



Melbourne, Wednesday 10 September 2025

Subject: Inquiry into Climate Risk Assessment

Dear Senate Environment and Communications References Committee,

The ARC Centre of Excellence for the Weather of the 21st Century welcomes the opportunity to contribute to the inquiry into the Climate Risk Assessment.

Our submission emphasises the critical need for timely, ongoing, robust and transparent risk assessments. We note that the Government's delay in releasing the Climate Risk Assessment since December 2024 is detrimental to informed decision-making. This delay hampers the Australian economy and community's ability to respond to climate risks, which are evolving rapidly due to changing science and climate conditions.

This submission calls for more inclusive consultation with the scientific community in future assessments to ensure the best available knowledge informs policy decisions.

We look forward to answering your questions at the public hearing on 16 September 2025.


Professor Christian Jakob

Director, ARC Centre of Excellence for the Weather of the 21st Century

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The ARC Centre of Excellence for the Weather of the 21st Century is a consortium of world-leading climate and weather researchers based across five Australian universities, together with major domestic and international partner organisations, including the Bureau of Meteorology and CSIRO.

21st Century Weather aims to address these challenges by answering a vital question:

How will Australia's weather transform as our climate changes?

We will advance our understanding of atmospheric circulation and weather systems, and develop ultra-high-resolution climate models to enhance our understanding of Australia's weather and climate.

The foundational knowledge we create will enable policymakers, industry and communities to make better decisions, harness weather resources and help us prepare for high-impact weather.



a) the Government's secrecy and withholding of the Climate Risk Assessment (the assessment) from the Australian public since December 2024

We are deeply disappointed by the delay in the publication of the assessment.

Having scientifically based information on climate risks for decision makers is urgent. Any delay in providing this information impacts the Australian economy, financial systems, and the broader community, as the critical information to meet the requirements of mandatory disclosure of climate risk and to plan adaptation actions contained in the assessment remains unavailable. Every day we lose in preparing our response to climate change, meeting internationally agreed targets will become more difficult and likely more expensive.

We note that any assessment has a limited lifetime as it can only be based on the science and information at the time it is written. In the nine months since the completion of the report, both the climate and the science have already significantly changed.

Like any report, this assessment will likely have strengths, weaknesses and gaps (see Term of Reference F). Hence, it must be seen as the first step in a process of continuous improvement as the science advances and the decision-making community uses and evaluates the assessment. Delaying the release of this assessment truncates this critical process, and consequently, the provision of even better information in future assessments.

b) the research, consultation and preparation of the assessment by the Department of Climate Change, Energy, the Environment and Water

The consultation during the preparation of the report was limited. Only one of our Chief Investigators was asked to review a draft of the assessment without having the underlying technical information used to make decisions contained in the assessment.

The preparation and review of future assessments must involve the scientific community outside major Government agencies, so that significant expertise that resides in academia can be leveraged to inform policy decisions.

The process by which scientists are chosen to produce and review the assessment should be transparent.

c) the expected ongoing impacts upon the Australian community that are contained within the assessment

As the 21st Century Weather team has not seen the assessment report, we cannot comment on the detailed expected ongoing impacts contained in it. However, it is well known that all sectors of the Australian economy are exposed to climate change and that climate change-related risks are likely to increase as emissions of greenhouse gases continue.

A few examples of climate change-related impacts include:

- Heatwaves are Australia's deadliest natural disaster. The combination of hot and humid weather conditions significantly increases health risks, as humidity prevents sweat evaporation, making it difficult for the body to cool down. Hours-long exposure without shelter can lead to heatstroke or death. Extreme heat can also worsen kidney and heart problems and be deadly in dry conditions, adding to mortality rates during heatwaves.
- Heatwaves, droughts, and fires are interconnected; drought increases the likelihood of extreme heat, which in turn heightens fire risk. Southeast Australia faces longer fire seasons and more extreme fire weather as heatwaves intensify, like we saw during the Black Summer of 2019–2020. Conversely, the heavy rainfall that ends droughts can lead to flooding, not just the prospect of replenishing depleted dams.
- Sea level rise has accelerated along Australia's east and southeast coasts over the past 2–3 decades. Tropical and extratropical cyclones exacerbate sea level rise impacts on local communities. The intense surface winds associated with these weather systems can drive heightened sea states with high waves ahead of the system and storm tides at landfall, resulting in additional coastal erosion and flooding.
- Severe convective storms cause extensive damage and substantial insured losses due to extreme wind, destructive hail and heavy rainfall. A single hailstorm can result in over \$1 billion in insured losses. Despite this high damage potential, the impact of climate change on the frequency and severity of these storms is still uncertain, making research into this area essential for sound decision-making.

Current global temperature levels mean that we are already locked into climate change impacts. Slow ocean processes mean it will take a long time for reductions in atmospheric carbon dioxide to significantly cool our planet. In fact, projections show that the deeper ocean will continue to warm for centuries even after we halt emissions. In SSP5–8.5 simulations, which project

the most extreme global warming, a five-year delay in reaching net-zero emissions results in higher temperatures around the world, resulting in increased risks of climate extremes.

d) the budgetary costs of both climate driven natural disasters and any government adaptation plans

As described in Term of Reference **C**, there is strong scientific evidence that higher global mean temperatures will very likely make many high-impact weather events, such as heatwaves, extreme rainfall, floods and bushfires more frequent and/or severe. Their impacts will worsen with every additional tenth of a degree of warming increasing the costs to respond and adapt to them.

Recent research has highlighted that an ice loss tipping point in Antarctica [“could be exceeded even under best-case CO2 emission reduction pathways, potentially initiating global tipping cascades”](#). We are at a point where we need to achieve large-scale ‘net-negative’ emissions—removing carbon from the atmosphere at a greater rate than it is emitted—to limit catastrophic climate change. Further emissions now increase the risks of catastrophic changes, which cannot be reversed even with carbon dioxide removal technology, while reaching net zero faster has benefits for many generations to come.

e) the Government’s ongoing approach to transparency related to reducing emissions and adaptation to a world currently on track for 2.6 to 3.1 degrees of warming

Government-funded science in general is carried out transparently. For example, publications, reports and briefing material from the ARC Centre of Excellence for the Weather of the 21st Century are [freely and openly available](#), as are those of the National Environmental Science Program’s Climate Systems Hub and other Government-funded activities.

While Australia has targets to reduce emissions, we lack Government-backed roadmaps across sectors to get there. The [Climate Change Authority’s Sector Pathways](#) to transition to clean energy is a great step, but it has not been implemented.

f) any other related matters

We would like to draw the attention of the committee to the fact that, by necessity, the assessment had to focus on a limited number of key climate risks. As a result, it does not contain information in several critical areas.

Chief amongst them are the climate-related opportunities for and risks to decarbonisation, a key area of 21st Century Weather's research. As we implement our decarbonisation plans, society will become more weather-dependent, for instance, through the significant deployment of renewable energy resources. This happens at a time when the weather is changing due to climate change. Research aimed at identifying opportunities and risks of weather change remains in its infancy and will require significant additional investment if we are to realise the opportunities and prepare for the risks.

For the reasons highlighted in Term of Reference **A**, assessing Australia's climate risk is an ongoing process requiring continuous updates. For those updates to be impactful requires to continuously advance the underpinning climate science. It is our view that this advancement is under serious threat in Australia. Future-proofing Australia must include future-proofing the science that underpins our decision making. We see three main pathways to mitigate against this threat:

1. ***Supporting new science to meet the challenges of achieving net-zero:***

Climate science has provided unequivocal evidence that the Earth is warming and that the emissions of greenhouse gases by human activities are responsible. It has also made great strides in translating the global change into projections of regional climate changes, including extremes, needed for adaptation. However, the need to implement measures for mitigation through the net-zero agenda provides new challenges for climate science. In particular, we must translate climate change to what matters most to those on the ground, i.e., weather change. We must also enhance our ability to monitor and predict carbon sinks that will be a critical part of net-zero. The need for a broad, deep and flexible climate science effort in, and for, Australia has never been greater.

2. ***Coordinating the weather and climate science effort at the national level:*** The current approach of funding weather and climate science through many different departments, both at federal and state level, with little to no coordination, is no longer value for money. The problem is too important and large and the investment options too limited to

carry on in the traditional competitive environment. There is an urgent need for a national strategy implemented in a highly collaborative manner, such as the one recently proposed by the Australian Academy of Sciences' [Decadal Plan for Earth System Science](#).

3. ***Significantly enhancing our climate computing capabilities:*** The information about the future of Australia's climate is the result of simulations with physically-based climate models. Their development and application critically hinge on supercomputing and data storage facilities. The supercomputer used for these simulations in Australia, currently located at the National Computational Infrastructure (NCI) facility, has now fallen to position 155 in the [Top 500](#) supercomputers in the world, well behind facilities in much smaller economies, such as Thailand, Taiwan and Iceland. Furthermore, the computer is shared with many other communities and is not dedicated to climate. The Government has invested \$55 million for its next upgrade in 2027. In comparison, the UK government has [just announced a £750 million upgrade](#) to academic supercomputing. The delivery of future climate risk assessments of similar quality to those of other nations urgently requires the establishment of a national climate compute facility. This facility should be equipped with a world-class high-performance computer and data facility, paired with the software infrastructure provided by the ACCESS-NRI (NCRIS) facility at its heart.