supplier's fleet of:

- 'Type 1' vehicles must emit no more than 141 grams of carbon dioxide per kilometre on average
- 'Type 2' vehicles must emit no more than 210 grams of carbon dioxide per kilometre on average.[15]

The standards become more stringent over time and currently have been set until 2029.

Suppliers have flexibility in how they can comply. Those whose fleets are more emissions-intensive than the relevant standard can meet their obligations by buying credits – 'units' – from those whose fleets beat the standard (NVES Regulator 2025). This mechanism gives suppliers an incentive to improve the availability and relative price of low-emissions vehicles.

As a market-based mechanism, the NVES is efficient. Compared with EV-specific subsidies, the NVES incentivises a broader set of emissions-reduction options. Vehicle suppliers can meet the standard not just by selling EVs, but also by selling cleaner fossil-fuelled cars.

Current NVES limits will speed up electrification of the light vehicle fleet. Modelling by Net Zero Australia indicates that if NVES limits continue to decline to 0 g CO_2/km by 2050 (which is much slower than the current decline rate), the NVES will reduce emissions from light vehicles at a rate close to a least cost net zero by 2050 pathway (Net Zero Australia 2025a, p. 23, 2025b, p. 26).

Costly and inefficient EV incentives should be phased out

Inquiry participants have argued that the FBT exemption is an effective measure to increase EV uptake because it directly impacts demand and yields other benefits besides reducing emissions. For example, a joint submission by AFIA, the EVC and NALSPA argued that the FBT exemption significantly increased EV uptake, contributed to lower air and noise pollution and created fuel cost savings for EV purchasers (sub. 111, pp. 20–23, 30–33). Origin Energy submitted that it is important the FBT exemption is not removed prematurely, and that support should for EVs should continue until they are 'cost competitive with the wider market, as well as to accelerate the rollout to align with targets' (sub. 215, p. 3).

While the exemption may increase EV uptake and have other co-benefits, it is unlikely to be the most cost-effective way of achieving those outcomes. Previous work by the PC estimated that the FBT exemption likely costs Australian taxpayers between about $1,000 and $20,000 per tonne of avoided CO_2-e and that state and

[15] *New Vehicle Efficiency Standard Act 2024*, s. 22. Type 1 vehicles are most passenger car models, while Type 2 vehicles are light commercial vehicles and some passenger cars (NVES Regulator 2025b).

territory EV subsidies have relatively high fiscal costs as well (2023a, p. 14). In addition, the exemption only benefits people who can access salary packaging or novated leases, incentivises more expensive car purchases (up to the exemption's threshold of around $90,000) and does not provide an equal benefit to consumers based on emissions reduction. These factors make the exemption more likely to be distortionary, since it rewards consumers for factors unrelated to the exemption's policy goals. Other policies that increase EV uptake, such as the NVES, are also likely to create similar co-benefits, such as reduced air pollution and noise.

Several state and territory governments have already eliminated EV purchase incentives. For example, the Queensland Government (2025b) wound up its rebate scheme for EV buyers in 2024, and the ACT Government significantly scaled back stamp duty discounts in September 2025 (ACT Revenue Office 2025).

Light vehicle policy settings should be assessed to ensure alignment with emissions targets

The 2026 review of the NVES should seek to ensure that the standard is calibrated to align with the Australian Government's emissions reduction targets. To achieve alignment, the review may need to consider ways to strengthen the NVES, such as by setting lower emissions intensity limits. The NVES could also set a single limit for both Type 1 and Type 2 vehicles, to reduce incentives for entities to sell more Type 2 vehicles (which are more emissions-intensive). Importantly, to decarbonise the light vehicle fleet, governments should seek to build on the NVES in the first instance.

The Australian Government may consider that stronger near-term incentives in the light vehicle sector are required to achieve its emissions reduction targets. In such a scenario, other policy levers may be needed to increase EV uptake in the near term if the FBT exemption is removed (because the NVES' emissions intensity standards have been set until 2029). If so, the Australian Government should assess what measures would align with the target at least cost abatement and benchmark them against target-consistent carbon values (recommendation 1.4), and also assess them against broader policy criteria, including efficiency, simplicity, and distributional impacts. Any further support should account for the extent to which existing policy settings incentivise EV uptake, such as the impact of the fuel excise, and ensure that regulatory settings facilitate the deployment of charging infrastructure.[16]

Consider changing tax exemptions for 'commercial vehicles'

Some inquiry participants argued that luxury car tax (LCT) and FBT exemptions for 'commercial vehicles' contribute to higher light vehicle emissions since vehicles eligible for the exemptions tend to be more emissions-intensive (Dr Anna Mortimore, sub. 199, p. 10; Streets People Love Hobart, sub. 127, p. 4). In the case of the LCT, these vehicles are not always used for commercial use (but fit into the 'commercial vehicle' category due to their size and potential payload). For example, someone purchasing a $100,000 EV would incur approximately an additional $2,600 in LCT relative to a similarly priced 'commercial vehicle'.

The LCT is a higher-cost and less efficient method of raising revenue than more broadly based taxes, and the PC has previously recommended considering removing the tax altogether (PC 2014, p. 168). Emissions considerations could further reinforce this finding. For example, exemptions for vehicles classed as 'commercial' could distort markets in the direction of purchasing emissions-intensive cars.

[16] The Australian Government has already undertaken multiple initiatives to increase the availability of charging infrastructure, including committing $40 million to accelerate rollout of kerbside and fast charging (DITRDCSA 2025a, p. 9). Increasing the charging infrastructure available would reduce anxiety that EVs may have limited travel distance ('range anxiety'), which is one of the key barriers to EV uptake (CCA 2023b, p. 2; CPRC 2022, p. 10).

The Australian Government should review whether LCT and FBT exemptions for 'commercial vehicles' should be maintained.

Recommendation 1.3
Phase out fuel tax credits for on-road heavy vehicle use; phase out EV subsidies

To address the emissions policy gap in on-road heavy vehicle use, the Australian Government should phase out access to fuel tax credits for fuel used in heavy vehicles travelling on public roads. To avoid policy overlap, access should be retained for Safeguard Mechanism facilities.

At the same time, government should work with the heavy vehicle sector to ensure regulatory arrangements and infrastructure support least-cost decarbonisation. This will mainly mean ensuring regulations and infrastructure are not a barrier to the adoption of zero-emission heavy vehicles.

The Australian Government should phase out the exemption of electric vehicles from the fringe benefits tax, and state and territory governments should phase out the exemption of electric vehicles from vehicle stamp duty and registration discounts.

The Australian Government should also assess the suite of policies that would most cost-effectively support emissions reduction in the light vehicle sector. This should include reviewing the merits of exempting 'commercial vehicles' from fringe benefits tax and the luxury car tax.

Assess and align policies against a benchmark

If Australia is to achieve net zero at the lowest possible cost, governments will need to rigorously assess the cost-effectiveness of policies and make sure they are consistent with an efficient pathway to reduce emissions. This will require:

- an agreed common benchmark for the cost-effectiveness of emissions-reduction policies
- assessing existing and new emissions-reduction policies against this benchmark
- publishing cost-effectiveness assessments to support transparency
- calibrating policies over time, where possible, to broadly align with the benchmark
- other measures to harmonise emissions-reduction incentives across sectors, including the integration of ACCUs into national policies.

Agree on a benchmark

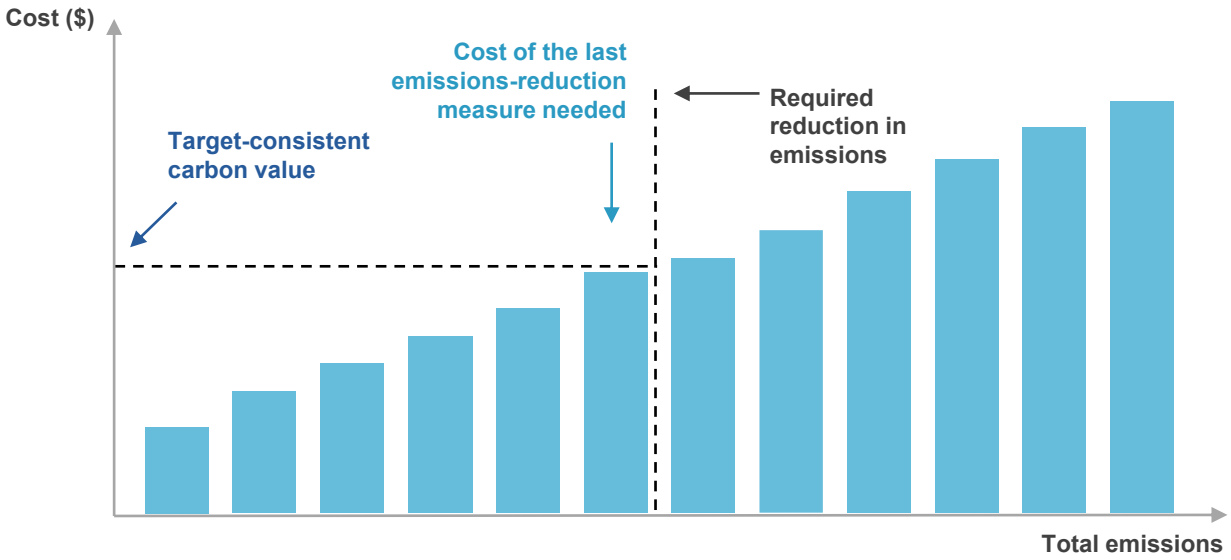
Use target-consistent carbon values

The Australian Government should task an independent agency to develop a cost-effectiveness benchmark to be used in the design and assessment of emissions-reduction policies. The AEMC highlighted that a uniform value of emissions reduction across the economy could contribute to 'making more efficient, least-cost decisions' (sub. 30, p. 2). National target-consistent carbon values (TCCVs) would serve this purpose. Many inquiry participants supported developing TCCVs to promote lower-cost, effective emissions reduction (AIGN, sub. 220, pp. 6–7; CMI, sub. 207, p. 5; Fortescue, sub. 216, p. 13; Infrastructure Partnerships Australia, sub. 135, p. 5).

TCCVs provide a guide to a country's efficient emissions-reduction pathway. They are estimates of the implied carbon prices needed to meet emissions targets and are determined using information about potential opportunities to reduce emissions in the economy.[17] TCCVs are calculated by modelling the prices per tonne of CO_2-e needed to reach particular targets in particular periods, assuming that the prices are paid by all emitters (Stern et al. 2022, pp. 11–12). Each value equals the cost of the last measure necessary (that is, the marginal cost) to achieve a certain reduction in emissions at a certain point in time (figure 1.2). Policies that apply over a long period can be benchmarked against future point-in-time TCCV estimates.

Figure 1.2 – A TCCV is the marginal cost of achieving an emissions target at a given point in time

Hypothetical intersection of an emissions target and a marginal abatement cost curve



A marginal abatement cost curve represents the set of available options to reduce emissions and the cost of each. Each column signifies one emissions-reduction option, and the sum of the widths of a set of columns represents an aggregate reduction in emissions.

Source: Adapted from Deloitte Touche Tohmatsu (2024, pp. 7–8).

TCCVs rise over time. This reflects the rising marginal cost of reducing emissions as emitters first exploit cheaper options before moving to more expensive ones to meet more stringent targets.

An alternative to the 'target-consistent' approach would be to base policy decisions on the social cost of carbon (SCC), a term that refers to the dollar value of the damage caused by climate change. Some analysts favour a SCC-based approach over a target-consistent one. For example, Aldy et al. (2021, pp. 851–852) have argued that targets are arbitrary political decisions and that governments should simply compare policies' costs and benefits, with benefits measured using an estimate of the SCC.

Nonetheless, the Australian Government's targets represent commitments made in international climate change negotiations. They are based on a range of factors, including climate science, the necessity of

[17] This is distinct from the value of emissions reduction developed by the Australian Energy Regulator, which is specific to the electricity sector and partly based on ACCU prices, not the abatement required to achieve Australian emissions reduction targets (AER 2024).

sharing the emissions-reduction burden globally and the state of international co-operation. TCCVs provide a foundation for, and would support, the achievement of Australia's agreed targets at the lowest possible cost.

Lean on existing modelling

TCCVs should be developed by an agency with relevant expertise, such as the PC or the CCA, in consultation with other relevant government agencies. The agency should be adequately resourced to develop and periodically update TCCVs.

Calculating TCCVs involves uncertainty and can be challenging. It requires assumptions about the costs of reducing emissions many years into the future. And some inquiry participants noted that while TCCVs can provide an important benchmark, it can be difficult to calculate TCCVs that are based on real abatement costs, as those costs are typically sector- and site-specific (Bluescope, sub. 134, p. 12; QFF, sub. 91, p. 6). bp Australia submitted that 'governments should not delay the implementation of [emissions-reduction policies] while they seek to establish the "correct" carbon values' (sub. 200, p. 4).

To streamline implementation, TCCVs could initially be based on marginal abatement incentives estimated by Treasury to support the *Net Zero Plan*, before transitioning to estimates produced by an independent agency. These marginal abatement incentives represent the most expensive abatement options taken up at different times to achieve emissions reductions consistent with Australian Government targets (Treasury 2025, p. 17). They are functionally equivalent to TCCVs. The values were estimated using whole-of-economy modelling and are suitable for cross-sectoral use. Adopting Treasury's estimated incentives as TCCVs in the short term would reduce the cost of implementing this recommendation and help ensure a benchmark is readily available for policy design and evaluation.

To account for uncertainty about future costs, the agency responsible for calculating TCCVs should conduct sensitivity analyses. The estimates should also be updated every few years as more information comes to light about likely future emission-reduction costs and as new interim targets are announced. When estimates are updated, the agency responsible for calculating TCCVs should consult closely with industry, other government agencies and relevant experts, particularly to provide feedback on the sector- and site-specific abatement costs used to calculate TCCVs. Updates to the TCCVs could also be informed by similar exercises conducted by other agencies (such as Infrastructure Australia and the NSW Government).

Estimate policies' cost-effectiveness and assess them against the benchmark

Estimating cost-effectiveness should be a standard part of the impact analysis process for major new emissions-reduction policies. The Australian Government should require that all significant new emissions-reduction policies are accompanied by a published cost-effectiveness estimate that clearly identifies:

- the costs created by the policy, such as those associated with switching from emissions-intensive activities to clean ones, as well as any fiscal costs
- the reduction in emissions that the policy will deliver
- any benefits created beyond emissions reduction, such as innovation spillovers, fuel cost savings and, in the case of electricity, reliability benefits.[18]

[18] The PC's report on *Creating a more dynamic and resilient economy* proposed enhancements to the Australian Government's impact analysis process (PC 2025b).

State and territory governments should also require that major new emissions-reduction policies are accompanied by cost-effectiveness estimates. Benchmarking all policies against a national TCCV would help incentivise emissions reduction where it is most efficient.

To support this benchmarking, the Office of Impact Assessment (OIA) could create a document with guidance on how to conduct cost-effectiveness analyses of emissions-reduction policies. Similar documents exist in other policy areas – for example, the OIA (2024) has a guide to valuing lives saved by policy interventions. Equivalent state and territory bodies could create similar documents or refer officials to the OIA document. Ideally, any OIA guidance on these matters would be of value to all levels of government.

For existing policies, periodic reviews provide opportunities to assess these policies against the benchmarks (PC 2025c). Information on actual costs, avoided emissions and other benefits could be used to create cost-effectiveness estimates to compare with TCCVs. The 2026-27 Safeguard Mechanism review should undertake one of these assessments, for example.

The national TCCVs should also be used in accountability reporting. Several government agencies monitor, or will monitor, efforts to reduce emissions and report their findings. For example, the CCA publishes Annual Progress Reports that inform the Australian Government's annual climate change statement. It would be valuable, in work such as this, to assess policies against the TCCVs.

Calibrate policies to broadly align with the benchmark

Over time, governments should calibrate policy settings so that policies' costs of achieving emissions reduction are broadly aligned with the national TCCVs. In general, policies should not drive emissions-reduction options that cost more than the prevailing TCCV (though there are exceptions, discussed below).[19] This will help Australia achieve net zero via a lower-cost combination of emissions-reduction options.

The TCCVs should inform the design of both existing and new policies. For example:

- in the next few years, the Australian Government will need to set emissions intensity standards for the NVES for the post-2030 period. This should be guided by the national TCCVs (recommendation 1.3). That is, the standards should be set so that the expected per-tonne costs associated with the NVES do not exceed the national TCCVs in the relevant years. The penalty for not meeting emissions limits should be calibrated to the TCCV. Future costs are uncertain and depend on factors like the relative prices of petrol and electricity, the relative costs of producing various car models and the roll-out of EV charging infrastructure. But even if it is a rough exercise, reference to the TCCVs would help avoid setting standards that are significantly misaligned with Australia's least-cost emissions-reduction pathway
- if the Australian Government reduces access to FTCs for on-road heavy vehicle use, it should do so in line with national TCCVs (recommendation 1.3). That is, the reduction in the value of the FTCs should be based on the emissions intensity of fuel and the prevailing TCCV value.

To meet targets, some policies will need to be more expensive than TCCV benchmarks. TCCVs are calculated on the assumption that all low-cost abatement options are exploited, but since there are gaps in emissions-reduction incentives – like the ones discussed in this report – some low-cost options will not be taken up. To achieve Australia's emissions targets, governments will therefore need to deliver some reductions in emissions that are costlier than the estimated TCCVs.

[19] Many policies are likely to have costs well below national TCCVs, such as policies that incentivise improvements in energy efficiency (McKinsey & Company 2008, p. 14).

Policies that achieve emissions reductions at higher cost than TCCVs can be justified where they achieve other benefits. These benefits could include supporting emerging technologies, improving other environmental outcomes (NRM Regions Australia, sub. 191, p. 3) and resilience (ALC, sub. 95, p. 2). Accounting for the benefits of supporting emerging technologies would address Santos' point that using carbon value benchmarks has the potential to 'incentivise "known" technologies and decarbonisation pathways, but disincentivise emerging technologies if their current cost is above the carbon values', which risks 'disregarding the potential for costs to reduce with time and additional R&D spend' (sub. 181, p. 4).

If policies have resilience benefits (such as reducing risk of supply chain disruptions) or support emerging technologies that reduce abatement costs over time, evaluation of them should be guided by the PC's guardrails for modern industry policy (2025d). For example, under the guardrails, policies that support emerging technologies are only likely to be justified if they create local knowledge spillovers, support is proportionate and there are built in off ramps (PC 2025d, p. 33). TCCVs estimated for future years can help policymakers assess the value of interventions designed to reduce costs over time. Importantly, these exceptions only apply in a limited set of circumstances. Governments should avoid policies that do not meet cost-effectiveness criteria and fail to meet the guardrails.

Take measures to aid the transition to net zero at least cost

Achieving net zero at least cost will require governments to take steps not yet discussed in this report. The PC has focused on the three largest contributors to Australia's emissions. Other sectors matter too, and governments should consider the following key principles (some of which have already been discussed in the sectoral net zero plans) as they seek to expand emissions-reduction incentives.

- Policy changes should be part of a broad and well-flagged sectoral approach that addresses barriers to decarbonisation and gives affected parties time to adjust.
- Sectors will need to develop their capacity to respond. Measurement systems need to be developed, supply chains and supporting infrastructure established, and innovative domestic technologies fostered (with mechanisms in place to unwind any government support over time).
- Vulnerable communities and consumers should be identified, and equity and transition issues addressed.
- Incentives should not favour one form of technology over another (except in the limited instances discussed above).
- New policies should be assessed via robust cost-effectiveness analysis and designed to broadly align with the agreed TCCVs.

Some emitters or sub-sectors will continue to find it difficult to reduce their on-site emissions. For them, access to ACCUs or other high-integrity offsets will be critical. It will be important therefore that both the integrity of ACCUs is maintained over time and that enough supply is delivered to meet demand. Some inquiry participants also noted that some ACCU methods delivered co-benefits, such as ecosystem services, that were not fully recognised within existing ACCU scheme frameworks (for example, QCC, sub. 128, p. 2). These issues will be addressed by the CCA's review of the ACCU scheme (CCA 2025d, pp. 4–5).

In the long term, the Australian Government should seek to integrate ACCUs into every national emissions-reduction policy. It will be important that emissions-reduction incentives are consistent across the economy in the long term, so that ACCUs are allocated efficiently. The Australian Government should be open to more broad-based carbon pricing arrangements in the future as Australia's decarbonisation effort moves on to the final handful of hard-to-abate activities.

Recommendation 1.4
Assess and align policies against a benchmark and improve transparency

The Australian, state and territory governments should improve the transparency of emissions-reduction policies by consistently including estimates of their cost-effectiveness in impact analyses. The estimates should routinely be assessed against agreed national target-consistent carbon values.

The Australian Government should:

- commission an independent agency with relevant expertise to develop national target-consistent carbon values. These values – estimates of the implied carbon prices needed to meet Australia's emissions targets – should be used consistently as policy benchmarks across government and in regular reporting on the cost-effectiveness of emissions-reduction policies
- design and evolve policy settings to be broadly aligned with these carbon values.

To support achieving net zero in 2050 at as low a cost as possible, the Australian Government should:

- continue to develop policies to extend emissions-reduction incentives to new sectors. The costs associated with any new policies to reduce emissions in areas such as agriculture and household gas should align with the target-consistent carbon values
- continue work to ensure Australian Carbon Credit Units (ACCUs) are high integrity and seek to integrate ACCUs into every national emissions-reduction policy in the long term so that hard-to-abate emitters face consistent incentives.

2. Speeding up approvals for new energy infrastructure

Summary

- **Environmental and other regulatory approvals for infrastructure projects are vital, but they are slowing down the energy transition and holding back productivity. Faster approvals can reduce emissions, reduce costs for developers, attract investment and make energy cheaper – all of which support productivity growth.**
  - A one-year acceleration to the connection of new wind farms in the National Electricity Market, and selected transmission projects, for example, could reduce electricity prices by 7% over the next decade.
  - Substantial delays to renewables more generally could make bills 30% higher than they need to be by 2030.
- **Just before this report was finalised, significant changes were made to the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) – including to introduce national standards, facilitate regional planning, provide more information about the environment and improve offsetting arrangements. These reforms are essential to speeding up approvals.**
- **Administrative changes should build on these reforms. Regulatory and facilitation resources should be focused on projects that are most important to the energy transition. The Australian Government has a list of priority projects, but the projects need to be assessed faster.**
  - A strike team should be formed to assess priority clean energy projects under the EPBC Act. The team should be adequately resourced and have a strong clean energy capability.
  - An independent person with strategic oversight should be appointed – an Australian Government Coordinator-General – to work across governments and with industry to keep approvals on track and break through roadblocks.
- **In the next review of the EPBC Act, in light of progress against clean energy targets, consideration should be given to requiring decision-makers to take into account the importance of the energy transition when assessing energy projects that impact the environment.**

Why speeding up approvals is important

New infrastructure is fundamental to both the clean energy transition and national productivity. To meet renewable energy targets and ensure a reliable supply of energy as ageing coal power plants retire, Australia needs to install large numbers of wind farms, solar farms and 'big batteries', and thousands of kilometres of transmission lines.

Clean energy projects are not without risks and costs. For example, they can affect local habitats, communities, businesses and cultural heritage sites. They can impede views and cause noise. And these impacts are not confined to a few small areas: according to one estimate, 111,000 square kilometres – 1.7 times the area of mainland Tasmania – could be needed for renewable infrastructure by 2060 (Pascale et al. 2025, p. 1).[20]

Although the need for laws to minimise these impacts is broadly recognised, planning and approvals processes can be slow and complex. This is one of the top challenges affecting confidence in the clean energy industry (CEC 2023, p. 21; CEIG 2025a, p. 5). The Climate Change Authority has said delays in environmental approvals are 'hindering progress towards the Government's 82% renewable electricity target and putting Australia's 2030 and 2035 emissions reduction targets at risk' (2025, p. 66).

Other countries face similar difficulties. The European Commission, for example, has said that 'slow and complex permitting processes are a key obstacle to unleashing the renewables revolution and for the competitiveness of the renewable energy industry' (European Commission 2022).

Delays in Australia are exacerbated by the fact that most large clean energy projects need multiple approvals. Each state has its own laws for protecting the environment and cultural heritage sites, land-use planning and development. And projects must also be approved under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (the EPBC Act) if they are likely to significantly impact threatened species, migratory birds, Ramsar wetlands, world heritage sites or other 'matters of national environmental significance'.

Several inquiry participants told us that to speed up approvals, the EPBC Act was the place to start.[21] It can take many years for projects to be approved under the Act (figure 2.1). The Clean Energy Investor Group found the EPBC Act was 'the single biggest barrier to timely, environmentally responsible, renewable energy development in Australia' (CEIG 2025b, p. 1).

National environment laws and related administrative arrangements are therefore the focus of the chapter, but many things affect the rollout of clean energy in Australia (box 2.1), and these can have a cumulative impact on investor confidence and the cost of the transition. The Australian Energy Market Commission submitted:

> It is not just the time it takes to approve new projects, but uncertainty over timing, the likelihood of success and the interdependence of multiple approval processes, that can 'chill' the signal for new investment. (sub. 30, p. 8)

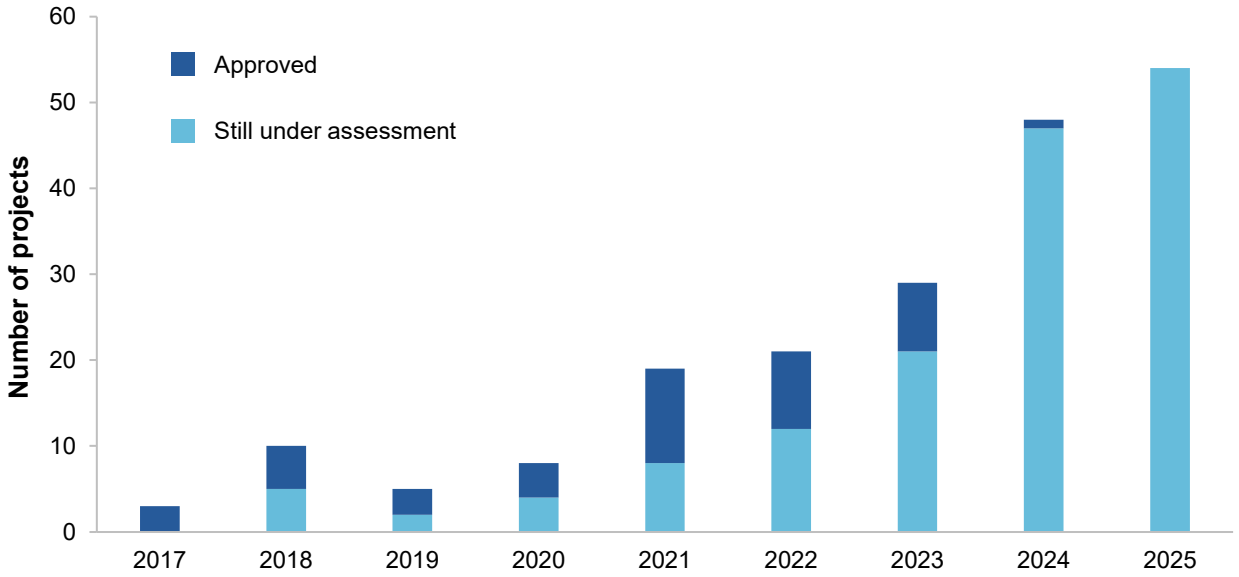
This chapter recommends how clean energy projects can be approved faster, without compromising environmental and other regulatory standards.

[20] Although much of this land could continue to be used for other purposes, such as agriculture.

[21] CEIG, qr. 12, pp. 2–3; Climate Action Network Australia, qr. 14, pp. 1–2; Origin Energy, qr. 48, p. 3; QREC, qr. 40, p. 3; RE-Alliance, qr. 16, pp. 2–3.

Figure 2.1 – It often takes years to reach a final decision for EPBC-referred projects

Decision status for renewable energy projects referred to DCCEEW 2017–2025



Decision status is at November 2025 for projects deemed controlled actions. This figure contains data on onshore and offshore wind, solar photovoltaics, standalone batteries, hydro and pumped hydro projects. Eleven abandoned projects are excluded.

Source: CCA (2025a, p. 69).

Box 2.1 – Other factors affecting the renewable energy transition

- **Cultural heritage processes:** Some developers were concerned about the need to navigate separate cultural heritage processes (QREC, qr. 40, p. 3), or poor guidance surrounding these processes (CEIG, qr. 12, p. 2). Reforms to national cultural heritage laws are ongoing (DCCEEW 2025n).
- **State and territory processes:** State and territory governments lead planning activities and their own environmental assessments, and they can conduct EPBC assessments under bilateral agreements. Improvements to state and territory approvals would support the clean energy transition (AEC, sub. 156, p. 2; CEIG, qr. 12, p. 2; Transgrid, sub. 213, p. 7).
- **Local government processes:** Engagement is important, but some local communities either feel that engagement is a 'tick-the-box' exercise (AEIC, sub. 180, p. 4; EWON, sub. 140, p. 2), or feel burdened by the energy transition (CRJO, sub. 217, p. 3). Local governments could play a larger role in the energy transition (ALGA, sub. 96, p. 7).
- **Connection to transmission:** Grid connection can take months or even years, delaying the energy transition (Tilt Renewables, sub. 267, p. 5). Connection delays lead to lost revenue and introduce significant risk for developers. They have been cited as a reason for companies leaving the renewables market (Parkinson 2025). Reforms to grid connection are ongoing (AEMO 2025a).

The economic benefits of faster approvals

Faster approvals for clean energy infrastructure are not only essential to meet climate targets (CCA 2025a, p. 66), but would also have a number of economic benefits. Faster approvals would reduce costs for developers, attract investment and help give consumers access to cheaper and cleaner energy than a slow approvals system would offer.

More efficient EPBC approvals and offsets would create direct savings for project proponents. The Productivity Commission heard that EPBC approvals are currently the most expensive development activity for wind energy projects and costs can be in the order of $5 million.[22] Offsets can also be costly for developers, making up 7–21% of the cost of transmission infrastructure (Gleeson 2025).

Reduced delays would also reduce costs for proponents. The PC heard about a six-month delay to a windfarm approval costing over $25 million due to contract renegotiations. We also heard that if a developer has raised $400 million, a one-year delay can cost upwards of $20 million in holding and opportunity costs (QREC, qr. 40, p. 4). Across all projects (not just renewables) currently assessed using referral information or preliminary documentation, a five-month reduction in delays could save $3 billion annually (DCCEEW 2025c, p. 2). Additionally, long project lead times introduce risks around the prices of inputs and supply chain management (ReCFIT, sub. 232, p. 4).

Delivering renewables on schedule is also important to maintaining grid stability and keeping electricity prices low. Electricity demand is rising and coal plants are ageing (AEMO 2024, p. 7). Renewable electricity is low cost and will continue to decline in price (Graham et al. 2025, pp. xii–xiv).

The Australian Energy Market Operator's *Integrated System Plan* lays out their view of the necessary development path for the deployment of renewables consistent with government commitments and net zero targets (2024, p. 47). The plan requires a mix of new wind, solar and transmission to maintain grid reliability. Modelling has confirmed that delays to renewable energy projects could lead to higher electricity prices, especially if the grid is forced to rely heavily on expensive gas generation, or forced to a less optimal build out of renewable and storage assets (for example, if delays particularly inhibit higher capacity wind generation).

- The Australian Energy Market Commission (2025b, pp. 8, 15) found that renewables are being built too slowly and electricity bills may rise as a result. A one-year acceleration for wind farms and key transmission projects could reduce National Electricity Market (NEM) residential electricity bills by 7% over the next decade.
- Nexa Advisory (2024, p. 7) found that one-year delays to new transmission could raise residential electricity bills by 0–3% across New South Wales, Queensland, South Australia and Victoria, while three-year delays could raise prices by 4–21%.
- Baringa Partners (2025, pp. 12, 14) found that a one-year delay to new transmission in the South-West Interconnected System could cost WA consumers $1.4 billion between 2028 and 2033, while a three-year delay could cost $3.9 billion.
- Jacobs Australia (2025) found that substantial delays, leading to only 49.1 gigawatts of renewables being available in 2030, rather than 72.7 gigawatts, could raise NEM residential electricity bills by 30%. In this scenario, there would be a risk that ageing coal generators could fail, raising bills by a further 11 percentage points.

[22] For context, a large 500 MW windfarm may cost around $1.7 billion (PC calculations based on Graham et al. 2025, p. 86).

National environment laws

Shortly before this report was finalised, substantial amendments were made to Australia's environment laws (the 2025 reforms),[23] implementing the core recommendations of Graeme Samuel's review of the EPBC Act (2020). The reforms should help address a number of concerns raised in this inquiry, including that long and complex approval processes were jeopardising the energy transition,[24] and that the EPBC Act was failing to safeguard nature.[25] Five elements of these reforms – discussed below and in more detail in our interim report and broadly supported by inquiry participants – have particular benefits for speeding up approvals.

National environmental standards

The 2025 reforms introduce legally enforceable national environmental standards (Parliament of Australia 2025b, p. 2).

National standards will provide greater clarity and certainty about the environmental outcomes that must be achieved when a project affects a matter of national environmental significance. They will make it easier for proponents to plan their projects, find cost-effective ways to comply with the law and prepare their impact assessments. Higher-quality impact assessments should also reduce the need for regulators to later ask proponents for additional information, which often causes delay.

Standards will also support bilateral agreements, the primary mechanism for reducing unnecessary duplication between jurisdictions. They could also facilitate more flexible approval conditions and help regulators assess projects, making regulatory decisions more consistent and predictable.

Standards are supported by conservation groups,[26] the clean energy industry[27] and businesses more generally.[28]

Regional planning

The 2025 reforms make significant changes to facilitate the making of regional plans, which take a landscape approach to environmental planning (Parliament of Australia 2025b, p. 5).

Regional planning should improve the speed and efficiency of the approvals process. Rather than assessing the environmental impact of each project separately, regional plans assess in advance the suitability of a broader region or landscape for multiple projects (DCCEEW 2022, pp. 3, 19–20). Projects in specified development zones ('go-zones') would have streamlined assessments, while development in areas of high environmental value would be heavily constrained or prohibited ('no-go zones').

Regional plans should reduce duplicated assessments and allow cumulative environmental impacts from multiple projects to be considered. They would help safeguard nature and avoid developers wasting time and resources on projects unlikely to be approved.

Regional plans should align with existing processes and be a priority in state renewable energy zones, which bring multiple clean energy projects together in prescribed areas.

[23] *Environment Protection Reform Act 2025* (Cth), *Environment Information Australia Act 2025* (Cth) and related Acts.
[24] Anonymous, sub. 209, p. 1; AGL, sub. 231, p. 10; CEIG, qr. 12, p. 2; Origin Energy, qr. 48, pp. 3–4; QREC sub. 212, pp. 1–2.
[25] ACBF, sub. 54, p. 2; Biodiversity Council, sub. 233, p. 6; Queensland Conservation Council, qr. 37, p. 1; WWF-Australia and the ACF, qr. 70, p. 2.
[26] ACBF, sub. 54, p.3; ACF, sub. 226, p. 1; Biodiversity Council, sub. 233, p. 3; WWF-Australia, sub. 87, p. 6.
[27] Anonymous, sub. 209, p. 2; Tilt Renewables, sub. 267, pp. 1–2; Transgrid, sub. 213, p. 6.
[28] AICD, sub. 259, p. 26; BCA, sub. 229, p. 7; CME, sub. 170, p. 8.

Developers and environmental groups agreed that better regional planning could improve outcomes.[29]

Information about the environment and cultural heritage

The 2025 reforms create a statutory position of the Head of Environment Information Australia to increase the availability and accessibility of environmental data (Parliament of Australia 2025a, p. 2).

Giving proponents, communities and regulators access to high-quality information about the environmental and cultural heritage attributes of an area – such as detailed maps showing the condition and location of nationally significant plants and animals – would expedite the approvals process and reduce costs.

This information would reduce risks to the environment and help proponents decide where to locate their projects and to prepare environmental impact statements. It would inform approval decision-making and regional planning and help communities to understand the effects of a project on local environments and to engage with development proposals. The information would shed light on changes to the environment over time, which would inform broader evaluations of the effectiveness of the EPBC Act.

Inquiry participants highlighted the issues caused by poor information. The Australian Climate and Biodiversity Foundation said:

> The lack of publicly available, consistent environmental data that is linked to national environmental priorities and approvals benchmarks has been a long-standing constraint on efficient approvals processes. This results in resource and time intensive data collection by proponents, repeated information requests, and difficulties in making assessment decisions due to data deficiencies. (sub. 38, p. 16)

Offset arrangements

Environmental offsets are used to compensate for environmental damages that cannot be avoided or mitigated. Averted loss offsets are the most common form and involve protecting and improving land that would otherwise have been under threat (Samuel 2020, p. 138).

But offsets do not always provide genuine environmental restoration (Audit Office of New South Wales 2022, p. 2; Samuel 2020, p. 138; VAGO 2022, pp. 2–3; WA DWER 2019, p. v). Improving the integrity of offsets is essential to delivering renewable energy projects while supporting the environment.

The 2025 reforms introduce higher integrity standards for offsets, with requirements to compensate to a 'net gain'. They also enable offsets to be discharged through payments to a Commonwealth restoration fund (Parliament of Australia 2025b, p. 3). There will also be a national standard for environmental offsets.

Giving developers the option to discharge offsets through a fund could increase efficiency. Clean energy developers can find it hard to deliver and manage offsets that are outside their core business (HSF and CEIG 2024, p. 24). Centralised funds may be better equipped to deliver offsets and can coordinate offsets to deliver landscape-scale projects in line with regional priorities (PC 2020b, p. 212).

While renewable energy and transmission developers supported such an approach,[30] conservation groups were concerned about potential environmental damage. Nonetheless, solutions exist that could deliver a high-integrity offsets fund while supporting developers (box 2.2).

[29] ACF, sub. 226, p. 1; AGL, sub. 231, p. 11; Anonymous, sub. 209, p. 2; Biodiversity Council, sub. 233, pp. 4–5; QCC, sub. 128, pp. 4–5; Tilt Renewables, sub. 267, pp. 3–4; WWF-Australia, sub. 87, pp. 6–7. While participants agreed about the value of regional plans, they disagreed about how strictly 'no-go zones' should be enforced.

[30] Tilt Renewables, sub. 267, p. 3; Transgrid, sub. 213, p. 6; Anonymous, sub. 209, p. 3.

Box 2.2 – Delivering high-integrity offset funds

Many inquiry participants were concerned about offset funds. Primarily, they worried that funds may take on obligations that they cannot meet, or that would take a long time to deliver, both of which have been issues for existing schemes.[a] Additionally, there are risks around the expertise and resourcing of government offset funds (ALCA, sub. 236, pp. 5–6).

However, reforms are possible. These include administrative solutions such as time limits for discharging offsets (Henry et al. 2023, p. 31), oversight and quality assurance processes (Audit Office of New South Wales 2022, p. 10) and reforms to ensure funds are suitably resourced.

Alternatively, funds could perform restoration activities before, rather than after, receiving payments from developers (WWF-Australia, sub. 87, pp. 7–8). This would eliminate the risk of a fund failing to offset harms but could be costly.

a. ALCA, sub. 236, pp. 4–6; Biodiversity Council, sub. 233, pp. 3–4; EDO, sub. 175, p. 5; RE-Alliance, sub. 162, pp. 6–7; WWF-Australia, sub. 87, pp. 7–8.

Community engagement

The 2025 reforms affecting community engagement include a proposed national standard about engagement with Aboriginal and Torres Strait Islander people and community consultation requirements for making regional plans (Parliament of Australia 2025b, pp. 2, 12, 290–291).[31]

Better engagement is essential to securing social licence for new energy infrastructure and with it, faster approvals. Regional communities bear most of a project's negative impacts, while the benefits of clean and reliable energy are shared more broadly. These communities have a right to be heard, yet they often say that developers do not genuinely listen to their views (box 2.1). The Australian Energy Infrastructure Commissioner has warned that without improvements to engagement practices there is a risk of leaving communities behind in the energy transition and 'letting frustrations fester' (Williamson 2025).

Engagement with Aboriginal and Torres Strait Islander people is vital. They have legal rights and interests over a significant proportion of land that is suitable for renewable energy projects (Quail et al. 2025, p. 1). Potential impacts on cultural heritage sites, for example, should be a key consideration for developers.

In line with Priority Reforms in the National Agreement on Closing the Gap, engagement should be 'meaningful, respectful and reciprocal', with transparent, accountable mechanisms through which Aboriginal and Torres Strait Islander people can inform and share decision-making (PC 2023b, p. 19). The PC has also heard that appropriate resourcing of Aboriginal and Torres Strait Islander groups could make their engagement with clean energy developers more effective and efficient.

Inquiry participants generally supported both a national standard for engagement and a standard for engagement with Aboriginal and Torres Strait Islander people.[32] These would both clarify expectations and raise the bar for the quality of consultation. Further work is also necessary to address concerns that fall outside the scope of the 2025 reforms (box 2.3).

[31] It is unclear whether there will also be a standard about community engagement more generally.

[32] Climateworks Centre, sub. 189, p. 13; CRJO, sub. 217, p. 2; Engagement Institute, sub. 157, pp. 4–5; EWON, sub. 140, p. 2; RE-Alliance, sub. 162, p. 7.

Box 2.3 – Broader engagement concerns

Community concerns about energy projects often extend beyond protecting matters of national environmental significance. For example, there are concerns about land-use conflicts (CRJO, sub. 217, p. 4), noise, visual amenity and the industrialisation of rural communities (YVC, sub. 116, p. 7). These are largely matters for state and territory governments, but the Australian Government also has a role.

- Engagement processes and benefit sharing requirements are not aligned between jurisdictions, with clean energy developers facing 'a patchwork landscape of obligations' (CEC, qr. 45, p. 3). The Australian Government could work with state and local governments to better align engagement and benefit sharing requirements. The Climate Change Authority has recommended a national program to guide community engagement and benefit-sharing (2025a, p. 54).
- Regional planning processes facilitate community engagement (Dyer 2023, p. 21). New regional planning under the EPBC Act should be aligned with state and local government regional plans to support community engagement.
- Australian Government initiatives like the Renewable Energy Developer Rating Scheme can provide guidance for states and local governments and inform local communities, including about developers' performance, financial stability and engagement capability.

Focus on priority projects

Reforming Australia's national environment laws was an important step towards speeding up approvals. With the passing of the legislative package in November 2025, attention will turn to implementation, including establishing the new regulator and preparing the national standards.

Complementary changes to administrative practices and arrangements could also speed up approvals and help address related concerns raised by inquiry participants (box 2.4). In the PC's view, special arrangements should be made to avoid delays in assessing Australia's most important clean energy projects.

In March 2025, the Australian Government released the National Renewable Energy Priority List. The list is designed to provide 'coordinated support for regulatory planning and environmental approval processes for identified priority renewable energy projects across Australia' (DCCEEW 2025l).

If approved and built, the 56 projects on the list could deliver an additional 16 gigawatts of generation capacity and six gigawatts of storage capacity across the nation, and key transmission projects that connect renewables into the grid (DCCEEW 2025l). Delivering these projects would make a significant contribution to meeting Australia's emissions reduction and renewable energy targets.

To expedite approvals for priority projects, the PC recommends two reforms: the establishment of a 'strike team' to assess priority projects on the list, and the appointment of a Coordinator-General to work across governments and break through roadblocks.

Box 2.4 – Concerns about administrative processes

At present, assessments under the EPBC Act are 'process heavy and highly discretionary' (WWF-Australia and ACF, qr. 70, p. 3). Reforms to the EPBC Act will go a long way towards addressing issues but much will depend on assessment teams and agency processes. Developers have raised numerous concerns with these processes, some of which reflect broader concerns about regulatory policy (PC 2025c).

- **Excessive risk aversion.** Developers report that the EPBC assessment process is overly stringent, with complex and duplicative requests for additional information and shifting requirements (Anonymous, qr. 92, p. 1; HSF and CEIG 2024, pp. 20–22). The PC also heard that requests for information are sometimes made unnecessarily late, causing further delays.
- **A lack of flexibility.** Inflexible approval conditions can make it difficult to make minor changes to build plans without a completely new approval (HSF and CEIG 2024, p. 24; Transgrid, sub. 213, p. 6).
- **Misalignment with state and territory rules.** For instance, bilateral assessments may not work effectively because departments have different processes (Climateworks Centre, sub. 189, p. 11). Additionally, the PC heard that the Australian Government less consistently recognises partial habitat impacts when considering offset requirements. For instance, even if only vegetation above a certain height needs to be cleared for a transmission line, an EPBC approval might still require an offset for vegetation below that height.

Set up a specialist strike team for priority projects

Given the urgency of the energy transition – and the number of clean energy projects that need to be built and assessed in coming years – a strike team should be established to assess priority clean energy projects under the EPBC Act.

The team should work exclusively on priority clean energy projects and be resourced to assess the projects in a timely manner.[33] This would address concerns from several inquiry participants that assessment teams are often under-resourced (CEIG, qr.12, p. 2; ENGIE, qr. 18, p. 2; Renewable Energy Alliance, qr. 16, p. 2). Additional funding was allocated to provide priority projects with tailored support (DCCEEW 2025l), but it is unclear whether this funding is adequate.

The strike team should have a strong capability in clean energy projects – experienced assessment officers who understand the industry, or particular parts of it, such as windfarms. Integrating environmental and clean energy expertise within the one team should help address this problem. It should also build understanding of renewable energy projects among environmental assessment officers, which can be lacking (HSF and CEIG 2024, p. 19).[34]

This assessment work is currently performed by the Department of Climate Change, Energy, the Environment and Water (DCCEEW), to inform the statutory decision-maker, the Minister for the Environment. If this assessment work remains in the department, the strike team should be there, and presumably largely

[33] Priority list projects are a small share of EPBC assessments. From the start of 2020 to November 2025, there have been about 730 non-withdrawn controlled actions, with about 180 of these relating to renewable energy generation and supply (PC calculations based on DCCEEW 2025d). The 56 priority list projects are a subset of renewable energy projects, and not every priority list project is a controlled action.

[34] The growing clean energy industry may itself have capability shortfalls, for example in relation to environmental assessments and engagement.

comprise assessment officers already in the department. However, if assessment work is largely delegated to the National Environmental Protection Agency, the strike team should sit within that agency. Either way, the strike team would not duplicate work undertaken by others.

The team should be set clear expectations and conduct assessments in line with best practice. It should:

- apply a risk-based approach where possible, for example by only issuing necessary and targeted requests for additional information
- provide greater transparency about progress against statutory timelines and the use of 'stop-the-clock' provisions
- work collaboratively with state and territory colleagues.[35]

Establishing this strike team is about making the assessment process more efficient; it is not about subverting environmental standards, as some participants feared. The core task of the team would remain protecting matters of national environmental significance.

State and territory governments should consider establishing similar strike teams focused on priority list projects, particularly if they play a greater role in EPBC assessments under reformed arrangements for bilateral agreements. The national strike team should work with states and territories to minimise duplication and share information, both of which should be made easier with the introduction of national standards. Out-posting staff to state and territory offices could strengthen co-operation and build an understanding of each other's processes (HSF and CEIG 2024, p. 21; PC 2020b, p. 178).

Establishing strike teams for other industries may also have merit. For example, since the release of the interim report, DCCEEW has established a strike team for housing approvals (Watt 2025).

Recommendation 2.1
Set up a specialist 'strike team' for priority projects

The Australian Government agency responsible for approvals under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) should establish a strike team to assess priority renewable energy projects. The strike team should:

- be adequately resourced to efficiently assess all priority projects
- integrate environmental and clean energy expertise
- be issued with clear expectations, tools and escalation procedures
- work with state and territory counterparts to reduce duplication and share information and expertise.

Appoint a Coordinator-General for priority projects

To further expedite the approval of priority clean energy projects, an independent Australian Government Coordinator-General with strategic oversight of approvals should be appointed.

The Coordinator-General should be tasked with working with industry and all relevant regulators and approval bodies, including Australian, state and territory government environmental, heritage and planning bodies; the Foreign Investment Review Board; and the Australian Energy Market Operator for network connection approvals.

[35] These principles align with a stewardship approach to regulation (PC 2025c).

The Coordinator-General should:

- **Track the progress of priority projects through approvals processes and report to ministers.** This will provide continued focus on delivering priority projects and increase transparency and accountability. The Coordinator-General should regularly report to the Minister for Climate Change and Energy, the Minister for the Environment, and when necessary, the Energy and Climate Change Ministerial Council.
- **Proactively work with industry and regulators to prevent unnecessary delays and smooth the approval process.**
- **Identify and help resolve roadblocks.** When a priority project hits a roadblock in an approvals process (and related post-approvals processes), the Coordinator-General should be empowered to escalate the matter by raising it with the relevant departmental secretary or even relevant ministers, when appropriate.
- **Suggest improvements to practice and policy.** The Coordinator-General should also recommend improvements to regulatory practices to prevent delays and provide broader input to approvals policy and reform.
- **Work with other bodies to assist Aboriginal and Torres Strait Islander communities.** These communities may need additional capacity to engage effectively with the significant number of proponents building infrastructure across the country. The Coordinator-General should work with relevant government bodies, such as the National Indigenous Australians Agency, to assist these communities to engage with proponents of priority projects.
- **Recommend updates to the priority list**, as discussed below.

The Coordinator-General should sit within a central agency, such as Treasury, and work across the Australian Government and with its state and territory counterparts. It should work co-operatively with related agencies such as the new National Environmental Protection Agency, the Major Projects Facilitation Agency, the Net Zero Economy Authority, Infrastructure Australia and the Australian Energy Infrastructure Commissioner. Its functions should be defined to avoid overlap with these bodies' functions.

Some participants suggested giving the proposed functions of the Coordinator-General to an existing body, such as Infrastructure Australia (ACCI sub. 197, p. 7) or the National Environmental Protection Agency (RE-Alliance sub. 162, p. 8), to minimise complexity and 'bureaucratic layers'. The recently established Investor Front Door is the most promising option. Its purpose is to help investors and business navigate approvals processes and fast-track unique and innovative projects with a capital expenditure over $50 million (Investor Front Door 2025). The Investor Front Door's remit extends beyond clean energy, but a Coordinator-General working in or alongside the Investor Front Door could have a more targeted focus. The Treasurer has announced that the government would consult on the establishment of a Coordinator-General (Chalmers 2025a).

The Coordinator-General should not have powers to override regulatory decisions, such whether a particular wind farm presents an unacceptable risk to a matter of national environmental significance. A number of participants emphasised the importance of this.[36]

Instead, it should focus on coordinating, advising and helping to resolve process roadblocks. Placing the Coordinator-General within a central agency should help the office holder to maintain independence from approvals decision-makers. Clear terms of reference and appropriate governance and accountability measures for the role are also necessary (QREC sub. 212, p. 2).

The Climate Change Authority has recommended establishing an Energy Transition Coordinator with some similar responsibilities (CCA 2024, p. 68), and has expressed support for the PC's recommendations about both the Coordinator-General and the strike team (CCA 2025a, p. 74).

[36] ACF, sub. 226, p. 2; EDO, sub. 175, p. 6; HOPE Inc, sub. 88, p. 4; WWF-Australia, sub. 87, p. 9.

Composition of the priority list

An independent Coordinator-General will be well placed to advise on which projects should be prioritised.

DCCEEW currently prepares the priority list, and a delegate of the Australian Government Minister for Climate Change and Energy approves it. States and territories provide input through the Energy and Climate Change Ministerial Council (DCCEEW 2025k, pp. 3–4).

Transmission projects are drawn from the Australian Energy Market Operator's market analysis and plans and other material (DCCEEW 2025k, p. 3). Generation and storage projects are chosen based on their potential contribution to energy transition targets, proximity to heritage and protected environmental sites, alignment with state and territory energy policies, and other factors (DCCEEW 2025k, pp. 1–3).

Each state was allocated five generation and storage priority projects and each territory was allocated one (DCCEEW 2025j). The list therefore includes some relatively small projects and may omit some larger ones.

The PC recommends that the Coordinator-General be tasked with recommending updates to the list as projects are approved and new priority projects need to be identified. Projects should be chosen based on their importance to the energy transition and without regard to the jurisdiction in which they are located, except to the extent their location affects their contribution to the transition (on jurisdictional neutrality more generally, see chapter 1). In making recommendations, the Coordinator-General should consult with industry, DCCEEW, the Energy and Climate Change Ministerial Council, the Australian Energy Market Operator and other relevant bodies.

A proponent's rating under the Developer Rating Scheme could also be added to the criteria for the priority list (AEIC, sub. 180, p. 4). This would encourage developers to take part in the scheme and improve their community engagement practices. It would also help to prioritise projects that are more likely to win social licence and avoid construction delays.

Some have suggested the list is too short. All projects that are genuine priorities for the transition should be included, and the regulator resourced to ensure they are all assessed efficiently.

Recommendation 2.2
Appoint a Coordinator-General for priority projects

The Australian Government should appoint within a central agency an independent infrastructure Coordinator-General. For priority clean energy projects, the Coordinator-General should:

- work with relevant regulators across all levels of government to track the progress of all approvals needed to start construction
- work proactively with industry and governments to investigate and help break through roadblocks
- report on progress to relevant Australian Government Ministers and the Energy and Climate Change Ministerial Council
- provide advice based on objective criteria about the composition of the National Renewable Energy Priority List.

Consider the energy transition in approval decisions

A number of things need to be considered when assessing projects that impact matters of national environmental significance, including 'economic and social matters',[37] but there is no explicit requirement to consider how a project might affect Australia's energy transition. While the 2025 reforms should make approvals faster, as discussed below, the next EPBC review should consider whether the needs of the energy transition should be given greater weight in decision-making.

Inquiry participants differed on whether clean energy projects should be treated differently to other projects for the purpose of environmental approvals. Some stressed that clean energy projects should be treated the same as other projects and warned against diluting environmental protections, giving some industries special treatment or setting a precedent for other 'carveouts'.[38] The Biodiversity Council said all industries should share 'minimum levels of accountability' for impacts on the environment:

> It is true that renewable energy offers significant environmental and social benefits, but so do many other industries – agriculture ensures food security, urban development increases housing supply and therefore affordability etc. … Nearly every major industry could claim some public benefit and begin lobbying for similar treatment. (sub. 233, p. 5)

However, while clean energy projects should not get a 'free pass', the PC considers that the transition should be given special consideration. The energy transition is necessary and urgent and will have a deep and extensive influence on Australia's economy and our quality of life. Interconnected clean and firming energy generation, storage and transmission are essential to a reliable supply of electricity and will be the foundation of decarbonisation in other parts of the economy.

The needs of the energy transition should therefore be considered when assessing energy projects – not as a determinative factor but rather as a matter to be taken into account, like the 'economic and social matters' the minister must already consider. A number of inquiry participants supported this reform.[39]

In considering the needs of the energy transition, decision-makers might take into account such matters as the urgency of the transition, a project's potential to abate emissions, its size and location, and other specific needs of the energy system, such as firming and system security services. In other words, this consideration will affect some clean energy projects more than others.

Guidelines should set out how to consider the needs of the transition, perhaps with reference to the Australian Energy Market Operator's *Integrated System Plan* and the priority list agreed to by the Energy and Climate Change Ministerial Council. Climateworks suggested Australia's emissions reduction and renewable energy targets should be considered, along with the Australian Government's sector plans (sub. 189, p. 14).

The phrase 'needs of the energy transition' in the PC's recommendation is deliberately broad and flexible and is not intended to preclude particular technologies or projects.

It might be argued that the needs of the energy transition can already be taken into account when considering 'economic and social matters', but an explicit reference to the energy transition in the relevant legislative provision would nevertheless highlight its importance and ensure it was properly considered.

The PC's recommendation should be distinguished from the long-debated 'climate trigger', which would require an EPBC assessment for projects that would generate significant greenhouse gas emissions. Many

[37] EPBC Act, s. 136.

[38] ACCI sub. 197, p. 7; ALCA sub. 236, p. 6; ARMR, sub. 94, p. 2; QCC sub. 128, p. 5.

[39] Ampol, sub. 283, p. 3; Climateworks Centre, sub. 189, p. 14; Fortescue, sub. 216, p. 17; SEC, sub. 117, p. 4; Transgrid, sub. 213, p.8.

participants told the PC that a climate trigger should be introduced,[40] with some considering it a natural complement to the PC's recommendation. The PC has not revisited debates around a climate trigger, but as discussed in chapter 1, the Safeguard Mechanism provides an effective incentive to reduce heavy industry emissions, and it could be improved by being expanded to cover more industrial facilities.

Our recommendation should also be distinguished from the national interest exemptions in the Act, which were expanded by the 2025 reforms. These are unlikely to be appropriate for most clean energy projects.

Given major reforms to the EPBC Act have only just been made, it would be disruptive to make further changes to the Act now. However, whether greater weight should be given to the energy transition in decision-making should be considered in the next review of the Act, particularly in light of progress against clean energy targets and the objectives of the 2025 reforms. To the extent it is possible under the existing law, decision-makers should consider the needs of the transition when taking into account 'social and economic factors'.

Recommendation 2.3
Consider if the energy transition needs more weight in approval decisions at next EPBC Act review

The next review of the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) should consider, in light of progress against clean energy targets and the objectives of the 2025 reforms, whether the Act should be amended to ensure the needs of the energy transition are taken into account when assessing energy projects that impact matters of national environmental significance.

[40] Climate Council, sub. 206, pp. 11–12; EDO, sub. 175, pp. 6–7; Fortescue, sub. 216, p. 15; RE-Alliance, sub. 162, pp. 8–9.

3. Addressing barriers to private investment in adaptation

Summary

Australia faces growing climate-related risks that will become increasingly costly without adaptation.

- A sustained policy focus will be needed over the long term.
- Investing in adaptation can lower costs to the economy, society and environment – enabling productivity gains.

Housing requires particular attention.

- People's experience of climate change will depend heavily on the resilience of their home. Resilient housing reduces exposure to the impacts of climate change and limits disruption and displacement.
- Housing affordability and resilience are not inconsistent goals. The cost of resilience measures can be minimised if built in at key decision points, such as new construction, renovations or rebuilding after disasters.

Adaptation of Australia's housing stock could substantially reduce future damages.

- Without further adaptation, cumulative climate-related damages to Australia's detached and semi-detached housing assets could be as high as almost $744 billion (in present value terms) by 2100.
- Making homes more resilient and locating new developments in lower-risk areas could reduce these damages by up to $240 billion cumulatively (in present value terms) over the same period.
- The benefits of adaptation are greatest when we act early. Delays risk significant avoidable losses.

Australians lack the information needed to drive investments in resilience.

- The Australian Government should lead the development of a publicly accessible database of all climate hazards, an outcome-based resilience rating system for housing and guidance on how to act.

Building on those foundations, governments should work together and develop a national strategy to improve the resilience of Australia's housing stock over coming decades.

- Goals for housing resilience would focus action and provide strong signals to the community and market.
- All stakeholders have a role to play. Households need timely information and, in some cases, financial support. Governments should invest in public infrastructure where efficient and ensure planning systems account for climate risks. Targeted measures will likely be needed to lift the resilience of existing homes.
- Reforms should be based on robust evidence and phased in to maximise benefits and manage costs.

To support economy-wide adaptation, the Australian Government should provide the Climate Change Authority with responsibility for reviewing and advising on national climate change adaptation policy.

Adapting to climate change ahead of time can reduce impacts and save costs in the long run

Reducing emissions of greenhouse gases is essential to limiting the severity of future climate impacts. The recommendations in chapters 1 and 2 are designed to help Australia reach its emissions targets in as timely and cost-effective a way as possible. This chapter focuses on adaptation to the climate impacts of emissions.

Emissions are closely linked with rising temperatures. Australia's average temperature has already increased by 1.5°C (ACS 2025b, p. 12). Estimates from the United Nations Environment Program and Climate Action Tracker suggest a 66% chance that global average temperatures will rise by about 3°C above pre-industrial levels by 2100 (Climate Action Tracker 2024, p. 16; UN Environment Programme 2024, p. 33). Temperature increases could be even higher if emissions-reduction efforts are not maintained.

Australia is beginning to experience a harsher climate. Compounding, cascading and concurrent climate-related events are already increasing in frequency and are expected to have far greater effects than individual events (ACS 2025, p. 31). Our future will include more extremely hot days, longer fire seasons, more heavy rainfall events, sea level rise with more coastal flooding and fewer but more intense tropical cyclones (ACS 2025, p. 12; Bureau of Meteorology and CSIRO 2024, p. 29). Hazards are also expected to shift geographically, placing more people in harm's way, including in areas previously considered relatively safe (CCA 2025c, p. 4).

In addition to these acute hazards, climate change will have chronic impacts such as prolonged droughts, declining water availability, soil degradation and shifts in ecosystems and agricultural productivity. These impacts will affect water security, food systems and the liveability of many regions, and have enduring and widespread consequences on health, wellbeing and economic opportunity.

The costs of not adapting are high and wide-ranging. For example:

- payments to states and territories for natural disaster response and recovery alone are projected to reach a cumulative $130 billion over the next 40 years (2022–23 dollars) (Treasury 2023, p. 107)
- labour productivity losses due to increased exposure to heat could reduce economic output by a cumulative $135 billion to $423 billion between 2023 and 2063 (2022–23 dollars) (Treasury 2023, p. 99)
- Australian property value losses are estimated to increase to $611 billion by 2050 and could increase to $770 billion by 2100 (Steffen et al. 2019, p. 8)
- heat-related deaths could increase by 444% for Sydney and 423% for Darwin under a three-degree temperature increase scenario compared to current conditions (ACS 2025b, p. 35)
- up to 70% of native plant species could face conditions outside their current climate range by 2050, risking species loss and ecosystem collapse (ACS 2025, p. 44).

Climate impacts will not be felt equally. Low-income households, renters, older Australians and regional and remote communities are more likely to be vulnerable to climate change impacts and may find it more difficult to respond. Aboriginal and Torres Strait Islander people also have strong connections to traditional lands, meaning in addition to some experiencing these vulnerabilities, climate impacts can also affect their wellbeing and challenge their right to freely pursue economic, social and cultural development.

Australia will need proactive and coordinated policymaking and investment over the coming decades.

The National Climate Risk Assessment identified eight systems requiring action (ACS 2025a, p. 12). While climate risk must ultimately be addressed holistically, examining all eight systems was beyond the scope of this inquiry. We focused on housing within the built environment to demonstrate how governments can design practical, coordinated measures to drive resilience in one system.

Australians need resilient housing

Within the built environment, large organisations that own or manage critical infrastructure and major assets are likely to have more incentives and capacity to invest in climate resilience. Obligations, such as the Australian Sustainability Reporting Standards, require these entities to disclose climate-related financial impacts. These reporting standards should encourage investment in adaptation.

Housing, however, presents a distinct challenge – and an opportunity. Homes are where climate impacts are often most directly experienced. They are both a major asset class and a key determinant of individual and community wellbeing. Improving housing resilience is critical to reducing future disaster costs, protecting health and productivity and ensuring equitable outcomes for vulnerable groups. It must be a central focus of our adaptation efforts.

- 15% of properties already face moderate to high climate risk (excluding heat) and the number of homes facing high climate risk could grow from one in 23 in 2025 to one in 20 by 2050 (Climate Council and Climate Valuation 2025, p. 49). Aboriginal and Torres Strait Islander communities are disproportionately exposed, particularly in regions vulnerable to rising sea levels and extreme weather events, such as the Torres Strait Islands (Chiew et al. 2022, p. 1629; Lowitja Institute 2021, p. 20; TSRA 2014, p. iii).
- Housing's design and location strongly influence exposure and vulnerability to climate hazards such as bushfires, floods and extreme heat. Yet analysis by the Bushfire Building Council of Australia indicated that only 10% of properties in bushfire-prone areas were built to bushfire planning or building regulation standards (Bushfire Building Council of Australia 2020, p. 6).
- On average, existing homes have an energy efficiency rating of just 1.7 stars (COAG Energy Council 2019, p. 7). Around eight million houses in Australia were built before mandatory energy efficiency standards and are more vulnerable to heatwaves (COAG Energy Council 2019, p. 7; CoreLogic and PowerHousing Australia 2022, p. 40).

Many households could benefit from resilience investments. Without adaptation, for example, heatwaves will reduce quality of life, worsen health outcomes and lower labour productivity (DHAC 2023, p. 84; Treasury 2023, pp. 96–98) – particularly as more people work from home. A smaller but growing share of households will face catastrophic risk from natural disasters (CCA 2025c, p. 2), leading to capital destruction. Climate risk can also increase ongoing expenses for households. Insurance premiums in high-risk areas are already significantly higher than in low-risk regions, and in some cases, insurance may not be affordable (Actuaries Institute 2024, p. 14) or lending may not be available (IGCC 2024, pp. 10–12). Other costs, such as higher energy bills during heatwaves or disruptions to employment, compound the potential financial burden. Building resilience can help avoid these escalating costs and protect household budgets over the long term.

Resilience and affordability goals should be pursued together. Both goals can be achieved by removing unwarranted zoning constraints and ensuring new homes are built in safer areas, including increasing density in existing lower risk and well-connected suburbs. Some low-cost resilience investments can have relatively high returns. For more substantial action, embedding resilience during planned investment cycles, rather than through costly retrofits, will help to keep housing affordable while reducing long-term risks. Acting early will allow resilience measures to be built in at natural decision points, such as new construction, major renovations or rebuilding after disasters, minimising overall costs.

Making homes both safe and affordable over the long term at lowest cost will deliver better outcomes for households and taxpayers – through reduced calls on government budgets for disaster recovery.

Adapting Australia's housing stock could substantially reduce future damages

To illustrate some of the benefits of more resilient housing, the Productivity Commission estimated how extreme weather-related damages to Australia's detached and semi-detached housing stock could be reduced under a set of stylised scenarios (appendix B). The scenarios explored how strengthening existing homes and guiding the location of new development could lower damages from climate-related physical risks between 2026 and 2100 (figure 3.1).

Without further adaptation, cumulative climate-related damages to Australia's detached and semi-detached housing assets could be as high as $744 billion (in present value terms) by 2100. By the end of the century, annual undiscounted damages could reach $31 billion per year, equivalent to around 1% of 2024-25 GDP.

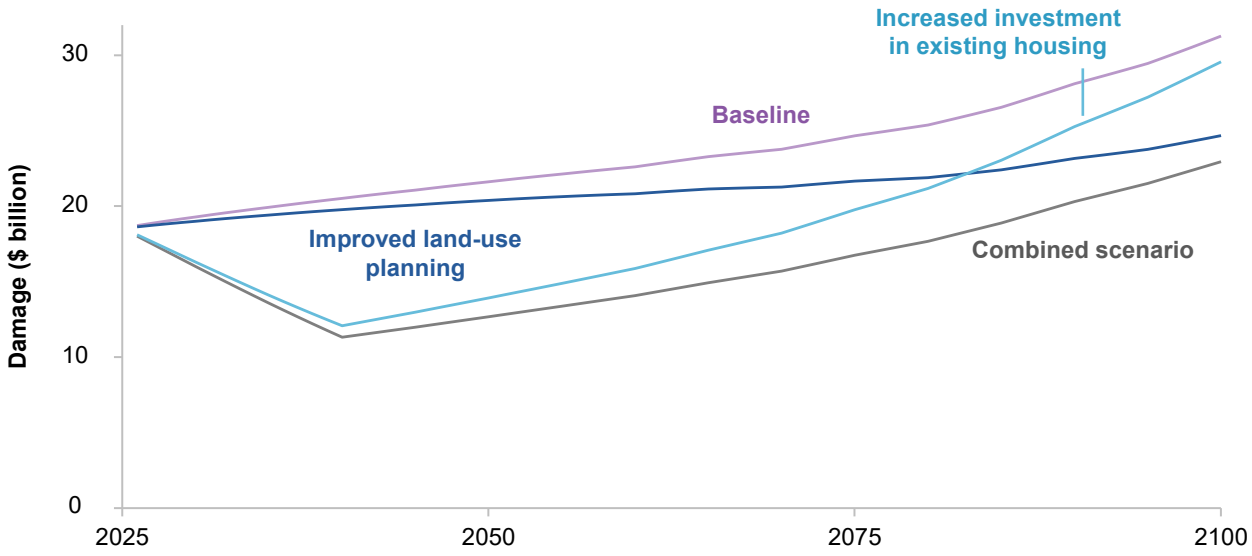
Actions to improve housing resilience could materially reduce expected cumulative damages over the same period by up to $240 billion (in present value terms).

- $186 billion of this (in present value terms) could come from measures that strengthen existing dwellings against extreme weather – such as retrofitting pre-2010 homes to higher standards
- $54 billion (in present value terms) could come from avoiding high-risk locations for new housing.

The PC's estimates are illustrative, showing the scale of avoided physical damages that could be achieved if broad adaptation actions were implemented. These scenarios do not model the effects of specific policies or programs, rather they demonstrate some of the potential benefits of adaptation measures. The analysis is not intended to provide definitive forecasts, identify the 'optimal' level of housing resilience, or offer a comprehensive assessment of all possible costs and adaptation strategies.

Figure 3.1 – Retrofits avoid damage early, but better land use has benefits that build over time

Expected damage under each scenario, no discounting, RCP 4.5, annual, 2026 to 2100



Damages are not discounted to support comparison across scenarios.

Source: PC analysis using data from XDI (Cross Dependency Initiative).

Our estimates are subject to uncertainty given the long timeframes involved and are limited to direct physical damage to housing. While climate risks to housing extend beyond asset damage, our estimates do not include the indirect benefits of more resilient housing – for example, increased health and public safety.

While adaptation actions can materially reduce expected damages, substantial residual risk will remain as climate hazards intensify.

Acting early delivers the greatest benefits. For example, accelerating a 15-year retrofit program for existing homes to five years could avoid an additional $38 billion (in present value terms) in damages between 2026 and 2100. In contrast, delaying the program to 30 years could result in around $44 billion (in present value terms) in additional losses.

Benefits from improved land-use planning accrue gradually because they apply only to new dwellings. However, because each new home built in a safer location reduces risk immediately, aggregate gains grow over time as the housing stock expands, and climate hazards intensify. Population growth and housing stock turnover are key drivers of future exposure. By 2100, millions of new dwellings will be added to accommodate Australia's projected population, making early planning decisions critical to avoid locking in long-term risk.

The true benefits of adaptation, and the risks and costs of adaptation, are likely to be much higher than reflected in the direct damage estimates alone. For example, indirect benefits could include:

- public health and safety gains from reduced exposure to hazards, including heat, leading to avoided healthcare and emergency management expenditure
- reduced displacement-related losses, which are a major driver of disaster costs, representing 20–40% of total disaster costs (CIE 2023, p. 16). Avoiding displacement prevents cascading impacts on mental health, temporary housing, education and workforce participation
- energy efficiency and cost savings, as some resilience upgrades can reduce household energy bills and emissions alongside resilience co-benefits
- avoided social and economic impacts, including cascading effects on infrastructure, essential services, and local economies that can result from widespread housing losses.

And given the potential for compounding, cascading, and concurrent hazard events, actual costs could escalate well beyond current projections.

Adaptation is not costless – there is a trade-off between the benefits and costs of resilience measures. Determining the most cost-effective or appropriate approach would require a separate, more detailed policy and cost-benefit analysis.

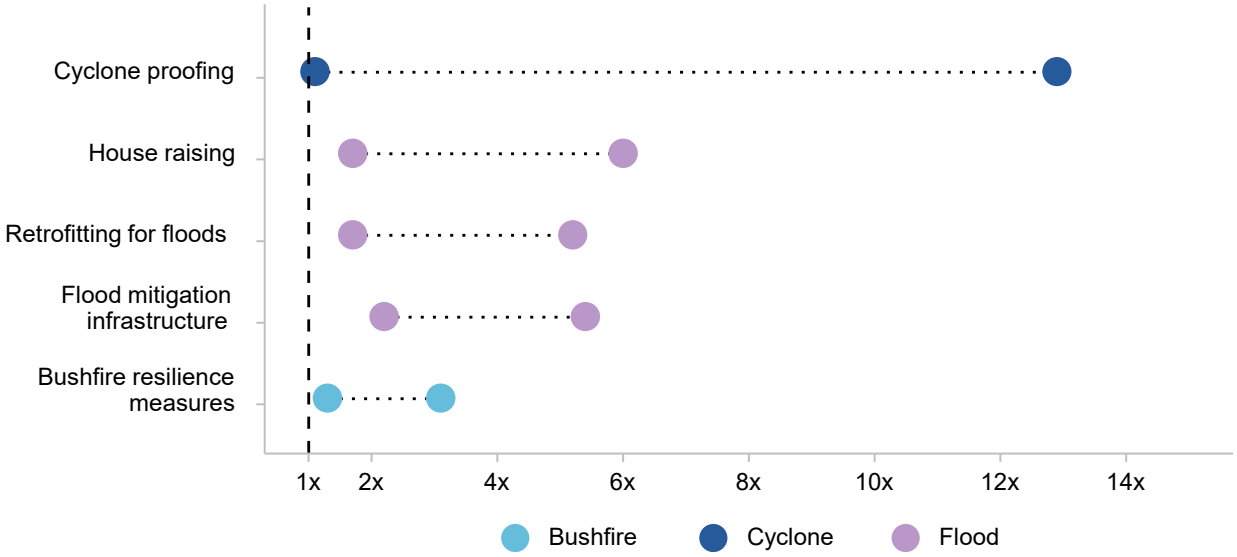
Nevertheless, evidence suggests many resilience measures can be cost-effective (figure 3.2). For example:

- retrofitting homes for cyclone protection across Northern Australia could have a return on investment of $8.9 for every dollar spent (Finity Consulting 2022, p. 6)
- low-cost retrofits such as sewer non-return valves, door-guards and toilet pan seals can provide cost-effective protection from floods up to one metre (CCC 2011, pp. 72–73)
- community awareness programs focused on preventing minor insurance claims have been estimated to provide an average return of $10 for every dollar invested (Suncorp Group 2015, p. 4).

Realising the benefits will depend on how adaptation measures are designed and implemented, and on complementary policies and investments that enable households and markets to act. Housing resilience will also rely on the resilience of other systems, such as infrastructure and essential services, which can amplify or dampen household-level outcomes during extreme events. Further work will be required to fully assess and unlock the gains estimated in this analysis, including integration with broader planning reforms and consideration of equity and distributional impacts.

Figure 3.2 – Resilience investments in housing yield high returns

Estimates of benefit-cost ratios for different resilience programs



Horizontal lines show the range of benefit–cost ratio estimates for different resilience investments.

Source: cyclone proofing from Urbis (2015, p. iii); retrofitting for floods and house raising from Queensland Reconstruction Authority (2019, pp. 120–121); flood mitigation infrastructure from Urbis (2014, p. v); bushfire resilience measures from Deloitte Touche Tohmatsu (2013, p. 11).

To unlock the benefits of resilience, governments must address barriers to private investment in adaptation. The recommendations in this chapter are tangible and foundational steps that governments can take to support adaptation and uplift the resilience of Australia's housing stock over time. The availability of trusted and authoritative climate-risk information and a resilience rating system will empower households to invest in resilience. Governments can build on these foundations to develop additional measures where household capacity or incentives will not be enough to drive socially optimal levels of investment in resilience.

While the emphasis here is on housing, several of the PC's recommendations also lay foundations for broader climate adaptation, supporting economy-wide decision-making and resilience.

Provide authoritative climate risk information

Australians need comprehensive information

Effective adaptation is built on access to trusted, consistent and actionable information on climate risks. Individuals, businesses, communities and governments all need reliable data to assess their exposure and vulnerability to climate hazards and to make informed decisions about how to manage those risks. Households might invest in resilience measures or relocate, while businesses could adapt operations or assets. For governments, information underpins effective planning, regulation and investment.

Despite progress by governments, including the work of the Australian Climate Service (ACS) and the National Emergency Management Agency, information on climate risk remains insufficient.

- Many flood studies are not publicly available (Standing Committee on Economics 2024, pp. 203–204). This is a problem because floods are one of the costliest and fastest-growing climate hazards (ICA 2025, p. 12), and floods rank highly among natural disasters when people are deciding where to live (Vij et al. 2022, p. 49).

- The spatial granularity of available information is often limited. Multi-hazard data tends to be published at a regional level. Presentation of data for 11 major regions in New South Wales and the Australian Capital Territory (NSW Government 2025a) limits the ability to identify local climate risk. The ACS provides information for several hazards, but granularity and temporal coverage of this data vary (ACS 2024). And the quality of local government flood modelling and flood risk maps varies depending on council resourcing and expertise (ALGA, sub. 5, p. 3; Standing Committee on Economics 2024, pp. 200–203).
- Australia's climate information ecosystem is fragmented (O'Kane et al. 2024, p. 60). This fragmentation can make it difficult for users to find relevant data and means there is no 'national picture'.
- Sometimes, information is simply difficult to understand (Standing Committee on Economics 2024, pp. 208–209). It can also be held in complex access environments that hamper use (Standing Committee on Economics 2024, p. 201).
- Older datasets rarely contain projections of evolving climate risk (ICA 2022, p. 8), which is crucial information for long-term investments in housing.
- Datasets focus on hazard prevalence, but information on other determinants of community exposure and vulnerability, such as asset and infrastructure resilience or land use, is less available (Pollenter, sub. 129, p. 4).

Several inquiry participants noted the importance of accessible household-level information on climate risks.[41] Available information was described as inadequate (ICA, qr. 11, pp. 3–4; RBC, qr. 88, p. 4), 'difficult to find' and 'difficult to understand' (Financial Rights Legal Centre, qr. 47, p. 2).

A national database would support decision-making and risk management

A central, publicly accessible database covering all climate hazards would provide wide-ranging benefits. It would reduce duplication across governments, improve the quality and consistency of risk assessments, and support more informed decisions by households, businesses and governments. A national database would help to fill gaps, lower the cost of adaptation and help ensure that forward-looking climate risk information is appropriately factored into planning, investment and insurance decisions.

Households, businesses and governments would all benefit from this data resource.

Access to data on climate hazards would help households to consider actions to protect their property and wellbeing. Including projections of climate risk would empower prospective homebuyers and renters to make better decisions about where to live, reducing the likelihood of unexpected losses or displacement.

Businesses could use the data to assess their exposure and vulnerability to hazards and design responses. Inquiry participants stated that better quality and more accessible climate risk data could enhance the quality of the assessments they conduct, including under financial reporting requirements (AIGN, sub. 220, pp. 10–11; TGE, sub. 148. p. 5). Blue Scope (sub. 134, p. 17) stated that additional public information would enable them to better manage climate risks in-house, avoiding the cost of an external consultant. Publicly available data and scenarios would be particularly helpful for small businesses, which may be unable to afford the external expertise often required to conduct these assessments.

Access to high-quality data would also assist insurers and the financial sector to develop and tailor resilience-oriented products. Open-access data could allow smaller and new financial firms to offer innovative financial instruments and products to fund local adaptation.

Government organisations across jurisdictions would benefit from access to consistent, forward-looking climate risk information. A central source of high-quality data would enable coordinated and evidence-based

[41] Actuaries Institute, qr. 83, p. 3; CPA Australia, qr. 59, p. 3; Financial Rights Legal Centre, qr. 47, p. 3; GBCA, sub. 37, pp. 5–7; ICA, qr. 11, p. 4; SECCCA, sub. 171, pp. 3–4.

management of physical climate risk. Data could support accurate cost–benefit assessments for infrastructure and land-use planning and could enable resilience and disaster recovery funding to be better targeted to projected climate risk.

Forward-looking projections would also allow government bodies to integrate climate risk considerations into long-term planning in areas such as housing, transport and water management. A shared public dataset would reduce duplication of modelling and analysis across jurisdictions and allow lesser resourced organisations to use high-quality risk information. Decisions about adaptation would be based on common and transparent information around future climate conditions. Publicly available climate risk and insurability information would help align incentives for adaptation by reducing the information gaps between insurers and households.

Some inquiry participants raised concerns that increased visibility of climate risk could exacerbate non-insurability or increase premium costs in high-risk areas (AICD, sub. 259, p. 27; ACCI, sub. 197, p. 8). Yet, withholding information would disadvantage prospective buyers or renters who may unknowingly move to areas that may become hazardous or uninsurable. Greater provision of risk information would make housing more cost-reflective, supporting households to take climate risk into account in their housing decisions (PC 2023a, p. 8). Insurers often have knowledge of climate risk from sophisticated modelling that is not available to households. Making this information public could help improve decision-making, enabling households to better understand their exposure to risk and make informed decisions about where to live.

Better information would also strengthen the signalling role of insurance markets. Integrating forward-looking climate projections with insurance pricing and coverage data would enable more informed decisions and help discourage maladaptive development in floodplains or fire-prone regions. Because premiums are typically set on an annual basis, they provide limited guidance about long-term exposure. A 2024 regulatory reform in California allowed insurers to incorporate forward-looking climate projections into premium setting, while requiring them to maintain coverage in high-risk areas (CDI 2024). This arrangement aimed to balance accurate and forward-looking risk pricing with the need to maintain insurance availability.

More accurate identification of risk can also reduce premiums in lower-risk areas. The Queensland Farmers' Federation argued that the absence of detailed, location-specific datasets leads insurers to rely on blunt models that inflate premiums and restrict coverage, undermining investment in otherwise low-risk regional areas (sub. 91, p. 11).

Designing a national climate risk database

The Australian Climate Service (ACS) Data Explorer and the Australian Government's National Climate Risk Assessment provide a strong foundation for a climate risk information system, offering publicly accessible and authoritative data on climate hazards, exposure, vulnerability and risk across Australia. The Data Explorer includes national-scale hazard visualisations (for heatwaves, bushfires, drought and coastal flooding, for example), exposure data from trusted sources (including the Australian Bureau of Statistics and Geoscience Australia), and new vulnerability indices. And the National Emergency Management Agency's National Resilience Action Library provides information on strategies as well as resources to help households take action to mitigate the impacts of bushfires, floods and cyclones.

Building on these foundations, a national database should:

- cover all dimensions of climate risk – hazard, exposure, vulnerability and response
- include historical and projected multi-hazard data under multiple emissions scenarios at a granular level
- integrate socio-economic and spatial data on housing, population, adaptation infrastructure (such as levees and firebreaks), and access to critical services, to support identification of vulnerability
- be maintained and updated regularly to keep information current and useful for decision-making

- use standardised data formats and incorporate privacy safeguards and governance for sensitive data
- deliver tailored outputs for different users, including households, with clear narratives and visualisations.

Where data already exists but is fragmented across public and private sources, it should be collated into a single authoritative platform. Some information under development could also be integrated. For example, the Hazards Insurance Partnership is developing a risk assessment and premium pricing (and insurance availability) dataset. Subject to privacy protections, this data could help connect climate risk with insurance outcomes, enabling households to understand the financial implications of their exposure. The Insurance Council of Australia highlighted that a central database including insurer information from the Hazards Insurance Partnership could provide an evidence base for land-use planning and targeted adaptation investment (ICA, sub. 131, p. 2).

Effective implementation will require clear governance arrangements, sustainable funding and protocols for data quality assurance. The database should be updated regularly based on agreed triggers and include mechanisms for monitoring and evaluation to ensure it meets user needs.

Any effort to improve climate risk information must be supported by capacity building to ensure that users can interpret it (O'Kane et al. 2024, p. 38; Styger et al. 2025, p. 18). Climate risk projections are complex and incorporate uncertainty – merely increasing the breadth and availability of information will not make it useful. Households may benefit from narratives explaining concrete consequences for homes and communities (Weber 2006, pp. 110, 116). Businesses may need forward looking adaptation scenarios or hazard probabilities combined with explanations of plausible disaster outcomes and historical examples (Fiedler et al. 2025, pp. 1908, 1925). Decision-support tools (for example, a cost–benefit calculator for resilience upgrades, insurance premium estimators or resilience ratings scores for properties) to make data actionable could also support the database. Participants in this inquiry highlighted the importance of translating complex climate risk information into formats that are accessible and tailored to different audiences.[42]

Recommendation 3.1
Improve access to climate risk information through a national database

The Australian Government should develop and maintain a central, publicly accessible national multi-hazard climate-risk information database. In developing the database, the Australian Government should coordinate with relevant federal, state and territory and local organisations to ensure alignment and integration of existing data sources where appropriate. The database should provide granular, accessible and actionable information on climate risk to the public, builders, insurers and governments.

Develop information on homes' resilience

Households need information on homes' resilience

There is evidence that climate risk information is being priced into property values (Beltrán et al. 2018, p. 676; Doupe et al. 2019, p. 112; Hino and Burke 2020, p. 11; Keys and Mulder 2020).

[42] Australian Institute of Company Directors, sub. 259, p. 27–28; Green Building Council of Australia, sub. 230, p. 4; Natural Hazards Research Australia, sub. 92, p. 2; ReCFIT, sub. 232, p. 7; South Australian Youth Forum, sub. 113, p. 7; The Uniting Church in Australia, Queensland Synod and UnitingCare Queensland, sub. 183, p. 4.

That said, many households either do not understand their home's resilience to climate risks or they lack information on how to respond. In a 2024 survey, only 29% of homeowners reported being aware of their home's risk of being impacted by a natural disaster (Domain 2024). For homebuyers, assessing a property's resilience is particularly challenging, and publicly available information is often difficult for some users to understand (Choice 2023, p. 22; Styger et al. 2025, p. 18).

Information gaps between buyers and sellers can affect market behaviour. When sellers know more about a property's resilience than prospective buyers, the latter can pay too much for homes that are poorly protected against hazards. Their ability to make informed decisions is undermined, and sellers have reduced incentive to invest in resilience features.

Even homeowners who are aware of climate risks can struggle to identify cost-effective ways to mitigate them. Weighing the costs of resilience upgrades against uncertain future benefits is a complex exercise. Climate change will happen over decades and may involve 'tipping points' or non-linear effects. This complexity can delay or prevent effective investment in resilience upgrades and favour short-term coping strategies – such as seeking cooler public spaces during heatwaves or securing loose items ahead of storms (Elrick-Barr et al. 2016, p. 182).

A resilience rating system for housing could help address these challenges. It would allow buyers to make more informed decisions about where they live, helping them avoid less resilient homes. Over time, this could create a price premium for resilient housing, encouraging sellers and developers to invest in and disclose resilience features. Many inquiry participants emphasised the benefit of a resilience rating system.[43]

Create a resilience star rating system

The Australian Government should lead the development of a nationally consistent star rating system to help households, builders and financial institutions make informed decisions, and drive investment in resilient housing. The system should reflect a property's ability to withstand multiple climate hazards – it should account for location-specific risks, present and projected climate conditions, and key property characteristics such as design and materials.

To be effective, the rating system should be outcomes based, meaning ratings reflect the potential cost of damage (for example, a one-star rating would indicate high expected damage costs). While prescriptive approaches can offer certainty by specifying inputs or methods required to achieve a given rating (PC 2025e, p. 49), an outcome-based model allows for innovation and flexibility in how that rating is achieved. This flexibility is particularly important in the context of climate change, where risks, and our understanding of how to mitigate them, are evolving. The Nationwide House Energy Rating Scheme (NatHERS), an outcome-based rating system, encourages innovative design methods that both achieve higher ratings and make construction costs cheaper (CSIRO 2013, pp. 68–69).[44]

A resilience rating system could also support more accurate insurance pricing and incentivise investment in resilience. Insurance premiums often fail to reflect improvements made by households (Housing Industry

[43] Actuaries Institute, qr. 83, p. 5; AGL, sub. 231, pp. 11–12; Australian Institute of Company Directors, sub. 259, p. 28; Brotherhood of St. Lawrence, sub. 126, p. 2; Cbus Super, qr. 19, pp. 2–3; Energy Efficiency Council, sub. 214, p. 3; Financial Rights Legal Centre, qr. 47, p. 4; GBCA, sub. 37, p. 6; Housing Industry Association, sub. 168, p. 6; HOPE Inc, sub. 88, p. 4; ICA, qr. 11, pp. 3–4; NAB, sub. 268, pp. 15–17; SA Youth Forum, sub. 113, p. 7; South East Councils Climate Change Alliance, sub. 171, p. 3–4; Think Brick Australia, sub. 210, p. 3; The Uniting Church in Australia, Queensland Synod and UnitingCare Queensland, sub. 183, pp. 4–5.

[44] The Nationwide House Energy Rating Scheme (NatHERS) measures the energy efficiency of Australian homes. It provides a star rating out of ten, which reflects a home's thermal performance and helps inform energy-conscious design.

Association, sub. 31, p. 16; Master Builders Australia, sub. 33, p. 26). One exception is the discounts facilitated by the Resilient Building Council's (RBC) bushfire resilience self-assessment app (ICA 2025, p. 11). The app lists actions to improve a home's bushfire resilience rating that are recognised by participating insurers through premium discounts. Between October 2023 and September 2025, 18 300 households implemented at least three recommended actions, resulting in over $206 million of private household investment in resilience improvements and up to a 21% reduction in premiums in high-risk bushfire areas (RBC, sub. 204, p. 18).

To maximise impact, the rating system should be compatible with insurer underwriting and financial firm credit risk assessment methods. This would enable resilience ratings to be used for insurance discounts or preferential credit products, like those offered for energy efficiency upgrades. Involvement of insurers and banks in design of the system would help ensure alignment with underwriting and credit assessment processes. The Insurance Council of Australia suggested that insurers be involved in providing data for the development of a resilience rating scheme, including data on hazard exposure, building design and materials, maintenance standards and mitigation measures (sub. 131, p. 2).

A rigorous rating system must accommodate how specific properties perform in their specific environment. This means accounting for location-specific climate hazards and how a building's design deals with them. Just as NatHERS ratings are based on a home's thermal performance, resilience ratings should reflect the actual features of a property. The RBC's bushfire resilience rating system considers features such as the distance of a house from bush, the presence of combustible insulation, roof size and potential fire paths into a house such as ventilation openings and windows (Henderson et al. 2022, pp. 95–98).

Importantly, homeowners lack salient information about how their property's exposure to climate risks will change over time. A resilience rating system should fill this gap by drawing on authoritative climate data (recommendation 3.1) and incorporating forward-looking assessments of exposure.

Developing a resilience rating system will require broad collaboration. Consultation with experts, including builders, developers, households and technical experts will be essential to ensure the rating system is practical, credible and accurately reflects potential damages from climate hazards. The rating system should also aim to learn from, and avoid duplicating progress made by, the private sector.[45]

To maintain credibility and relevance, the rating system should be subject to ongoing review and refinement. NatHERS, for example, was improved by multiple studies critiquing its methodology in the early years of development (Williamson 2000, pp. 105–108) and is now embedded in the National Construction Code (NCC).

The highest policy priority in establishing a resilience rating system is to lift the low levels of resilience in the existing housing stock – new houses are generally more resilient due to modern building standards (ABCB 2014, p. 15). The PC is not suggesting changes to the NCC, although the Australian Building Codes Board (ABCB) already has building resilience as an objective (box 3.1).

[45] Several organisations have designed resilience assessment approaches for buildings. The RBC, supported by funding from the Australian, Queensland and New South Wales Governments, has extended its work on bushfire risk to develop a multi-hazard resilience rating. The Green Building Council of Australia's Green Star building rating system considers multiple features such as energy efficiency, water use and resilience, providing an example of how to incorporate various aspects into a single composite rating. And private firms offer household-level climate-risk reports.

Box 3.1 – Resilience-related changes to the NCC must demonstrate high benefits that exceed costs

The PC has previously argued that while the NCC is sound in principle, aspects of the code and how it is implemented impose unnecessarily high costs on building construction (PC 2025e, p. 5). The PC recommended an independent review covering the NCC's effectiveness against its aims and objectives; its governance arrangements and membership; and how states and territories are implementing it (PC 2025b, p. 54).

Past changes to the NCC after natural disasters and the adoption of high energy-efficiency standards have improved new buildings' resilience to climate hazards. Newer buildings tend to perform much better than older ones (ABCB 2014, pp. 8, 15). Improved building standards have been found to reduce annual average cyclone-related losses by nearly two-thirds (McAneney et al. 2007).

Building Ministers decided to make climate resilience an objective for the Australian Building Codes Board (ABCB) from 1 July 2025 (ABCB 2024). This mandate will enable the ABCB to explore options for cost-effective building standards that increase property resilience. Prevention of water ingress from wind-driven rain in cyclone-prone areas could be an example (CIE 2023, pp. 4, 53–54).

Access to an outcomes-based rating system could support this objective. Such a system, anchored to the cost of damages from climate hazards, would provide information on the potential benefits over time of housing improvements that could be weighed directly against additional construction and compliance costs. Any changes to the NCC relating to resilience would need to carefully consider potential overlap with existing aspects of the code, including how existing energy efficiency requirements already make buildings more resilient to heat (Climate Council 2022, pp. 4–5).

The ABCB will face challenges in deciding how the NCC should support resilience.

- Changes to the NCC need to create a net benefit to society and should not be implemented if superior alternatives are available.[46] In some areas there may already have been over-investment in adaptation (for example, requirements for interconnected fire alarms were introduced despite an assessment that this would have net costs (ABCB 2013, p. 10)).
- The NCC's three-yearly review cycle means that standards could be updated as climate projections evolve but 'shifting the goal posts' has costs. It can deter innovation because industry will be reluctant to make investments that are likely to quickly become outdated. The PC has recently drawn attention to these trade-offs (PC 2025e, p. 50).

Fast-track implementation of a resilience ratings system to realise the benefits

The growing frequency and severity of climate-related damage (ACS 2025a, p. iii) highlights the urgency of establishing a national resilience rating system. A delayed or under-resourced rollout risks missing the window to influence household decisions. As noted above, our analysis indicates that delaying a retrofit program of the existing housing stock could markedly add to the value of avoidable damage to the housing stock – in addition to other impacts from disasters on community health and wellbeing.

Development of a resilience rating scheme must learn from the drawn-out experience of developing Australia's residential energy efficiency rating scheme. The national energy efficiency rating framework began with tools such as the Five Star Design Rating (Ballinger 1988), followed by the establishment of NatHERS in 1993. Subsequent

[46] *Australian Building Codes Board Intergovernmental Agreement*, s. 6.

intergovernmental commitments, including the National Strategy on Energy Efficiency (2009) and the 2019 and 2025 Trajectory for Low Energy Buildings, have reiterated long-standing goals such as expanding ratings to the existing housing stock and mandatory disclosure of ratings. Yet these goals remain only partly realised, highlighting the risk of slow progress without sustained effort, resourcing and coordination.

The rollout of a resilience rating scheme could be expedited by building on the governance and infrastructure established under NatHERS. For example, information provided by CSIRO's NatHERS rating software, such as the climate zone, dwelling elevation and air infiltration features of a house (CSIRO n.d), which could be relevant for a resilience rating. Where feasible, resilience metrics could be aligned with NatHERS inputs. For instance, features that improve bushfire resilience, such as tightly sealed, non-combustible insulation, can also enhance thermal performance. Alignment would allow design data already collected under NatHERS to inform resilience ratings, reducing duplication and administrative burden. Resilience rating design could draw on the learnings of the NatHERS scheme to create a behaviourally informed rating that effectively signals resilience to homebuyers and renters. Locating a resilience rating within an Australian Government program like NatHERS could also assist in integrating resilience ratings with a range of government home upgrade subsidy schemes, where these schemes provide cost-effective incentives to increase housing resilience.

National consistency delivers clear productivity gains. A single resilience rating system reduces duplication, lowers compliance costs and enables economies of scale – avoiding the inefficiencies of fragmented state-based schemes. Consistent standards build market confidence, simplify investment decisions and support integration with housing, finance and insurance policies. This approach accelerates rollout, improves efficiency and ensures resilience ratings deliver maximum economic and community benefit.

To be effective, the resilience rating system must be scalable. The limited number of NatHERS assessors for on-site assessments of existing homes (DCCEEW 2025f) suggests that relying solely on in-person evaluations could significantly delay rollout. One potential solution is a dual assessment pathway, combining online self-assessment tools with professional verification. Multiple inquiry participants highlighted that self-assessments could assist in a ratings rollout at scale (Climateworks Centre, sub. 189, p. 16; ICA, sub. 131, p. 2; NAB, sub. 268, p. 15). Where resilience ratings are used to support insurance discounts or preferential credit products, self-assessment results could be verified by an off-site certifier. On-site assessments should remain available for complex, multi-hazard or high-risk properties, or for individuals who are less comfortable with digital tools (RBC, sub. 204, p. 5).

To support rollout at scale, existing professions with adjacent expertise should be engaged to offer resilience ratings as an add-on service at key household decision points (Climateworks Centre, sub. 189. p. 16; RBC, sub. 204, pp. 5–6). These could include energy assessors, building and pest inspectors, insurance assessors, real estate agents and other builders and tradespersons. This approach could help embed resilience ratings into everyday housing transactions and renovation decisions, increasing uptake and impact.

Provide guidance on cost-effective resilience investments

The Australian Government should lead the development of decision support tools and clear, practical guidance on cost-effective resilience measures to help households and industry identify building features that reduce climate risk and improve long-term performance. Guidance should:

- cover multiple hazards and provide certainty to builders and insurers to recommend specific actions
- be forward looking, informed by projected climate risks and developed collaboratively with the ABCB, insurers, local councils, and industry
- be regularly reviewed to reflect advancements in climate science and building technologies.

Examples of cost-effective resilient building features include cyclone-resistant doors (Queensland Government 2025a, pp. 1–2), wet-proofing for flood-prone areas (RBC 2024, p. 6) or non-combustible roofing frames to protect from bushfire (CSIRO 2021). Resilience measures can yield high returns on investment (figure 3.2), particularly when targeted to local hazard profiles.

Pairing this guidance with the resilience rating system would give households, developers and builders more confidence that upgrades will deliver tangible benefits. Improvements in a home's resilience rating could also lead to reduced insurance premiums, providing homeowners with an immediate financial incentive to act. Inquiry participants highlighted that clear guidance on adaptation measures to reduce risk can be effective at prompting investment in resilience features.[47]

Existing resources, such as the National Resilience Action Library under the Hazards Insurance Partnership, provide a starting point, but there is limited information on which investments deliver the biggest net benefits for households. Clear national guidance and decision support tools could address this gap.

To support household investment, the Australian Sustainable Finance Institute has suggested expanding Australia's sustainable finance taxonomy to include adaptation (sub. 20, p. 6). A taxonomy can provide markets with a definition of what qualifies as a sustainable activity. Including adaptation measures, could enable financial institutions to offer green loans and concessional finance for resilience upgrades, improving household access to lower-cost finance and facilitating capital flows toward resilience upgrades.

Recommendation 3.2
Develop a nationally consistent climate resilience rating system for housing

The Australian Government should lead development of a nationally consistent climate resilience star rating system for housing. The rating system should:

- be outcome-based, with ratings reflecting potential cost of damage from climate hazards
- account for location-specific climate hazards and property characteristics
- be supported by practical guidance material so that households, builders and insurers can identify cost-effective upgrades to improve a property's resilience.

Development of the rating system should:

- build on existing work undertaken in this area
- integrate over time with the Nationwide House Energy Rating Scheme (NatHERS)
- learn lessons from NatHERS to accelerate development and implementation of the rating system.

Address other barriers to investment

A climate risk database, a resilience rating system and guidance on cost-effective resilience upgrades are essential building blocks for improving housing resilience – but they are not sufficient on their own.

Even with these foundations in place, other barriers impede investment. Climate risk information needs to be salient at key decision points – such as when people are buying, selling or leasing a home. Planning and zoning decisions can constrain where and how homes are built. Insurance pricing can be distorted by taxes,

[47] Actuaries Institute, qr. 83 p. 24; AGL, sub. 231, p. 12; Foundation for Rural & Regional Renewal, qr. 21, p. 3; GBCA, sub. 37, p. 7; MFAA, qr. 75, p. 2; Wimmera Southern Mallee Development, qr. 30, pp. 9–10.

discouraging uptake.[48] And even when resilience investments are cost-effective, households may not act if they do not expect to realise the full benefits.

Many households also face financial constraints or struggle to prioritise short-term spending to address long-term risks (Natural Hazards Research Australia, sub. 92, pp. 3–4). Participants to this inquiry highlighted that affordability remains a key barrier to household uptake of resilience measures (ANMF (Federal Office), sub. 184. p. 10; Green Building Council of Australia, sub. 230, p. 5; Natural Hazards Research Australia, sub. 92, pp. 3–4).

Resilience at the household level is also closely linked to the resilience of other systems. Shared infrastructure, such as roads, drainage, energy networks and emergency services, can also amplify or undermine the benefits of private investment in housing resilience (IGCC, sub. 166, pp. 10–11; Infrastructure Victoria, sub. 121, p. 2; NRM Regions Australia, sub. 191, p. 7).

Governments need to take considered and coordinated action

All three levels of government have distinct and complementary roles in helping Australia adapt to the impacts of climate change.

Many of the mechanisms for improving housing resilience, including planning, building regulation and asset management, sit with state, territory and local governments. But the Australian Government also has a role to play, in national leadership, information provision and coordination, given its significant role in resourcing disaster recovery, maintaining the social safety net and meeting national productivity and resilience goals. Responsibilities should remain with those best placed to act but must be supported by clear national coordination and accountability.

Effective intergovernmental coordination, led by the Australian Government, can help minimise the cost of creating a climate-resilient housing stock. Agreed goals for housing resilience would provide a pathway for policy action. Clear and aligned roles and responsibilities would avoid gaps or overlaps in policy efforts. Accountability measures would keep governments on track. And early signalling of the importance of adaptation could encourage efficient private investment in resilience and reduce long-term policy costs.

Clear and aligned roles and responsibilities, across all levels of government and between public and private actors, will be essential for coordinated action to succeed. Without clarity, there is a risk of duplication, gaps or misaligned incentives that undermine resilience outcomes.

Adaptation at scale will require careful policy design and sustained effort. Increasing investment in resilience may require significant policy change, and governments will need to consider how and when to phase in new measures. Some policies can only be implemented after the resilience rating system has been created and tested. Choosing the right mix of policies will take time, particularly as the information required to evaluate the costs and benefits of potential options may not yet be available. Laying the groundwork now will reduce future costs and increase the likelihood that adaptation efforts are effective and equitable.

Given the systemic nature of climate risk, adaptation considerations must be integrated across all Australian government portfolios to ensure an efficient and effective response. The Australian Government's National Adaptation Plan and initiatives such as the Climate Risk and Opportunity Management Program provide a foundation for aligning adaptation efforts across portfolios. The National Adaptation Plan sets national

[48] As the PC has previously observed, the Cyclone Reinsurance Pool may distort insurance pricing and reduce incentives for households to manage natural disaster risks (2024a, p. 8). Some inquiry participants disagree, with the Housing Industry Association supporting government-backed reinsurance pools as a method to maintain insurance affordability in high-risk areas (sub. 31, p. 17).

priorities and a framework for action, creating an opportunity to move beyond fragmented approaches to mainstreaming adaptation into policies and programs across all portfolios.

While adaptation and disaster risk management are distinct, they are closely interlinked. Greater alignment between climate adaptation and disaster resilience policy, funding, and governance is needed to ensure both chronic and acute climate risks are addressed in a coordinated and cost-effective way. Similarly, emissions reduction and adaptation should be considered in parallel, supporting a more integrated and efficient national response to climate change.

The National Adaptation Plan's action agenda (DCCEEW 2025, p. 17), currently under development, presents an opportunity to further strengthen alignment. By integrating adaptation into policies and programs across all portfolios, governments can make better use of resources, improve community outcomes and ensure that resilience-building efforts are coherent, coordinated and sustained over time. Over the next decade, adaptation should become core business for all portfolios, delivering a unified response to both chronic and acute climate risks.

A coordinated strategy to drive investment in housing resilience

Effective adaptation in housing will require all levels of government to develop and coordinate policies under a nationally cohesive strategy (Property Council of Australia, qr. 84, p. 7). Australian governments should work together to establish a coordinated strategy to generate sustained investment in housing resilience.

This work should be anchored in time-specific and outcome-based goals for housing resilience, supported by cost-effective measures to achieve them. For example, governments could aim for a substantial proportion of homes to meet a minimum resilience rating and level of heat resistance within 15 years. Progress towards adaptation goals and policies should be reviewed regularly (recommendation 3.4).

To improve household investment in resilience governments should focus on four priorities:

- improving households' capacity to understand and use climate risk information
- uplifting the resilience of the existing housing stock
- embedding climate risk in planning and zoning decisions
- coordinating public and private investment to facilitate neighbourhood- and precinct-level resilience.

The aim should be to influence the investment decisions of the millions of buyers, sellers and renters who make up Australia's housing market. Inquiry participants noted that embedding resilience in specific interventions to address housing resilience and sector-specific plans could help unlock private investment in adaptation (ACTU, sub. 32, p. 14). Governments should consider how to integrate the climate risk information database (recommendation 3.1) and the resilience rating system (recommendation 3.2) into decision-making processes.

Policy measures should be selected based on a clear understanding of where government action is needed, and where households or markets can lead. Rigorous analysis of costs and benefits will be essential to avoid unnecessary regulatory burden or expense. Adherence to established impact assessment processes will help ensure that interventions are proportionate and effective (PC 2025c).

Beyond household-level measures, governments will need a framework for targeted investment in local infrastructure and capacity building to improve neighbourhood and precinct-level resilience. This framework should outline how governments will coordinate public and private investment and account for interdependencies between housing and other systems. In some areas, improving housing resilience may require adapting the surrounding environment or upgrading or reinforcing public infrastructure. Agreed goals for housing resilience should guide the level and type of targeted investments.

Governments should also align resilience measures with critical investment and renewal decision points – such as infrastructure upgrades, urban renewal programs and public asset maintenance cycles. These moments offer strategic opportunities to embed climate resilience into existing capital planning and deliver long-term value. Coordinating resilience actions with these decision points could reduce retrofit costs, improve efficiency and ensure that public investment supports broader adaptation goals.

A well-designed policy response must also consider vulnerability to climate risk and equity. Vulnerable households, including renters, low-income groups and remote communities may find it harder to invest in resilience. Participants to this inquiry submitted that these groups are less likely to benefit from market signals alone and may require other actions to ensure adaptation is inclusive and effective.[49]

For Aboriginal and Torres Strait Islander people, strong cultural and historical connections to Country are central to self-determination, identity and wellbeing. These connections can make relocation in response to climate risks particularly complex, even where there is clear awareness of the impacts. Policy responses should be developed in partnership with Aboriginal and Torres Strait Islander communities, respecting self-determination and cultural values, and supporting adaptation solutions that enable people to remain on Country wherever possible.

Agreeing on goals for housing resilience and an initial series of actions should be a near-term priority. Governments will need to act over the long term and adjust as new information becomes available. Some actions can be phased in and refined over time. Others will depend on successful implementation of foundational reforms. For example, measures to support resilience rating disclosure should be implemented once the rating system is comprehensive and robust, and market responses are understood.

Support household use of information

Buyers who understand climate risk are more likely to value resilience, and research shows they are willing to pay a premium for resilient housing when risk is clearly communicated (Niu et al. 2025, pp. 7–9). To support households' capacity to understand and use climate information, governments could identify mechanisms to:

- increase awareness and understanding of climate risk, such as by making training and resources available to real estate agents, mortgage brokers and tradespeople who can share information with customers
- support resilience ratings disclosure, including through ensuring training is available for rating assessors
- build community capacity to act on climate risk, to provide support communities to respond
- promote disclosure of resilience ratings, for example by requiring mandatory disclosure at point of lease or sale in high-risk locations.

Experience with related policies suggests that disclosure requirements would take some time to embed. NatHERS and the Trajectory for Low Energy Buildings, developed over three decades, have gradually built toward energy efficiency disclosure. Implementing a resilience rating disclosure scheme would involve costs for governments and homeowners, including to administer the scheme and undertake resilience assessments. Analysis for the Trajectory for Low Energy Buildings found that mandatory energy efficiency disclosure would yield a net benefit, but costs would be in the billions of dollars (Common Capital 2024, p. 13). Governments considering implementing resilience rating disclosure should undertake similarly rigorous cost–benefit analyses and identify appropriate ways to phase in requirements.

The PC has previously recommended that vendors be required to disclose the physical climate hazards of a property to reduce information asymmetry between sellers (or landlords) and buyers (or renters) (PC 2023a,

[49] ANMF (Federal Office), sub. 184, pp. 10–11; ReCFIT, sub. 232, pp. 6–7; UNICEF Australia, sub. 202, p. 2; Uniting Church in Australia Queensland Synod and UnitingCare Queensland, sub. 183, pp. 4–5.

p. 8). Mandatory disclosure could also help investors realise returns on resilience upgrades, as properties with higher ratings may attract a premium. The Actuaries Institute (qr. 83, p. 4) argued that disclosure 'would help to inform and empower both buyers and sellers, driving market-based solutions'. Several other inquiry participants raised the benefits of transparently communicating climate risks via mandatory disclosure (Cbus Super, qr. 19, p. 3; Financial Rights Legal Centre, qr. 47, p. 3; MFAA, qr. 75, p. 3; RBC, qr. 88, p. 2). Nevertheless, any decision to implement mandatory disclosure would require a careful assessment of the costs and benefits.

Address resilience of the existing housing stock

Even with more salient climate risk information, other barriers will likely prevent housing resilience goals from being met. Without targeted action, many existing dwellings will remain exposed to increasing climate risk for decades to come.

To build resilience across the existing stock, governments could consider mechanisms to:

- increase access to finance for retrofitting homes, including subsidising resilience upgrades for vulnerable households in high-risk areas (for example the Resilient Homes Funds in New South Wales and Queensland)
- support households to 'build back better' and rebuild to higher resilience standards after natural disasters, including greater flexibility around 'like-for-like' rebuild rules for insurance claims
- improve the resilience of social housing, such as by committing to meet minimum resilience ratings
- address barriers to landlord investment, such as by implementing minimum standards for rental housing in high-risk areas (as has occurred through minimum energy efficiency requirements in the Australian Capital Territory and Victoria, which impact resilience (ACT Government 2025; Victorian DEECA 2025).

Several inquiry participants argued that minimum standards combined with financial support, such as concessional finance, would be necessary to improve resilience in the existing housing stock. These approaches would help low-income households and renters, groups less able to afford or undertake voluntary upgrades, access climate-resilient housing (ACOSS, sub. 24, pp. 8–9; Actuaries Institute, qr. 83, pp. 2, 4; ASBEC qr. 44, p. 5; GBCA, sub. 37, p. 8; RBC, qr. 88, pp. 2, 4).

Minimum resilience rating standards for rental housing may be warranted, given the steeper barriers to investing in this segment. It is often difficult for landlords and renters to negotiate who bears the cost of investment (PC 2005, p. 105, 2012, p. 215). However, many renters also face housing stress, making them particularly sensitive to increases in the cost of housing (SCRGSP 2024, pp. 3–4).

Any regulatory measures should pass a cost–benefit assessment. Minimum resilience standards for rental housing would impose compliance costs and their development would need to be done with care. If introduced, governments should provide adequate lead time to allow adjustment and minimise unintended impacts.

Continue developing planning principles

Where people live directly affects their exposure to climate impacts. Differences in climate risk drive large variation in insurance premiums – median home insurance premiums in southern Australia are roughly half those in cyclone-prone northern regions (ACCC 2024, p. 8), and in areas exposed to major flood risk, premiums can exceed $30,000 per year (ICA 2025, p. 6).

While individuals may consider climate risk when choosing where to live, their decisions are shaped by government planning systems and public infrastructure investment. Inquiry participants noted planning systems do not sufficiently account for future climate scenarios (ICA, qr. 11, p. 3; IGCC, qr. 33, pp. 6–7). With Australia's population projected to increase by approximately 10 million people by mid-century (Centre for Population 2024, pp. 1–2), land use planning systems must integrate climate risk to avoid compounding exposure.

Governments are already reforming planning and approval systems, creating an opportunity to embed national goals for housing resilience. State, territory and local governments hold the levers for change, but

poor planning decisions can impose costs on all taxpayers – for example, through the cost of disaster recovery, which is often funded by governments.

Population growth and housing stock turnover are key drivers of future exposure. Continuing to build housing in high-risk areas will increase exposure and asset losses. The PC's analysis indicates that by 2100, millions of new dwellings will be added to accommodate the projected population, making early planning decisions critical to avoid locking in long-term risk as climate risks intensify.

Efforts to improve housing resilience must be integrated with broader initiatives to reduce housing costs. Well-timed action, supported by clear information, can motivate households, and ensure that planning and zoning reforms both free up new housing supply and direct growth to safer, more resilient locations.

Better land use will be needed over the long-term as Australia's housing stock is replaced. Planning ministers have agreed that New South Wales will lead development of a national framework and guidance on principles for natural disaster and climate risk considerations in land-use planning decisions (Planning Ministers 2023). However, progress has been limited, and implementation needs to accelerate to ensure these commitments translate into practical outcomes.

Governments should commit to implementing the framework and principles so that land-use decisions do not unnecessarily increase Australians' exposure to climate hazards. There is a pressing need to integrate climate risk into broader planning and zoning reforms, so that changes support the delivery of more, cheaper and safe homes. Addressing both climate resilience and housing supply together will deliver the greatest benefits for communities and is the most cost-effective and sustainable approach.

Recommendation 3.3
Improve resilience through a national strategy for housing resilience

The Australian Government should work with state, territory and local governments to establish a national strategy to improve the resilience of Australia's housing stock over coming decades. The strategy should be supported by cost-effective actions to:

- improve households' access to climate risk information and their capacity to understand and use it
- embed climate risk in planning and zoning reforms
- facilitate resilience retrofits of the existing housing stock, particularly in high-risk areas
- improve coordination of public and private-investment to deliver measurable improvements in neighbourhood and precinct-level resilience.

Actions should consider the needs of vulnerable households and communities and align with critical investment and renewal decision points. Actions should proceed only where benefits exceed costs, based on impact assessments that carefully consider the full range of economic, social and environmental costs and benefits.

Strengthen national reporting, monitoring and evaluation of national adaptation policy

Enhance the role of the Climate Change Authority

Monitoring, evaluation and learning (MEL) arrangements are fundamental to good policymaking (PC 2020a, p. 4). They support continuous improvement, help governments assess whether policies are working as

intended, and increase accountability for managing climate risks and delivering adaptation commitments (DAWE 2021, p. 35; DCCEEW 2024c, p. 10).

The Australian Government's development of a MEL system for the National Adaptation Plan (DCCEEW 2025, p. 57) should help to fill a critical gap in Australia's adaptation policy architecture. Embedding independent oversight within this system and legislating an ongoing review process for the National Adaptation Plan would strengthen its credibility and ensure progress is sustained over time.

An expanded role for the Climate Change Authority (the Authority) would support the refinement of Australia's MEL framework and contribute to continuous improvement in national adaptation policy.

The Authority is a statutory body established to provide independent advice on climate change mitigation.[50] Despite the increasing severity of climate risk, adaptation policy lacks a central, independent advisory body. The Authority's mandate does not explicitly include adaptation, limiting its ability to provide integrated advice on climate adaptation and resilience. Expanding the Authority's mandate to include adaptation would strengthen Australia's institutional capacity to manage climate risk and ensure adaptation policy benefits from the same independence, transparency and expertise that supports emissions reduction.

International experience reinforces the value of independent oversight. In the United Kingdom and New Zealand, independent bodies conduct biennial reviews of adaptation progress, advising on adequacy and recommending improvements (NZ Climate Change Commission 2020, 2025; UK Climate Change Committee 2023, p. 11, 2025). Biennial reviews strike a balance between maintaining momentum and allowing time for policies to demonstrate impact.

Inquiry participants strongly supported an adaptation reporting function and an expanded role for the CCA.[51] Many highlighted the benefits of regular, independent and transparent reporting to hold governments accountable, identify policy gaps and guide efficient investment in adaptation.[52]

The Australian Government should legislate to provide the Authority with an adaptation advisory function, including the ability to:

- conduct biennial reviews of progress under the National Adaptation Plan and Climate Risk Assessment
- undertake other reviews if requested by the Minister or Parliament
- conduct independent research on climate change adaptation.

These changes would provide the Authority with adaptation policy functions similar to its emissions reduction responsibilities.

Any national adaptation reporting function should be designed to align with disaster resilience frameworks, enabling coordinated planning and more efficient use of public resources (Pollenter, sub. 129, p. 6). It must also ensure that adaptation is not treated as a standalone issue and that chronic impacts of climate change are given equal focus alongside acute impacts.

To be effective, the Authority will need to be resourced appropriately and supported by dedicated expertise. Adaptation involves different skills, methods and approaches from emissions reduction and an expanded role must reflect this (AGL sub. 231, p. 13; ReCFIT sub. 232, pp. 7–8).

[50] The *Climate Change Authority Act 2011*, s. 11 and *Climate Change Act 2022* outline the Authority's functions.

[51] ALGA, sub. 96, p. 12; ANMF (Federal Office), sub. 184, p. 11; GBCA, sub. 230, p. 7, ICA, sub. 131, p. 4; NAB sub. 268, p 17.

[52] ANMF (Federal Office), sub. 184, p. 11; GBCA, sub. 230, p. 7; ICA, sub. 131, p. 4; Office of Kate Chaney MP, sub. 141, p. 20.

Recommendation 3.4
Expand the Climate Change Authority's role in national climate change adaptation policy

The Australian Government should legislate to provide the Climate Change Authority with responsibility to review and advise on national climate change adaptation policy. As part of this function, the Climate Change Authority should conduct:

- progress reviews of the National Adaptation Plan and National Climate Risk Assessment every two years
- other reviews of national climate change adaptation policy if requested by the Australian Government Minister responsible for Climate Change or by the Parliament
- research on climate change adaptation, including identifying opportunities to improve adaptation policy and practice.

Appendices

A. Public consultation

This appendix outlines the consultation process and lists the organisations and individuals who participated in the inquiry. The PC received the terms of reference for this inquiry on 13 December 2024. The PC consulted with 88 individual organisations (table A.1) across 168 meetings. A consultation questionnaire was released on 19 May 2025 seeking feedback on specific aspects of our policy reform areas. The interim report was released on 3 August 2025, with feedback invited via a call for submissions. In total, 91 questionnaire responses (table A.2) and 283 submissions (table A.3) were received. Read submissions and questionnaire responses.

The PC would like to thank everyone who has participated in this inquiry.

Table A.1 – Consultations

Participants
Actuaries Institute
Australian Renewable Energy Agency (ARENA)
Assistant Professor Arjuna Dibley (National University of Singapore)
Aurora Energy Research
Australian Banking Association (ABA)
Australian Building Codes Board (ABCB)
Australian Climate and Biodiversity Foundation (ACBF)
Australian Climate Service (ACS)
Australian Council of Social Services (ACOSS)
Australian Council of Trade Unions (ACTU)
Australian Energy Council (AEC)
Australian Energy Infrastructure Commissioner (AEIC)
Australian Energy Market Commission (AEMC)
Australian Energy Regulator (AER)
Australian Financial Markets Association (AFMA)
Australian Government Department of Climate Change, Energy, the Environment and Water (DCCEEW)
Australian Government Department of Industry, Science and Resources (DISR)
Australian Government Department of Infrastructure, Transport, Regional Development, Communications, Sport and the Arts (DITRDCSA)

Participants

Australian Government Department of the Prime Minister and Cabinet (PM&C)
Australian Government Treasury
Australian Industry Group (Ai Group)
Australian Local Government Association (ALGA)
Australian Prudential Regulation Authority (APRA)
Australian Sustainable Built Environment Council (ASBEC)
Australian Sustainable Finance Institute (ASFI)
Australian Trucking Association (ATA)
Baringa
BloombergNEF
Business Council of Australia (BCA)
Carbon Market Institute (CMI)
Centre for Policy Development (CPD)
Clean Energy Council (CEC)
Clean Energy Finance Corporation (CEFC)
Clean Energy Investor Group (CEIG)
Clean Energy Regulator (CER)
Climate Change Authority (CCA)
Climateworks Centre
Cross Dependency Initiative (XDI)
Commonwealth Scientific and Industrial Research Organisation (CSIRO)
Dr Dylan McConnell (University of New South Wales)
Dr Gabrielle Kuiper
Dr Tom Longren (Australian National University)
Electric Vehicle Council
Energy Efficiency Council
Energy Networks Australia (ENA)
Engagement Institute (formerly IAP2 Australasia)
EY Port Jackson Partners
Financial Services Council
First Nations Clean Energy Network
GIRA Advisory
Grattan Institute

Participants
Green Building Council of Australia (GBCA)
Herbert Smith Freehills Kramer (formerly Herbert Smith Freehills)
Housing Industry Association (HIA)
Infrastructure Australia
Insurance Council of Australia (ICA)
Investor Group on Climate Change (IGCC)
Marsden Jacob Associates
National Automotive Leasing & Salary Packaging Association (NALSPA)
National Electricity Market Review
National Emergency Management Agency (NEMA)
National Native Title Council (NNTC)
Natural Hazards Research Australia
Net Zero Australia
Net Zero Economy Authority
New South Wales Department of Climate Change, Energy, the Environment and Water
New South Wales Department of Planning, Housing and Infrastructure
New South Wales Productivity and Equality Commission
New South Wales Treasury
Nous Group
NSW EnergyCo
Office of Zali Steggal MP
Pollination Group
Professor Frank Jotzo
Professor Ross Garnaut AC
Property Council of Australia
Queensland Renewable Energy Council (QREC)
Queensland Treasury
RepuTex Energy
Reserve Bank of Australia (RBA)
Resilient Building Council
South Australian Department for Energy and Mining
Spektrum Development
Tilt Renewables

Participants
Victorian Department of Energy, Environment and Climate Action
Western Australian Department of Energy, Mines, Industry Regulation and Safety (DEMIRS)
Western Australian Department of Jobs, Tourism, Science and Innovation
Windlab

Table A.2 – Questionnaire

Participants	qr no.
Actuaries Institute	83
Adi Paterson	8
APA Group	43
Arup	56
ASFA	46
ATN Universities	17
Australian Council of Superannuation Investors (ACSI)	20
Australian Energy Producers	81
Australian Food and Grocery Council (AFGC)	64
Australian Industry Greenhouse Network (AIGN)	87
Australian Industry Group (Ai Group)	52
Australian Logistics Council (ALC)	69
Australian Sustainable Built Environment Council (ASBEC)	44
Australian Trucking Association (ATA)	71
Australis Solar	6
Ben Beattie	1
Brotherhood Of St Laurence	79
Carbon Market Institute (CMI)	53
Cbus Super	19
Cement Industry Federation (CIF)	38
Centre for Policy Development (CPD)	34
Chartered Accountants Australia and New Zealand (CA ANZ)	41
Clean Energy Council	25, 45, 78
Clean Energy Investor Group (CEIG)	12
Climate Action Network Australia (CANA)	14
ClimateWise Associations	77

Participants	qr no.
Community Power Agency	49
CPA Australia	59
CropLife Australia	82
Electric Vehicle Council (EVC)	32
Electrical Trades Union of Australia (ETU)	39
Energy Efficiency Council (EEC)	24
ENGIE	18
Engineers Australia	73
Essential Energy	51
Evie Networks	63
Financial Rights Legal Centre	47
Fortescue	80
Foundation for Rural & Regional Renewal (FRRR)	21
Heavy Vehicle Industry Australia (HVIA)	36
Hydro Tasmania	31
IFM investors	42
Insurance Council of Australia (ICA)	11
Investor Group on Climate Change (IGCC)	33
John Pitt	68
Justin Lippiatt and Everdant Pty Ltd.	2
Justin Miller	67
Maritime Union of Australia (MUA)	66
Master Electricians Australia (MEA)	26
MFAA	75
Minerals Council of Australia (MCA)	89
Mining and Automotive Skills Alliance Ltd (AUSMASA)	65
Net Zero Institute	57
Nexa Advisory	91
Origin Energy	48
Property Council of Australia	84
Queensland Conservation Council (QCC)	37
Queensland Renewable Energy Council (QREC)	40
Real Estate Institute of Australia (REIA)	9
Rebecca Cannon	15

Participants	qr no.
Renewable Energy Alliance (RE-Alliance)	16
Resilient Building Council (RBC)	88
Rio Tinto	61
Southerly Ten	22
Stan Moore	55
Stephen Wilson	35
T & E	62
The Australia Institute	74
The Australian Energy Infrastructure Commissioner	23
The Salvation Army Australia	10
The Superpower Institute	85
The Tech Council of Australia (TCA)	76
Uniting NSW.ACT	50
Urban Taskforce Australia	90
Wimmera Southern Mallee Development (WSM Development)	30
WWF-Australia and the Australian Conservation Foundation (ACF) (WWF-Australia and ACF)	70
XBase Pty Ltd	13
Anonymous	3
Anonymous	4
Anonymous	5
Anonymous	7
Anonymous	27
Anonymous	28
Anonymous	29
Anonymous	54
Anonymous	58
Anonymous	72
Anonymous	86
Anonymous	92

Table A.3 – Submissions

Participants	Sub no.
Affiliated Insulation Industry Coalition (AIIC)	62
AGL Energy Limited (AGL)	231
Aimee Lindorff	247
Alan Pears	123
Alethux	255
Ampol	283
Andrew Ho	103
Angus Lyttle	76
Anne Osborne	169
ANU Institute for Climate, Energy, and Disaster Solutions (ICEDS)	159
ARC Centre of Excellence for the Weather of the 21st Century (21st Century Weather)	179
Arup	194
Ascera Energy	176
ATCO	218
Ausgrid	98
Australia Post	155
Australian Academy of Science	273
Australian Aluminium Council	120
Australian Aluminium Council Ltd	4
Australian Automobile Association (AAA)	262
Australian Automotive Dealer Association (AADA)	234
Australian Chamber of Commerce and Industry (ACCI)	19, 197
Australian Climate and Biodiversity Foundation (ACBF)	38, 54
Australian College of Nursing (ACN)	241
Australian Conservation Foundation (ACF)	226
Australian Council of Learned Academies (ACOLA)	227
Australian Council of Social Service (ACOSS)	24
Australian Council of Trade Unions (ACTU)	32, 266
Australian Dairy Products Federation (ADPF)	26
Australian Energy Council (AEC)	41, 156
Australian Energy Markets Commission (AEMC)	30, 219
Australian Energy Producers	228
Australian Environment Foundation (AEF)	82

Participants	Sub no.
Australian Finance Industry Association (AFIA)	260
Australian Financial Markets Association (AFMA)	27, 139
Australian Food and Grocery Council (AFGC)	252
Australian Forest Products Association (AFPA)	224
Australian Glass and Window Association (AGWA)	136
Australian Hydrogen Council	278
Australian Industry Greenhouse Network (AIGN)	220
Australian Institute of Company Directors (AICD)	18, 259
Australian Institute of Petroleum (AIP)	58
Australian Land Conservation Alliance (ALCA)	236
Australian Livestock and Rural Transporters Association (ALRTA)	249
Australian Local Government Association (ALGA)	5, 96
Australian Logistics Council (ALC)	95
Australian National University, National Centre for the Public Awareness of Science (ANU)	261
Australian Nursing and Midwifery Federation (Federal Office) (ANMF (Federal Office))	184
Australian Pipelines and Gas Association (APGA)	10, 193
Australian Psychological Society (APS)	251
Australian Renewable Energy Agency (ARENA)	185
Australian Small Business and Family Enterprise Ombudsman (ASBFEO)	42, 269
Australian Sustainable Built Environment Council Limited (ASBEC)	119
Australian Sustainable Finance Institute (ASFI)	20
Australian Trucking Association (ATA)	192
Australian Academy of Technological Sciences & Engineering (ATSE)	14
AXiLe Informatics	263
Binalong-Bowning Community Action Group (BBCAG)	167
Biodiversity Council	233
BlueScope	134
bp Australia	200
Brotherhood of St. Laurence (BSL)	126
Bushfire Survivors for Climate Action (BSCA)	138
Business Council of Australia (BCA)	16, 229
C and T Creed	64
Cairns and Far North Environment Centre (CAFNEC)	146

Participants	Sub no.
Canberra Region Joint Organisation (CRJO)	217
Capricorn Conservation Council	97
Carbon Market Institute (CMI)	207
Carolyn Eccleston	67
Centre for Policy Development (CPD)	188
Chamber of Commerce and Industry Western Australia (CCIWA)	23
Chamber of Minerals and Energy of Western Australia (CME)	170
Chartered Accountants Australia and New Zealand (CA ANZ)	254
Chemistry Australia	248
Cheryl O'Donnell	52
Citizens' Climate Lobby (CCL)	44
Civil Contractors Federation Australia Ltd (CCF)	9
Claire Smith	105
Climate Council	206
Climateworks Centre	189
Coca-Cola System	17
Colin Boyce MP, Federal Member for Flynn	203
Commonwealth Bank of Australia (CBA)	35
Consult Australia	161
Consumer Healthcare Products Australia (CHP Australia)	281
Copenhagen Infrastructure Partners	40
Council of Small Business Organisations Australia (COSBOA)	29
Craig Kenny	72
CropLife Australia	11
Dairy Australia	276
David Lee	282
Deborah Pergolotti	270
Dee Smith	107
Diana Fisher	198
Dominic Legoe	106
Dr Anna Mortimore	199
Dr Anne Smith	2
Eastern Alliance for Greenhouse Action (EAGA)	143
Electric Vehicle Council (EVC)	145

Participants	Sub no.
Emma Aisbett	90
Energy & Water Ombudsman NSW (EWON)	140
Energy Consumers Australia (ECA)	101
Energy Efficiency Council (EEC)	214
Energy Futures Foundation (EFF)	238
Engagement Institute	157
Environmental Defenders Office (EDO)	175
EY Australia	196
Fair Futures	211
Federal Chamber of Automotive Industries (FCAI)	190
Federation Asset Management	8, 173
Financial Services Council (FSC)	1
Fiona Hayward	110
Fortescue	216
Fortinet	257
Friends of the Forest Inc	177
Future Smart Strategies	74
Gas Energy Australia (GEA)	154
Get Around Caboolture	49
Glenda Pitman	85
Global Institute for Women's Leadership at the Australian National University (GIWL)	84
GrainGrowers	100
Green Building Council of Australia (GBCA)	37, 230
Green Energy Statecraft Project	195
GreenCollar	225
Heavy Vehicle Industry Australia (HVIA)	7, 244
Householders' Options to Protect the Environment (HOPE Inc)	88
Housing Industry Association (HIA)	31, 168
Hydro Tasmania	122
Infrastructure Partnerships Australia	135
Infrastructure Victoria	121
Institute for Energy Economics and Financial Analysis (IEEFA)	142

Participants	Sub no.
Institute of Public Affairs (IPA)	205
Institution of Civil Engineers (ICE)	93
Insulation Council of Australia and New Zealand	61
Insurance Council of Australia (ICA)	131
Investor Group on Climate Change (IGCC)	166
Jack Pezzey	208
James Richardson	114
James Trevelyan	63
Jeanette Kemp	75
Jemena	223
John Freebairn	235
John Kite	46
John Moore	55
John O'Donnell	99
John Seddon	3
Justine McLeod	60
Kimberley Land Council (KLC)	149
Larissa Taylor	165
Law Council of Australia	239
Lisa Siciliano	201
Lite n Easy	6
Local Government Association of Queensland (LGAQ)	221
Lumetior Pty Ltd	65
Lynette LaBlack	22
Maria Bradley	112
Maritime Emissions Reduction Coalition (MERC)	163
Master Builders Australia	33, 275
Master Electricians Australia (MEA)	124
Matt Hayward	144
Michael Seebeck	186
Microsoft	265
Minerals Council of Australia (MCA)	272
National Australia Bank (NAB)	268
National Automotive Leasing and Salary Packaging Association Ltd (NALSPA)	28

Participants	Sub no.
National Automotive Leasing and Salary Packaging Association, Electric Vehicle Council and Australian Finance Industry Association (NALSPA, EVC, AFIA)	111
National Electrical and Communications Association (NECA)	13
National Growth Areas Alliance (NGAA)	245
National Road Transport Association (NatRoad)	164
Natural Hazards Research Australia	92
Nexa Advisory	86
North Queensland Natural History Group Inc (NQNHG)	125
NRM Regions Australia Ltd	191
Office of Kate Chaney MP	141
Origin Energy	215
Paul Miskelly	104
Peter Burnett	56
Peter Butler	109
Peter Newman	51
Planetary Health Equity Hothouse (ANU)	151
Polestar Australia	237
Pollenter	129
Property Rights Australia (PRA)	187
Protect the Bush Alliance Inc (PTBA)	258
Queensland Conservation Council (QCC)	128
Queensland Farmers' Federation (QFF)	91
Queensland Renewable Energy Council (QREC)	212
Rainforest Reserves Australia (RRA)	45, 78
RE-Alliance	162
Regional Australia Institute (RAI)	15, 250
Renewables, Climate and Future Industries Tasmania, Department of State Growth (ReCFIT)	232
Research Australia	264
Resilient Building Council (RBC)	204
Responsible Investment Association Australasia (RIAA)	36
Rob Cumming	147
Robin van Spaandonk	73
Rory Ellison	68
SA Youth Forum (SAYF)	113

Participants	Sub no.
Santos Ltd	181
Science & Technology Australia	253
Senex Energy	12, 133
Sev Clarke	43
Smart Energy Council (SEC)	117
Solar Citizens	277
South East Councils Climate Change Alliance (SECCCA)	171
Stan Moore	150
Streets People Love Hobart Inc (SPLH)	127
Sue Holmes	246
Suzanne Bell	66
Sydney Airport	89
Team Global Express (TGE)	148
Telstra	271
Tesla Motors Australia (Tesla)	256
The Alliance for Responsible Mining Regulation (ARMR)	94
The Australasian Railway Association (ARA)	160
The Australian Energy Infrastructure Commissioner (AEIC)	180
The Cement Industry Federation Limited (CIF)	153
The Centre for Independent Studies (CIS)	152
The Group of Eight (Go8)	39
The Justice and Equity Centre (JEC)	34, 222
The Nature Conservancy (TNC)	132
The Superpower Institute	21
Think Brick Australia	210
Tilt Renewables	267
Tim Walshaw	240
Toyota Australia	158
Transgrid	25, 213
UNICEF Australia	202
Uniting Church in Australia Queensland Synod and UnitingCare Queensland	183
University of New South Wales (UNSW)	280
UNSW Energy Institute	174

Participants	Sub no.
Valeriy Ogienko	57
Veolia ANZ	80
Victorian Automotive Chamber of Commerce (VACC)	70
Voice for Walcha	182
Wagga Wagga City Council	172
Waste Management and Resource Recovery Association of Australia (WMRR)	118
Wendy Tuckerman	79
Wesfarmers	274
Western Australian AI Hub (WA AI Hub)	243
Western Sydney University – Urban Transformations Research Centre (WSU – UTRC)	48
Woodside Energy	178
WWF-Australia	87
Yass Valley Council (YVC)	116
Anonymous	83
Anonymous	130
Anonymous	242
Anonymous	47
Anonymous	279
Anonymous	71
Anonymous	77
Anonymous	59
Anonymous	102
Anonymous	137
Anonymous	115
Anonymous	81
Anonymous	108
Anonymous	69
Anonymous	50
Anonymous	53
Anonymous	209

B. Quantifying the benefits of adaptation investment

B.1 Summary

This appendix outlines the Productivity Commission's approach to estimating potential reductions in climate-related physical damages to Australia's detached and semi-detached housing stock under different scenarios, which explore how housing resilience and the location of new housing developments can help reduce physical damage.

The PC assessed direct physical damage from extreme weather between 2026 and 2100, comparing:

- a baseline scenario, in which no additional efforts are made to reduce the risk of physical damages to Australia's detached and semi-detached housing assets
- scenarios that include actions to reduce the risk of damage to housing assets through increased investment in the resilience of existing homes and improved land-use planning for new housing developments.

These scenarios do not model the effects of specific policies or programs; rather, they illustrate the potential impact if effective adaptation actions, such as retrofitting homes or improved land-use planning, were implemented. Results represent avoided physical damages to housing assets only. The analysis does not include: indirect benefits of actions to improve resilience such as heat protection; avoidance of cascading social and economic impacts; or the costs of adaptation measures.

Estimates are indicative and subject to uncertainty associated with long-term climate projections, modelling assumptions and data limitations. The analysis is intended to illustrate some of the potential benefits of foundational adaptation actions, not to provide definitive forecasts or a comprehensive assessment of all possible costs and adaptation strategies.

Climate and hazard risk data was provided by XDI (Cross Dependency Initiative).[53] The central analysis used a climate scenario consistent with the Representative Concentration Pathway (RCP) 4.5, with supplementary analysis conducted under the higher-emissions RCP 8.5.[54]

Without further adaptation and under a baseline scenario, climate-related physical damages to detached and semi-detached housing assets over 2026 to 2100 could be as high as:

- $744 billion (present value) under a moderate emissions scenario (RCP4.5)
- $800 billion (present value) under a high-emissions scenario (RCP 8.5).

[53] XDI is a provider of asset-level physical climate risk and adaptation analytics. XDI uses proprietary geospatial and engineering-based models to assess exposure and potential damage to buildings and infrastructure under multiple climate and emissions scenarios.

[54] RCPs describe possible greenhouse gas concentration pathways that drive projected changes in climate-related hazard intensity and frequency. These RCPs were used in the Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report (IPCC 2014, p. 57).

By the end of the century, annual undiscounted damages could reach $31 billion per year, equivalent to approximately 1% of 2024-25 GDP (PC calculations based on ABS 2025a, table 1).

Actions that improve housing resilience could reduce cumulative damages over 2026 to 2100 by $240 billion (present value, RCP 4.5):

- $186 billion (present value) from making existing dwellings more resilient
- $54 billion (present value) from avoiding new housing development in high-risk areas.

While the present value estimates of direct physical damages are relatively similar under RCP 4.5 and RCP 8.5, the non-modelled impacts – such as heat-related hazards and cascading social and economic effects – would likely be substantially greater under higher emissions scenarios. As a result, the overall risks and costs of inaction could be much higher under RCP 8.5 than is reflected in the direct damage estimates alone.

Realising the benefits will depend on how adaptation measures are designed, implemented, and supported by complementary policies and investments. Further work will be required to fully realise and assess the gains estimated in this analysis.

B.2 Data

XDI provided the PC with a proprietary dataset that contained modelled estimates of Maximum-to-date Value-At-Risk (MVAR) (B.3 Scenario design and methodology) climate hazards for Australia's property stock under different scenarios of housing resilience. This dataset served as a base for the PC's analysis. The PC supplemented the dataset with housing stock and population data from the ABS to align with the requirements of the scenarios assessed in this report.

Hazards

The analysis covered seven major climate-related hazards that pose risks to detached and semi-detached dwellings in Australia. The data does not include hazards such as hail or landslides. As such, and given the potential for cascading, concurrent or compounding events, actual asset damages from hazards may be greater than those estimated in this analysis.

The selected hazards represent the primary climate-related risks to housing assets:

- **Coastal inundation (including sea-level rise)** – sea water flooding due to high tides, wind, low air pressure and waves damages coastal land, infrastructure and buildings.
- **Forest fire** – high temperatures, dry conditions and high wind speeds can cause destructive fires that spread via trees and forest.
- **Riverine (fluvial) flooding** – changes in precipitation in a catchment cause rivers to exceed capacity, inundating nearby areas.
- **Surface water (pluvial) flooding** – extreme rainfall leads to overland flooding.
- **Tropical cyclone wind** – high sea surface temperatures which create complex low pressure weather systems can lead to tropical cyclones with destructive extreme winds.
- **Extreme wind** – sea surface temperature changes cause high-wind conditions that exceed a building's design specifications.
- **Soil movement** – soil contraction due to decreased rainfall causes damage to structures.

Exposure and housing stock

The following information sources informed projections of the housing stock:

- **Address base:** XDI constructed their exposure dataset using the Geoscape geocoded national address file (G-NAF), which contains approximately 15.4 million addresses.
- **Dwelling type filter:** the PC scaled down damages from the 15.4 million G-NAF addresses to an estimated initial 9.5 million houses and semi-detached dwellings in 2024 (PC estimates based on ABS 2022, table 1, 2025e, table 1). That is, the PC assumed that the type of building at a G-NAF address was independent of hazard risk. This may not fully hold. For example, if historical development patterns have led to houses and semi-detached dwellings being concentrated in higher-risk areas (such as near rivers, beachfronts or bushland) then the analysis might underestimate the true level of risk for houses and semi-detached dwellings.
- **Housing archetypes:** XDI projected damages for 'low-resilience' homes and 'increased-resilience' homes (table B.1). The PC has assumed that low-resilience homes are representative of builds before 2010 and high-resilience homes are representative of homes built in 2010 or later.[55] The latter reduce, although do not eliminate, asset damage from hazards.

Table B.1 – Housing archetypes are based on physical and engineering differences

Building characteristics used in the analysis, by feature and archetype

	Low-resilience home	Increased-resilience home
Floor height above ground	Low-resilience homes are 0.25 metres above the ground. At this height, floodwater is more likely to enter the building. Features such as floors, walls and electrical wiring are more likely to get wet, increasing asset damage and repair costs.	Increased-resilience homes are 0.5 metres above the ground. This height keeps many shallow floods out of the building. With less inundation, fewer materials are damaged, reducing overall asset damage.
Fire protection	Low-resilience homes are a built to a baseline standard of fire resilience, consistent with long-term average housing losses from Australian bushfire. This lower standard increases the chance of ignition from bushfire embers. Once ignited, the materials of the house are more likely to spread the fire across the building, leading to major asset damage.	Increased-resilience homes incorporate additional features such as blocking mechanisms to reduce ember infiltration and ignition-resistant roofing. These features reduce the probability that a home burns in a bushfire by 20–25% compared with a low-resilience home.
Cyclone and windstorm resilience	Low-resilience homes are built to withstand 1-in-50-year cyclone winds and 1-in-50-year windstorms (based on location within Australia's defined wind region zones). During stronger cyclones or windstorms, roofs, cladding and openings are more likely to fail, increasing asset damage and repair costs.	Increased-resilience homes are built with stronger fixings and windows. This makes them more likely to withstand rarer and more intense 1-in-500-year cyclone winds or 1-in-500-year wind events (based on location within Australia's defined wind region zones).

[55] This is a simplifying assumption. While newer buildings are generally more resilient to climate hazards (ABCB 2014, pp. 8, 15), not all older dwellings are of low-resilience, and not all newer dwellings are of increased-resilience. Data on the resilience of the dwelling stock is limited.

- **Replacement cost:** each dwelling's replacement cost was set at an average of $417,000. This is based on Mallon et al.'s (2019, p. 18) replacement cost of $314,000, inflated to 2024-25 dollars.[56]
- **Housing stock development:** the housing stock changes due to the building of new homes to accommodate population growth and from stock turnover as old houses are replaced.
- **Population and dwellings projections:** The PC estimated the future dwelling stock using ABS (2023) population projections. Population figures were converted to dwellings using the 2024 ratio of 1 dwelling per 2.41 people. Available ABS projections extend to 2071, and the data was then linearly extrapolated to give a population of 45 million in 2100. Although population estimates to 2100 vary significantly, our estimate is close to a United Nations estimate of approximately 43 million (UN 2024).
- **Stock turnover:** The PC used a cohort-survival model to represent the retirement and replacement of dwellings over time. The model was based on the initial stock of 2.5 million dwellings in 1954[57] and ABS dwelling completions data from 1955 onwards (ABS 1954, vol VIII, p. 7, 2025b, table 37). A mean dwelling life of 90 years with a standard deviation of 20 years and a small correction factor (less than 0.1%) were applied. Parameters were chosen so that the model was consistent with historical build data and current estimates of the housing stock. The use of a longer dwelling life than the asset life of 59 to 88 years used by the ABS at different points in time reflects that renovations can extend the life of dwellings (ABS 2021).
- **Spatial allocation:** XDI used geospatial boundary files from the ABS to allocate dwellings to local government areas (LGAs) and hazard zones, ensuring accurate local-level exposure representation.

B.3 Scenario design and methodology

Damage metric

The PC compared expected housing asset damage across scenarios using the Maximum-to-date Value-At-Risk (MVAR) metric. The MVAR represents the annual average loss from damage as a fraction of the total replacement value of a property. It is calculated using the relative risk contribution of each structural element of a house and considers the likelihood and potential severity of damage to each element. This means it gives a way to compare the level of risk or potential insurance costs, without being tied to a specific dollar amount.

MVAR reflects the highest expected annual damage to an asset from climate-related hazards observed to date, smoothing out year-to-year fluctuations in climate model projections. Using a simple annual value-at-risk measure may misrepresent the average trend if a given year is unusually low risk due to climate variation.

For example, a house with a $400,000 replacement cost and expected Average Annualised Losses of $2,000 per year has a Value-At-Risk of 0.5%. If annual Value-At-Risk changes from 2070 to 2073 are:

- 2070: 0.50%
- 2071: 0.51%
- 2072: 0.53%
- 2073: 0.52%

[56] Costs were inflated by 32.9%, reflecting the midpoint between house construction costs index (ABS 2025d, table 17) and the consumer price index (ABS 2025c, table 1), to account for COVID-19 related volatility and uncertainty in long-term repair costs.
[57] This count of dwellings is an underestimate as the 1954 Census excluded fully Aboriginal and Torres Strait Islander occupied dwellings.

Then the MVAR for 2073 would be 0.53% as it is the highest Value-At-Risk observed to date. On average, MVAR will be slightly higher than reporting expected annual damage. This reflects XDI's approach, which uses MVAR instead of historical annual averages.

Scenarios

The PC used four stylised scenarios to explore how improving housing stock resilience and the location of new development might help reduce physical damage to detached and semi-detached housing assets:

- **Baseline** – current patterns of home building development continue, including ongoing development in high-risk areas (defined as locations where the annual MVAR exceeds 1% of asset value). Dwellings built before 2010 are assumed to be of a low-resilience archetype (table B.1), while builds from 2010 onwards are assumed to be of an increased-resilience archetype (table B.1), reflecting updates to building codes.
- **Scenario 1: increased investment in existing housing** – private and public actions upgrade the 7.3 million pre-2010 dwellings remaining in 2040 to an increased-resilience archetype. Upgrades in housing quality occur at a constant annual rate between 2026 to 2040. End-of-life dwellings are assumed to be rebuilt in the same location. New homes to accommodate population growth are added within each LGA in proportion to the existing dwelling stock, including in high-risk areas.
- **Scenario 2: improved land-use planning** – from 2026 onwards, new homes required for population growth are not built in high-risk areas. Dwelling growth is redirected to safer locations within the same LGA, or to lower-risk LGAs (resulting in MVAR for these homes being reduced to 1%). Land-use planning excludes the replacement of end-of-life dwellings – dwellings that reach their end-of-life over this period are assumed to be rebuilt in the same location. Pre-2010 homes are not upgraded and remain of a low-resilience archetype.
- **Scenario 3: combined scenario** – combines the assumptions of Scenarios 1 and 2: resilience upgrades to pre-2010 dwellings occur between 2026 and 2040, and new housing growth avoids high-risk areas. End-of-life dwellings are assumed to be rebuilt in their original location.

These scenarios are illustrative and focus on the potential benefits of actions across society to reduce damage to detached and semi-detached housing assets. Apartments and non-residential buildings are excluded due to their distinct exposure profiles and adaptation options. The analysis does not examine the full range of possible adaptation policy responses, such as managed retreat, property buybacks, insurance or major protective infrastructure, which may also be required in some instances. The scenarios aim to demonstrate the potential benefits of foundational 'no regrets' actions to improve housing resilience, rather than to assess the merits of alternative policy options.

Common features of each scenario

The following common features were applied across all four scenarios:

- **Timeframe** – estimates were produced for the period 2026 to 2100.
- **Geography** – housing asset data aggregated at the LGA level, with results reported at the national level.
- **Emissions scenarios** – two emissions scenarios were considered – RCP 4.5 and RCP 8.5. The supplied XDI data considers climate risk under each of these emissions scenarios.
- **Climate models** – hazard data were derived from XDI's proprietary models. The XDI analysis used the CORDEX regional climate models for all hazards, supplemented by the Coastal Inundation model (Haigh et al. 2014) for coastal hazards and the CMIP5 model for Tropical Cyclone Wind.

Methodology

XDI estimates of MVAR use externally sourced coastal inundation, flooding, forestry, elevation and ground data, together with climate models which estimate the prevalence and intensity of hazards. These were combined with XDI proprietary modelling of assets' resilience to climate hazards. MVAR estimates were provided and analysed for an RCP 4.5 emissions scenario and a supplementary RCP 8.5 emissions scenario.

XDI's dataset contains MVAR estimates at five-yearly intervals between 1990 to 2100, aggregated to LGAs and for each hazard and all hazards combined. The PC produced annual MVAR figures assuming a linear increase in MVAR between every provided five-yearly MVAR figure. As an illustration, if MVAR was estimated as 0.5% in 2050 and 0.6% in 2055, we assumed a 0.02 percentage point increase occurred annually from 2050 to 2055.

Annual expected damages were estimated by multiplying the average MVAR across the dwelling stock by the number of dwellings and the replacement cost per dwelling. Total damages for each scenario were estimated by summing damages from 2026 to 2100. Summed MVAR figures for each scenario were compared to produce an estimate of the avoided MVAR from different patterns of adaptation action.

The scenarios do not eliminate all asset damage. Given the costs of resilience measures, there is a trade-off between the benefits and costs of adaptation. The estimates presented here are not intended to identify the 'optimal' housing archetype or policy mix. Instead, by construction, the scenarios estimate the impacts of upgrading different housing archetypes, without considering the full range of policy, regulatory or funding options that could be used to achieve these upgrades. Determining the most cost-effective or appropriate approach (such as mandating minimum standards or subsidising upgrades for social housing) would require a separate, more detailed policy and cost–benefit analysis. The estimates do not cover all potential housing resilience pathways – they are illustrative of the substantial gains that could be achieved.

Discount rate and sensitivity testing

Future damages were converted to present values by discounting cumulative annual MVAR estimates between 2026 and 2100. A central discount rate of 2.5% per year was applied, with sensitivity testing at 0% and 5%. These results are presented in the findings section. Given the long timeframe of our analysis, the discount rate chosen materially influences present value estimates.

The selection of the 2.5% discount rate reflects a balance between rates commonly applied in Australian government policy design and the lower rates often recommended for climate adaptation analysis.

While the Australian Government's Office of Impact Analysis (OIA) suggests the use of a higher annual discount rate of 7%[58] for regulatory impact assessments (OIA 2023a, p. 10), our analysis is not a formal impact assessment of a specific policy, but rather an exploration of potential long-term damages and adaptation benefits at a societal level.

For this reason, we have drawn from the most recent IPCC Assessment Report, which did not use a single discount rate, but noted that discount rates of 2–5% are common for ex post comparison of climate mitigation options (Guivarch et al. 2022, p. 1846). Lower discount rates between 0.1–2.5% are also common when analysing climate adaptation options (Chambwera et al. 2014, p. 959).

[58] For longer timeframes, the OIA recommends a 7% discount rate for the first 30 years, a 5.4% discount rate for the next 45 years and an even lower discount rate afterwards (OIA 2023b, p. 5).

B.4 Findings

Under the baseline scenario and RCP 4.5, estimated cumulative damages to detached and semi-detached housing assets could reach up to $744 billion (present value) between 2026 and 2100. This scenario assumes no additional actions are taken to improve housing resilience.

Implementing measures that reduce physical damage to housing assets has the potential to reduce these damages by up to $240 billion (present value). Of this, $186 billion is attributable to resilience upgrades to existing homes and $54 billion to land-use planning that directs new housing away from high-risk areas.

Baseline damages

Natural hazards are projected to cause up to $744 billion in property damage by 2100 (table B.2). Most losses occur later in the century and flooding accounts for the most damage (figure B.1). Use of a higher discount rate significantly reduces the estimated damages – but they remain substantial. And the estimate only covers asset damage. It does not account for additional losses from heat, cascading impacts or other factors excluded from the modelling.

Table B.2 – Hazards could cause significant property damage by 2100

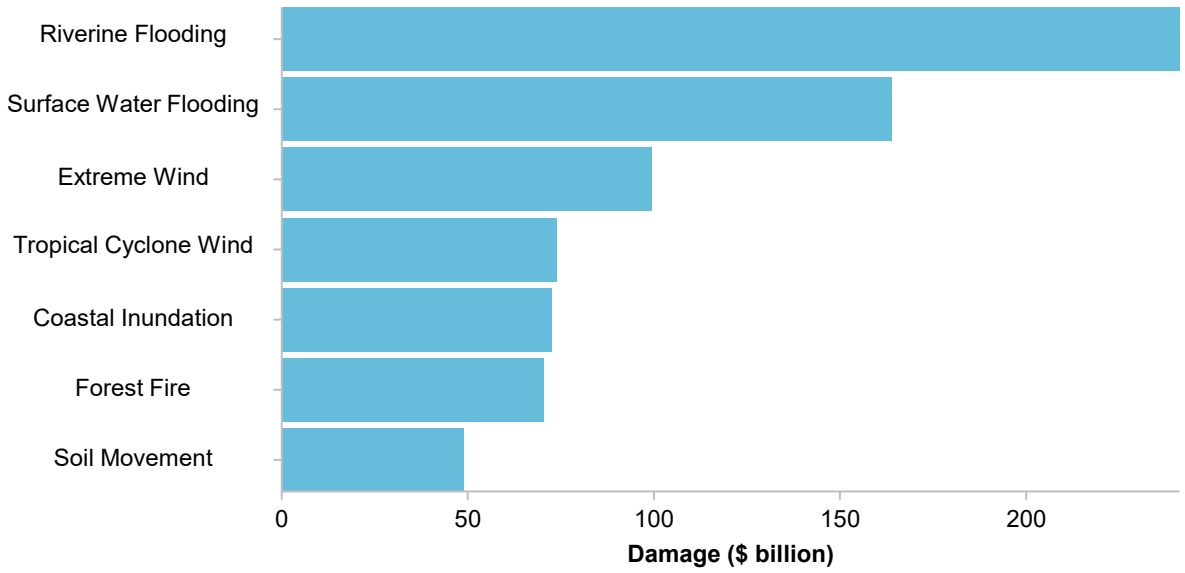
Expected damage by RCP and discount rate, total 2026–2100

	RCP 4.5	RCP 8.5
2.5% discount	$744 billion	$800 billion
5% discount	$409 billion	$428 billion
No discount	$1774 billion	$1976 billion

Source: PC analysis using data from XDI.

Figure B.1 – Flooding is expected to cause the most damage

Expected damage by hazard, 2.5% discount rate, RCP 4.5, total 2026–2100



Riverine and surface water flooding may overlap, and some damage may be counted in both.

Source: PC analysis using data from XDI.

Reform benefits

Reforms have the potential to substantially reduce damages. The combined scenario (Scenario 3), which includes both resilience upgrades to existing homes and improved planning, is estimated to reduce damages by up to $240 billion (present value) under RCP 4.5 (table B.3). Under RCP 8.5, avoided damages are slightly higher at $258 billion (present value) (table B.4).

Increased investment in existing housing (Scenario 1), such as through retrofitting existing homes, could reduce damages by up to $186 billion (present value) under RCP 4.5 (table B.3). Under RCP 8.5, avoided damages increase to $196 billion (present value) (table B.4). Timely implementation under this scenario is important to secure early gains. A shorter 5-year program could avoid an additional $38 billion in damages between 2026 and 2100, while a delayed 30-year program could result in $44 billion in additional losses (present value, RCP 4.5).

Improved land-use planning for new housing developments (Scenario 2) has the potential to reduce damages by up to $54 billion (present value) under RCP 4.5 (table B.3). Under RCP 8.5, avoided damages increase to $63 billion (present value) (table B.4).

Table B.3 – Making existing homes more resilient and improved land-use planning could avoid almost $240 billion dollars in damages by 2100

Expected savings under each reform scenario, RCP 4.5, total 2026–2100

	2.5% discount	5% discount	No discount
Increased investment in existing housing	$186 billion	$105 billion	$388 billion
Improved land-use planning	$54 billion	$21 billion	$184 billion
Combined scenario	$240 billion	$126 billion	$573 billion

The avoided expected damage of individual reforms may not sum to combined scenario avoided expected damage due to rounding.

Source: PC analysis using data from XDI.

Table B.4 – Savings under RCP 8.5 are slightly higher than savings under RCP 4.5

Expected savings under each scenario, RCP 8.5, total 2026–2100

	2.5% discount	5% discount	No discount
Increased investment in existing housing	$196 billion	$109 billion	$420 billion
Improved land-use planning	$63 billion	$23 billion	$219 billion
Combined scenario	$258 billion	$132 billion	$639 billion

The avoided expected damage of individual reforms may not sum to combined scenario avoided expected damage due to rounding.

Source: PC analysis using data from XDI.

Different scenarios deliver benefits at different times. Increased investment in existing homes yields larger short-term benefits, while improved land-use planning becomes more important over the long term (figure B.2). Because the benefits of land-use planning depend on the gradual addition of new housing stock, they accrue further in the future and are therefore more heavily reduced by discounting. However, the opportunity

to act is greatest when new homes are being planned and built, allowing these benefits to be realised with less disruption and, in many cases, likely at lower cost than retrofitting existing homes.

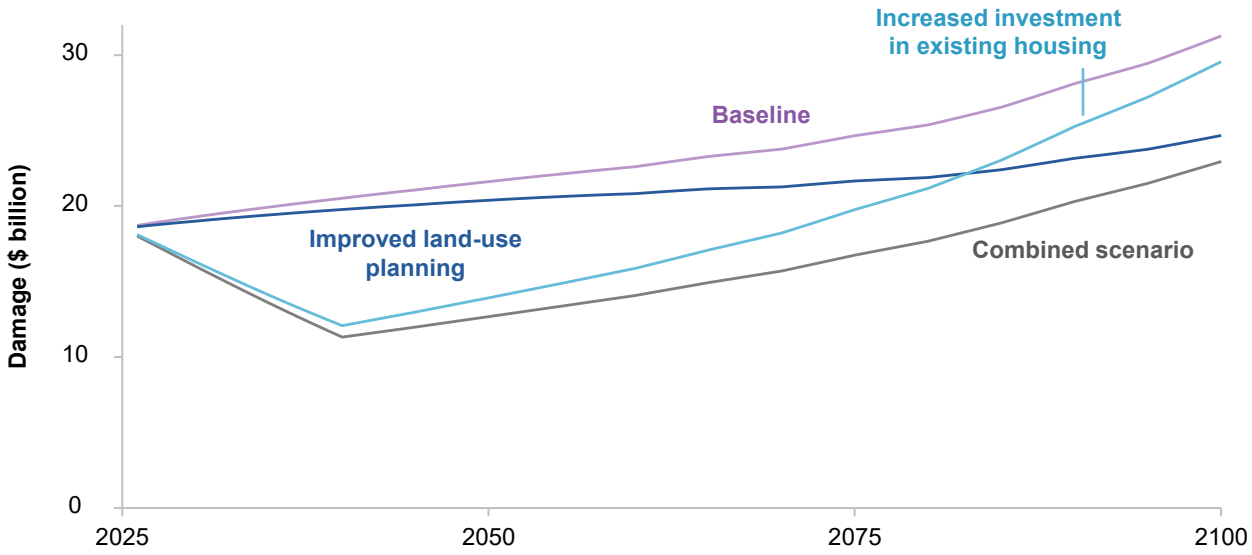
To aid comparison of the scenarios, the PC has presented undiscounted annual damages (figure B.2). For context, a 2.5% discount rate implies that the present value of $1 in 2100 is only 16 cents today.

Retrofits are most valuable early on, when many low-resilience homes remain. In 2040, completing the retrofit program across all 7.3 million remaining pre-2010 dwellings reduces annual damages from $21 billion to $12 billion per year (undiscounted, RCP 4.5). By 2100, the annual avoided damages fall to about $2 billion (undiscounted, RCP 4.5), as only 1 million pre-2010 dwellings are projected to remain.

In contrast, improved land-use planning delivers increasing benefits over time, as it applies to a growing share of new dwellings. In 2040, annual damages are reduced by less than $1 billion, since the reforms only affect around 2 million new dwellings (undiscounted, RCP 4.5).[59] By 2100, land-use planning improvements have a larger effect as around 7 million dwellings have been built after reforms, reducing annual damages from $31 billion to $25 billion (undiscounted, RCP 4.5).

Figure B.2 – Retrofits could help avoid damage early, but better land-use planning has benefits that build over time

Expected damage under scenarios, no discounting, RCP 4.5, annual, 2026 to 2100



Damages are not discounted to support comparison across scenarios.

Source: PC analysis using data from XDI.

[59] These 2 million homes are those built to accommodate population growth, and do not include builds replacing the existing stock which are not affected by the reforms considered here. Of these homes only 4.4–8.8%, based on year and scenario, are assumed to be built in a better location.

B.5 Robustness

The estimated avoided damages from improving the quality and location of the housing stock are large but subject to significant uncertainty. These estimates should be interpreted as indicative of the potential for avoided damages, rather than precise forecasts.

A key limitation of this analysis is the exclusion of the costs associated with upgrading the existing housing stock. The modelling assumes that the resilience upgrades considered are generally cost-effective and are rolled out widely. In practice, resilience upgrade cost-effectiveness will vary. Costs may be reduced when retrofits are timed with key events, such as renovations or rebuilding after disasters, which our scenario timing (completing upgrades by 2040) may allow. In some cases, high retrofit costs may limit uptake and reduce realised benefits. Extensive renovations or well-timed retrofits could be cost-effective, potentially increasing benefits.

The costs of improving land-use planning are also excluded. In practice, integrating adaptation with broader improvements in planning and approvals, such as increasing housing supply while making safer siting decisions, can help manage costs and deliver wider benefits. Some opportunity costs from avoiding high-risk areas could be offset by other amenity or community gains when done as part of an integrated package.

Additionally, the analysis captures only the effect of redirecting some new dwellings away from high-risk areas, it does not include removing buildings from high-risk areas for instance through buy back or relocations. The analysis does not assess other planning tools or design choices. Nor does it consider potential resilience gains from changes in dwelling types, density, urban form or complementary adaptation measures.

Additional sources of uncertainty include long-term climate projections, hazard modelling assumptions and future policy and behavioural responses. As such, the results should be considered indicative and interpreted with caution.

Estimates of baseline damages vary

Estimates of the expected effects of climate change on property vary across studies. This reflects differences in climate projections, hazard coverage, asset definitions, discount rates and modelling approaches.

For instance, the results presented here find significantly higher annual damages in 2026, than the Centre for International Economics (CIE) estimates for 2013–2022 (table B.5). Key reasons for these differences include:

- projected increases in climate risk over time
- broader hazard coverage in this analysis
- rising repair costs and increases in the size of the dwelling stock

CIE estimates were also conservative and subject to significant uncertainty, particularly around how they accounted for the insurance coverage of flood damages (CIE 2023, pp. 19–20).

Table B.5 – Estimates of climate related costs to residential dwellings vary

Literature on losses attributed to extreme weather events and natural disasters

	Losses	Hazards
National climate risk assessment (ACS 2025a, p. 106)[a]	Losses in Australian property value could be $571 billion by 2030, $611 billion by 2050 and $770 billion by 2100 under a high emissions scenario (RCP 8.5).	Bushfires, floods, coastal inundation, heat-waves, soil movement, windstorms
Insurance catastrophe resilience report 2023-24 (ICA 2024, p. 6)	$4.5 billion average annual insured losses (did not account for uninsured losses but captured more than just residential property damage) 2019-20 to 2023-24.	Bushfires, cyclones, earthquakes, floods, hail, storms
Resilience, durability and the National Construction Code (CIE 2023)	$2.7 billion average annual residential property damage from 2013–2022.	Bushfires, cyclones and floods
Special report: update to the economic costs of natural disasters in Australia (Deloitte Access Economics 2021)	$38–73 billion per year in economic costs from natural disasters (captured more than just residential property damage) between 2020 to 2060.	Bushfires, coastal inundation, cyclones, earthquakes, floods, hail, storms

a. Results presented in the National Climate Risk Assessment were based on Steffen et al. (2019).

Abbreviations

2025 reforms	The *Environment Protection Reform Act 2025* (Cth), *Environment Information Australia Act 2025* (Cth), and related Acts
ABCB	Australian Building Codes Board
ACCU	Australian Carbon Credit Units
ACS	Australian Climate Service
CCA	Climate Change Authority
CIS	Capacity Investment Scheme
ECMC	Energy and Climate Change Ministerial Council
DCCEEW	Department of Climate Change, Energy, the Environment and Water
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cth)
ESEM	Electricity Services Entry Mechanism
EV	Electric vehicle
FBT	Fringe Benefits Tax
FTC	Fuel tax credits
GO	Guarantee of Origin
GDP	Gross domestic product
LCFS	Low carbon fuel standard
LCLF	Low carbon liquid fuel
LCT	Luxury car tax
LGA	Local Government Area
MEL	Monitoring, evaluation and learning
NCC	National Construction Code
NEM	National Electricity Market
NVES	New Vehicle Efficiency Standard
NSW EPA	New South Wales Environment Protection Authority
OIA	Office of Impact Analysis
PC	Productivity Commission
qr	Questionnaire response
RCP	Representative Concentration Pathway
RBC	Resilient Building Council
RET	Renewable Energy Target
RUC	Road user charge

SCC	Social cost of carbon
SMC	Safeguard Mechanism Credit
TCCV	Target-consistent carbon values
TEBA	Trade-exposed baseline-adjusted

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