



## **AUSTRALIAN NUCLEAR ASSOCIATION INC.**

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### Commentary on Draft 2020 Integrated System Plan

Dated: 27<sup>th</sup> February 2020

Chief Executive Officer

Australian Energy Market Operator

Dear Ms Zibelman

Thank you for the opportunity to make this submission.

We have read the Draft 2020 Integrated System Plan and note it proposes a wide range of renewable scenarios. The wide range of renewable options reflects the very large uncertainties that lie ahead for the NEM.

As would be expected from a government agency, the draft ISP reflects existing government policies both state and federal. This is a major restriction and limits the ability of the plan to explore a wider range of options.

The main policies of note are:

1. VRET 2030 target of 50%
2. QRET 2030 target of 50%
3. Nuclear not considered due to the legislative ban

### **Omission of Large Nuclear Power Plants**

AEMO has partnered with CSIRO by using its GenCost 2019-20 in the preparation of the ISP.

CSIRO has made no mention nor inclusion of larger nuclear power plants in Tables B.1 through to B.3. We consider this to be a significant oversight because they are our best indication of nuclear energy cost. There are currently 46 nuclear power plants under construction worldwide not including prototypes. Only five of these are being constructed using plants from the USA (AP1000) or France (EPR) which have incurred significant time and cost over-runs. The rest are of Russian, Chinese and South Korean origin. They set the true benchmark cost. CSIRO appear to have made no attempt to engage with this wider industry.

Over 100 power reactors with a total gross capacity of about 120,000 MWe are on order or planned<sup>i</sup> and only a couple in the USA are Small Modular Reactors.

Many of the nuclear power plants currently under construction or planned are in nations of far less wealth than Australia and/or with more constrained grids. These include Bangladesh, Argentina, Romania, Turkey, Egypt, Kazakhstan, Pakistan, Finland, Hungary, Slovakia and Uzbekistan. It is not credible to assume that all these nations are failing to maintain competitive power prices with nuclear energy.

### **Danger in picking winners**

Whereas the AEMO planners have produced least cost plans to meet the needs of the NEM and its customers, integrating the existing underlying government policies which prevent nuclear energy result in higher cost outcomes than could otherwise be achieved for the Australian public and industry. The existing policies force AEMO to plan scenarios that miss out on taking advantage all the best available technologies. For these reasons we suggest that AEMO have been restricted in being able to produce truly technology neutral outcomes. As such the public will potentially be denied the benefits of what a true technology neutral approach could provide.

### **Results of Scenarios**

Costing of the scenarios put forward in the ISP is a very difficult job. We note that while the plan provides relative cost indications between the plan no direct comparisons are made with existing price/cost levels.

To restore Australia’s energy competitiveness, our desire is for NEM wholesale prices/costs to fall over time back to 2017 levels (Pre-Hazelwood power station closure). We do not see the Draft 2020 ISP achieving this goal.

### **Costs of Nuclear Energy**

We are continually reviewing the costs of nuclear energy technologies to be used in the EPC models.

Our current analysis of nuclear plant costs is:

<b>Plant</b>	<b>Large Nuclear Power Plant</b>	<b>NuScale</b>	<b>BWRX 300</b>
<b>Capital Cost \$/kW</b>	\$6,966	\$5,332	\$4,000
<b>Discount Rate</b>	6%	6%	6%
<b>Fuel Cost \$/MWh</b>	\$12.41	\$12.41	\$12.41
<b>Operations Variable \$/MWh</b>	\$9.18	\$9.18	\$9.18
<b>Operations Fixed \$/MW</b>	\$91,504	\$91,504	\$91,504
<b>Life Years</b>	60	60	60
<b>Carbon Intensity T/MWh</b>	0.019	0.019	0.019
<b>Availability %</b>	90	90	90
<b>Levelised Cost of Electricity \$/MWh Assumes no curtailment</b>	\$84.77	\$72.67	\$56.22

The capital cost base for the three classifications of nuclear power plant were derived as follows:

1. Large Scale Nuclear Power Plant – Used US\$8.6 Billion for 2,800 MWe for Shin Kori Units 5&6 and then adapted for Australian materials and labour rates plus enabling infrastructure
2. NuScale based on US\$3610/kW provided by NuScale and adjusted for transport and Australian Labour and Materials.<sup>ii</sup>
3. BWRX 300 from General Electric is targeting a capital cost in the region of US\$2000 – US2,500/kW<sup>iii</sup> Our adjustment for Australian applications of an nth of a kind is A\$4,000.kW

The cost used by CSIRO of \$16,304/kW has no supporting documentation nor can any be sourced. No company would knowingly market such a generator.

### **Upgrades in the EPC/NEM model**

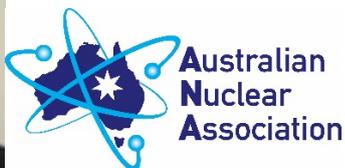
Electric Power Consulting (EPC) are in the process of upgrading their NEM models that will allow cost comparisons of scenarios that are put forward in the ISP. In addition, the model outputs will examine options that sit outside the constraints imposed on AEMO by existing government policies and look at the issues in a more technology neutral way. We plan to assist with making these outcomes public over time.

### **Robert Parker**

Vice President, Australian Nuclear Association

[www.nuclearaustralia.org.au](http://www.nuclearaustralia.org.au)

<https://nuclearforclimate.com.au/>



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<sup>i</sup> World Nuclear Association <https://www.world-nuclear.org/information-library/current-and-future-generation/plans-for-new-reactors-worldwide.aspx>

<sup>ii</sup> Provided by NuScale at Australian Nuclear Association conference 2019, [https://www.nuclearaustralia.org.au/wp-content/uploads/2019/10/ANA2019\\_Mundy.pdf](https://www.nuclearaustralia.org.au/wp-content/uploads/2019/10/ANA2019_Mundy.pdf)

<sup>iii</sup> [https://nuclear.gepower.com/content/dam/gepower-nuclear/global/en\\_US/documents/product-fact-sheets/GE%20Hitachi%20BWRX-300%20Fact%20Sheet.pdf](https://nuclear.gepower.com/content/dam/gepower-nuclear/global/en_US/documents/product-fact-sheets/GE%20Hitachi%20BWRX-300%20Fact%20Sheet.pdf)