Nuclear Disaster:

The impact on climate emissions of Australia attempting to adopt nuclear energy

Executive Summary

The federal Liberal-National Coalition has proposed building nuclear reactors in Australia to replace retiring coal-fired power stations and reach net zero emissions by 2050.

Using the Australian Energy Market Operator's (AEMO) Integrated System Plans, and covering the shortfall of electricity supply between coal and nuclear with gas - as stated in opposition leader Peter Dutton's Budget in Reply[1] - it is estimated this policy would produce as a minimum 2.3 billion tonnes of additional carbon emissions between now and 2050 compared to the AEMO's Step Change scenario[2].

This would be equivalent of emitting double the 2022 annual emissions of the resource state of Oman, every year for the next 25 years[3].

The calculations in this paper use a series of assumptions based on what the federal Coalition has said their nuclear reactors plan would achieve. Many of these assumptions are not considered feasible by energy experts: it is near impossible that nuclear reactors could come online in 2040[4], nor that Australia could build nuclear reactors at one of the fastest rates in history. The build rate used in this analysis generously matches the relatively fast rate achieved by France from 1978, which had a population of 53 million, and had already been building nuclear power reactors for 23 years. It is extremely unlikely that Australia could match this build rate, but this has been used as a proxy for the purposes of the analysis. Even with this scenario's very ambitious build rate of nuclear reactors, the National Electricity Market would not reach net zero by 2050.

Drastically reducing carbon emissions this decade is essential to avoiding more extreme fires, heatwaves, floods and droughts as the impacts of climate intensify. The proposal by the

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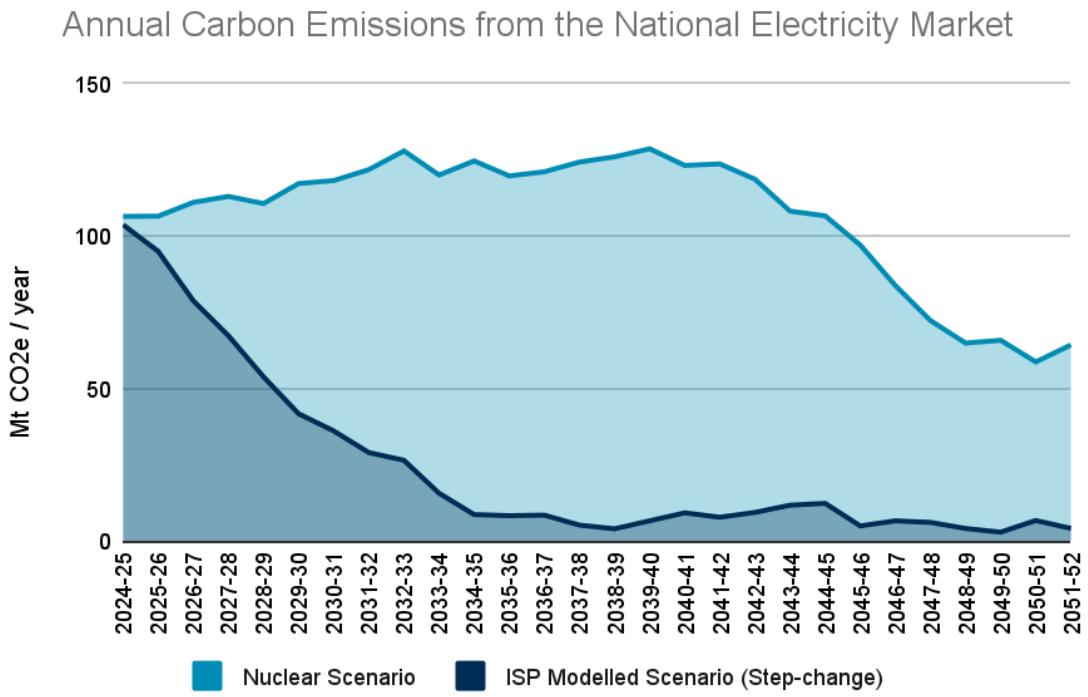
[1] Liberal (2024) *Leader of the Opposition's Budget Address in Reply* Available at: https://www.liberal.org.au/latest-news/2024/05/16/leader-oppositions-budget-address-reply (accessed 17 May 2024)

[2] Australian Energy Market Operator(2024)*Integrated System Plan* Available at: https://aemo.com.au/en/energy-systems/major-publications/integrated-system-plan-isp (accessed 10 May 2024)

[3] European Commission (2024) *EDGAR - Emissions Database for Global Atmospheric Research* Available at: https://edgar.jrc.ec.europa.eu/report_2023 (accessed 17 May 2024)

[4] Ison, S. (2024) 'Nuclear energy could take another 25 years: experts', The Australian, 16 February

federal Coalition would not significantly reduce emissions until the late 2040s, by which time catastrophic impacts would be almost certain. The proposal would break Australia's existing international commitments to both the current 2030 target and its obligations under the Paris Agreements. Any proposal to introduce nuclear reactors to Australia is therefore not a climate policy, but rather a policy to increase emissions, acting to distract from urgent climate action over the coming decades.



Context

Australia is in an historic transition away from a predominantly coal powered electricity system. Existing coal power stations are reaching the end of their technical life and replacing them with new coal power stations is uneconomical[5].

However, the most important reason for the shift to renewable energy is that burning coal for electricity is also the leading cause of the carbon emissions that are driving the climate crisis[6].

At the global climate negotiations at COP21 in 2015, Australia signed on to the 'Paris Agreement' to limit global heating to 1.5 degrees celsius[7]. This target was set to limit the worst impacts of global heating. Crossing the 1.5°C threshold risks unleashing far more severe climate change impacts. Meeting this target requires significant reductions in carbon emissions in this current decade. The science from the Intergovernmental Panel on Climate Change indicates that global greenhouse gas emissions must peak before 2025 at the latest and decline 43% below 2019 levels by 2030 to limit global warming to 1.5°C[8]. Meeting this global goal requires wealthy and capable nations like Australia to reduce emissions by significantly more than the global average.

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[5] Jotzo, F., Mazouz, S. and Wiseman, J. et al (2018), *Coal transition in Australia: an overview of issues*, CCEP Working Paper 1903, Sep 2018. Crawford School of Public Policy, The Australian National University, ch. 3, p. 11

[6] CSIRO (2024) *What are the sources of carbon dioxide in the atmosphere?* Available at: https://www.csiro.au/en/research/environmental-impacts/climate-change/Climate-change-QA/Sources-of-CO2 (accessed 10 May 2024)

[7] Parliament of Australia (2017) *Paris climate agreement: a quick guide* Available at: https://www.aph.gov.au/About_Parliament/Parliamentary_Departments/Parliamentary_Library/pubs/rp/rp1718/Quick_Guides/ParisAgreement (accessed 16 May 2024)

[8] United Nations Climate Change (2020) *The Paris Agreement* Available at: https://unfccc.int/process-and-meetings/the-paris-agreement (accessed 20 May 2024)

The National Electricity Market that powers Australia's eastern states is already powered by almost 40% renewable energy like wind and solar[9]. The federal Labor government has committed to reach 82% renewable energy by 2030 and reach net-zero emissions by 2050[10].

The federal Liberal-National Coalition does not support the 82% renewable energy by 2030 target[11] with senior figures calling for a moratorium on utility-scale renewable energy projects[12]. The federal Coalition does support net-zero by 2050[13] and is proposing to use nuclear reactors to reach the target[14].

Nuclear reactors do not create carbon emissions when producing electricity. However, they do "burn" uranium which is a non-renewable resource and creates radioactive toxic waste.

This paper estimates the carbon emissions produced from continuing to burn coal and, in particular, gas for Australia's electricity supply until 2052. It is extremely unlikely that nuclear reactors could come online by 2040-41. This timeline is being used for the purpose of estimating emissions and not to suggest this is a feasible scenario. The heavy reliance on gas in this estimation downplays future emissions from the Coalition's nuclear plan. If coal closures are delayed by more than anticipated by AEMO, total emissions would be even higher.

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[9] Clean Energy Council (2024) *New Report: Almost 40 Per Cent of Australia's Electricity Supplied By Renewables* Available at: https://www.cleanenergycouncil.org.au/news/new-report-almost-40-per-cent-of-australias-electricity-supplied-by-renewables (accessed 10 May 2024)

[10] Department of Climate Change, Energy, the Environment and Water *Powering Australia* Available at: https://www.dcceew.gov.au/energy/strategies-and-frameworks/powering-australia (accessed 10 May 2024)

[11] Toscano, N and Foley, M. (2023), 'Business rejects Coalition fight against 'reckless' renewables rollout', Sydney Morning Herald, 19 August

[12] Rae, M. (2024) 'Shock at call for moratorium on 'reckless renewables'', Australian Associated Press, 6 February

[13] Liberal Party of Australia (2022) *Protecting our Environment* Available at: https://www.liberal.org.au/our-plan/environment (accessed 10 May 2024)

[14] Peter Dutton (2024) *Leader Of The Opposition – Transcript – Interview with Matt Shirvington, Sunrise* Available at: https://www.peterdutton.com.au/leader-of-the-opposition-transcript-interview-with-matt-shirvington-sunrise-2/ (accessed 10 May 2024)

Data Sources

This paper is based on statements made in the media by members of the federal Coalition on their yet-to-be released nuclear energy policy. They have proposed:

- Building nuclear reactors on the sites of existing coal power stations[15]
- Putting a moratorium on utility-scale (10 megawatts or larger) renewable energy projects[16]
- Continuing to install rooftop solar[17]
- Generating electricity from gas and coal until nuclear reactors become available

This paper uses the following assumptions about the energy system:

- Demand for electricity grows as per the AEMO's Integrated Step Plan[18]
- Rooftop solar installations grow as per AEMO's Integrated Step Plan
- Utility solar & wind is halted
- Coal power stations close when they reach their expected retirement date, and they maintain a capacity factor similar to 2023
- First nuclear generation in Australia occurs in 2040-41 as per market analysis[19]
- Generation increases at the same rate (kilowatt hours per annum per capita) that France's nuclear generation expanded in the years after 1977, one of the fastest nuclear expansions in history[20]
- That subsidies allow nuclear power stations to survive economically despite competition with household solar power during peak power use during daytime hours

[15] Chambers, G. (2024)''Coal plants perfect for reactors', says Coalition', The Australian, 15 February

[16] Rae, M. (2024) 'Shock at call for moratorium on 'reckless renewables'', Australian Associated Press, 6 February

[17] Greber, J. (2024) ''Breakthrough moment': Littleproud backs rooftop solar'", Australian Financial Review, 20 February

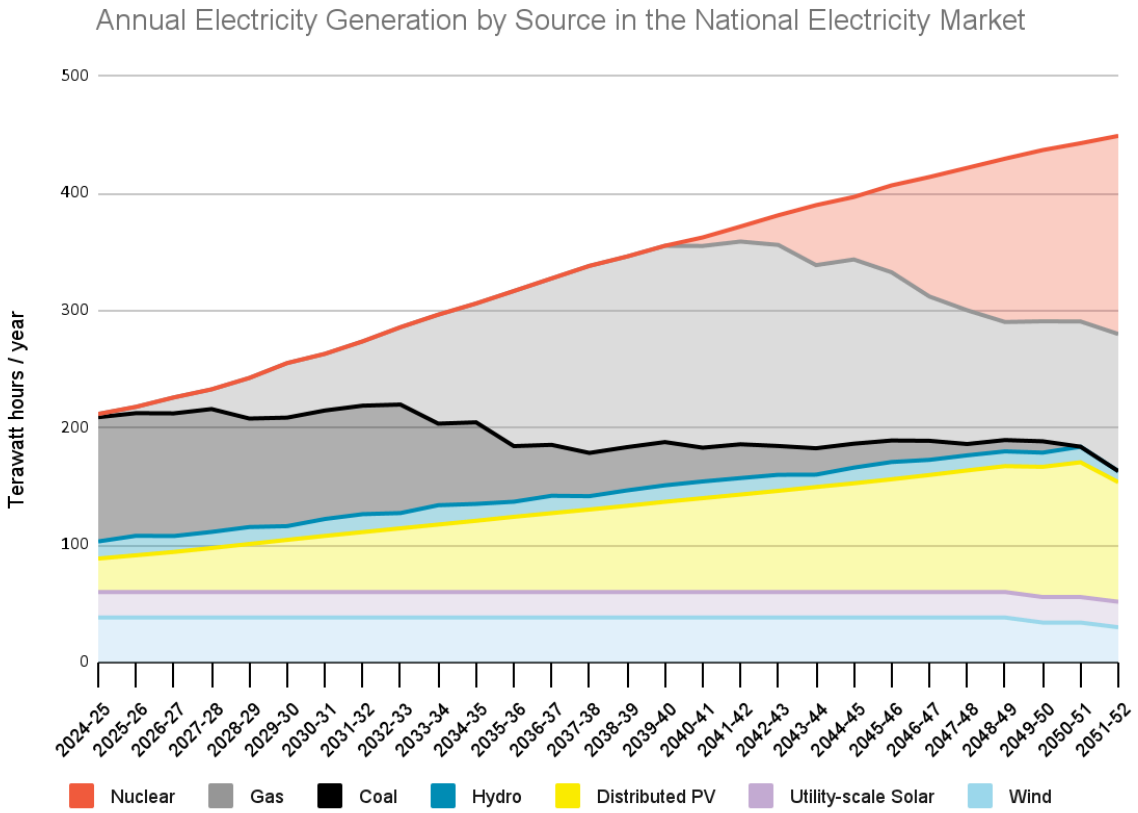
[18] Australian Energy Market Operator(2024)*Integrated System Plan* Available at: https://aemo.com.au/en/energy-systems/major-publications/integrated-system-plan-isp (accessed 10 May 2024)

[19] Ison, S. (2024) 'Nuclear energy could take another 25 years: experts', The Australian, 16 February

[20] Hannah Ritchie and Pablo Rosado (2020) *Electricity Mix* Available at: https://ourworldindata.org/electricity-mix (accessed 3 June 2024)

Energy Mix in the Nuclear Scenario

Using these assumptions, the only option for meeting electricity requirements is a huge expansion in the use of gas in the National Electricity Market. This would grow rapidly from the relatively small amount of gas currently in the National Electricity Market and peak in 2040 when it is feasible that nuclear reactors could begin to generate electricity. Gas is a fossil fuel and a greenhouse gas. That means burning and producing gas drives climate change. Emissions from the extraction, processing and export of gas have been a significant factor in Australia's emissions staying so high[21].



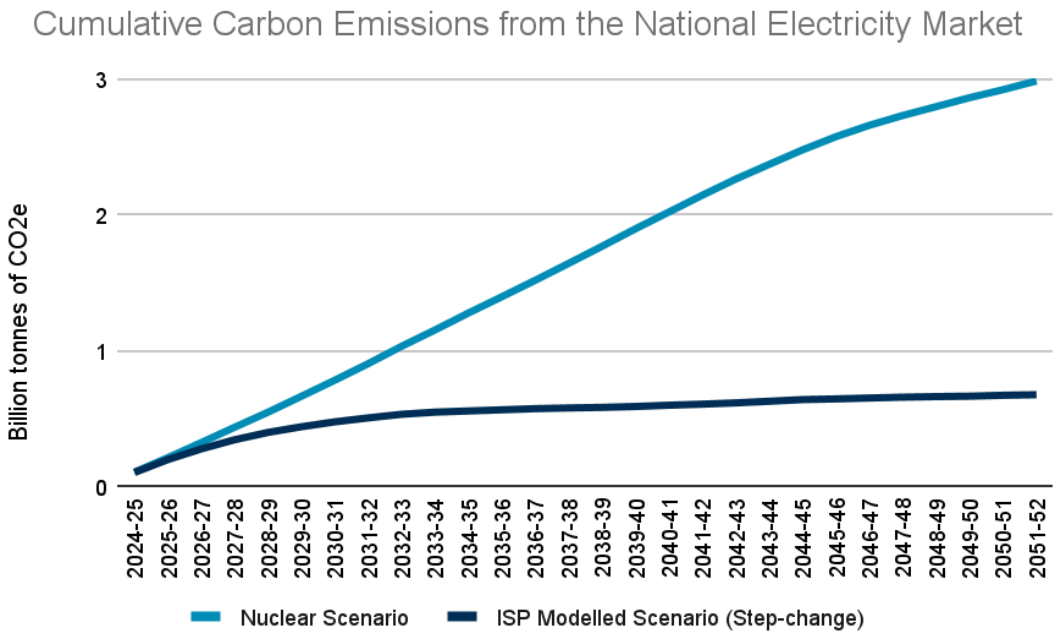
[21] Department of Climate Change, Energy, the Environment and Water (2024) *Australia's National Greenhouse Accounts* Available at: https://greenhouseaccounts.climatechange.gov.au/ (accessed 31 May 2024)

Findings

The federal Coalition's nuclear reactors scenario would produce at least 2.3 billion tonnes of additional carbon dioxide equivalent emissions between now and 2050 compared to AEMO's Step Change scenario and require more than a tenfold expansion of gas generation.

The federal Coalition's plan would require that Australia walks away from the Paris Agreement.

The federal Coalition claims to support nuclear reactors as a way to lower carbon emissions but this is clearly not the priority given the significant additional emissions under their scenario.



In order to avoid the worsening impacts of climate change, it is essential that parties from all sides of politics urgently replace coal and gas using the technology we have here and now: renewable energy like wind and solar, firmed with batteries and hydro.