Submission to the Committees on Environment and Communications

Regarding: *Environment and Other Legislation Amendment (Removing Nuclear Energy Prohibitions) Bill 2022*

From: Independent Engineers and Scientists Date: 15 January 2023

We are independent engineers, scientists and professionals with no monetary, political or ideological connections to the issue at hand. We represent a wealth of collective experience in electrical and systems engineering, technical analysis, physics, economics and sciences. We have extensively studied climate change and AEMO's plans for a world-leading, "once-in-a-century transformation" of the NEM into an electricity grid dominated by renewable wind and solar generation.

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We wish to state that we firmly support the removal of nuclear energy prohibitions. Senator Canavan's second reading speech is commendable in putting forward a strong case for this bill.

This submission makes the following points:

1. Reliable 24/7 baseload power generation is an essential requirement for the NEM going forward, as it has been in the past. In the NEM, customers require power, *when it is needed.*

2. Nuclear power, which has been proven reliable for grid-scale electricity generation in the last 60 years, is undergoing promising new development in multiple countries for production-line manufacturing of smaller standardised modules to lower costs and enhance fail-safe features.

3. The government clearly believes that lowering CO_2 is a critical goal – reliable nuclear power generation offers negligible emissions in operation and very low emissions overall.

4. AEMO's plan for the future NEM grid, using primarily wind and solar power generation, completely fails to meet any of the government's stated goals for reliability, affordable costs and low emissions despite claims by the Integrated System Plan (ISP) dated 30 June 2022 and many others. In fact the ISP, as it is now being implemented, will likely cause enormous economic damage to the nation, create massive unreliability characterised by frequent large-scale blackouts and risks to national security.

a. Our 26 page submission to AEMO in February 2022, as part of the public consultation process, detailed the reasons for our concerns. Following publication of the 2022 ISP, which ignored these concerns, we prepared a detailed reliability assessment of the ISP for years 2030, 2040 and 2050, which demonstrated that the future NEM dispatchable reserve margin falls from a historic and reliable +20% into deeply negative numbers. The reason is quite simple: the ISP fails to provide either sufficient baseload power or energy storage to last through a single 24 hour cycle – even when wind and solar outputs are average. The assessment report is attached to this submission.

b. Studies are underway to evaluate costs and emissions for the ISP on a full whole-of-system, whole-of-life basis. Claims by CSIRO and AEMO (and widely reported in the media) that intermittent and highly variable renewable wind and solar generation are the cheapest form of electricity generation are disingenuous since they ignore massive costs of required baseload back-up and energy storage on a scale sufficient to make the ISP grid design reliable. Similarly, claims by AEMO and many others that renewable wind and solar generation creates no emissions are also misleading since they do not take into account the emissions associated with mining, processing and manufacture of thousands of times more material required to create an equivalent grid than one based on reliable baseload power.

c. A recent interim paper was prepared in response to a December 2022 announcement by ARENA of eight 'big battery' projects for firming renewables in order to assess what additional costs would be incurred by 2030 to augment the ISP design to deliver reliable power. The conclusion, given that solar power is zero for 16 hours of every 24 hour cycle and wind power frequently varies down to minimal output levels, sometimes for many days over large regions, is that it would require a massive increase in battery energy storage (13 times more than the ISP) and a tripling of wind and solar energy generation in order to recharge the energy storages. The estimated additional costs for a 7 day (similar to Snowy 2.0) battery energy storage capacity, is $3.6 trillion. Clearly, it is an unaffordable cost that underlines the complete failure of the AEMO ISP and will be far higher than any other equivalent system. The paper is attached to this submission.

d. The environmental footprint of a renewables dominated electricity grid is enormous when compared to that of a conventional baseload-powered grid. It will require a land area greater than the state of Victoria.

5. The government finds itself in a difficult position after having championed intermittent and variable renewable wind and solar power generation as the answer to a reliable, affordable and low emissions NEM. The truth will be revealed by realities in the next few years as baseload coal plants are forced to retire as a result of the imposition of subsidies, royalties, renewable energy certificates and preferencing into the NEM designed to increase costs and lower the utilisation rates of these plants. Even with major new wind and solar projects, the reality is that it is impossible and unaffordable to augment the presently planned and inadequate energy storage capabilities (including Snowy 2.0) to make the ISP a suitable system for Australia.

6. A far more viable approach is to use reliable, proven and efficient baseload power generation which requires no energy storages, no extra transmission lines and provides confidence to all consumers that power will be delivered when required. Short term emission reductions can be accomplished by building efficient gas-powered generators BEFORE retiring

coal plants. An immediate start needs to be made on investigating and planning for the introduction of reliable nuclear power generation into the NEM mix, which will further lower emissions. Many other countries have committed to initial installations of small modular reactors by the end of this decade by which time costs and technical issues will be well known.

7. Australia can choose to take a back seat to small modular reactors and wait until other countries gain the necessary experience and position in the potential delivery pipeline. This will only disadvantage Australia in international markets.

8. Surely, Australia deserves to establish a more progressive position on the introduction of safe, reliable and lower cost nuclear power technologies.

9. The first step is the removal of legislative barriers to consideration of nuclear power at all levels of government and therefore this bill deserves wide and prompt support.

Australia needs a new vision for implementing an electricity grid that will serve it through the 21st century. It is urgent that the existing plan be replaced by an approach that meets the goals set out by government for reliability, affordable cost and low emissions.

Thank you for the opportunity to express our opinions on this important matter.

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