

SUMMARY FOR POLICYMAKERS

MISSION ZERO: HOW TODAY'S CLIMATE CHOICES WILL RESHAPE AUSTRALIA

We are now in the age of climate consequences - when the devastating impacts of climate change hit home for communities and nations right around the globe. From record-breaking global heat to unprecedented floods and fires, it is now clear that climate change threatens lives and livelihoods here and now.

This is the backdrop against which the Federal Government has commenced consultation and analysis to inform the setting of Australia's next emissions reduction target for 2035. Under the Paris Agreement - to which Australia is a party - signatory nations must set a new and stronger Nationally Determined Contribution every five years. The next one is due by 2025. This will be the first national target set using the processes outlined in Australia's *Climate Change Act* which includes broad public consultation and expert advice from the Climate Change Authority.

In ***Mission Zero: how today's climate choices will reshape Australia***, the Climate Council has drawn together the latest climate science and impacts to inform the task at hand. This summary for policymakers presents findings from this report, including laying out the deep cuts to emissions the science makes clear are now needed - this decade and beyond - to avoid runaway climate change. The reality is simple and the need for our best efforts is stark: there is no safe level of global warming and everything we do now matters.



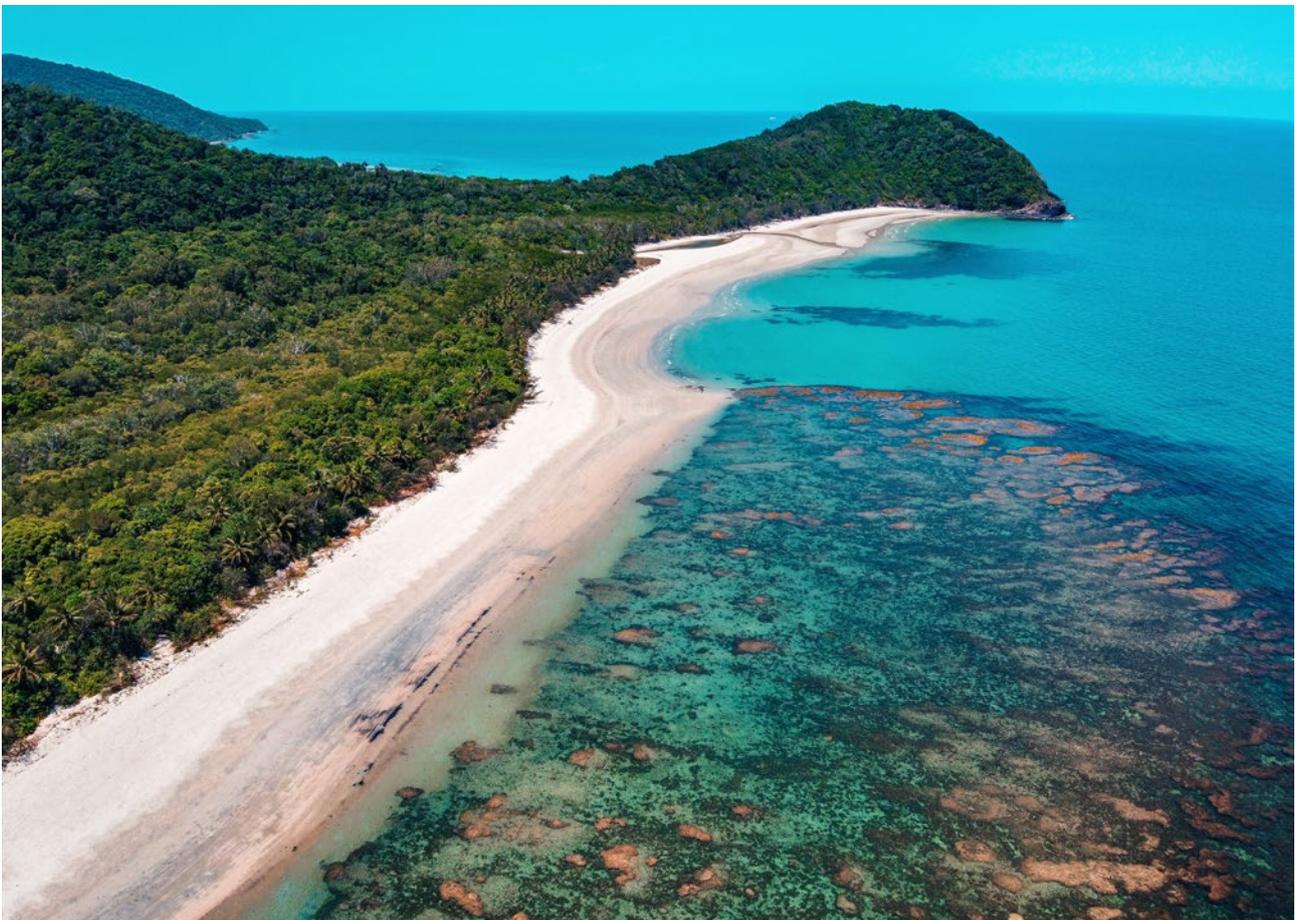
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THE CRITICAL ECOSYSTEMS WE DEPEND ON ARE COLLAPSING

From the world's oldest forests to its largest coral reef system, Australia is home to some of the most remarkable ecosystems on the planet. These national treasures harbour an extraordinary array of plant and animal species; a majority of which are endemic – meaning they are found nowhere else on Earth.

At today's global average temperature rise of 1.2°C, many of these sites have already suffered tremendous damage. A recent CSIRO-led study has affirmed that World Heritage Sites across Australia and around the world are facing unprecedented challenges from climate change. More than half of the Gondwana Rainforests in New South Wales and Queensland were affected by the catastrophic Black Summer fires of 2019-20. As moist rainforests, these rich ecosystems – which developed over many millions of years – were previously considered too wet to burn. It is unlikely they will return to their previous ecological state.





Further north, the Wet Tropics of Queensland support the highest level of biodiversity anywhere in Australia. Despite covering only 0.12 percent of the Australian landmass, these forests support more than a third of Australian mammal species and half of all Australian bird species. Twenty years ago, scientists warned that unless more was done to reduce greenhouse gas emissions, climate change could drive more than half the endemic vertebrates to extinction. Evidence now shows many of these species, including ringtail possums and many birds, have been declining in population size and distribution area much faster than predicted.

The Great Barrier Reef, our most famous natural wonder, is a poster child for the climate crisis. Too much heat stress causes corals to expel the symbiotic algae that provide them with essential nutrients and give them their vibrant colours. Prolonged bleaching can cause the corals to die. The Reef has been affected by marine heatwaves that resulted in four mass bleaching events in the past decade – in 2016, 2017, 2020 and 2022. Under a scenario where we fail to curb emissions, the Reef could face such bleaching conditions every year after 2044. This would effectively destroy the Reef, and most shallow water tropical reefs worldwide.

Ultimately, the unravelling of these and other ecosystems represents the unravelling of our very life support system. We are all fundamentally dependent on diverse and productive ecosystems for our food and other basic needs.

More than half of Australia's total economic output is also linked to industries heavily dependent on nature - from tourism and agriculture to fisheries and horticulture. Every tonne of carbon left in the ground and every action to accelerate cutting emissions, is protecting the species and ecosystems we treasure and depend upon.

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EXTREME WEATHER IS ESCALATING, AS ARE THE RISKS

The upward march in global average land and sea surface temperatures is remarkably consistent with what climate modellers have long projected. This has been likened to a staircase, with global temperatures rising steadily and consistently over time, but jumping around from year to year.

The true impact of climate change is felt not through this steady rise in average temperatures and the total amount of energy being absorbed by our atmosphere and ocean, but rather through the sudden and severe events this creates: mega fires, destructive storms, and deadlier heat waves.

Extreme heat is one of the most direct and measurable climate impacts, and one of the costliest when it comes to our health and wellbeing. More Australians have died as a result of extreme heat than any other natural hazard. July 2023 saw intense and persistent heatwaves in the southwest of the United States, southern Europe and China. Many heat records were broken, with temperatures exceeding 50°C in California and China. Over the same period, Australia experienced its warmest winter on record. Rapid analysis by World Weather Attribution deemed

some of these dangerous events to be statistically impossible in the absence of climate change. Globally, July was the hottest month ever recorded and the first month in which the global average temperature rise spiked to 1.5°C above pre-industrial levels.

As temperatures have soared, many communities have suffered through devastating and unprecedented fires, including in Canada, Europe, North Africa and Hawaii. At the same time, floods and landslides caused by torrential downpours have killed many people and seen millions displaced across Asia, including in Korea, north India and China. Often, one type of extreme weather has hit directly on the heels of another. For example, in China, just two weeks after the country logged its highest ever recorded temperature, with a high of 52.2°C in the northwest, Beijing and surrounding Hebei province were struck by deadly downpours. Beijing saw its heaviest rainfall on record and more than a million people were evacuated.

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OUR OCEANS ARE RAPIDLY HEATING UP, WITH DANGEROUS EFFECTS ON OUR WEATHER

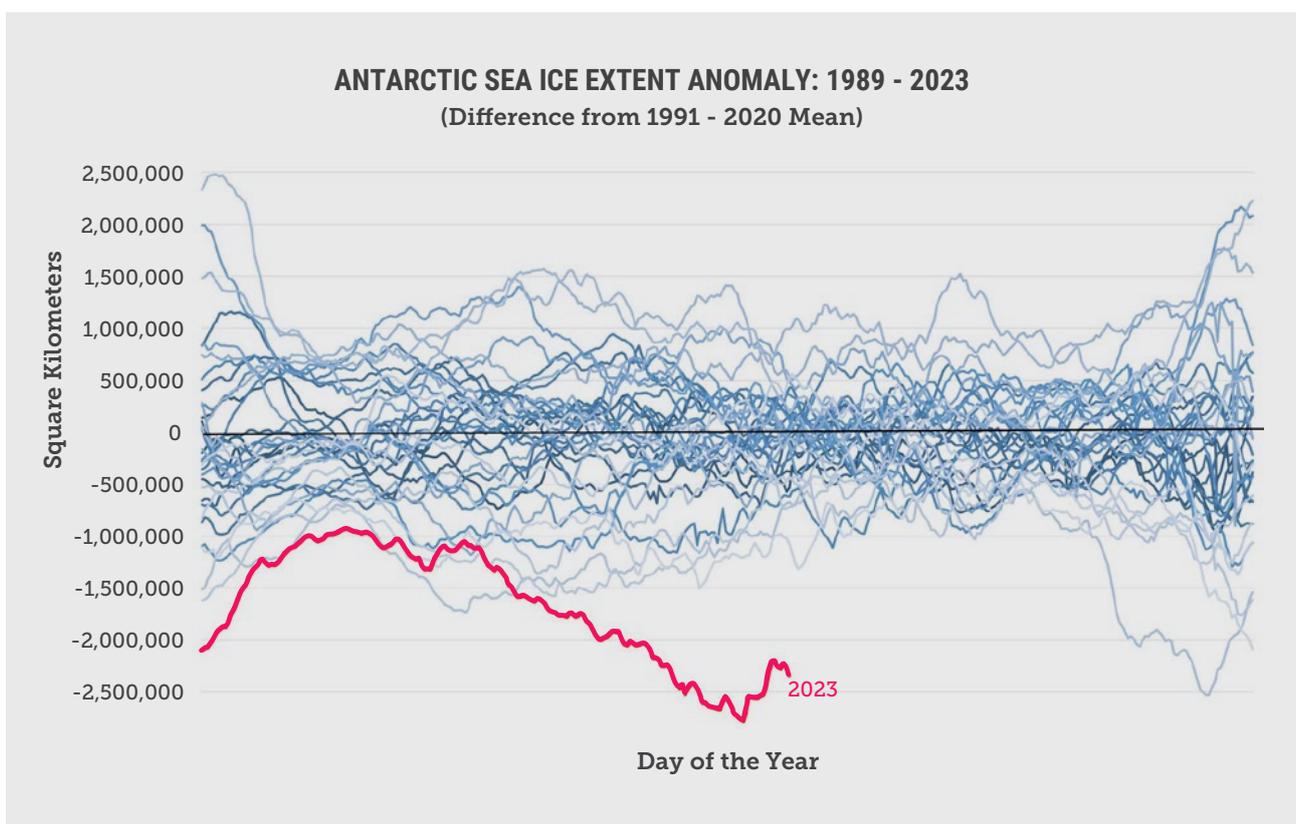
Water has a much higher capacity to absorb heat than air. This immense capacity to absorb and store heat means that the vast majority – around 93 percent – of the excess heat in our climate system from greenhouse gas emissions has been absorbed by the ocean. The rate of ocean warming has increased dramatically in recent decades and today, we are putting more than 10 zeta joules of extra heat into the ocean each year. That's the equivalent energy of five Hiroshima bomb explosions every second, or 150 million each year. Rising greenhouse gases and escalating climate change are also changing the ocean's chemistry, making it more acidic and less oxygen-rich.

In August 2023, the world set a new record for the average daily global sea surface temperature. Remarkably, August is not typically one of the warmest months for the global ocean, with the highest average sea surface temperatures typically recorded in March.

These ocean changes affect our weather and climate. Natural cycles in our weather patterns are influenced by patterns in ocean surface temperatures. Recent research led by Australian scientists has concluded that strong El Niño and La Niña events are already occurring more frequently as a result of climate change.

An increase in the frequency of strong El Niño and La Niña events means more pronounced swings between periods that are wetter than average and those that are drier. This increases the risk of devastating floods, following shortly after or before deadly heatwaves, and extreme fire conditions.

In 2023, Australia is already facing this reality, as we switch from a protracted La Niña event to the return of El Niño conditions and a hot, dangerous summer ahead.





WE ARE ON THE CUSP OF CROSSING POINTS OF NO RETURN

A growing body of research has warned that the Earth System contains 'tipping elements', which once pushed beyond a certain threshold – known as a 'tipping point' – may undergo abrupt, non-linear and irreversible changes. These tipping elements include the polar ice sheets; large ecosystems such as the Amazon rainforest; and circulation patterns such as the ocean currents that distribute heat around the globe.

The consequences of crossing these tipping points would be catastrophic. For example, the collapse of major ice sheets on Greenland, West Antarctica and part of East Antarctica would commit the world to around 10 metres of irreversible sea-level rise. The loss of rainforests or the thawing of permafrost would result in additional release of greenhouse gases, amplifying global warming.

In 2008, a group of leading climate scientists identified nine key tipping elements in the Earth System. Just over a decade later, they warned that more than half of these tipping elements –

including the Greenland ice sheet and Arctic sea ice – were now 'active'. A recent review paper suggests that even at today's level of global warming it is possible that we have crossed tipping points for the Greenland ice sheet, West Antarctic ice sheet and tropical coral reefs. At global warming of above 1.5°C and well below 2°C – that is, within the Paris Agreement temperature goal – these and some other tipping points, including widespread and abrupt thawing of permafrost, are not only possible but *likely*.

At today's level of around 1.2°C of global warming, we are already at risk of triggering abrupt and irreversible changes in the climate system.

The tipping of one or two elements could have a domino effect and the Earth System would continue to warm until it reached a new stable state, regardless of our efforts to rapidly reduce greenhouse gas emissions. That new state would be much hotter than the climate of the past several thousand years, during which our complex human societies were able to develop and flourish.

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WE CANNOT OFFSET OUR WAY OUT OF CLIMATE CHANGE

It's time to debunk a dangerous and pervasive myth standing in the way of rapid climate action in Australia: the idea that we can 'offset' emissions from the continued burning of fossil fuels. In reality, we can't carry on burning fossil fuels, including gas, and make up for it by storing some carbon emissions elsewhere, either by way of 'nature-based solutions' such as planting more trees, or by somehow directly capturing and securely storing the carbon. That's equivalent to trying to extinguish a fire while at the same time throwing more fuel on the flames.

One tonne of carbon released from long-term storage through the burning of fossil fuels is *not* offset by one tonne of carbon being absorbed by planting trees, restoring wetlands or other land-based offset schemes.

That is because when we dig up and burn fossil fuels, carbon is being released from long-term, stable storage underground. Whereas when we store carbon in soil, it remains part of the active exchange of carbon between land-based ecosystems, the upper ocean and our atmosphere, and may not stay stored in the land for long. Forests may be destroyed by fire, disease, floods or droughts – all of which are increasing with climate change – quickly returning the carbon to the atmosphere.

There is no prospect that carbon capture and storage (CCS) and carbon capture, utilisation and storage (CCUS) technologies can deal with the vast majority of emissions that would result from continued dependence on fossil fuels. While these technologies may play a limited role in capturing *residual* emissions, from essential industries such as steel and cement where there isn't yet a low- or zero- emissions alternative available, they are no substitute for determined efforts to cut out the use of fossil fuels.

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THE CARBON BUDGET FOR A SAFE FUTURE IS ALMOST SPENT

A carbon budget is the maximum amount of greenhouse gases that can be released into the atmosphere while still having a chance of limiting the global average temperature to a given level. The science of carbon budgets involves probabilities. For example, we can estimate a budget that provides a 50 percent probability of limiting warming to 1.5°C; which is a one in two chance. If we want a higher likelihood of successfully limiting global warming to 1.5°C, say a two in three chance (or 67 percent probability) then the budget set for the amount of carbon that can be emitted becomes smaller. Would we board a plane if we knew there was a 50 percent chance of it falling from the sky? Of course not, we would find a safer way to travel. In the same way, the future of our planet is too important to leave up to a coin toss.

Future emissions reduction targets should aim to limit warming as much as possible, and reduce the risk of catastrophic outcomes, with the highest probability of success. This means aligning as close as possible with a budget that provides a 67 percent chance of limiting warming to 1.5°C.

Owing to decades of failure to adequately reduce emissions, the remaining global carbon budget for a high chance of limiting warming to 1.5°C by the end of this century is either now extremely small or already exhausted. Furthermore, almost all scenarios that see us limiting warming to 1.5°C involve a period of temporary 'overshoot' - temporarily exceeding warming of 1.5°C but then bringing the temperature back down over time by removing enormous quantities of greenhouse gases from the atmosphere (for which no technology, at the scale required, exists).

It is abundantly clear that any remaining chance of eventually limiting warming to 1.5°C requires truly transformative change, including roughly halving global emissions this decade. That requires progress at a scale, scope and pace far greater than we are seeing today.

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AUSTRALIA'S 2035 EMISSIONS REDUCTION TARGET MUST BE NET ZERO

Australia's emissions reduction targets should represent a fair share of the global emissions reduction task. Our next Nationally Determined Contribution to the Paris Agreement must reflect Australia's historical responsibility for climate change, our economic capability, and our natural advantages in renewable energy.

Under the Paris Agreement, Australia and all countries have committed to continually striving to limit warming to 1.5°C, recognising that every increment of further warming gets us into more and more dangerous territory. We assess that the remaining global carbon budget for a two-in-three chance of limiting warming to 1.5°C is just 92 Gt CO₂; this figure rises to 392 Gt CO₂ for a two-in-three chance of limiting warming to 1.7°C.

To play its part in global emissions reduction efforts, Australia should use no more than 0.97 percent of the available global carbon budget. This is a generous allocation, given we only account for 0.33 percent of the global population. Applying that share to these global carbon budgets, Australia would need to achieve net zero emissions by 2038 to align with a global carbon budget that provides a 67 percent chance of limiting warming to 1.7°C, and 2027 for a 67 percent chance of limiting warming to 1.5°C.

Given the extreme and escalating risks from climate change, and the narrow window remaining in which to avoid a truly catastrophic scenario, the Climate Council calls for Australia to plan to reach net zero emissions by 2035.

Net zero by 2035 represents a point in this range (2027-2038) that balances the maximum rate of emissions reductions possible for Australia, with the need to limit warming as much as possible and with the highest probability of success. Net zero by 2035 is a gargantuan task. We do not make the recommendation lightly, but progressive refinements to climate science, the mounting evidence and the impacts we are already experiencing today makes very clear all that is at stake.

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THIS IS THE MOMENT FOR DECISIVE ACTION

The path to avoiding climate catastrophe has narrowed. Yet even as we draw close to dangerous tipping points in our climate system, so too are we beginning to witness seismic economic and social shifts that propel us towards stronger action. Globally, the cost of renewable energy has continued to plummet. In Australia, public support for stronger action on climate change has reached an all-time high.

Rapid and wide-scale action to cut emissions may be more urgent than ever, but it is also *more possible than ever before* as new technologies scale up and roll out across the energy, transport and industrial systems that produce the bulk of our emissions.

There are practical steps governments can and should be taking right now to start cutting emissions at this speed and scale. The Australian Government should fix our national environment law so that it no longer gives the green light to polluting fossil fuel projects, put in place strong fuel efficiency standards to slash pollution from our cars, and turbocharge the electrification of our grid. State, territory and local governments should speed up the electrification of homes, businesses and transport, while reshaping how our cities are designed so liveability and sustainability comes first.

These and other actions will unlock the huge private investment needed so industry can start driving solutions to the climate crisis, instead of being part of the problem. Clean energy, green industries and new technologies can form the backbone of our future economy - so Australia can help the world cut emissions while getting paid for it.

A national plan to cut emissions by 75 percent by the end of this decade and reach net zero by 2035 can guide this work and keep us laser-focused on the mission ahead.

Right now, we stand on the cusp of history: will we go all-in on cutting emissions to help build a safer and more prosperous world? Or will we squander this opportunity and tip past the point of no return, condemning everyone to a far more dangerous and unstable world? The climate choices we make today will set the course.

Net zero by 2035 must be our mission: the lives, livelihoods and quality of life for Australians today and for generations to come depend on it.

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SUMMARY OF POLICY RECOMMENDATIONS



Climate Council recommends that Australia's emissions reduction targets and our next Nationally Determined Contribution to the Paris Agreement:

- › Be based on genuine emissions reductions. The use of offsets must be minimised and accounted for separately, in order that we are measuring and transparently accounting for real and effective efforts to limit climate damage.
- › Aim to limit warming as far as possible and with the highest probability of success. This means aligning as close as possible with a budget that provides a 67 percent chance of limiting warming to 1.5°C.
- › Recognise the extreme and existential risks posed by tipping points in the climate system, and the need to do everything possible to eliminate the risk of catastrophic scenarios.
- › Represent a fair share of the global emissions reduction task, factoring in Australia's historical responsibility for climate change, our economic capability, and our natural advantages in renewable energy.

We assess that Australia's 2035 target must be net zero.



The Climate Council is an independent, crowd-funded organisation providing quality information on climate change to the Australian public.

The Climate Council acknowledges the Traditional Owners of the lands on which we live, meet and work. We wish to pay our respects to Elders past and present, and recognise the continuous connection of Aboriginal and Torres Strait Islander peoples to Country.

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