

SUBMISSION

Submission to the Department of Climate Change, Energy, the Environment and Water

Submission to the National Adaptation Plan Issues Paper

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The Australian Academy of Technological Sciences and Engineering (ATSE) is a Learned Academy of independent, non-political experts helping Australians understand and use technology to solve complex problems. Bringing together Australia's leading thinkers in applied science, technology and engineering, ATSE provides impartial, practical and evidence-based advice on how to achieve sustainable solutions and advance prosperity.

As global temperatures rise, risks to Australia's infrastructure, cultural heritage, social cohesion and environment are intensifying. Ideally these risks would be mitigated by addressing the root cause of climate change, with ATSE having called for Australia to aim for net zero emissions by 2035 (ATSE, 2023). However, even with immediate action, evidence shows that average global temperatures have already risen 1.1°C above pre-industrial levels (Intergovernmental Panel on Climate Change, 2023). Already our oceans are acidifying and droughts, cyclones, dust storms and fires have become more likely or more severe (Australian Academy of Science, 2021). These weather events risk damage to Australia's vital transport networks, energy transmission network, water supplies and other critical infrastructure. No less importantly, they also risk damage to human health, wellbeing, social cohesion, cultural artifacts, and natural environment and wildlife.

An effective National Adaptation Plan will ensure that Australia's infrastructure, people and its socio-cultural artifacts are protected in warming world. A core aspect of this will be recognising that the risks identified by the National Climate Risk Assessment are interrelated and intersectional. Damage to the natural environment will impact health, food producers, remote communities and more. Our adaptation strategy will also be affected by those of the nations in our region – climate change will not respect national borders and so a regionally integrated approach will be necessary.

To support the Department of Climate Change, Energy, the Environment and Water in developing the National Adaptation Plan, ATSE makes the following recommendations:

Recommendation 1: Align the National Adaptation Plan, National Water Initiative and the Murray-Darling Basin Plan to ensure a coordinated approach to managing water security and quality.

Recommendation 2: Apply a Probabilistic Risk Assessment Framework to build resilience and redundancy into Australia's expanding energy transmission network, transportation system, and other critical infrastructure, as well as cultural and environmental assets.

Recommendation 3: Ensure that the National Adaptation Plan accounts for compounding, cascading and co-occurring weather and climate events.

Recommendation 4: Implement and fund a coordinated national strategy on decarbonising the healthcare sector.

Recommendation 5: Embed One Health and equity principles into the National Adaptation Plan.

Recommendation 6: Increase investments in research projects related to climate change and resilience.

Ensuring Australia has enough water

Water intersects with every single risk identified by the National Climate Risk Assessment. Resilience of Australia's water supplies will therefore be vital to ensure there is sufficient drinking water, agricultural production, hydroelectric power and more. A warming climate is expected to lead to lower rainfall across parts of Australia and an increase in evaporation (Helfer et al., 2012), making the management of water resources more important. While debate often focuses on water quantity, environmental and other outcomes also hinge upon other aspects such as water quality, timing, duration, variability, and temperature - water quantity alone is not enough to ensure Australia's water future.

Currently, significant work is being undertaken to examine Australia's water systems, through the National Water Initiative and Murray-Darling Basin Plans. Adaptation to climate change will require a coordinated approach, so the National Adaptation Plan must be aligned with this work. This will require adaptation planning to be built into these other water use strategies, with consideration given to the balance of water use and the role that water has (both directly and indirectly through food) on human health and wellbeing.

Recommendation 1: Align the National Adaptation Plan, National Water Initiative and the Murray-Darling Basin Plan to ensure a coordinated approach to managing water security and quality.

Redesigning Australia through resilient systems

As previously highlighted in ATSE's *Building a resilient Australia* position statement, resilience should be baked into the planning process of all infrastructure (ATSE, 2022a). This will require a combination of the ability to withstand shocks, redundancy to provide backups where systems fail, and the ability to rapidly identify and repair disruptions where they occur. Accurately predicting risk will be essential to this. Deterministic risk assessments, which show what will happen under clearly defined and predictable circumstances, have traditionally been used for major infrastructure projects. As the climate warms and weather systems become less predictable in planning processes, a new assessment methodology is required. Probabilistic Risk Assessment is one such method that models risk, while allowing for greater uncertainty and incomplete knowledge (ATSE, 2022b)¹. Adopting this risk assessment methodology would improve the management of the growing risk in an uncertain climate future.

The interrelationship between climate systems, weather events and environmental characteristics means that the occurrence of one event can trigger others, creating a compounding effect. The likely increase in bushfire frequency and severity as the planet continues to warm, leads to barren landscapes and increased rainfall runoff, increasing the risk of flooding and droughts after bushfires (United Nations Environment Programme, 2022). Australia's infrastructure, cultural and environmental assets will need to be able to survive repeat and compounding events. Any effective adaptation and resilience plan will need to properly recognise and respond to the increasing possibility of multiple catastrophic events co-occurring or cascading from one another.

Integrating the necessary renewable energy generation capacity will result in a larger and more distributed energy network. This expansion of the transmission network presents a once-in-a-generation opportunity to build climate resilience into the very fabric of our energy infrastructure. Instead of attempting to retrofit existing energy infrastructure or working around existing networks, planners can design a strong and resilient energy network, built to meet our energy needs into an uncertain future. In seizing this opportunity, Australia's electricity networks should ensure the network prioritises redundancy and advanced monitoring capabilities, creating a more distributed and robust system which is less susceptible to disruptions caused by extreme weather events.

This principle can be applied beyond simply energy infrastructure. Transport infrastructure is vital to our way of life. Recent weather events have caused significant disruptions to regional communities that have been cut-off from supplies due to a lack of redundancy in transportation networks. In 2023, Derby, Broome and other towns in Western Australia were cut off from the rest of the state following significant flooding that caused the collapse of the Fitzroy River Bridge (Shepherd, 2023). Earlier this year, the only road and rail routes between Western Australia and South Australia were temporarily cut off, causing significant supply chain delays (Lucus, 2024). Redundancy is needed within Australia's transportation network to ensure that the severing of any one link does not isolate regions or cause major supply chain issues.

When considering building adaptation and resilience into Australia's major assets, the Academy advocates going well beyond infrastructure and economic assets, to specifically include environmental assets (e.g. Australia's biodiversity) and cultural assets (e.g. culturally significant First Nations sites). These are equally important to national wellbeing as well as often contributing to economic opportunities. For example, some cultural sites have origins estimated to be ten times older than the pyramids of Egypt - and regularly bring in tourists from Australia and abroad to view this record of Australia's precolonial history (O'Connell, 2022). These sites are just as much at risk of climate change related damage as Australia's infrastructure.

¹ For more information of Probabilistic Risk Assessments, please see ATSE's [Probabilistic Risk Assessment Explainer](#).

Probabilistic assessments can form an important part of assessing risk, and implementing protection and adaptation measures for cultural and environmental assets.

Recommendation 2: Apply a Probabilistic Risk Assessment Framework to build resilience and redundancy into Australia’s expanding energy transmission network, transportation system, and other critical infrastructure, as well as cultural and environmental assets.

Recommendation 3: Ensure that the National Adaptation Plan accounts for compounding and co-occurring weather and climate events.

Redesigning healthcare to be more resilient and support human welfare

Australia’s health infrastructure is inadequate to manage changes caused by climate change. Hospitalisations for extreme weather-related reasons are increasing (Penden, 2023), while at the same time, there has been a continual decline in the number of available beds per capita (Australian Medical Association, 2023). The sector is also a serious contributor to climate change, with 7% of Australian emissions being traced back to healthcare (Malik et al., 2018). A nationwide strategy to upgrade healthcare systems to allow for the decarbonisation of the sector and prepare for the impacts of climate change on human health would be an important and catalytic resource to support resilience and adaptation.

Adopting a One Health model would be an ideal starting point for a fully integrated adaptation strategy. This approach considers that there is no line between human health and the sustainability of the world’s ecosystems – with humans naturally reliant on clean air, food and water security and agricultural systems, amongst others². A wholistic perspective like this is also more in line with connections from Traditional Knowledge systems, where actions such as culturally appropriate cool burn-offs are not simply viewed as hazard reduction measures, but rather as a holistic practice dedicated to maintaining the health of the country. Similarly, it would be important to consider an equity lens, including considering an intersectional perspective that covers multiple forms of disadvantage, including gender, race, remoteness, culture and socioeconomic status. By adopting these kind lenses through which to view adaptation, the National Adaptation Plan will ensure that responses are not siloed by sector, that the cumulative impacts of changes across various sectors are properly recognised and that the community is properly supported during transitions.

Recommendation 4: Implement and fund a coordinated national strategy on decarbonising the healthcare sector.

Recommendation 5: Embed One Health and equity principles into the National Adaptation Plan.

Developing new methods of adaptation

The basis for any future adaption will be the research and development that is being done now and over the coming years into climate change and how our nation can adapt. This research will provide the data upon which probabilistic risk assessments can be based, and more accurate data will necessarily lead to more accurate risk assessments. Similarly, tools and techniques for adapting our infrastructure, water systems, health care and more will need to be developed and refined. Government support for climate and adaptation research will be fundamental to Australia’s ability to adapt to climate change over the long term. Investing in Australia’s Collaborative Research Centres and Rural Research and Development Corporations, along with other climate research, will help to develop this capacity, providing new options for addressing the impacts of climate change.

Recommendation 6: Increase investments in research projects related to climate change and resilience.

² For more information on One Health, please see our [One Health Explainer in ATSE’s Impact Magazine](#).

ATSE thanks the Department of Climate Change, Energy, the Environment and Water for the opportunity to respond to the National Adaptation Plan. For further information, please contact academypolicyteam@atse.org.au.

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