Climate Council of Australia

Submission to:	Targets, Pathways and Progress
Addressed to:	Climate Change Authority
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About the Climate Council

The Climate Council is Australia's own independent, evidence-based organisation on climate science, impacts and solutions.

We connect decision-makers, the public and the media to catalyse action at scale, elevate climate stories in the news and shape the conversation on climate consequences and action, at home and abroad.

We advocate for climate policies and solutions that can rapidly drive down emissions, based on the most up-to-date climate science and information.

We do this in partnership with our incredible community: thousands of generous, passionate supporters and donors, who have backed us every step of the way since they crowd-funded our beginning as a non-profit organisation in 2013.

To find out more about the Climate Council's work, visit www.climatecouncil.org.au.

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1. Introduction and summary of recommendations

The Climate Council welcomes this opportunity for a further round of input to the Climate Change Authority (CCA)'s development of advice on Australia's 2035 emissions reduction target. The CCA's work is a crucial input shaping the speed and scale of climate action in Australia over the coming decade, so it is essential this is informed by a strong focus on what the science tells us is necessary now to avoid the worst impacts of dangerous climate change.

We received the CCA's issues paper with a mix of encouragement and dismay.

On the one hand, the CCA's issues paper provides compelling reasons for taking all necessary action to protect Australians from worsening climate harm.

You have rightly acknowledged the dangers facing Australia in a rapidly warming world (page 8, 11 of issues paper), recognised that we must strive to limit global warming to 1.5°C (page 6, 11), recognised that Australia can play an important role in helping accelerate global action (page 6, 13) and that our commitments must reflect our obligations under the Paris Agreement and our status as an advanced economy (page 9). You also state that the CCA "aims to push the boundaries of what is currently deemed possible" (page 6) and argue that the right goal can "catalyse transformative action", creating a "virtuous cycle of learning and improvement". Further, you correctly observe that an overly conservative target may "fail to adequately address the systemic changes required for success" (page 10). These are all points with which we strongly concur, and which are well supported by available evidence.

We are therefore dismayed by the CCA's preliminary advice that Australia set a target for 2035 of only 65-75% below 2005 levels. This falls well short of the principles and considerations that the CCA has laid out in the issues paper, as well as its mandate under the Climate Change Act 2022.[1]

Independent analysis commissioned by the Climate Council and undertaken by Climate Resources concludes that a target for Australia of 70% below 2005 levels by 2035 – the midpoint of this range – aligns with global warming of well over two degrees this century (see Box 1).[2] As you are aware, it is well understood that this is a wholly unacceptable level of risk for Australian

[1] As noted in the issues paper (page 9), the Climate Change Act 2022 requires that the CCA consider, inter alia, the physical impacts of climate change on Australia.
[2] Based on an equal-per-capita share of the global carbon budget. See Box 1.

communities. It would push communities beyond their capacity to adapt, cause the decimation of ecosystems we depend upon for our survival, and be devastating for our future economy and security.

We are concerned with two parts of the CCA's analytical approach to the initial targets assessment.

The first is the absence of a meaningful carbon budget analysis that would enable more fulsome consideration of the underlying science, Australia's global responsibilities, and necessary prudence when dealing with catastrophic risks. Second is an overly conservative assessment of what Australia can achieve if we prioritise cutting emissions further and faster this decade. Together, these analytical shortcomings have led to a preliminary recommendation that does not reflect what is necessary or what is possible.

The first part of our submission - *The science basis* - addresses the first of these issues by stepping through the essential considerations in determining a target that is aligned with climate science and Australia's international obligations. It focuses primarily on the first two questions posed in the issues paper. In the second part, we present our evidence for the deep and genuine cuts to emissions that are achievable this decade.

The CCA is independent of government and politics, and has access to the country's foremost scientific expertise. The CCA has a unique opportunity to inform decision makers and all Australians about the scale and pace of action required to protect communities here and worldwide from the escalating impacts of climate pollution and the dangerous warming it fuels. This is an opportunity to set Australia on the right path with its next climate targets – one which keeps our children safer from climate change and sets our economy up for success in a zero emissions world. We urge you to make the most of this important opportunity by providing science- and evidence-based advice which courageously sets out what's needed now.

Recommendations

Recommendation
The CCA adopts a more precautionary approach to the extreme climate risks now facing Australians and communities worldwide. Its recommended target should aim to help limit warming to the lowest level now possible. The Climate Council reaffirms that, balanced with the maximum rate of emissions reductions possible for Australia, we must aim to reduce emissions to 75% below 2005 levels by 2030 and reach net zero by 2035.

Recommendation
The CCA takes a methodical and transparent approach to determining Australia's share of the global emissions budget, demonstrating how it aligns with our responsibilities under Article 2 of the Paris Agreement — including the principle of common but differentiated responsibilities and respective capabilities, in light of different national circumstances — as well as Article 4.4, on the responsibilities of developed countries.

Recommendation
Governments should fully embrace the potential of distributed energy generation and storage, including household solar and community batteries, recognising the additional benefits for energy resilience and affordability.

Recommendation
In decarbonising transport, and alongside vehicle electrification, governments should focus on enabling Australians in our cities and major regional centres to use shared and active transport for more trips, more often. This carries the additional benefits of promoting better health, boosting social connections, and creating more vibrant cities and regions.

Recommendation
To support transparent emissions accounting, and ensure priority is given to achieving genuine emissions reductions this decade, complementary targets should be set for gross emissions reductions, land sector removals, and engineered removals. The CCA's advice to the Australian Government should reflect this approach, to facilitate adoption of disaggregated targets nationally.

Recommendation
The Australian Government, through its target setting and enabling policies and regulations, has a critical role in catalysing transformative action and driving the necessary innovation and investment. Our national target should reflect the true urgency of the climate crisis and the wealth of opportunities that now exist to rapidly reduce climate pollution.

Recommendation
Governments must support the replacement of fossil fuels with renewable energy by ensuring no extensions to the life of coal-fired power stations, and supporting the progressive wind-down of gas network infrastructure.

Recommendation
To overcome workforce constraints, the Australian Government should establish an Australian Energy Corps: an integrated network for training, placing and supporting energy workers.

Recommendation
To ensure solutions are accessible to all, governments should provide low-cost financing to help with affordability of clean energy and efficiency upgrades, and set stronger minimum construction standards for new buildings.

Recommendation
The Australian Government should work with states and territories to improve collaboration with local communities, including through working together on a National Clean Power Map, and funding Community Energy Coordinators to facilitate dialogue, information flow and knowledge sharing between the community, project proponents, and government agencies.

Recommendation
The Australian Government should play a part in the research and development required to reduce agricultural methane and develop clean manufacturing industries in Australia.

Recommendation
The Australian Government should ensure Australia seizes the opportunities for cutting methane pollution by setting a national methane reduction target consistent with Australia's commitment to the Global Methane Pledge and Article 2 of the Paris Agreement. Climate pollution reduction plans, including Australia's Net Zero Plan under development, should specifically address methane, and update policies and regulations as needed to deliver these.

Recommendation
Regarding how Australia can further support other countries to decarbonise and develop sustainably, the CCA's advice should include advising on targets for reducing fossil fuel production and export, and on the provision of international support for mitigation, adaptation and addressing loss and damage. The Australian Government should also ensure that Australia's scope 3 emissions are reported and accounted for.

Recommendation
Engagement with First Nations communities should occur in part through the National First Peoples Platform on Climate Change (NFPPCC). Clean energy projects should follow the principles and guidance provided by the First Nations Clean Energy Network.

2. The science basis

Relevant questions from the issues paper:

1. How should the authority take account of climate science and Australia's international obligations in considering possible emissions reductions targets for 2035?

2. How should the authority weigh the goals of ambition and achievability in considering possible emissions reductions targets for 2035?

The most important responsibility of governments is to uphold the security and wellbeing of their citizens.

The key test for Australia's 2035 emissions reduction target is whether it is adequate to protect Australians from unacceptable risks and harms from climate change. To meet this test, it must align with climate science, represent a suitably prudent approach to catastrophic climate risks, and align with Australia's international obligations under the Paris Agreement.

Setting an appropriate, science-based target that aligns with our responsibilities as an advanced economy is fundamental to ensuring Australian governments, communities and private sector entities approach the challenges of this make-or-break decade with the vigour and resolve that the climate crisis demands. Such a target should be framed in terms of what is necessary from the point of view of prudent risk management. Language of 'ambition' is unhelpful as it frames necessary action as optional or above the bare minimum. This is simply not the case when the impacts of climate change are already hitting home harder and more frequently for Australians, and communities globally.

On the question of balancing necessity with achievability: given the profound risks to Australians and people worldwide from climate change, a responsible approach is doing everything reasonably demonstrated to be achievable. Setting our sights too low undersells Australian resolve and ingenuity, and risks a future of far greater dangers and disruption. In effect, it involves saying either that we expect other countries to do more than we are willing to do ourselves, and/or that we are willing to take an enormous gamble with the future security and wellbeing of Australian communities.

Determining a 2035 target for Australia must begin with a methodical accounting of climate risks, consideration of the global carbon budget, and Australia's role in the global emissions reduction task. The CCA's issues

paper indicated little consideration of the global carbon budget or Australia's responsibilities under the Paris Agreement. As a priority, we urge the CCA to engage much more substantively with this aspect in your ongoing analysis as work continues during 2024.

In this section we restate the case for a target for Australia of net zero by 2035, outlining the key factors that must be taken into account for a target to align with climate science and Australia's responsibilities under the Paris Agreement.

2.1 Protecting Australian communities

The CCA has acknowledged that Australia is already facing severe impacts from climate change today, and that every fraction of a degree of further warming will bring greater risks and impacts (page 11). However, the discussion paper suggests insufficient consideration has been given to these impacts in the CCA's work so far. Nor does it appear your analysis has adequately taken stock of the risks involved in adopting a target that falls short of the action required to limit warming as close as possible to 1.5°C.

Today's level of global warming is already proving devastating for many Australian communities and ecosystems. We are already facing more extreme and destructive downpours, deadlier heatwaves, and worsening fires (BoM and CSIRO 2022). These are coming at a significant cost to our economy, security and our mental and physical wellbeing (Climate Council 2024a). While these impacts alone should be a clarion call for faster cuts to climate pollution, to gain a more complete picture of the impacts of today's warming we need also to consider the rapid changes to some of our critical ecosystems and to our ocean.

2.1.1 Tipping points

Some of our foremost marine scientists believe that the Great Barrier Reef, having suffered its worst ever heat stress and the fifth mass bleaching event in less than a decade, has most likely crossed a tipping point and is fading into a new 'shadow state' (Climate Council 2024b).

This alarming development is consistent with our latest understanding of the sensitivity of tipping elements in the climate system. In 2022, a major review of the available science on tipping points concluded that tropical coral reefs were likely to cross a tipping point at around 1.5°C of global

warming above pre-industrial levels, but that the tipping point could be as low as 1°C (Armstrong McKay et al. 2022).

The growing likelihood that we have crossed a tipping point for tropical coral reefs including the Great Barrier Reef is both troubling in its own right, and a stark warning about the need for far greater cuts to climate pollution this decade. It suggests that other tipping points — such as the collapse of ocean currents or abrupt thawing of Arctic permafrost — could also be triggered at lower levels of global warming than previously thought.

When a large ecosystem or other tipping element is tipped into a new state, this can devastate the communities who depend on it. Crossing tipping points may also worsen climate change. For example, the abrupt thawing of arctic permafrost would release vast amounts of greenhouse gases into the atmosphere, amplifying global warming. The collapse of the ocean currents that distribute heat around the Earth's surface would have a dramatic effect on the weather patterns we all depend on for our survival. By their interconnected nature, the tipping of one or two elements could lead to an irreversible cascade, with catastrophic consequences for human societies (Climate Council 2021).

All in all, the latest science and observations suggest we may be at far higher risk of imminent and major climate disruptions than was thought only a few years ago. This is particularly apparent when looking at changes in our ocean (Climate Council 2023a).

2.1.2 Our ocean: Coming back to bite us

Alongside record-shattering land surface temperatures, the past year has laid bare the extraordinary impact of climate pollution on our ocean, and its implications for communities in Australia and worldwide.

The vast majority of the excess heat in our climate system from climate pollution — around 93% — has been absorbed by the ocean (IPCC 2019). By absorbing so much heat, the ocean has lulled us into a false sense of security, masking the true extent of human interference in the climate system. There are signs that its capacity to do so is nearly exhausted, with serious consequences (Climate Council 2023a).

All life on Earth, including our own, depends on a healthy ocean. Together, the ocean and atmosphere shape our climate, affecting weather conditions worldwide. The ocean produces more than half of our oxygen. It connects communities around the planet, and for many it is core to our identity and culture.

At time of writing, we have seen more than 400 consecutive days on which a new global average sea surface temperature has been set for that day of the year (Climate Reanalyzer and NOAA 2024). At the same time, we are seeing alarming declines in sea ice, accelerating sea-level rise, many species on the move, and signs of changes in the ocean circulation and currents that distribute heat, nutrients and carbon around the world, with profound implications for life as we know it (Climate Council 2023a).

The conclusion from these developments is inescapable. We are already experiencing an extremely dangerous level of global warming.

The only responsible target is one that limits warming to the lowest level now possible and with the best chance of success. Anything less is an irresponsible gamble with the future security and wellbeing of communities in Australia and worldwide.

2.2 The carbon budget and managing risks

2.2.1 We need better than a coin's toss chance

When facing a challenge as grave and as far reaching as the climate crisis, the rational response is to do everything in our power to limit harm, and reduce the risks of a truly cataclysmic outcome. Too often our response ends up playing a high risk game: betting on a best-case scenario and ignoring the enormous gamble this takes with our collective future.

The CCA's current approach outlined in the issues paper reflects such a gamble. In adopting the Intergovernmental Panel on Climate Change (IPCC)'s scenario for limiting warming to 1.5°C with 50% probability of success as the sole reference point, the analysis does not give due consideration of the inherent risks in such an approach (page 12).

When dealing with catastrophic risks of the kind that climate change represents, working to a scenario that offers anything less than a 67% probability of success exposes lives and livelihoods to an unacceptably high level of risk. Indeed, even a 67% scenario carries a very high level of risk. If we fail to limit warming as close to 1.5°C as possible, the range of plausible futures is truly nightmarish: mass extinction, collapse of human societies and unimaginable suffering. While there is significant debate over the likelihood of such scenarios, their possibility calls for us to do everything in our power to avoid them (Kemp et al. 2022). We have to give ourselves more than a coin's toss (50%) chance of success.

2.2.2 Known unknowns — carbon cycle feedbacks and non-CO_2 gases

For an appropriately prudent approach to the management of extreme climate risks, we must also take proper account of other known uncertainties.

Perhaps the most important of these is carbon cycle feedbacks — processes within the carbon cycle that can either amplify or dampen the effects of climate change. A key example of a carbon cycle feedback is the thawing of carbon-rich permafrost. As global temperatures rise, permafrost begins to thaw, releasing carbon into the atmosphere in the form of CO_2 and methane — both greenhouse gases. This leads to further warming, which leads to more thawing, and so on.

While we know these feedbacks exist, we can only estimate what their overall effect will be. In its Sixth Assessment, the IPCC provides a best estimate for how much the global carbon budget should be reduced to account for permafrost thaw and other carbon cycle feedbacks that we know enough about. However, the uncertainties around this estimate are large, with the possibility that the effect of carbon cycle feedbacks could be considerably greater, particularly with warming beyond 1.5°C.

To account for this uncertainty, the Climate Council has argued that we must adopt a more precautionary approach to carbon cycle feedbacks and work from a smaller global carbon budget. (See calculations in Appendix A.)

A second area of uncertainty in global carbon budgets relates both to the rate at which we manage to reduce non-CO_2 greenhouse gases including methane, and to the effect of reduced emissions of aerosols as we stop burning fossil fuels. Here again, a more precautionary approach is warranted. In its Sixth Assessment, the IPCC provided a wide range of uncertainty for the effect of reductions of non-CO_2 emissions. Taking the same approach to carbon cycle feedbacks, these uncertainties, and the extreme dangers should the effect prove to be towards the upper end of the uncertainty range, demand that we further reduce our estimate of the available global carbon budget (See calculations in Appendix A.)

2.3 Australia's role

The CCA has affirmed that its advice must take into account Article 2 of the Paris Agreement. As you rightly state, this requires not only that we pursue efforts to limit warming to 1.5°C, but that our target "reflect equity and the

principle of common by differentiated responsibilities and respective capabilities, in light of different national circumstances". In other words, our target must match Australia's unique set of characteristics, including our historical emissions, economic strength, and potential for renewable energy and other climate solutions. It is important that the Authority also recognises Article 4.4 of the Paris Agreement, which states that "Developed country Parties should continue taking the lead by undertaking economy-wide absolute emission reduction targets".[3]

Avoiding climate catastrophe depends on all countries playing their part. That is, taking actions in line with the equity and effort-sharing principles of the Paris Agreement.

It is disappointing that the CCA has not yet taken a methodical approach to determining an Australian share of a global emissions budget. This was central to the approach adopted by the CCA in the preparation of its previous targets advice in 2014, and is arguably the most important step in determining a national target. Notwithstanding the need to also assess what is technically possible for Australia, missing this critical step leaves the CCA unable to demonstrate that its recommended target takes account of Article 2 of the Paris Agreement.

In our own work to determine Australia's share of the global emissions budget, the Climate Council both replicated the approach taken by the CCA in 2014, and also applied an alternative 'equal-per-capita' formula.

In 2014, the CCA, using a modified version of a framework known as 'contraction and convergence', concluded that to play its part in global emissions reduction efforts, Australia could use no more than 0.97% of the available global carbon budget. Many have argued that a 0.97% share was overly generous to Australia, given that we only account for 0.33% of the global population. It would be difficult to argue for a 0.97% share today, given Australia's emissions since 2014, further changes in the emissions profile of other countries, and other factors. Nonetheless, it provides a useful reference point that enables us to compare the CCA's advice today with its previous advice.

The Climate Council concluded that for a 67% probability of limiting warming to 1.5°C, taking a precautionary approach to carbon cycle feedbacks and non-CO2 emissions (see Sections 2.2.2), and allocating 0.97% of the global emissions budget to Australia, we should aim to achieve net zero

[3] Notably, Article 4.4 can reasonably be interpreted as requiring developed countries to achieve net zero before 2050, given a target of net zero is understood as the average global requirement.

emissions by 2027 (Climate Council 2023b; see summary of calculations in Appendix A). For a 67% probability of limiting warming to 1.7°C, we should aim to achieve net zero emissions by 2038.

To provide a second reference point, we calculated Australia's share of the global emissions budget on an equal-per-capita basis. In other words, a share that is proportionate to our population, or that assumes that every person worldwide is entitled to an equal share of the remaining global carbon budget. This results in a much smaller emissions budget for Australia. We conclude that if working from an equal-per-capita share of the global emissions budget, Australia has already exhausted its share of a budget that provides a 67% chance of limiting warming to 1.5°C. (See calculations in Appendix A.)

The Climate Council recognises that determining a fair share of the global carbon budget is highly sensitive to the methodology applied, the factors taken into consideration, and how they are weighted. Nonetheless, a target of 65-75% below 2005 levels by 2035 cannot be shown to accord with Article 2 of the Paris Agreement under any of the most commonly applied effort-sharing methodologies.

2.4 Implications

After taking a careful look at the global carbon budget, adopting extra precautions around carbon cycle feedbacks and non-CO_2 emissions, and considering Australia's responsibilities under the equity and effort sharing principles of the Paris Agreement, the Climate Council has repeatedly stated Australia should adopt an emissions reduction target of 75% below 2005 levels by 2030 and net zero by 2035 (Climate Council 2021, 2023b, 2023c, 2024c). This balances the need to limit warming as far as possible and with the highest probability of success, with the maximum rate of emissions reductions that we believe is now possible for Australia.[4]

We should further note that while our focus here is on Australia's domestic emissions, we recognise that Australia's contribution to global climate change includes the very large quantities of emissions produced when Australian exports of coal and gas are burned overseas (see also Section 6.1). These exported emissions, which are more than double Australia's domestic

[4] Note that in arriving at this recommendation we allocated a generous 0.97% share of the global emissions budget to Australia - the figure used by the CCA in 2014. Further, that the budget was short of the action required for a 67% probability of limiting warming to 1.5°, once we reduced the budget to take account of uncertainties with carbon cycle feedbacks and non-CO_2 emissions. (See calculations in Appendix A.)

emissions, are relevant when considering Australia's historical responsibility for climate change, and our share of the global emissions budget.

In the next section we present our evidence for how Australia can reduce emissions by 75% by 2030, getting us on the right track for net zero by 2035. Given the profound risks to Australians and people worldwide from climate change, we cannot set a target that is anything less than what can be reasonably shown to be achievable. Further, as you have noted (page 9), countries' Nationally Determined Contributions (NDCs) to the Paris Agreement should reflect their "highest possible ambition". Not a 'meet-and-beat' target, but one that demands we bring our A game, and leave it all on the field.

Recommendation
The CCA adopts a more precautionary approach to the extreme climate risks now facing Australians and communities worldwide. Its recommended target should aim to help limit global warming to the lowest level now possible. The Climate Council reaffirms that, balanced with the maximum rate of emissions reductions possible for Australia, we must aim to reduce emissions to 75% below 2005 levels by 2030 and reach net zero by 2035.

Recommendation
The CCA takes a methodical and transparent approach to determining Australia's share of the global emissions budget, demonstrating how it aligns with our responsibilities under Article 2 of the Paris Agreement — including the principle of common but differentiated responsibilities and respective capabilities, in light of different national circumstances — as well as Article 4.4, on the responsibilities of developed countries.

BOX 1: A target for Australia of 65-75% by 2035 risks global warming of well over two degrees

In preparing this submission, the Climate Council commissioned Climate Resource to assess the global temperature rise implied by an Australian emissions reduction target of 65-75% below 2005 levels by 2035. In other words, how much warming we would see if all countries made a comparable effort.

The analysis affirmed that, under any reasonable interpretation of the equity and effort sharing principles of the Paris Agreement, a target range of 65-75% falls substantially short of the emissions reductions required of Australia.

A target for Australia of 65% by 2035 (and net zero by 2050) aligns with global warming of **at least 2.3-2.6°C**, assuming every country adopts an equivalent per capita share of the remaining global emissions budget. A target of 75% — the upper end of the CCA's preliminary range — implies warming of **2.2-2.5°C**.

Allowing Australia a larger share of the remaining global emissions budget — such as the 0.97% share on which the CCA's 2014 advice was based — reduces the level of implied warming. However, this approach is very unlikely to be deemed fair by the rest of the world, as we would be relying on other countries to compensate for our high level emissions by working harder themselves.

The analysis also affirmed that, in addition to setting a stronger 2035 emissions reduction than 75%, Australia can move closer to a 'fair' contribution to the world's work to tackle the climate crisis by strengthening its existing 2030 targets, bringing its net zero date forward from 2050, and substantially increasing its financial support for climate action in other countries.

A copy of the full analysis from Climate Resource is available from simon.bradshaw@climatecouncil.org.au.

3. We have a pathway to 75% by 2030, to get on the right track for net zero by 2035

Relevant questions from the issues paper:

4.. What technologies are important for each sector's pathway to net zero and why?

In our submission to the CCA in 2023, and subsequent report *Mission Zero*, the Climate Council outlined why Australia must aim to reduce its emissions by 75% below 2005 levels by 2030 and achieve net zero by 2035. This is a target that balances the need to limit warming as far as possible now with the maximum rate of emissions reductions possible for Australia (Climate Council 2023b, 2023c).

Since that submission, we have undertaken a major new research project to show *how* Australia can cut climate pollution by 75% by 2030 while empowering Australian communities and getting on the right track for net zero by 2035. The pathway in our report *Seize the Decade* demonstrates this is possible with technologies and techniques that are available to us today (Climate Council 2024c). In other words, unlike many such modelling exercises, we have not made any assumptions about technologies not yet proven. Nor do we include excessive reliance on carbon offsets or removals.

Technologies that enable energy efficiency, electrification and fuel switching are key to enabling the transition across most sectors of the Australian economy. Below we provide a brief snapshot from our plan for key sectors.

3.1 Electricity

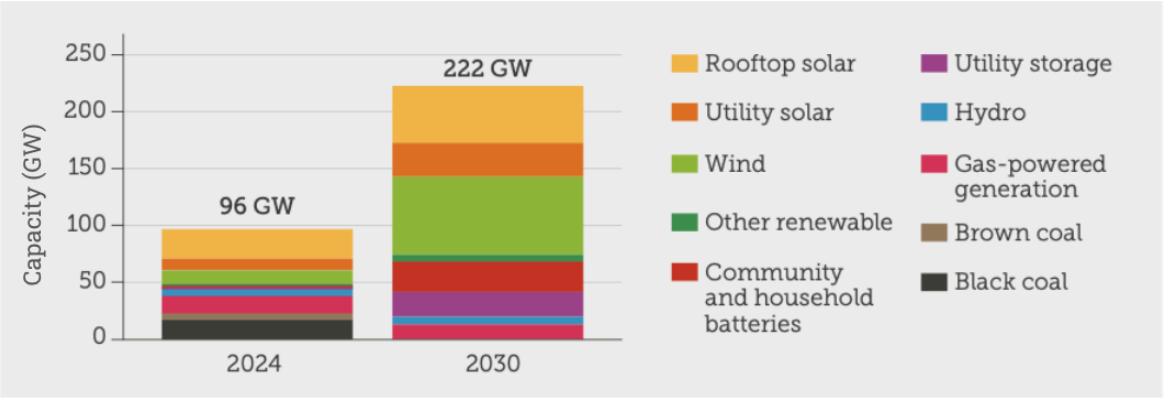
As noted by the CCA, decarbonising the electricity sector will be critical to the successful decarbonisation of all sectors (page 20).

We need to fully decarbonise our electricity grid and build a zero emission energy system big enough to meet the needs of domestic decarbonisation across all sectors. Doing so will also lay the foundations for clean industries that ensure Australia's next era of economic prosperity and support other countries to decarbonise.

The Climate Council's analysis shows a need to grow Australia's electricity generation and storage capacity from 96 GW in 2024 to 222 GW by 2030. By 2030, we can have a grid that runs on 94% renewables (Climate Council 2024c, page 12).

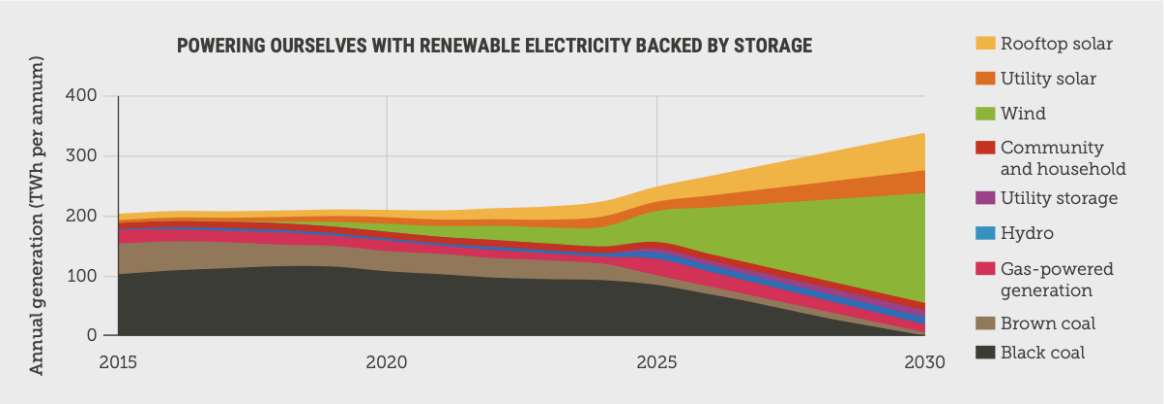
This capacity will be made up of a combination of rooftop solar and batteries in homes and businesses, with large-scale renewables like onshore wind and solar farms and storage like big batteries and pumped hydro. The two figures below show the modelled change in electricity capacity mix up to 2030.

Figure 1: Comparing Australia's electricity capacity mix between 2024 and 2030



Source: 2024 capacity based on AEMO (2023a), APVI (2024) and OpenNEM (2024); 2030 based on analysis by the Climate Council and Institute for Sustainable Futures (Climate Council, 2024c).

Figure 2: Changing energy generation mix from 2015 to 2030 (National Electricity Market only)



Source: Generation refers to the NEM only. Historic generation based on AEMO (2023a); projected generation based on analysis by the Climate Council and Institute for Sustainable Futures (Climate Council, 2024c).

Notably, distributed energy generation and storage from households rooftops and community batteries can play a key role. Generating and storing energy near where it is used in homes, businesses and communities, has the

additional benefits of making our energy system more resilient, and making efficient use of existing infrastructure and resources.

Our analysis identified that four million more rooftop solar systems on Australian homes can contribute 24 GW of renewable generation capacity. Installing two million household batteries and 5,000 community batteries can provide another 24 GW of storage capacity (Climate Council 2024c, page 12).

Recommendation
Governments should fully embrace the potential of distributed energy generation and storage, including household solar and community batteries, recognising the additional benefits for energy resilience and affordability.

3.2 Built environment

There are readily actionable steps to electrify and improve energy efficiency in residential and commercial buildings. Relatively low cost upgrades can help improve the thermal efficiency of residential buildings by approximately 8% and commercial buildings by approximately 12% (Climate Council 2024c, page 24).

Pairing rooftop solar with energy efficient, electrified homes and commercial buildings has a threefold benefit: adding renewable electricity generation capacity; further reducing energy costs for consumers; and helping the resilience of the grid by producing energy close to where it is consumed and reducing demand.

3.3 Transport

Decarbonising transport will involve a combination of vehicle electrification and, importantly, enabling a shift to shared and active transport for more trips, more often. In doing so we can substantially reduce pressure on the energy system to manage the increase in vehicle fleet electrification.

Our analysis identifies the opportunity of shifting 30% of projected private vehicle kilometres to shared and active transport by 2030 (Climate Council

2024c, page 20). This carries the additional benefits of promoting better health, boosting social connections, and creating more vibrant cities and regions (Climate Council 2023d). We note that the CCA has not considered the immediate potential of mode shift, and instead focussed primarily on the electrification of light vehicles (page 25). Enabling greater use of shared and active transport can slash climate pollution further and faster this decade because its impacts are experienced immediately through reducing use of private cars. This is in comparison with vehicle electrification, where the limited speed of fleet turnover will mean major emissions reductions take longer to achieve.

In our analysis, one-third of all passenger kilometres can be travelled by electric vehicles by 2030. This can be achieved by prioritising the accelerated electrification of vehicles that travel the most kilometres – for example taxis, rideshare vehicles and government fleets.

With the right infrastructure and technologies for enabling vehicle-to-grid or -home (V2G or V2H) applications, electric vehicles can also serve a dual purpose as both zero emissions transportation and household energy storage, further enabling the development of a larger and cleaner reliable electricity grid.

Recommendation
In decarbonising transport, and alongside vehicle electrification, governments should focus on enabling Australians in our cities and major regional centres to use shared and active transport for more trips, more often. This carries the additional benefits of promoting better health, boosting social connections, and creating more vibrant cities and regions.

3.4 Industry

For industries that require relatively low levels of heat energy, such as food and beverages, light manufacturing, the paper industry and some parts of the chemicals industry, switching from using gas for heat to efficient electric technologies is possible today. For industries that require higher temperatures, such as cement and metals manufacturing, and for which electrification is more challenging, it is possible for biomass and biofuels to play a larger role before 2030.

Maximising electrification alongside fuel switching and increased circularity would reduce the use of coal in industry by 41% by 2030, oil products such as diesel by 86% by 2030, and gas by 31% by 2030 (Climate Council 2024c, page 16).

Developing Renewable Energy Industrial Precincts to co-locate industrial activities with large-scale renewable electricity generation can minimise the need for new transmission and better streamline delivery of the large amounts of energy required for electrified mining and manufacturing.

Beyond 2030, the full decarbonisation of industry will be enabled by the availability of affordable zero emission fuels like renewable hydrogen.

By 2030, the Climate Council's analysis estimates around 7 petajoules of renewable hydrogen can be manufactured in Australia. This initial, limited supply needs to be prioritised for industrial use and not diverted to other uses like heating homes or powering light passenger cars where electrification is a better option.

4. Genuine, deep reductions in carbon pollution must be the priority

Relevant questions from the issues paper:

4. How should governments decide upon the appropriate allocation of resources towards reducing emissions, removing carbon from the atmosphere, and adapting to climate change impacts?

The Climate Council recognises that avoiding catastrophic climate change requires both cutting climate pollution very substantially this decade, and also removing many gigatons of carbon from the atmosphere over the coming decades.

However, we strongly caution that every increment of further warming increases the chance of crossing tipping points in the climate system. It is likely that these changes cannot be reversed within centuries or millennia, even through large-scale carbon dioxide removal. Further, it remains unclear whether we can ever remove carbon dioxide at the scale that most 'overshoot' scenarios entail.

While it is important to focus on ways of increasing sustainable land sector removals and engineered removals (for example, enhanced rock weathering / mineral carbonation), every missed opportunity to reduce climate pollution at its source this decade increases the risks and dangers we face.

(Comments relating to climate change adaptation are provided in Section 7.2.)

Recommendation
To support transparent emissions accounting, and ensure that priority is given to achieving genuine emissions reductions this decade, complementary targets should be set for gross emissions reductions, land sector removals, and engineered removals. The CCA's advice to the government should reflect this approach, to facilitate the adoption of disaggregated targets nationally.

5. The role of government

Relevant questions from the issues paper:

5. How can governments use mandates, rules, and standards to accelerate Australia's decarbonisation? Is more planning by governments needed? If so, how should this be coordinated and how can this be done while making the transition inclusive, adaptive, and innovative?

6. How can governments stimulate private finance needed for the net zero transition — are there innovative instruments that could be deployed or new business models that governments could support? Is there a bigger role for governments to play in coordinating the investment needed to transition the economy?

8. What further actions can be taken by government (e.g. through public funding), the private sector and households to accelerate emissions reductions, including in relation to the deployment of technologies and access to new opportunities in the transition to net zero? What barriers stand in the way and how could they be overcome?

10. How can governments, business and people, including First Nations people, help ensure the benefits and burdens of the net zero transition are equitably shared.

12. How can Australian governments support the wellbeing of workers, communities and regions as the nation decarbonises, including in relation to cost of living, workforce and industry transition and access to low emissions technologies and services?

Governments have a fundamental role in enabling the rapid cuts to climate pollution necessary to protect communities in Australia and worldwide, while ensuring that the benefits of stronger action are shared.

The Australian Government should set a target that catalyses transformative action by working to the boundaries of what is possible and driving the necessary innovation and investment. As required under the Paris Agreement, the target must reflect our "highest possible ambition", and represent no less than the maximum rate of emissions reductions that can reasonably be achieved.

An appropriate target must be accompanied by clear, long-term policies, legislation and regulations that set the direction of Australia's decarbonisation journey, provide certainty to communities and investors,

and enable the swift transformation of our energy system and rapid development of other climate solutions.

Recommendation
The Australian Government, through its target setting and enabling policies and regulations, has a critical role in catalysing transformative action and driving the necessary innovation and investment. Our national target must represent the maximum rate of emissions reductions that can reasonably be shown to be achievable.

5.1 Provide certainty to investors and the community

Investors and the community need assurance that the regulatory environment will remain stable over the lifespan of their investments. Governments can support this by avoiding frequent changes to energy policies and regulations, and providing clear and efficient assessment processes.

Additionally, governments can ensure that coal facilities close on time, and support a managed wind-down of the gas network.

Extending the life of coal-fired power stations can make it challenging for renewable energy projects to compete economically, especially in the absence of policies such as a carbon price to level the playing field. It can distort the market, sending misleading signals to investors about ongoing demand for fossil fuel-based energy, and uncertainty about the growth potential of renewable energy investments. Similarly, delaying the start of a managed wind-down for gas network infrastructure can delay the electrification of buildings and unnecessarily prolong the use of gas-powered appliances.

Recommendation
Governments must support the replacement of fossil fuels with renewable energy by ensuring no extensions to the life of coal-fired power stations, and supporting the progressive wind-down of gas network infrastructure.

5.2 Support decentralised and community-led solutions

As noted in Section 3.1, distributed energy generation and storage solutions have a major role to play in Australia's energy transformation, and carry many additional benefits for businesses and communities.

The Australian Government can incentivise a wide roll out of rooftop solar and distributed batteries.

Specifically, the federal government can develop a targeted version of the Small-scale Renewable Energy Scheme, that applies specifically to commercial and industrial solar installation. Commercial and industrial building owners could be required to install a minimum amount of solar on their premises. Those who install more than the minimum amount would earn certificates that they can sell to businesses who can't install this amount.

The Australian Government can also scale-up community solar programs to assist those living in apartments and rental properties with gaining access to clean energy resources.

Last but not least, the federal and state governments can update the National Construction Code to require all suitable new and substantially rebuilt homes to have rooftop solar.

5.3 Help build the workforce

The CCA has identified a shortage of skilled workers as a key barrier to decarbonisation (page 20). The Australian Government needs to implement initiatives for accelerating the training and upskilling of a large new energy workforce, removing barriers to rolling out large scale renewable energy projects and widespread adoption of rooftop solar across residential, commercial and industrial buildings.

The Climate Council recommends establishing an integrated network for training, placing and supporting energy workers — the Australian Energy Corps (Climate Council 2024c, page 30).

To fully electrify our buildings and make them more energy efficient, we must support existing trades workers to upskill and repurpose their skills to benefit from the strong pipeline of jobs in energy efficient and zero-emission building work.

Recommendation
To overcome workforce constraints, the Australian Government should establish an Australian Energy Corps: an integrated network for training, placing and supporting energy workers.

5.4 Ensure solutions are available to all

Moving from gas to electricity and improving energy efficiency can enable households to save on energy costs while helping reduce climate pollution.

However, the upfront costs of home upgrades and installing rooftop solar and batteries can be a significant barrier for some Australians.

Governments can provide low cost financing to help with the affordability of clean energy and efficiency upgrades. They can also use green bonds to finance the installation of rooftop solar and batteries for public housing.

In addition, governments can set stronger minimum construction standards to accelerate energy efficiency, electrification and installation of solar on all new buildings in Australia. Residential and commercial buildings can be required to meet minimum energy performance standards, which progressively strengthen over time, to drive an ongoing improvement across Australia's homes and commercial buildings.

Recommendation
To ensure solutions are accessible to all, governments should provide low cost financing to help with affordability of clean energy and efficiency upgrades, and set stronger minimum construction standards for new buildings.

5.5 Build social licence

Achieving the rapid growth in renewable energy required to replace fossil fuels demands a concerted effort to build the necessary social licence.

The Australian Government should work with states and territories to improve collaboration with local communities. This includes working together on detailed national mapping to identify, by the end of 2025, the best areas for new renewable energy infrastructure. The result would be a National Clean Power Map that takes into account environmental, social, cultural and network impacts and benefits of siting any new infrastructure.

In parallel, governments can fund Community Energy Coordinators. These coordinators would facilitate dialogue between the community, project proponents, and government agencies, enable information flows and foster knowledge sharing about design and delivery of new electricity infrastructure.

Recommendation
The Australian Government should work with states and territories to improve collaboration with local communities, including through working together on a National Clean Power Map, and funding Community Energy Coordinators to facilitate dialogue, information flow and knowledge sharing between the community, project proponents, and government agencies.

5.6 Invest in research and development

While many of the solutions needed to drive down Australia's climate pollution this decade and reach net zero by 2035 already exist, others require further development before they can be adequately scaled. There is an important role for governments in supporting the necessary research and development to support Australia's full decarbonisation and the development of prosperous new clean industries.

5.6.1 Reducing agricultural methane

The Climate Council suggests that further research on reducing methane emissions in the agriculture sector is a priority. Current thinking is that changes to cattle diets or the use of feed additives which reduce the production of methane will be an important solution to greenhouse gases from animal digestion. However, further work is required to develop affordable distribution methods for these additives that suit both grazing and feedlot cattle operations. (More general discussion on methane is included in Section 5.7.)

5.6.2 Supporting the development of clean manufacturing

Australia has a huge opportunity to produce clean manufactured goods for export, including green iron, steel, aluminium and cement, as well as the production of renewable hydrogen.

However, further work is required to research and develop technologies that work best for the Australian context.

For example, in the case of green iron, the current leading green iron technology — direct reduction — can use hydrogen to replace carbon inputs, but it requires high grade iron ore. Most of the iron ore that Australia currently produces is lower grade and will require additional processing before it can be used in a direct reduction process (IEEFA 2023a). Meanwhile, other countries that also have access to abundant renewable energy, such as Brazil and Africa, are also vying for the investment in green iron supply chains (IEEFA 2023b).

Recommendation
The Australian Government should play a part in the research and development required to reduce agricultural methane and develop clean manufacturing industries in Australia.

5.7 Deal with Australia's methane problem

Dealing with methane is one of the most effective ways to limit dangerous warming in the near- to medium-term. However, methane pollution in Australia is yet to receive the attention it deserves. This is despite Australia being a very large source of methane pollution, and the availability of many solutions for substantially cutting methane pollution.

The first essential step in dealing with Australia's methane problem is to properly measure it. This will help to build a shared understanding among government, industry and communities of what we're up against.

Opportunities to improve reporting on methane pollution in Australia include aligning reporting requirements under the National Greenhouse and Energy Reporting (NGER) Act with international best practice, and mandating all fossil fuel facilities to undertake direct and site-specific measurement of methane pollution.

Once we have a clearer picture of how much methane pollution is produced in Australia, we can take more targeted and effective action to cut it. These opportunities will be found in three major sectors of the Australian economy: fossil fuels, agriculture and waste.

Opportunities to cut methane pollution from coal and gas include ending the approval of new and expanded coal and gas facilities, mandating operators to monitor and deal with leaks, and banning all non-emergency flaring and venting of gas. Opportunities to cut methane pollution from food include supporting further research into livestock feed additives and other emerging solutions in animal agriculture (see Section 5.6.1), enabling a scale-up in production of safe and healthy protein alternatives to meat and dairy, and supporting consumer education campaigns on the climate impact of different types of food.

Government policy, regulation and investment will be essential to seize the opportunities for cutting methane pollution. This includes setting a national methane reduction target, incorporating specific plans for dealing with methane into Australia's Net Zero Plan.

Recommendation
The Australian Government should ensure Australia seizes the opportunities for cutting methane pollution by setting a national methane reduction target consistent with Australia's commitment to the Global Methane Pledge and Article 2 of the Paris Agreement. Climate pollution reduction plans, including Australia's Net Zero Plan under development, should specifically address methane, and update policies and regulations as needed to deliver these.

6. Other matters

Relevant questions from the issues paper:

3. How can Australia further support other countries to decarbonise and develop sustainably?

11. How can governments better ensure First Nations people are empowered to play a leading role in the development and implementation of climate change policies and actions, including as they relate to the ongoing curation of the Indigenous estate?

13. How can governments help Australians prepare for and respond to the impacts of climate change?

6.1 Supporting action beyond our shores

The Climate Council welcomes the CCA's recognition that we can and must do more to support other countries to decarbonise, in light of both our status as one of the world's largest fossil fuel exporters, and our abundant potential for clean energy and industries.

Australia has great potential to help lower global greenhouse gas emissions through future clean industries, at the same time securing the next phase of our economic prosperity. Fulfilling our potential for future clean exports depends on building a zero emission energy system big enough to support new and expanded clean industries (see Section 3.1) and investing in research and development (see Section 5.6).

As an advanced economy we also have the responsibility under the Paris Agreement to support less developed countries with developing sustainably, adapting to the impacts of climate change, and addressing loss and damage from climate change.

Recommendation
Regarding how Australia can further support other countries to decarbonise and develop sustainably, the CCA's advice should include advising on targets for reducing fossil fuel production and export, and on the provision of international support for mitigation, adaptation and addressing loss and damage. The Australian Government should also ensure that Australia's scope 3 emissions are reported and accounted for.

6.2 Supporting First Nations leadership

The Climate Council recognises the disproportionate impact of climate change upon many First Nations communities, the leadership of First Nations communities and organisations in driving climate solutions, and the importance of First Nations communities sharing strongly in the opportunities and benefits of Australia's energy transformation.

We recognise the important work undertaken and guidance provided by the National First Peoples Platform on Climate Change (NFPPCC) and the First Nations Clean Energy Network. These initiatives are led by First Nations people in Australia. Notably, there was also significant engagement of First Nations people in developing the most recent Australia State of the Environment Report.

The NFPPCC is supported by the NESP Climate Systems Hub — a partnership of Australia's leading climate change research and decision-making agencies.[5] The NFPPCC and NESP Climate Systems Hub, in partnership with the Tubba-Gah Wiradjuri Aboriginal Corporation will host a third National First Peoples Gathering on Climate Change in October this year.[6]

The First Nations Clean Energy Network has developed valuable practical guidelines for the clean energy industry, government and communities to help ensure that First Nations communities share the benefits of Australia's energy transformation (First Nations Clean Energy Network 2022).

Recommendation
Engagement with First Nations communities should occur in part through the National First Peoples Platform on Climate Change (NFPPCC). Clean energy projects should follow the principles and guidance provided by the First Nations Clean Energy Network.

[5] See: https://nesp2climate.com.au/indigenous-partnerships/national-first-peoples-platform-on-climate-change/

[6] At the National First Peoples Gathering on Climate Change in Cairns in 2021, more than 100 First Nations people prepared the 2021 First Nation Peoples Statement on Climate Change. See: https://nespclimate.com.au/wp-content/uploads/2021/10/NFPGCC-Statement-on-Climate-Change.pdf

6.3 Preparing for the climate impacts of today and tomorrow

While recognising that every possible effort must be made to reduce the severity of climate impacts through rapidly reducing climate pollution, the Climate Council recognises that we also have a massive challenge in dealing with the impacts with which we are now faced, and the still greater impacts which we will face in future.

Emergency Leaders for Climate Action (ELCA) — a special project of the Climate Council — is engaging closely with the National Climate Risk Assessment and the development of Australia's National Adaptation Plan. In June 2024, ELCA will be publishing a set of priorities for ensuring that Australian communities are better protected in the face of worsening extreme weather disasters. These include:

- Improving our understanding of the climate risks facing Australian communities through nationally consistent assessments and downscaled climate projections.
- Prioritising the people and places at greatest risk of climate-fuelled disasters.
- Supporting community-led adaptation and disaster response.
- Building household resilience to the impacts of climate change.
- Full implementation of the recommendations arising from the 2019/20 Black Summer bushfire inquiries.

The Climate Council stresses that while essential, greater resourcing of climate change adaptation efforts can never be a substitute for the strongest possible action to reduce climate pollution. Without stronger efforts to tackle the root causes of the climate crisis, we will be on course for a future in which Australian communities are increasingly unable to adapt.

7. Conclusion

This submission has outlined specific, actionable steps the CCA can take to build on the preliminary analysis provided in the issues paper, and ensure your final advice to government is aligned with what the science and evidence says is necessary and possible now.

We particularly urgethat more robust consideration be given to Australia's share of the global emissions reduction task, and the full scale of emissions reductions that are possible with technologies available today.

The preliminary advice charts a course of action which would bring unacceptable risks to our children's future, and the wellbeing and security of Australian communities. We can and must do better as a nation.

The Climate Council is committed to playing our part, including by continuing to communicate the urgency of the challenge, researching and championing climate solutions, putting forward practical policies, helping to build social licence for faster cuts to climate pollution, and empowering Australian communities with the information they need.

We urge the CCA to reflect deeply on the important, and entirely unique role, you play as an agency which is independent of government and politics, and the opportunity this creates to put science and evidence first in your advice.

We look forward to continuing our engagement with the CCA as your team works towards final advice on 2035 targets.

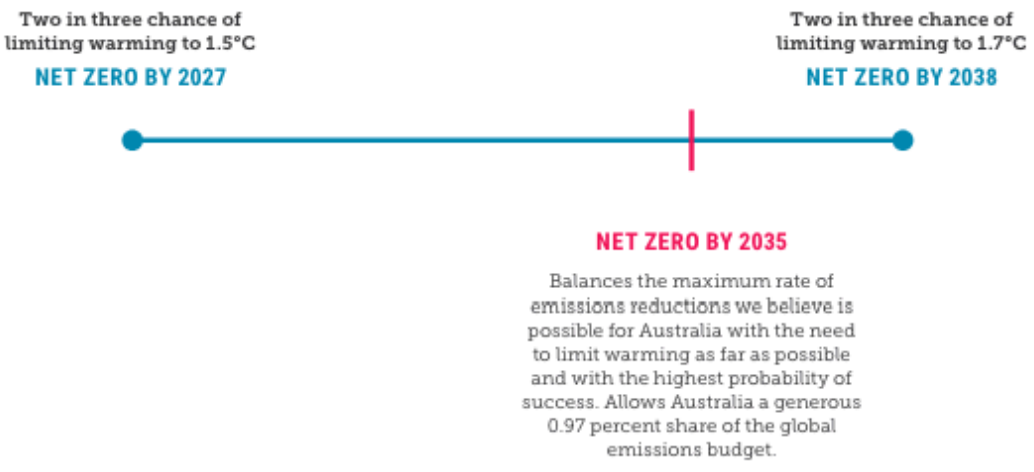
Appendix A: The Climate Council's carbon budget calculations

Table 1: Global carbon budget

	Two in three chance (67 percent probability) of limiting warming to 1.5°C		Two in three chance (67 percent probability) of limiting warming to 1.7°C	
Base budget from 1 January 2020 (IPCC 2021a)	400 Gt CO_2		700 Gt CO_2	
Emissions for 2020, 2021, 2022 (Friedlingstein et al. 2022)	-121 Gt CO_2		-121 Gt CO_2	
Accounting for non-CO_2 greenhouse gases	Our best estimate -90 Gt CO_2 (Climate Council 2021b)	IPCC range ±220 Gt CO_2 (IPCC 2021a)	Our best estimate -90 Gt CO_2 (Climate Council 2021b)	IPCC range ±220 Gt CO_2 (IPCC 2021a)
Carbon cycle feedbacks	Our best estimate -97 Gt CO_2 Taking the upper end of IPCC's range, based on a precautionary approach to carbon cycle feedbacks.	IPCC range 26 ±97 Gt CO_2 39 Gt CO_2 (26 x 1.5) is already included in the base budget. (IPCC 2021a).	Our best estimate -97 Gt CO_2 Taking the upper end of IPCC's range, based on a precautionary approach to carbon cycle feedbacks.	IPCC range 26 ±97 Gt CO_2 44 Gt CO_2 (26 x 1.7) is already included in the base budget. (IPCC 2021a).
Remaining budget to net zero emissions	Our best estimate 92 Gt CO_2	IPCC range 280 ±317 Gt CO_2	Our best estimate 392 Gt CO_2	IPCC range 580 ±317 Gt CO_2
Date at which net zero emissions must be achieved globally, assuming linear rate of decline (based on our 'best estimate' figures above)	2027		2043	

Table 2: Carbon budgets for Australia

		Two in three chance (67 percent probability) of limiting warming to 1.5°C	Two in three chance (67 percent probability) of limiting warming to 1.7°C
Remaining budget to global net zero emissions		92 Gt CO_2	392 Gt CO_2
Australia's remaining budget to net zero emissions	0.97 percent share of the global budget	0.89 Gt CO_2	3.80 Gt CO_2
	Equal per capita (0.33 percent) share of the global budget	0.30 Gt CO_2	1.29 Gt CO_2
Date at which Australia should achieve net zero emissions, assuming linear rate of decline Emissions in 2022: 0.464 Gt CO_2 (DCCEEW 2023a)	0.97 percent	2027	2038
	Equal per capita (0.33 percent)	-budget exhausted-	2028



Further commentary on these tables is available in the Climate Council's *Mission Zero: How today's climate choices will reshape Australia.* https://www.climatecouncil.org.au/resources/missionzero/

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