15 November 2024

Via nuclear.reps@aph.gov.au

Submission to the House Select Committee on Nuclear Energy

The Clean Energy Council (the 'CEC') welcomes the opportunity to provide a submission to the Inquiry into nuclear power generation in Australia.

The CEC is the peak body for the renewable energy sector in Australia. We represent and work with around 1,000 businesses operating in Australia across solar, wind and hydro power, energy storage and renewable hydrogen. Our mission is to accelerate Australia's clean energy transition.

The clear message that we wish to share with the House Select Committee is that nuclear electricity generation in the Australian context does not put us on the least cost pathway to the timely replacement of our aging, coal-fired power generation fleet and that deploying nuclear electricity generation would risk increasing consumer energy bills and worsen the reliability of our electricity system.

Australia's energy transition is well under way, with renewable energy – hydro, solar and wind – backed by energy storage providing over 40 per cent of Australia's electricity needs today. By the end of 2025, we expect that this number will grow to around 48 per cent, based on the projects currently under construction that are due to be completed in the year ahead.

With an enabling investment and policy environment supporting the next generation of electricity supply, the electricity sector can play a key role in Australia achieving its net zero ambitions.

In fact, the renewable energy and storage sector has made sizeable investments. In Q3 of 2024 we saw investors commit to 1.4 GW of new renewable generation capacity (wind and solar plants) and 2.8 GW / 8.0 GWh of new energy storage (big battery) projects. If we can maintain this pace over coming quarters and years, we will stay on track to realising this goal.

Distributed energy is also playing a key role in delivering cost savings to consumers. Over four million solar panels have been installed across Australian households meaning Australians have now collectively saved up to $6 billion annually off their energy bills, equivalent to an average of $1500 a year per installation. Rooftop solar and battery installations are reliable technologies that are highly trusted by consumers which complement the deployment of large-scale renewable energy generation.

For the sake of all electricity consumers and their energy bills – from household to heavy industry – it is critical that we stay on our current least cost pathway.

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Based on AEMO's modelling for the 2024 Integrated System Plan, 90 per cent of Australia's coal-fired power stations are expected to retire by 2035. It is vital that we bring new low-cost capacity online ahead of these retirements to avoid power shortages and minimise price shocks from these retirements or the increased frequency of unexpected outages in the intervening period.

In the remainder of the submission, we highlight that:

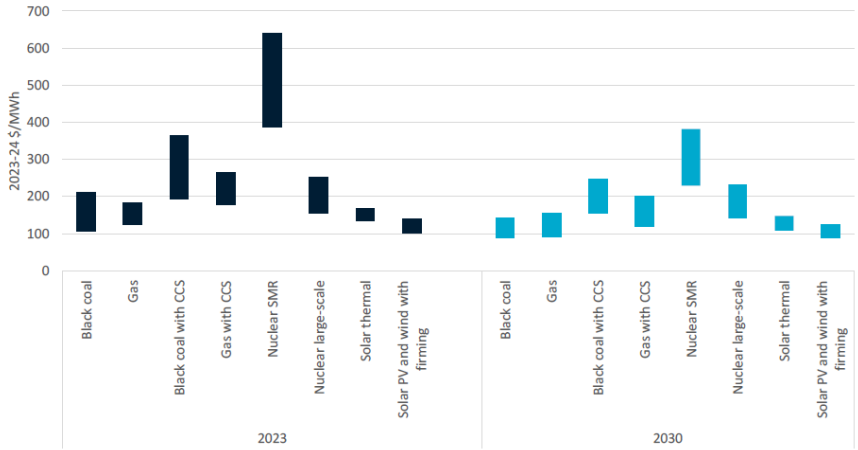
1. Renewables are delivering the lowest cost pathway to net zero and the transition is underway
2. Nuclear power represents the highest cost electricity generation option for Australia and risks higher prices while we wait for it to come online.
3. Nuclear power would not be ready in time to substitute our aging coal-fired power fleet, creating further risks of higher energy prices, potentially supply-side shortfalls and jeopardising system reliability.

1. Renewable energy (and storage) is the lowest cost pathway to replace aging coal generation

As outlined in the Australian Energy Market Operator's ('AEMO') Integrated System Plan ('the ISP'), the lowest cost way of replacing retiring coal-fired power generation is through the deployment of solar and wind, backed by energy storage (including batteries and pumped hydro), a minor back-up role for gas-fired power generation, and the augmentation of our transmission network.

In addition, CSIRO's analysis (see diagram below) projects that in 2030, solar PV and wind; with firming; are expected to be a third of the cost of nuclear small modular reactors per megawatt hour. Renewables will not lose their comparative advantage and will provide better economic and social outcomes for consumers, even if nuclear generation technology becomes cheaper.

Calculated LCOE by technology and category for 2023 and 2030



Source: CSIRO, GenCost 2023-24 Report[1]

2. Nuclear power represents is the highest cost electricity generation option for Australia

Nuclear reactors represent the highest cost technology option for Australia across several factors including levelised cost of energy (LCOE) and total cost of technology deployment.

The CEC commissioned independent analysis from Egis that analysed the levelised cost of electricity across different energy generation technologies. Egis' analysis confirmed large-scale nuclear energy is up to six times more expensive than renewable energy[2] and that nuclear may be even higher cost than currently forecast as waste management and plant decommissioning have been omitted by previous cost calculation research.

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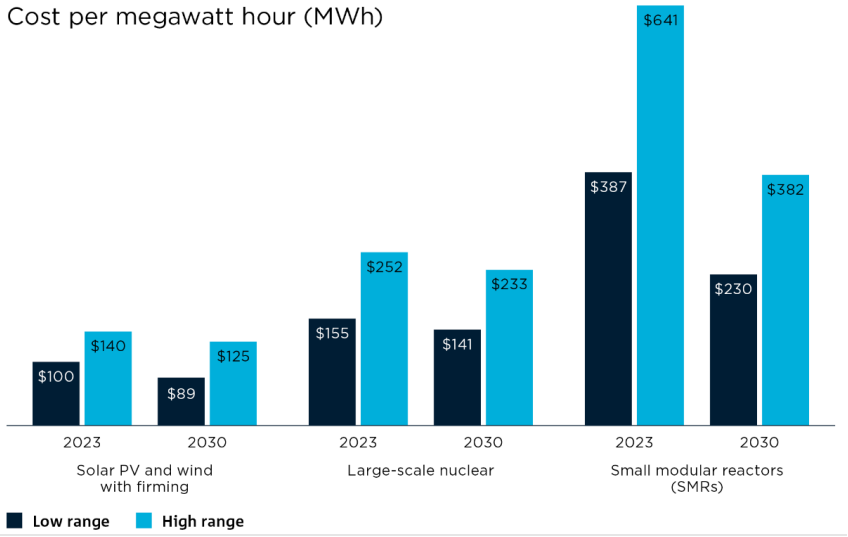
[1] GenCost 2023-24 report | CSIRO
[2] Levelised Cost of Electricity Review | CEC, May 2024

The latest energy technology cost analysis by CSIRO, GenCost 2024, found that 'small modular reactors' would be the highest cost solution for supplying Australia's electricity needs. We acknowledge it is difficult to estimate the final LCOE produced by theoretical SMR technology however, CSIRO acknowledged it is likely that Australia would experience higher costs due to the absence of an existing nuclear industry[3].



Source: CSIRO, GenCost 2023-24 Report[4]

The cost to deploy large-scale nuclear power generation varies internationally. Even though it is difficult to estimate the capital cost to deploy technologies that we do not have in Australia, we can observe the current risks and costs of large-scale nuclear generation deployed overseas.

The projects below are all large-scale reactors, which are, according to CSIRO analysis expected to have lower capital cost per MW estimates compared to small modular reactors[5]. Each of these three nuclear reactors are located in countries with established nuclear industries and have experienced blow outs in construction timeframes and costs.

[3] GenCost 2023-24 report | CSIRO
[4] GenCost 2023-24 report | CSIRO
[5] GenCost 2023-24 report | CSIRO

Nuclear reactor	Location	Size	Phase	Start of construction	Expected operation	Construction time	Capital build cost
Hinkley Point C	UK	3.3 GW	Construction	2017	2029-2031	12-14 years	£31-34 b (AUD 89.7 b)
Sizewell C	UK	3.2 GW	Construction	2024	2032-2035	9-12 years	~£20 billion (AUD 39.6 b)
Flamanville 3	France	1.6 GW	Commission	2007	2024	17 years	€13.2 billion (AUD 27.6 b)

Even if Australia was able to procure established large-scale nuclear technology and delivered the project on-time and under budget (which has been observed abroad in countries with simpler labour and regulatory environments such as China and the United Arab Emirates), nuclear electricity generation would remain a high-cost source of electricity generation.

The 'strike price' for the Hinkley Point C reactor in the UK, currently under construction, is currently £124.65 per megawatt hour, rising annually with inflation. This current strike price is equivalent to around AUD $244 today, which is somewhere between 3-5 times the cost of power from new renewable projects today, and about three times the cost of firmed renewables.

Ultimately, someone has to pay for the higher construction and fuel costs. The price will ultimately need to be borne by electricity consumers (households, business, industry), or by the Australian Government (and therefore taxpayers).

In its recent September 2024 study, the Institute for Energy Economics and Financial Analysis found that if the cost of these plant were to be recovered from consumers, it would involve a median annual household energy bill increase of $665 per annum across all regions[6].

[6] Nuclear in Australia would increase household power bills | IEEFA, September 2024

Table 2: Increase in electricity bills to recover cost of nuclear plants based for various regions, by consumption levels – averaged across nuclear scenarios (AUD/year)

Region	Consumption levels					
	Median	Household size (number of people)				
		1	2	3	4	5+
VIC	656	478	783	822	939	1190
NSW	676	450	732	850	996	1213
SEQ	720	451	678	816	1016	1165
SA	607	384	664	812	937	1160
Average for all regions	665	441	714	825	972	1182

Source: Institute for Energy Economics and Financial Analysis, September 2024[7]

More immediately, retail price increases would be felt well before any putative nuclear reactors commenced operation. This is due to the fact that large, government owned nuclear assets being forced into the system would likely deter private investors from continuing to develop renewable generation and storage projects in Australia.

This would of course be worsened by any government policy to deliberately slow the pace of renewable investment and increase reliance on existing coal assets, or construct new gas-powered generation (GPG), in the expectation that nuclear generation will eventually enter the system.

This would likely markedly increase energy wholesale prices, which would quickly flow through to higher retail bills for customers.

An increased reliance on coal generation would likely increase wholesale prices and create significant risks of supply side shortfalls. Coal generators are less reliable as many near their end of technical life, with decreasing economic viability leading to a reduced willingness of operators to invest in refurbishments and maintenance. This means these assets are increasingly likely to exit the system, potentially unpredictably. This can create supply side shortfalls, driving increased wholesale prices and potentially threatening overall power system supply reliability.

Any decrease in renewable generation and storage investment would also likely drive heavier reliance on existing GPG assets as well as potentially requiring new investment in gas generation. Gas is currently the most expensive form of power generation and is linked to international prices – this was a key driver of the high prices experienced in 2022, which drove an unprecedented and prolonged suspension of the east coast energy market. A greater reliance on GPG will therefore automatically lead to higher wholesale electricity prices.

[7] Nuclear in Australia would increase household power bills | IEEFA, September 2024

Increased wholesale prices would also be driven by the higher capital costs associated with any new GPG investment. Market perceptions of stranded asset / carbon risk is likely to result in markedly higher required ROIs for these assets from investors, which will in turn lead to much higher bid prices and therefore wholesale market prices.

Finally, any additional upstream gas supply and transmission pipeline capital investment needed to support GPG will also markedly increase final wholesale prices.

Both increases in wholesale prices, driven by less renewables and increased reliance on coal and gas, will flow through to markedly higher retail bills in the medium term, if we are to delay the transition in the hope that nuclear power stations can be built by the 2040s.

3. Standing up a new nuclear energy industry in Australia will take at least two decades

For nuclear to be helpful for our energy transition, it would need to be available within the coming decade in time to replace our aging thermal generation plants.

However, we consider it highly unrealistic that any nuclear reactors could be operating in Australia before 2045 due to the following considerations:

- The ban on nuclear power generation in Australia would need to be overturned by Federal and state parliaments. Noting that this policy does not have bi-partisan support, nor Government support in any state of Australia, it is difficult to see how this could occur quickly.
- Assuming bans were overturned in relevant jurisdictions, Australia would need to develop the necessary regulatory frameworks for this new industry, including laws and subordinate regulation spanning planning, environmental, building and construction, and safety legislation, and establish new institutions to oversee the safe design and operation of these plants, and the handling and management of their waste.
- Planning and design of the new nuclear reactors would need to be in accordance with the above regulations, and the detailed technical assessments of their compliance would take time, particularly within a ‘first of a kind’ scenario for Australia.
- Heightened public interest and concern about the safe design and operation of these plants would likely result in extended timeframes for community engagement and consultation around the proposed plants. Social licence and community engagement processes would likely add many years to project timelines.
- Based on the examples provided earlier of the construction timeframes for large-scale nuclear reactors, the expected construction timeframe could be between 9-17 years.
- The absence of an existing skills base in Australia to build and operate nuclear power stations means that it would be reasonable to expect that the design and construction timeframes would be longer in Australia than in countries with a tradition of nuclear energy.

Every nuclear reactor built within the past decade in the OECD has run over time and over budget. As an example, the Hinkley C reactor which commenced construction in 2017 was originally due to be completed by May 2025. Following an initial expected delay for the first reactor to be completed by 2028, the delivery date of the first unit may now not occur until 2031 due to the 'complexity' of the project.

Conclusion

Australia's clean energy transition is well underway, supercharged by available technology and taking advantage of our wind and sun natural resources, it is delivering economic benefits to consumers. In 2023, renewables accounted for almost 40 per cent of our total electricity supply and we are on-track to reach 50 per cent by the end of 2025.

With 49 projects already in the pipeline from financial commitment onward (equivalent to 9.7 GW / 24.3 GWh in capacity), the renewable energy sector is ensuring Australia's electricity system will be reliable, secure and flexible to match supply with demand in a way that provides affordable and quality electricity to consumers.

With the right policy settings, investors are eager to finance Australian projects that will continue driving down the cost of energy across the economy. Investment in solar and wind alone is expected to result in regional economic activity worth $68 billion and create tens of thousands of new jobs before 2030.

This large-scale renewable build out is supported by the growth of rooftop solar, that is driving average total annual energy bill savings of up to $6b per annum.

Waiting for potential nuclear SMR technology that may be ready in the future is a risky energy strategy.

Expecting consumers to pay for a high-cost source of electricity generation for the duration of the life of the nuclear plant, is a risky energy strategy.

The evidence is clear – Australia does not need nuclear. The lowest cost power plants (solar and wind combined with energy storage) will result in the lowest cost electricity bills for consumers, and it is therefore in the interests of Australian households, businesses and industry that we get on with the job of deploying renewable energy as quickly as possible.

Yours sincerely

Kane Thornton
Chief Executive