

**Submission
No 50**

**INQUIRY INTO CLIMATE CHANGE (NET ZERO
FUTURE) BILL 2023**

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Submission to the

NSW Parliament Portfolio Committee No. 7 – Planning and Environment

regarding the

Climate Change (Net Zero Future) Bill 2023

Professor Penny D Sackett

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I write with regard to the New South Wales (NSW) Climate Change (Net Zero Future) Bill 2023¹ (hereafter, the Bill), which is now under inquiry by NSW Parliament Portfolio Committee No. 7 – Planning and Environment (hereafter, the Committee).

I understand that the intent of the Bill’s proposers is to “establish guiding principles for action to address climate change; to set 2030 and 2050 targets for the reduction in net greenhouse gas emissions in New South Wales; to set an objective for New South Wales to be more resilient to a changing climate; and to establish the Net Zero Commission to monitor, review and report on progress towards the 2030 and 2050 targets and the objective and to exercise other related functions,” as set out in the Long Title of the Bill.

My Experience

My training is in physics, in which field I hold a PhD from the University of Pittsburgh, USA. I have authored or co-authored over 170 scientific and research publications, which together have garnered more than 4500 citations. My research has been conducted on three continents, with service including the Directorship of the Research School of Astronomy and Astrophysics, and the Mt Stromlo and Siding Springs Observatories at the Australian National University (ANU) during the period it was rebuilding from the devastating 2003 bushfires.

From 2008-2011, I was Chief Scientist for Australia. In that role, I provided independent, whole-of-government scientific advice and undertook science advocacy and liaison with community, bureaucracy, and state governments.

Serving a three-year term from 2017-2019, I was a member of the Scientific Advisory Board of the Potsdam Institute for Climate Impact Research, a world-renowned institution for climate research and its impacts. For six years from 2015-2021, I was a Councillor of the Australian Capital Territory Climate Change Council, serving as its Deputy Chair and then Chair.

¹ NSW Climate Change (Net Zero Future) Bill 2023, accessed on 21 October 2023 at: <https://www.parliament.nsw.gov.au/bills/Pages/bill-details.aspx?pk=18510>

Currently, I am a Distinguished Honorary Professor, Institute for Climate, Energy and Disaster Solutions at the ANU. In this role, I undertake work relating to community engagement, climate science synthesis and communication. I am also the Principal of Penny D Sackett Strategic Advisory Services, which I operate as a sole trader assisting governments, businesses and other organisations with matters of science and sustainability. My recent experience includes authoring over 30 independent reports relating to the greenhouse gas (GHG) and climate implications of various proposed fossil fuel developments in Australia to inform development consent authorities and Australian courts, as well as submissions to the Commonwealth Government on climate legislation and offsets, and briefs to the ACT government on its carbon budget and the social cost of carbon.

Preface

Unabated climate change is likely to be greatest overall threat to the environment of New South Wales because it is comprehensively dangerous, global, fundamental, rapid, compounding, self-reinforcing, has delayed effects and, in some cases, is irreversible.²

Nearly all of the global heating driving climate disruption in past 160 years is due to human activities, with natural forces (volcanos, solar radiation changes, etc) playing a negligible role.³

The current level of global warming is about 1.2 degrees Celsius (°C) above pre-industrial times.⁴ For comparison, the temperature difference between ice ages and the intervening periods is about 4°C – 6°C, temperature differences associated with sea levels changes of 100m, dramatic differences in the fraction of Earth covered by ice, and completely different species dominating the biosphere, on land and in the ocean.⁵ **Global heating of 1.5°C will likely be upon us, at least as a temporary fluctuation, by 2027 or sooner.⁶**

There can be no doubt that climate-induced risks of further species extinction and environmental destruction apply to Australia, as is made starkly clear in the chapter of the latest IPCC Assessment Report (AR6 WGII) that deals specifically with climate change impacts for Australia, which states:^{7,8}

² See, e.g., Sackett P. D. (2022) Expert Report Regarding the Greenhouse Gas Implications of the proposed Mt Pleasant Optimisation Project, Section 2, and references cited therein. Accessed at:

https://www.ipcn.nsw.gov.au/resources/pac/media/files/pac/projects/2022/05/mt-pleasant-optimisation-project-ssd-10418/email-and-postal-public-submissions/dams-heg/attachment-a--sackett-report-climate-change-impacts_redacted.pdf

³ Gillett, N.P. et al. (2021) Constraining human contributions to observed warming since the pre-industrial period, in Nature Climate Change, <https://doi.org/10.1038/s41558-020-00965-9>

⁴ World Meteorological Organisation, et al. (2022) United in Science 2022, Accessed here: https://public.wmo.int/en/resources/united_in_science

⁵ See, e.g. <https://theconversation.com/the-three-minute-story-of-800-000-years-of-climate-change-with-a-sting-in-the-tail-73368>

⁶ WMO (2023) Global Annual to Decadal Climate Update: Target years 2023, and 2023-2027. Accessed at: <https://hadleyserver.metoffice.gov.uk/wmolc/>

⁷ IPCC AR6 WGII (2022) Chapter 11, Australasia, in Climate Change 2022: Impacts, Adaptation and Vulnerability, Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change, accessed at: <https://www.ipcc.ch/report/ar6/wg2/>

⁸ Only references to literature, figures and the like have been omitted from these direct quotes. I have placed some phrases in **bold** font.

“The region faces an extremely challenging future.

*“Climate trends and extreme events have combined with exposure and vulnerabilities to cause major impacts for many natural systems, with some **experiencing or at risk of irreversible change in Australia.**”*

Specifically, ARG WII notes:

“The Murray-Darling Basin (MDB) is Australia’s largest, most economically important and politically complex river system. The MDB supports agriculture worth A\$24 billion/year, 2.6 million people in diverse rural communities, and important environmental assets including 16 Ramsar listed wetlands. Climate change is projected to substantially reduce water resources in the MDB (high confidence), with the median projection indicating a 20% decline in average annual runoff under 2.2°C average global warming. This reduction, plus increased demand for water in hot and dry conditions, would increase the already intense competition for water.”

“Increasing climate risks are projected to exacerbate existing vulnerabilities and social inequalities (high confidence.) These include inequalities between Indigenous and non- Indigenous Peoples, between generations, rural and urban areas, incomes and health status, increasing the climate risks and adaptation challenges faced by some groups and places. Resultant climate change impacts include the displacement of some people and businesses, and threaten social cohesion and community wellbeing.”

“Delay in implementing adaptation and emission reductions will impede climate resilient development, resulting in more costly climate impacts and greater scale of adjustments (very high confidence).”

“Reducing the risks would require significant and rapid emission reductions to keep global warming to 1.5 – 2.0°C, as well as robust and timely adaptation. The projected warming under current global emissions reduction policies would leave many of the region’s human and natural systems at very high risk and beyond adaptation limits.

The overwhelming scientific evidence, just some of which is quoted above, makes clear that GHG emissions targets that will allow the resilience to a changing climate that the Bill espouses are those aimed at holding global warming to 1.5°C – 2.0°C, with the most devastating consequences avoided by holding global heating as close to 1.5°C as possible. This principle underlies my recommendations for changes to the Bill.

Recommended Changes to the Bill

Recommendation 1

Given the central role of science in understanding the increasing risks of climate change, as well as mechanisms to mitigate and adapt to its effects, and

Given that the threat of increased climate change is to the social and environmental wellbeing of NSW as well as economic wellbeing (as noted in Part 2, Clause 8.1 of the Bill),

It is strongly recommended

That the guiding principles be restructured to emphasise first and foremost the most important aspects of effective action on climate change to read at Part 2, Clause 8.4, namely:

(4) Action to address climate change should be taken in a way that –

- (a) preserves and improves the social, environmental and economic well-being of New South Wales,**
- (b) acknowledges and utilises the best available science,**
- (c) is compatible with holding global heating to well below 2.0°C, and**
- (d) is fiscally responsible.**

Recommendation 2

Given the change to Part 2, Clause 8.4 outlined above and consistent with its intent,

It is recommended that the guiding principle stated to Part 2, Clause 8.8 be modified to read:

(8) Action to address climate change should take into account the following—

- (a) the knowledge and perspectives of Aboriginal communities,**
- (b) the need to reduce the risk climate change poses to human health,**
- (c) the need to support local communities, including Aboriginal communities which may be affected by the action, by considering the effects of climate change and any climate change action on their –**
 - (i) social, environmental and cultural needs,**
 - (ii) local employment and industries, and**
 - (iii) employment transition opportunities.**
- (d) the need for education and skills diversification,**
- (e) the need to ensure essential utilities and infrastructure are provided, including energy, water, telecommunications and transport,**
- (f) the impact of the action on consumer costs in New South Wales, including energy costs.**

Recommendation 3

Background

I applaud the enshrining of GHG emission targets into law. Doing so enables binding climate legislation and policies to be enacted and pursued by subsequent governments, and sends a clear signal to industry, investment agents, the populace of NSW and the world that the jurisdiction is serious about climate action.

As noted above, GHG targets that meet the goals of the Bill are those that are consistent with holding global heating to well-below 2°C, with the goal of holding it as close to 1.5°C as possible.

Even at 1.5°C of global heating, which is essentially inevitable before 2035, we can expect that:

- **Peak heatwaves that occurred only once per 30 years in pre-industrial times in Australia, can be expected every 2.7 years.**⁹
- **Many coastal areas in Australia will experience what are now considered ‘once-in-100-years extreme-sea-level events’ at least once a year by 2100.**¹⁰
- **What used to be Australia’s hottest year on record (2019) is now an average year.**¹¹
- **The likelihood of crossing some Earth tipping points becomes significant.**¹²

Tipping points^{13,14} in the **Earth System** refer to thresholds that, if crossed, would lead to far-reaching, and in some cases, abrupt changes in Earth subsystems (called tipping elements). The nature of tipping points is that they are irreversible on timescales associated with natural variability in the Earth System.

Examples of tipping elements include permanent dieback of forests, changes in ocean circulation that would permanently alter precipitation patterns around the world, loss of ice sheets, glaciers and sea ice that would accelerate permanent sea level rise, permanent destruction of all the world’s coral reefs, and uncontrolled permafrost melt that would dramatically accelerate further global warming. Some of these **subsystems are already**

⁹ Perkins-Kirkpatrick, S.E. and Gibson, P.B. (2017) Changes in regional heatwave characteristics as a function of increasing global temperature. *Nature Scientific Reports*, 7: 12256. DOI:10.1038/s41598-017-12520-2

¹⁰ Tebaldi, C. et al. (2021) Extreme sea levels at different global warming levels. In *Nature Climate Change*, 11, 746-751, <https://doi.org/10.1038/s41558-021-01127-1> Accessed 12 May 2023.

¹¹ CSIRO/BOM (2020) State of the Climate 2020, Commonwealth of Australia. <http://www.bom.gov.au/state-of-the-climate/>

¹² Armstrong McKay, D.I. et al. (Sep 2022) Exceeding 1.5°C global warming could trigger multiple climate tipping points, *Science*, 377, 1177. Accessed at: <https://www.science.org/doi/10.1126/science.abn7950>

¹³ Lenton, T. M., Held, H., Kriegler, E., Hall, J. W., Lucht, W., Rahmstorf, S., & Schellnhuber, H. J. (2008) Tipping elements in the Earth’s climate system. *Proc. Natl. Acad. Sci. (USA)*, 105(6), 1786–1793. <https://doi.org/10.1073/pnas.0705414105>

¹⁴ Schellnhuber HJ, Rahmstorf S, Winkelmann R (2016) Why the right climate target was agreed in Paris. *Nature Climate Change*, 6:649-653

showing signs of becoming unstable, with ‘tipping points’ that likely lie on our current trajectory of global heating above pre-industrial temperatures.^{15, 16}

A recent review¹⁷ of tipping elements and observational evidence of their evolution, concludes: “*The Earth may have left a safe climate state beyond 1°C global warming. A significant likelihood of passing multiple climate tipping points exists above ~1.5°C, particularly in major ice sheets. Tipping point likelihood increases further in the Paris range of 1.5 to <2°C warming.*”

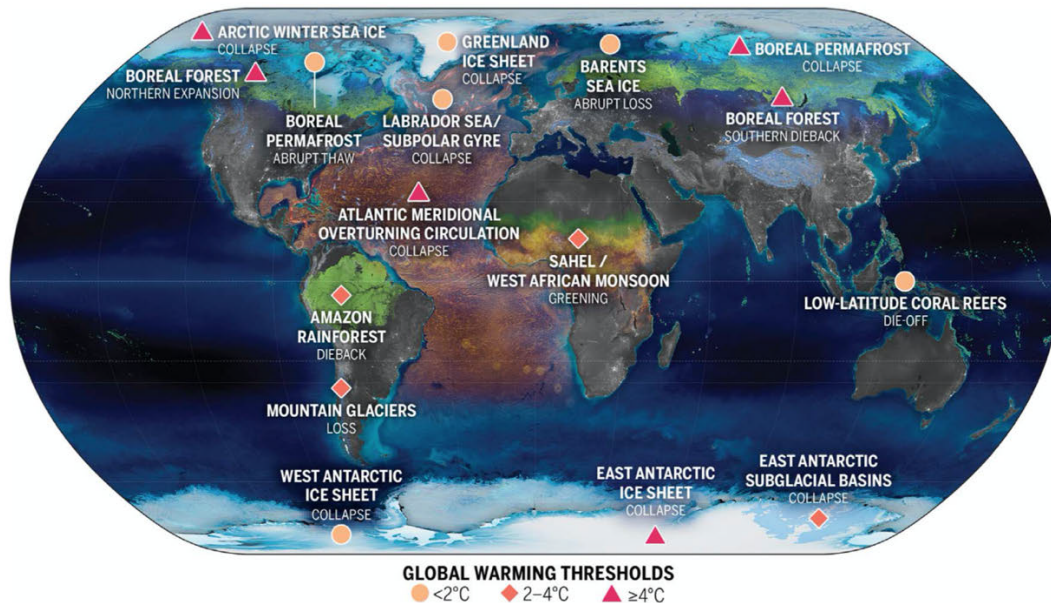


Fig. 1: The location of climate tipping elements in the cryosphere (blue), biosphere (green), and ocean/atmosphere (orange), and global warming levels at which their tipping points will likely be triggered. The pins are coloured by temperature: below 2°C, i.e., within the Paris Agreement range (light orange circles); between 2 and 4°C, i.e., accessible with current policies (orange diamonds); and 4°C and above (red triangles). [From Armstrong McKay et al. 2022]

As it currently reads, the Bill would set targets for reducing net GHG emissions in NSW by at least 50% by 30 June 2030 from the net GHG emissions in 2005, and by June 2050 to reduce net GHG emissions in NSW to zero. These targets are insufficient for consistency with holding heating as close to 1.5°C as possible, or with holding it to well below 2.0°C.

Starting with the remaining carbon budgets as given by the recent IPCC report as of 2020,¹⁸ and bringing them forward to the beginning of 2024, recognising that about 157 gigatonnes of carbon dioxide (Gt CO₂) has been emitted in the intervening years, Table 1 sets out the

¹⁵ Steffen W et al. (2018) Trajectories of the Earth System in the Anthropocene. Proc. Natl. Acad. Sci. (USA) doi:10.1073/pnas.1810141115 and associated Appendix, accessed at: <https://www.pnas.org/content/pnas/115/33/8252.full.pdf>

¹⁶ Lenton, T. M., Rockström, J., Gaffney, O., Rahmstorf, S., Richardson, K, Steffen, W. & Schellnhuber, H.J. (2019) Nature, vol 575, pp 592 – 595.

¹⁷ Armstrong McKay, D.I. et al. (Sep 2022) Exceeding 1.5°C global warming could trigger multiple climate tipping points, Science, 377, 1177. Accessed at: <https://www.science.org/doi/10.1126/science.abn7950>

¹⁸ IPCC (2021) AR6 WGI, Summary for Policymakers, Table SPM.2

remaining carbon dioxide emission budgets associated with a two-thirds chance of holding global heating to 1.5°C¹⁹, 1.7°C and 2.0°C.

Table 1: Remaining global carbon budgets from the beginning of 2024 for a 67% chance of holding heating to various temperature limits (rounded to the nearest 10 Gt CO₂)

Global heating relative to the period 1850-1900	Paris Agreement Significance	Estimated remaining carbon budget from the beginning of 2023 (GtCO ₂)
Temperature Limit		<i>67% likelihood of limiting global heating to temperature limit</i>
1.5 °C	Required Level of Effort	240
1.7 °C	Consistent	540
2.0 °C	Not Consistent	990

These budgets are for CO₂ emissions only, and assume that non-CO₂ emissions are reduced sharply. Specifically, for methane, they assume at least a 30% emissions reduction in 2030 compared to 2010, and a 50% reduction by 2050.²⁰

Given that humanity emits about 40 Gt CO₂ per year, with no sign yet of decreasing below that level, at current 'spend' rates the 1.5°C budget will be exhausted in about 6 years, that is, by 2030. The carbon budget for holding heating to 1.7°C with a two-thirds chance would be exhausted in about 13 to 14 years at current emission levels, well before 2040.

This is just one way to understand that emissions must be cut much more swiftly than the targets currently set in the Bill. The Climate Council of Australia recommends a GHG emissions reduction of 75% by 2030 and net zero emissions by 2035 in order to have a reasonable chance of holding global heating as close to 1.5°C as possible.²¹

A little over a year ago, NSW led the nation with its objective to cut GHG emissions by 70% (compared to 2005 levels) by 2035.²² Yet this 2035 target is not mentioned or legislated in the current Bill. Indeed, Part 2, Clause 9.3 of the Bill appears to forbid *any* interim target to be regulated. This represents a large and inexplicable retrograde step for NSW and its duty to protect its citizens from the current and multiplying dangers of climate disruption.

Given the above, it is strongly recommended that the 2030 net GHG emissions reductions target be significantly strengthened (which is to say that more than a 50% GHG emissions reduction is required before 2030), that the NSW commitment to a 70% reduction in net GHG emissions by 2035 be enshrined in the Bill, and that the net zero GHG target be brought forward in time.

¹⁹ It is highly likely that we have already lost the chance to holding heating to 1.5°C by 2100 without first exceeding that value temporarily. However, the 2021 IPCC reports indicate that it may still be possible to hold warming to just above 1.5°C and then return it 1.5°C or below by 2100.

²⁰ United Nations Environment Programme (2021). Emissions Gap Report 2021: The Heat Is On – A World of Climate Promises Not Yet Delivered. Nairobi. Accessed at: <https://www.unep.org/resources/emissions-gap-report-2021>

²¹ Climate Council of Australia (2023) Mission Zero: How Today's Climate Choices will Reshape Australia, accessed at: <https://www.climatecouncil.org.au/resources/missionzero/>

²² See, e.g., <https://www.energy.nsw.gov.au/nsw-plans-and-progress/government-strategies-and-frameworks/reaching-net-zero-emissions> and <https://www.epa.nsw.gov.au/your-environment/climate-change/climate-change-nsw-overview>

Recommendation 4

Background

Climate science indicates that climate impacts are hitting harder and sooner than previous scientific assessments have expected. Over two decades, the IPCC has published a series of science-based risk assessments for people, ecosystems and economies worldwide. A comparison of these “Reasons for Concern” (see Fig. 2 below, based on the WMO 2019 report and updated by AR6 WII)^{23 24} shows that the level of risk has increased with each subsequent analysis from 2001 to 2022. More recent IPCC reports indicate higher risks (redder colours) than did previous reports for the same average global warming.

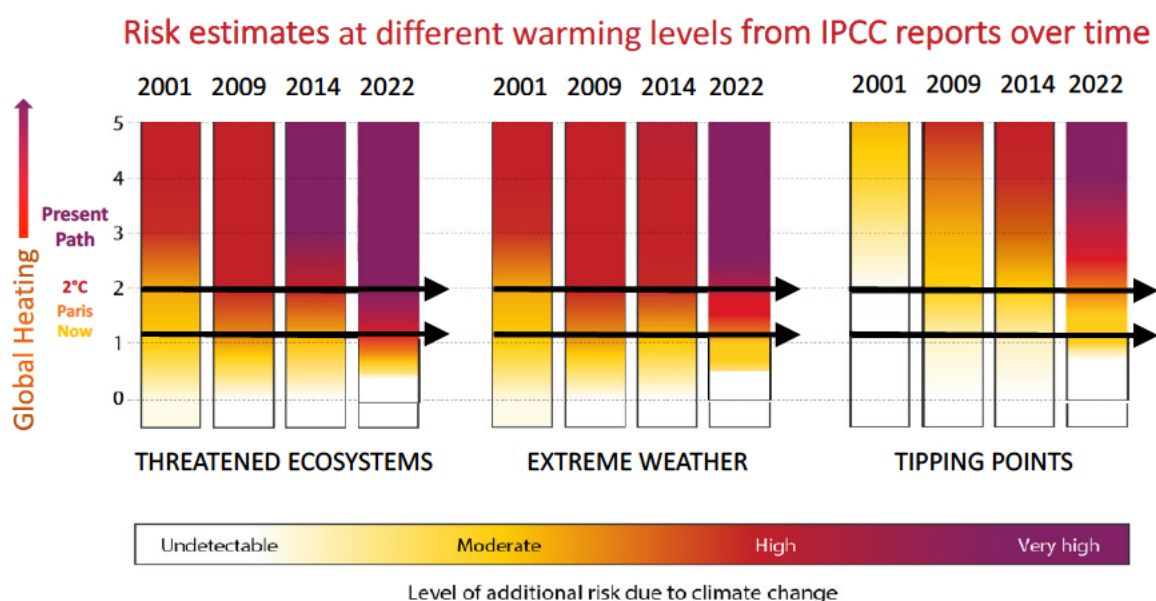


Fig. 2: As temperature (above pre-industrial time) climbs upward, climate risks increase (shown by deeper, dark colours). Indicated are the present (marked as 'now'), the 'Paris Agreement' range of well below 2°C, a 2°C scenario, and the present trajectory leading to about 3°C of global heating. More recent IPCC reports (arrows moving left to right) indicate higher risks than did earlier reports at the same temperature.

The conclusion is clear: the more we learn, the more we realise how dangerous even a small amount of warming can be.

Given the above, together with the rapidly evolving opportunities for true emissions reduction, it is very strongly recommended that the puzzling, restrictive, illogical and ethically questionable clause of the Bill that is Part 2, Clause 9.3 — which restricts regulations from setting a specific interim target to reduce net GHG emissions in NSW by a particular date occurring before 30 June 2050 — *be removed*. This should be done irrespective of whether Recommendation 3 is accepted.

²³ WMO 2019, United in Science, Report prepared for the UN Climate Action Summit 2019, <https://wedocs.unep.org/bitstream/handle/20.500.11822/30023/climsci.pdf>

²⁴ IPCC (2022) AR6 WGII, Summary for Policymakers

Given the importance of the Net Zero Commission (hereafter, the Commission) to the peoples of NSW, and the importance of the reality and appearance of independence from inappropriate political interference, it is crucial that the Commission is appointed, maintained, advises and reports in a transparent and independent manner. The following recommendations are made to strengthen the Bill in this regard.

Recommendation 5

The need for up to three temporary commissioners is not made in the Bill. As currently written, the Bill specifies that temporary commissioners are appointed in the first instance for no more than 18 months, and that rather than being appointed and potentially removed by the Governor, as are commissioners, temporary commissioners are appointed and potentially removed by the Minister.

It is recommended that distinctions between commissioners and temporary commissioners with regard to their appointment and potential removal be eliminated. This can be achieved by eliminating Clauses 5.3 and 5.4 in Schedule 1 and rewriting Clause 5.2 in Schedule 1 to read:

(2) The Governor may, on the recommendation of the Minister, remove a commissioner or a temporary commissioner from office.

and by eliminating Clause 12.1.b in Part 3 of the Bill, whilst rewriting Clause 12.1.a to read:

(a) 5 – 7 commissions and up to 3 temporary commissioners appointed by the Governor, on the recommendation of the Minister,

Recommendation 6

Assuming that the provision for temporary commissioners is to allow terms to be staggered in time,

It is recommended to remove the potential to misconstrue the appointment or reappointment of temporary commissioners as in any way political by modifying Clause 2 of Schedule 1 as follows:

2 Term of office of temporary commissioners

- (1) Temporary commissioners may be appointed at the initial establishment of the Commission for the sole purpose of allowing the staggering of terms.**
- (2) A temporary commissioner holds office for the term, not less than 18 months and not exceeding 3 years, specified in the instrument of appointment.**
- (3) A temporary commissioner may be re-appointed but must not hold office for a cumulative total of more than 5 years.**

Recommendation 7

Due to the immediate need to dramatically reduce fossil fuel GHG emissions before 2030, and to give full and best effect to the deliberations of the Commission, including allowing the Commission to have a fighting chance to fulfil its mission,

It is very strongly recommended that the Bill be amended to place a moratorium on new coal mines, coal mine extensions, and the exploration or exploitation of new gas fields in NSW, as recommended by the International Energy Agency in its Net Zero by 2050 roadmap²⁵ for the global energy sector.

I thank you for the opportunity to provide this submission to the Committee, and would be happy to discuss these matters further, should that be deemed valuable.

Distinguished Honorary Professor
ANU Institute for Climate, Energy and Disaster Solutions

²⁵ EA (2021) Net Zero by 2050: A Roadmap for the Global Energy Sector, accessed at: <https://www.iea.org/reports/net-zero-by-2050>