

**Australian Academy of Science submission on the
Climate Change Authority's 2026 Annual Progress Advice consultation paper**

The Australian Academy of Science (the Academy) welcomes the opportunity to comment on the Climate Change Authority's 2026 Annual Progress Advice consultation paper.

The emissions reduction targets in Australia's updated Nationally Determined Contribution, based on the Climate Change Authority's advice, is a range from 62-70% below 2005 levels by 2035. **The Academy reiterates its position that Australia must pursue the highest end of this target.**

Based on current policies globally, we are on track to experience warming of 2.8°C.¹ This submission offers advice to strengthen Australia's climate change policy and ensure that Australia maintains the scientific capability that is needed to:

- enhance our climate modelling and understanding,
- accelerate the energy transition,
- reduce emissions and remove greenhouse gases from the atmosphere, and
- prepare our communities and environment to adapt to climate change impacts.

The Academy recommends that:

- the Australian Government should coordinate Australia's climate modelling capability and formalise responsibilities across relevant organisations to ensure Australia's participation in the Coupled Model Intercomparison Project (CMIP), recognising the essential role of this capability for Australia and that Australia provides for the region.
- the Australian Government should establish an Australian Institute for Earth System Science, tasked with developing, coordinating and implementing the national strategies required to deliver answers to nationally significant climate change questions, including the capability required to strengthen climate modelling.
- the Australian Government should commit to sustaining and securing open climate science and international collaboration on climate change mitigation and adaptation in its Annual Climate Change Statement.
- the Australian Government should maintain its leadership in the region through supporting Australia's role as a trusted scientific partner in the Asia-Pacific.
- the Australian Government should set and implement national targets for scope 3 emissions reductions, methane emissions reductions and greenhouse gas removal.
- the Climate Change Authority should explicitly address marine sectors and systems in its reference pathways.
- strategically direct resources to address science capability gaps to strengthen the ability of Australia to mitigate and adapt to climate change.

¹ United Nations Environment Programme (2025). *Emissions Gap Report 2025: Off target – Continued collective inaction puts global temperature goal at risk* [Olhoff, A., chief editor; Lamb, W.; Kuramochi, T.; Rogelj, J.; den Elzen, M.; Christensen, J.; Fransen, T.; Pathak, M.; Tong, D. (eds)]. <https://doi.org/10.59117/20.500.11822/48854>.

Australia's active participation in international research collaboration, open science and climate modelling are essential capabilities that must be maintained

Consultation paper question 3 – What do you see as the top priorities for climate policy reform and why?

Coordinate and ensure Australia's climate modelling capability and participation in CMIP

Climate modelling underpins climate mitigation and adaptation, for example informing adaptation planning, greenhouse gas removal implementation and the strategic siting of critical infrastructure. Australia's climate modelling capability is delivered across several organisations in government, publicly funded research agencies and universities.

ACCESS-NRI is the national research infrastructure that supports the development of and research with the Australian Climate Community Earth Systems Simulator (ACCESS) modelling system. It provides essential services underpinning capability to model climate change in Australia and our region. ACCESS is the only physical climate model with bespoke development for the Southern Hemisphere.²

Australian leadership in delivering this capability ensures the Southern Hemisphere is represented in global coupled climate models. Australia contributes to the Coupled Model Intercomparison Project (CMIP) through a partnership between ACCESS-NRI and CSIRO. CSIRO provides a coordinating role, managing the reporting and delivery of ACCESS models into CMIP.

ACCESS-NRI is only one component of Australia's climate modelling capability. It provides the software infrastructure and technical solutions that integrates science from Australia and overseas, but it does not identify or resolve science questions.³

Climate science capability in the National Environmental Science Program (NESP), publicly funded research agencies and universities must be maintained to undertake research with ACCESS-NRI. This includes collecting observations of our climate on which models rely – today's observations cannot be collected tomorrow.

High-performance computing and data (HPCD) infrastructure is also fundamental to Australia's climate modelling capability. ACCESS requires a seamlessly integrated Tier-1 peak HPCD system, and a pathway to exascale HPCD.⁴ This need extends beyond climate modelling and to other science disciplines. The Academy recommends development of a 10-year plan to deliver long-term strategy and targeted investment in Australia's HPCD infrastructure.

Without these elements Australia's ability to contribute to global climate models and deliver essential national capability will falter.

Given Australia's constrained research funding environment – an environment which has seen cuts to programs such as NESP in the 2026/7 Federal Budget – the Australian Government needs to ensure that essential national climate modelling capability (e.g. upload of models to CMIP) that **must** be delivered, can be delivered. Currently, there is no mandate for CSIRO to coordinate the coupled climate model upload to CMIP. National, strategic coordination is required to ensure that we maintain the science capability to meet our national needs and international obligations. This can be operationalised by mandating ongoing responsibility for the model to a government science agency, so Australia can reliably deliver the climate model for the Southern Hemisphere.

The Academy highlights that First Nations-led initiatives the National First Peoples Platform on Climate Change (NFPPCC) and the National First Peoples Gathering on Climate Change, are also supported by NESP. These are critical capabilities that should continue to be supported. Australia's response to climate change requires

² Australian Academy of Science (2024). *A decadal plan for Australian Earth system science 2024–2033*. <https://science.org.au/our-work/resources-reports/reports-publications/decadal-plan-australian-earth-system-science-2024-2033>.

³ Ibid.

⁴ Ibid.

solutions informed by First Nations knowledges and science in decision-making, management and conservation practices.

Recommendation: The Australian Government should coordinate Australia's climate modelling capability and formalise responsibilities across relevant organisations to ensure Australia's participation in CMIP, recognising the essential role of this capability for Australia and the region.

Enhance Australia's climate modelling capability

Australia cannot simply maintain its existing climate modelling capability, it must also be strengthened. Models cannot yet simulate the processes at the local scales critical for adaptation and will never do so without investment in further development.

Increasing the granularity of Australia's climate models is an essential capability to enhance adaptation planning and the quality of adaptation planning rests on the quality of the climate information available. Australia's National Adaptation Plan acknowledges this, identifying "[c]limate science, data and risk management information" as cross-cutting enablers for adaptation.

The Academy recognises the work to date via Australia's first National Climate Risk Assessment (NCRA). The NCRA is a valuable starting point, however, it does not provide the granular level of detail required yet. Many adaptation interventions will need to be deeply local with decisions informed by more localised climate models.

The Australian Government should support future versions of the NCRA which provide the more granular information required. To deliver this, the uplift of Australia's climate modelling capability, including the granularity of models, will be critical.

Similarly, climate models are critical to the deployment of greenhouse gas removal approaches as they can inform understanding of the potential success of different approaches and how they may impact Earth systems.⁵ Novel greenhouse gas removal approaches can be more difficult to implement into models, further exemplifying why continued uplift of our modelling capability is required.⁶

Unlike other countries, Australia lacks a model that links the physical climate through to biogeochemistry, food webs and ocean marine industries. While some targeted models within individual research institutes address this to some degree, an integrated national platform should be the goal.

As well as increasing the spatial granularity of models, an expanded capability to forecast on the scale of a few years to a decade would allow for improved planning in response to climate change.

Observations and fundamental climate science knowledge underpin our ability to model future changes. Australia needs the full spectrum of capability to have accurate national climate information and feed into international processes. This includes knowledge of Australia's unique ecosystems and biodiversity and marine, ocean and coastal science.

Recommendation: The Australian Government should establish an Australian Institute for Earth System Science, tasked with developing, coordinating and implementing the national strategies required to deliver answers to nationally significant questions, including the capability required to strengthen climate modelling.⁷

⁵ Australian Academy of Science (2023). *Greenhouse gas removal in Australia: A report on the novel negative emissions approaches for Australia roundtable*. <https://science.org.au/our-work/resources-reports/reports-publications/greenhouse-gas-removal-australia-report-novel-negative-emissions-approaches-australia-roundtable>.

⁶ Ibid.

⁷ Australian Academy of Science (2024). *A decadal plan for Australian Earth system science 2024–2033*. <https://science.org.au/our-work/resources-reports/reports-publications/decadal-plan-australian-earth-system-science-2024-2033>.

Australia must support open climate science collaboration

Sharing reliable, transparent and comparable climate information, such as climate models and satellite observations, is essential to international cooperation on climate change. There is a growing need for Australia to prioritise securing our national capability and sustaining open climate science, at a time when we are seeing reduced support for agencies in the US which have historically played a critical role in producing and maintaining critical climate datasets. Australia must be aware of key dependencies on international partners, and mitigate risks associated with these dependencies.

As noted in the Academy's input into the Belem Mission to 1.5, it is vital that international partners, research institutions and non-governmental organisation prioritise robust data stewardship and invest in structures to strengthen international cooperation. Australia's Annual Climate Change Statement should reflect this commitment.

Recommendation: The Australian Government should commit to sustaining and securing open climate science and international collaboration on climate change mitigation and adaptation in its Annual Climate Change Statement.

Australia should continue its leadership on climate action in the Asia-Pacific region through ongoing partnerships

The Academy welcomes the Australian government's focus on advancing the interests of our Pacific neighbours in its role as President of Negotiations on COP31. Building on this commitment to leadership and collaboration in our region, the Australian Government should support ongoing partnerships that strengthen cooperation on climate research and deepen science advice mechanisms.

These partnerships provide a platform to address shared climate challenges in the Asia-Pacific. For example, collaboration across our region is essential to the implementation of sustainable ocean management under climate change. Through collaboration across the Pacific there are pertinent lessons for Australia too, such as the impacts of and adaptation to climate change in remote locations in Australia's north.

Australia's scientific leadership in our region includes strong participation in multilateral research initiatives, international scientific advisory bodies and shared data platforms. For example, the International Science Council Regional Focal Point for Asia and the Pacific, hosted by the Academy, seeks to ensure that the unique needs and priorities of Asia and the Pacific region are integrated into the global scientific dialogue. This includes engagement with partners to build capability for science advice and science diplomacy architecture in the Pacific, such as supporting the establishment of the Pacific Academy, and funding calls for collaborative research missions. This platform is an asset that should be leveraged by the Australian Government.

Recommendation: The Australian Government should maintain its scientific leadership in the Asia-Pacific by supporting platforms to strengthen scientific collaboration across the region.

Australia should set national targets for scope 3 emissions reduction, methane emissions reduction and greenhouse gas removal

Consultation paper question 3 – What do you see as the top priorities for climate policy reform and why?

Australia has set targets to track our emissions reductions to net zero emissions. There are opportunities to stimulate action in other areas by setting and monitoring progress against specific targets. Targets would set clear expectations and provide a common goal to motivate action across academia, industry and government.

The Australian Government should set and implement national targets for three priority action areas:

- **Scope 3 emissions reductions.** When Australia exports coal and gas to other countries, the resulting greenhouse gas emissions occur offshore, and fossil fuel exports are a major contributor to Australia's scope 3 emissions. Scope 3 emissions are indirect emissions that are a consequence of an entity's actions but occur from sources not controlled by that entity. The Academy recognises the progressive roll out of scope 3 mandatory reporting for corporations under the Australian Sustainability Reporting Standards. While this may serve as a valuable input to national reporting, this is not a commitment to

track national scope 3 emissions nor a goal to reduce scope 3 emissions. The Academy continues to reiterate this recommendation made in previous submissions to the CCA.

- **Methane emissions reductions.** Different greenhouse gases have different roles in reaching net zero. CO₂ has historically and for good reason received the most attention and must reach net zero to stabilise the climate. However, methane (CH₄) reductions are also critical. Compared to CO₂, methane has a much shorter lifetime in the atmosphere and much higher global warming potential on a 20-year time scale than CO₂.^{8,9} Aggressive methane emission reductions can be used to lower peak warming and to bring temperatures down after overshoot. Australia is a signatory to the Global Methane Pledge, but the Australian Government is yet to establish a specific national methane emissions target and plan for implementation. The Academy recognises the Climate Change Authority's current consultation on fossil methane as a starting point for action to reduce methane emissions.
- **Greenhouse gas removal (GHG removal).** GHG removal refers to the removal of greenhouse gases from the atmosphere and their durable, long-term storage. There are two main reasons GHG removal is necessary: to offset hard-to-abate emissions to achieve net zero, and to further reduce greenhouse gas concentrations following overshoot. Australia needs a robust portfolio of nature-based and engineered solutions suited to Australia's unique environment and natural assets that are affordable and environmentally and socially acceptable. The CSIRO's Australian Carbon Dioxide Removal Roadmap and the Academy's [Greenhouse gas removal in Australia](#) report provide a basis to identify and implement next steps to foster innovation in GHG removal methods in Australia.

Methane emission reductions and greenhouse gas removal should be additional efforts alongside urgent and deep reductions in CO₂ emissions.

Recommendation: The Australian Government should set and implement national targets for scope 3 emissions reductions, methane emissions reductions, and greenhouse gas removal.

Marine emissions reductions should be represented in reference pathways

Consultation paper question 1 – What are your views on the proposed approach for setting reference pathways to assess progress, including strengths, limitations and any alternative approaches that should be considered?

The proposed approach for setting reference pathways is reasonable, however, the lack of pathways for marine sectors and systems is a notable gap in the current draft.

We recognise that marine sectors may be covered in part by agriculture and transport, but it is unclear whether this is the case in the draft provided. Similarly, while land-based and engineered removals are represented, blue carbon is not.

As further reference pathways are developed, innovation metrics would complement the economic transformation metrics proposed. For example, metrics could include technology readiness progression, pilot and demonstration deployment, private investment leverage and commercialisation outcomes.

Recommendation: The Climate Change Authority should explicitly address marine sectors and systems in its reference pathways.

Science capability gaps must be addressed to support abatement

Consultation paper question 2 – What signs are you seeing of emissions reductions across industries, businesses, households or investors? What barriers or delays to abatement are you observing?

⁸ Canadell, J.G., Villalobos, Y., Harman, I., and Evans, H. (2025). *Australia's methane budget*. Fact sheet. NESP Climate Systems Hub. https://nesp2climate.com.au/wp-content/uploads/2025/10/Fact-sheet_Australias-methane-budget_Final-1.pdf.

⁹ IPCC (2021). The Earth's Energy Budget, Climate Feedbacks, and Climate Sensitivity Supplementary Material, in *Climate Change 2021: The Physical Science Basis*. https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_Chapter07_SM.pdf.

Analysis for the Academy's [Australian Science, Australia's Future: Science 2035](#) initiative identified eight science capabilities increasing most in demand in Australia. Of these, geoscience and materials science were identified as at high risk of not being able to meet future demand with likely or certain gaps on every indicator assessed.

Both capabilities are critical to abatement.

Geoscience underpins the discovery and extraction of critical minerals used in renewable energy technologies and geological storage for greenhouse gas removal, but due to declining university enrolments and workforce shortages risks Australia's geoscience capability risk not being able to meet demand.

Australia's materials science capability is also under strain, with existing education, workforce and funding gaps. Materials science is fundamental to the transition to net zero, for example battery developments to support the energy transition, greenhouse gas removal methods and hydrogen production.

Recommendation: The Australian Government should strategically direct resources and use policy levers to address science capability gaps to strengthen the ability of Australia to mitigate and adapt to climate change.

To discuss or clarify any aspect of this submission, please contact Lauren Sullivan, Science Policy and Advice Manager (science.policy@science.org.au).