Net Zero Commission

Pathways Call for Evidence Submission

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NSW Net Zero Commission

Submission in response to Call for Evidence on NSW Decarbonisation Pathways

July 2026

About The Superpower Institute

The Superpower Institute's (TSI's) mission is to help Australia seize the extraordinary economic opportunities of the post-carbon world.

A net zero Australian economy will reduce global emissions by just over 1 per cent. But if Australia successfully seizes the economic advantage in exporting zero emissions goods, this can create an opportunity for full employment with rising incomes for a growing population sustained over more than a generation, and reduce global emissions by up to 10 per cent.

Renowned economist Ross Garnaut and economic public policy expert Rod Sims have joined forces through The Superpower Institute, to focus on practical research and policy to unlock this opportunity. The Institute specialises in the policy settings and market incentives needed to make Australia an economic superpower and provides practical knowledge to governments and industry to realise this opportunity.

TSI works across the building blocks of the superpower economy including: renewable energy, green hydrogen, land carbon and minerals processing; the potential zero carbon export products including green iron and green aluminium; and the enablers of this economy including economic and fiscal policy, trade policy and regional development.

Please contact TSI's CEO Baethan Mullen and Chief Scientist Professor Peter Rayner via info@superpowerinstitute.com.au for any further information.

https://www.superpowerinstitute.com.au/.

Submission

TSI welcomes the opportunity to contribute to the New South Wales Net Zero Commission's 2026 Call for Evidence.

Our evidence focuses on the following of the Commission's guided questions, within the context of methane emissions reduction:

1d. What are the opportunities or barriers for collaboration across sectors to support the transition?

6. What evidence can you provide to inform pathway inputs and assumptions? For example, cost curves, deployment rates, or sector-specific data, include commercially sensitive data where relevant.

We will address the latter question first.

What evidence can you provide to inform pathway inputs and assumptions?

Methane emissions reduction is one of the most powerful short-term opportunities to mitigate climate change

Methane is a much more potent greenhouse gas than carbon dioxide, with a global warming potential of 27-30 over a 100 year period (GWP-100), depending on whether it is from a fossil or non-fossil source (methane from fossil fuels has a GWP-100 of approximately 29.8). That is, the emission of one tonne of fossil methane has the same heating impact on the climate over 100 years as the emissions of 29.8 tonnes of carbon dioxide.

In addition to the direct warming impact of methane, the GWP-100 also considers the long-term impact of methane's chemical interactions in the atmosphere (for example, its role in atmospheric ozone formation, which is itself a greenhouse gas).

When considered over a 20-year period, the GWP (or GWP-20) is instead 82.5, reflecting the fact that most of methane's climate impact occurs during its relatively short lifetime in the atmosphere.

Due to methane's higher global warming potential, particularly in the near term, rapidly reducing methane emissions - while also reducing emissions of other greenhouse gases - represents an opportunity to immediately improve temperature outcomes, allowing time for the development of decarbonisation pathways for sectors that are more difficult to abate. This is particularly true if we intend to limit temperature overshoot.

Methane-specific budgets or targets would support rapid action on methane

In light of the above, we recommend that the Commission consider the use of a methane-specific emissions reduction target to catalyse investment in methane emissions reduction.

The ultimate purpose of emissions reductions targets is to ensure that greenhouse gas emissions are reduced in line with an emissions budget that presents the most likely chance of limiting anthropogenic global warming to a certain level, such as the 1.5 degree goal of the Paris Agreement.

However, it isn't sufficient simply to reach net zero by a certain date. The volume of greenhouse gas emitted during that time will directly influence the temperature increase that is observed, as shown in Figure 1.

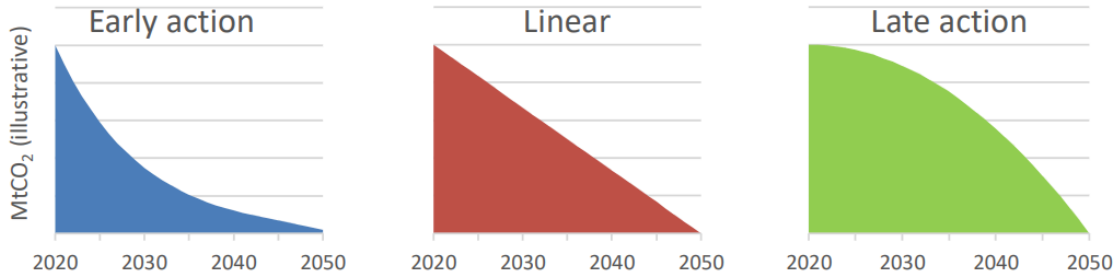

Figure 1: Illustrative decarbonisation trajectories to 2050. Each of these pathways reaches net zero by 2050, but in the Late Action pathway the total cumulative emissions are double the emissions of the Early Action pathway, which leads to double the warming impact.[1]

A recent analysis by Climate Resource of least-cost emissions reduction scenarios consistent with 1.5 to 2 degree outcomes found that at both global and national levels, methane emissions from energy (as opposed to agriculture, forestry, and other land uses) need to decline rapidly by 2030. For example, in Australia methane emissions from energy are reduced by between 73% and 79% by 2030 relative to 2020, depending on whether the scenarios allow for peak warming of 1.6 degrees or 1.8 degrees (see Figure 2). This implies reducing fossil fuel methane emissions is some of the least cost mitigation in Australia and globally.[2] If the reductions in fugitive methane emissions from fossil fuels are not achieved, the cost of limiting warming will be higher.

[1] McGuire et al., "The role of carbon budgets in translating the Paris Agreement into national climate policy,"

[2] We are also aware of work being undertaken by CSIRO to establish a cross-sectoral methane emissions reduction cost curve.

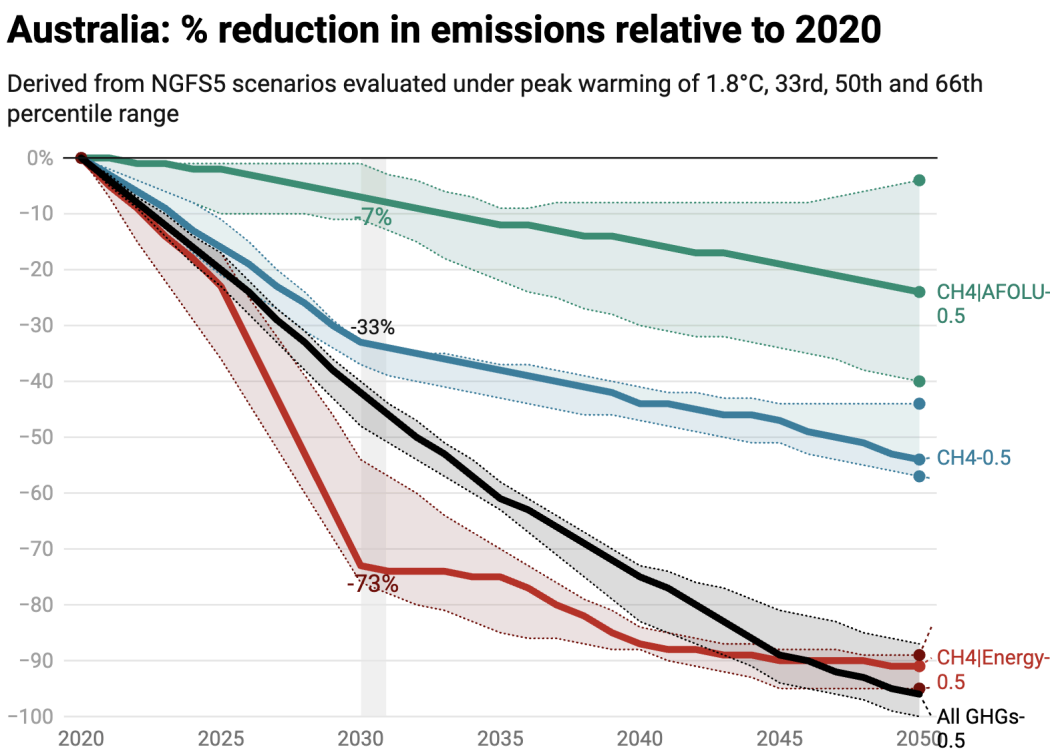

Figure 2: Australian methane emissions from energy and land use, under scenarios with a peak warming of 1.8 degrees.[3]

Conversely, increasing methane emissions in the near term (including through the expansion of fossil fuel extraction and consumption) risks making it more difficult to reach net zero, and also increases the likelihood that even if we meet net zero, we will exceed temperature perturbation targets.

There is a substantial and growing body of evidence that fugitive methane emissions are systemically underestimated in emissions inventories

Except for direct measurement techniques, which can be expensive and difficult to implement in some cases, most process-driven methane monitoring relies on emission factors. There are different bases for determining emissions factors at regional and facility-level scales, which introduce uncertainties into the calculation of methane emissions.

The technique of using other measurement technologies to verify emissions estimates, such as satellite observations, flyovers, and tower-based monitoring, is well-established. Unfortunately, such techniques have provided strong evidence that the emissions from fossil fuel production are considerably higher than reported in national emissions inventories. For example, in the case of Australia the IEA compared

[3] Burdon, Lewis, and Spiller, 'Australian Methane Targets Consistent with the Paris Agreement Temperature Goal - Insights from Integrated Assessment Models'

general evidence from atmospheric measurements with process-based estimates and found that emissions from Australian coal mines may be 60% higher than reported.[4] This aligns with other studies, which have found similar results for Australian mines using both satellite and flyover techniques.[5]

TSI performed its own analysis of methane emissions from large emitters over Australia in 2024, using its Open Methane tool.[6] The study calculated the so-called local enhancement of methane concentration, defined as the average concentration within 20km of an emission minus the concentration between 20 and 100 km away. We compared this local enhancement as measured by the best available global satellite data set and the expected values from a high-resolution air quality model. The study noted that the model significantly underestimated the local enhancements with the underestimate growing with the emission strength as predicted by the inventory. The relationship between measured and modelled enhancements can be used to estimate the required multiple of emission strengths to bring the two data sets into agreement. While the small number of points allows considerable scatter, in this estimate the calculation yields a best value of twice the inventory emissions with a 50% chance that the emissions are larger than this and a 95% likelihood that the emissions are stronger than the official inventory.

Another recent study of the Bowen Basin found that there is a statistically significant bias for open-cut coal mines utilising NGER Methods 1 and 2, with top-down CH4 measurements averaging 2.8 times higher for all open-cut mines versus bottom-up methods.[7] While Method 1 operators showed a higher bias (5.4 times higher), the bias for Method 2 operators was also 2.4 times higher. Similar results were also found for mixed-method mines, particularly where less than 50% of ROM production was from underground mines. This bias was observed across all of the measured mines, suggesting that the issue is systemic in nature and not as a result of operator error.

Although the authors note that the applicability of these results to other mining basins requires further study, the addition of this study to the existing literature around discrepancies between top-down and bottom-up measurements of methane emissions is a further line of evidence suggesting that fugitive methane emissions are being significantly underestimated, and accordingly that methane mitigation efforts in this sector should be accelerated. The balance of evidence is that the problems with the emissions inventory are methodological. Since the same methods are used to

[4] International Energy Agency, *Global Methane Tracker: Documentation - 2024 Version*.
[5] See for example Sadavarte et al., 'Methane Emissions from Superemitting Coal Mines in Australia Quantified Using TROPOMI Satellite Observations', and Borchardt et al., 'Insights into Elevated Methane Emissions from an Australian Open-Cut Coal Mine Using Two Independent Airborne Techniques'.
[6] https://openmethane.org/
[7] Harris et al., 'Evaluation of Coal Mine Methane Inventory Methods Using Aircraft-Based Approaches in the Bowen Basin, Australia'.

predict emissions from mine expansions or extensions it is likely forecast emissions are also underestimated. This in turn will place a far larger burden on other sectors to meet emission targets.

What are the opportunities or barriers for collaboration across sectors to support the transition?

TSI was recently the co-convener of the inaugural Forum for Reducing Australia's Methane Emissions (FRAME) Conference. Hosted across two days in Canberra, the Conference featured cross-sectoral participation from all methane-emitting sectors in Australia, with representatives from government, industry, academia and civil society. A copy of the post-conference summary is **attached** for your reference.

One of the key pieces of feedback from the Conference was that participants welcomed the opportunity to collaborate with and learn from peers across sectors. Based on our experience, there is a strong appetite for cross-industry fora focused on different aspects of decarbonisation pathways, whether around specific gases or technologies, just transition factors, social licence, or other areas.

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