



Australian Academy of Science

SUBMISSION TO THE

**REVIEW OF CLIMATE POLICIES**

BY THE DEPARTMENT OF THE ENVIRONMENT AND ENERGY

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# Australian Academy of Science submission to the Review of Climate Policies

## Introduction

The Australian Academy of Science welcomes the opportunity to contribute to the development of Australia's climate change policy through this response to the consultation paper released from the Department of the Environment and Energy. This response was informed by Fellows of the Academy and members of several of its National Committees for Science, all of whom are world leaders in different aspects of environmental and climate science and are recognised authorities in their field. The Academy's Fellowship and National Committee members would be pleased to provide further scientific advice on any of the matters raised in this submission.

National climate policies are fundamentally about managing the risks associated with climate change and climate variability, and the Academy commends the Australian Government on its intention to review current policies in light of new information about current and projected future climate patterns. While this information is and always will be incomplete, the degree of scientific certainty and consensus is increasing steadily as more and better data is collected and analysed using more rigorous and reliable scientific techniques, and climate models are improved to better account for natural and human systems, and global and regional scales involved.

The Academy firmly believes that the Australia's climate policies must:

1. allow the government and the community to make reasonable projections about the nature and impacts of climate change, locally as well as globally;
2. proactively respond to these projected impacts to avoid or alleviate adverse outcomes to the extent possible;
3. respond to the projections to mitigate negative impacts where they cannot be avoided or alleviated; and
4. allow and promote Australia's economic and societal transition to a more sustainable basis that has fewer risks associated with man-made climate change.

## Response to Consultation Questions

The Academy has focused this response on the general questions regarding climate change policies and those pertaining to the role of science, technology and innovation.

**Question 1: Australia has committed to considering a potential long-term emissions reduction goal for Australia beyond 2030. What factors should be considered in this process?**

The Academy strongly recommends that Australia's 2030 greenhouse gas emission reduction target should not be regarded as an endpoint, but rather as an interim target along a trajectory to an ultimate goal of net zero greenhouse gases emissions early in the second half of the Century. Signatories to the Paris Agreement accepted that in order to limit global warming to 1.5-2.0-degrees

above pre-industrial levels, the world would need to reach net-zero carbon emissions by the end of the Century, and thereafter would likely need to reduce atmospheric greenhouse gas levels.<sup>1</sup>

In order for the world to achieve this target, developed countries like Australia will need to achieve net-zero greenhouse gas emissions at or shortly after the middle of the century, enabling less developed countries a longer time to develop and decarbonize.

For these reasons, the Academy recommends that the policies being considered by the Australian Government now should be developed in the context of longer-term greenhouse gas emission reduction goals to 2050 and beyond. This is particularly important with respect to long-term policy frameworks in sectors such as energy, mining, agriculture and manufacturing where the lifecycle of infrastructure investment and program delivery is measured in decades.

A long-term perspective is also important in the context of national security related to climate-related migration and political instability in the region, climate related natural disasters, and the effect of changing climate on diseases and pests of human, animal and plant communities.

The Academy further recommends the adoption of a systems approach to policy development and evaluation. The earth, ocean and atmospheric systems that govern local and global climate are complex and interrelated, and the impact of reduction, adaptation or mitigation measures in different sectors of Australia's economy cannot be considered in isolation.

A comprehensive national climate policy framework based on an integrated systems approach that aligns different policy measures across portfolios and at different levels of government will amplify effectiveness, reduce costs, and reduce perverse incentives. The Academy suggests that such a policy would need to go beyond reduction of existing emissions, and encompass the full range of adaptation strategies to both natural and human-induced change. It must address the intersection of climate change with other key policy areas including:

- Urban design and associated transport policies to limit the requirements for fossil fuel-based transportation and energy generation.
- Energy demand management, energy storage and energy efficiency, to better manage Australian energy use and, again, limit the requirement for fossil fuel-based energy generation.
- Pollution management beyond emissions reduction in a range of industries.
- The impact of human and environmental activity in the catchment areas feeding the Great Barrier Reef.
- Agricultural practices and productivity (for example alternatives to nitrogen-based fertilisers)
- Scaling up existing renewable energy sources and existing energy storage methods, such as pumped hydroelectric power and batteries.
- Economic exposure from uncertainty in relation to international climate treaties.

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<sup>1</sup> The Academy also notes that the most recent projections by the United Nations Environment Programme indicate that the current trajectory based on Nationally Determined Contributions as at November 2015 is a global average temperature increase of <3-3.5°C by the end of the century, assuming all conditional and unconditional contribution commitments are met, with the broader projected range of <3-4°C assuming only unconditional contribution commitments are met. See [http://uneplive.unep.org/media/docs/theme/13/EGR\\_2015\\_Technical\\_Report\\_final\\_version.pdf](http://uneplive.unep.org/media/docs/theme/13/EGR_2015_Technical_Report_final_version.pdf)

In addition, the Academy suggests that the policy framework would need to include platforms to address adaptation to climate change impacts in a number of areas, such as:

- The effects of changed climate conditions on public health, such as the impacts of heat waves and the spread of tropical disease<sup>1</sup>.
- The effect of changes in agricultural productivity on food security.
- The effect of changing rainfall patterns on water security.
- Ongoing damage to the Great Barrier Reef and related ecosystems.
- The impact of sea level rises on Australian and Pacific region coastlines, especially coastal megacities in South Asia, South-East Asia and China.
- The impact of sea level rises on small island states and resultant population movements.
- The diplomatic and strategic implications of global climate change in Australia and the region.

The inherent difficulty of predicting the future means that a number of different approaches will be required to mitigate risk and ensure policy efficacy. The Academy suggests that such approaches should draw on the best available complex systems modelling platforms and expertise, and should include mechanisms for ongoing feedback and review. It is extremely unlikely that “perfect” solutions will exist, where no sector is impacted adversely. It is therefore important to be clear sighted about what transformations are necessary and are likely to safeguard and build national capacity in the long term, and to improve the certainty that can be generated from projections by improving the analysis and modelling of climate systems.

#### **Question 2: What process could Australia use to implement its Paris targets every five years?**

The Academy supports the need for regular independent review of progress towards Australia’s emissions targets that integrates expert advice and assessment of the evidence. The Academy suggests that the process used to consult with stakeholders on Australia’s 2030 emissions reduction target is a useful model.

In late 2016 the Academy concluded an analysis of Australia’s climate science research capacity. This analysis, which has been provided to government *via* the National Climate Science Advisory Committee was conducted by Academy Fellows and other experts with recognised standing as world experts on climate science. The report concluded that the largest gaps in climate science research capacity were not in investigator-led, university-based research, but rather in those areas of climate science that fall predominantly to publicly funded research agencies.

The review considered that Australia’s climate observation capacities were particularly vulnerable, including atmospheric monitoring, ocean hydrography, ice core records. These observations were traditionally conducted by CSIRO, the Australian Nuclear Science and Technology Organisation (ANSTO), the Australian Antarctic Division (AAD), the Bureau of Meteorology (BoM) and the Integrated Marine Observing System (IMOS). Climate modelling capacity was also found to be vulnerable, especially the Australian Community Climate and Earth System Simulator (ACCESS) model. This lack of capacity is of particular concern given climate monitoring and modelling programs are essential for timely and accurate feedback on climate change and the effect of system inputs such as policy interventions.

A particular advantage of climate observation and modelling capacity is the ability to track impacts of current policy settings and determine whether we are capable of meeting the current targets. The Academy recommends that climate services should be used by government stakeholders to monitor

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<sup>1</sup> A recent Academy report focused on the potential impact of climate change on health; particularly of vulnerable Australians. See [www.science.org.au/supporting-science/science-sector-analysis/reports-and-publications/climate-change-challenges-health](http://www.science.org.au/supporting-science/science-sector-analysis/reports-and-publications/climate-change-challenges-health)

and adjust the implementation of climate policies in order to ensure that the measures taken by government are effective in lowering Australia's exposure to the risks presented by climate change.

These capacities are also critical to monitoring changes in Australia's emissions profile and in making projections about the potential impacts of climate change policy settings, and as such should inform the target review process.

**Question 4: What is the role of research, development, innovation and technology in reducing Australia's emissions?**

As noted, the Academy believes that Australia's observation networks and climate modelling capabilities can and should play a fundamental role in identifying the effectiveness of climate emissions reductions policies.

Beyond that, advances in science and engineering in the field of renewables offer significant opportunities for reducing emissions and adapting to climate change and provide economic development.

**Question 6: Are there any particular concerns or opportunities with respect to jobs, investment, trade competitiveness, households and regional Australia that should be considered in relation to research, development, innovation and technology?**

The Academy's climate change capability review also identified gaps in Australia's climate services capability. This capability relates to the processing of climate change research results in ways that provide benefit to different stakeholders. Climate science service providers – often researchers or consultants – work with climate researchers to analyse peer-reviewed and transparent climate models and develop credible methods for providing more specific regional information. The information is provided to end users to interpret and tailor packaged climate change projections in the most useful form.

Climate observations and models provide information that is useful in all sectors of the Australian economy. By investing in the capacity of agencies such as CSIRO, the BoM, AAD and others to collect, collate, analyse and disseminate this data, the government will provide a foundation for an economy which is able to respond and adapt to climate stress. By cultivating capacities – within CSIRO, or elsewhere – to adapt and tailor this information to different sectors, Australia has an opportunity to further promote the development of resilience to the impacts of climate change across a range of industry sectors. A model for this climate information broker role is the CSIRO Climate Risk and Resilience Group, which uses the information from climate services specialists to link climate information with real-world application in areas such as primary production, insurance, commerce and emergency services.

Other examples include:

- Real-time integration of climate modelling and weather prediction with farming systems to guide decision-making increasingly accurate forecasting systems with agricultural plant and animal development models.
- Modelling of conditions known to cause algal, fungal or bacterial blooms, to identify at-risk water sources and safeguard water supplies.
- Combining hospital and weather data to identify regions where the populace is most vulnerable to the health impacts from heat waves.
- Historical and projected models of natural disasters, such as floods, hurricanes and bushfires, to inform emergency services policies and procedures and to ensure service readiness.
- An ongoing hydrological survey of national water resources.

- Combining terrestrial, oceanic and satellite observations to inform the management of the Great Barrier Reef Marine Park and preservation strategies for the living parts of the Great Barrier Reef.
- Use of satellite observations to improve short- and long-term weather projections.

Investing in Australia's climate services capacity would allow Australia to leverage the knowledge gained through research and development through new industry models into innovations that improve industrial productivity and actively improve competitiveness. This in turn will guide Australia to investments in the industries of the future – renewable energy, energy storage, smart grids, electric transport – rather than subsidies of those of the past.

### General recommendations for climate change policy

Further to the above, the Australian Academy of Science suggests that the following measures be considered to inform and strengthen Australia's climate change policies:

1. Consideration be given to undertaking a comprehensive and independent review of recent trends in observed global and national climate, in greenhouse gas emissions and in climate change projections as an essential input to decisions on updating the 26-28% emissions reduction target, as part of a long term goal of carbon neutrality by 2050 or soon after.
2. Careful consideration be made in the formulation of national climate-related policies on scientifically informed planning, for adaptation to unavoidable climate change, and for monitoring and review of impacts and outcomes.
3. Consideration be given to increasing Australia's capacity to deliver enhanced national climate observations and modelling through current agencies and research organisations, including CSIRO, Bureau of Meteorology, the Australian Nuclear Science and Technology Organisation, the Australian Antarctic Division, climate-related cooperative research centres, and specialists in climate analysis, land and water usage, and marine geology at state and territory level. The Academy further suggests consideration of the development in the medium-term of new capability for multi-decadal climate prediction.
4. Consideration be made to increasing the capacity of CSIRO and other agencies to broker data obtained through climate observations and modelling to inform other sectors, to provide government and industry stakeholders with tailored climate advice to inform climate change mitigation and adaptation activities.