NUCLEAR FOR CLIMATE AUSTRALIA

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Submission to:

Comment on GenCost 2020-21

Dated: 1st February, 2021

This submission addresses what we consider are significant errors and omissions in the approach taken to nuclear energy in all GenCost publications including the draft GenCost 2020-21 document.

1. Current Cost definition and large nuclear power plants

Large Gigawatt scale nuclear power plants are not included in the GenCost 2020-21 analysis despite approximately 50 currently being constructed worldwide.

GenCost defines current cost in para 2.1 which states:

Our preferred definition of current costs are the costs that have been demonstrated to have been incurred for projects completed in the current financial year (or within a reasonable period before).

A relevant recent example of a large nuclear power project, which fits the criteria of current cost, would be the 5.6GW four-unit plant built by South Korea in the UAE.

Out projected cost for 1GW versions of those plants suitable for Australia would have an overnight cost of between A$6,000 and A$7,000/kW (US$4,620-US$5,390). This fits conservatively within the following table from Projected Costs of Generating Electricity 2020 Edition produced by the International Energy Association and the Nuclear Energy Agency

Table 3.4a: Nuclear generating technologies – New build

Country	Technology	Net capacity (MWe)	Overnight costs (USD/kWe)	Investment costs (USD/kWe)		
				3%	7%	10%
France	EPR	1 650	4 013	4 459	5 132	5 705
Japan	ALWR	1 152	3 963	4 402	5 068	5 633
Korea	ALWR	1 377	2 157	2 396	2 759	3 066
Russia	VVER	1 122	2 271	2 523	2 904	3 228
Slovak Republic	Other nuclear	1 004	6 920	7 688	8 850	9 837
United States	LWR	1 100	4 250	4 721	5 435	6 041
Non-OECD countries						
China	LWR	950	2 500	2 777	3 197	3 554
India	LWR	950	2 778	3 086	3 552	3 949

Figure 1 - Nuclear New Build - large plants source IEA/NEA

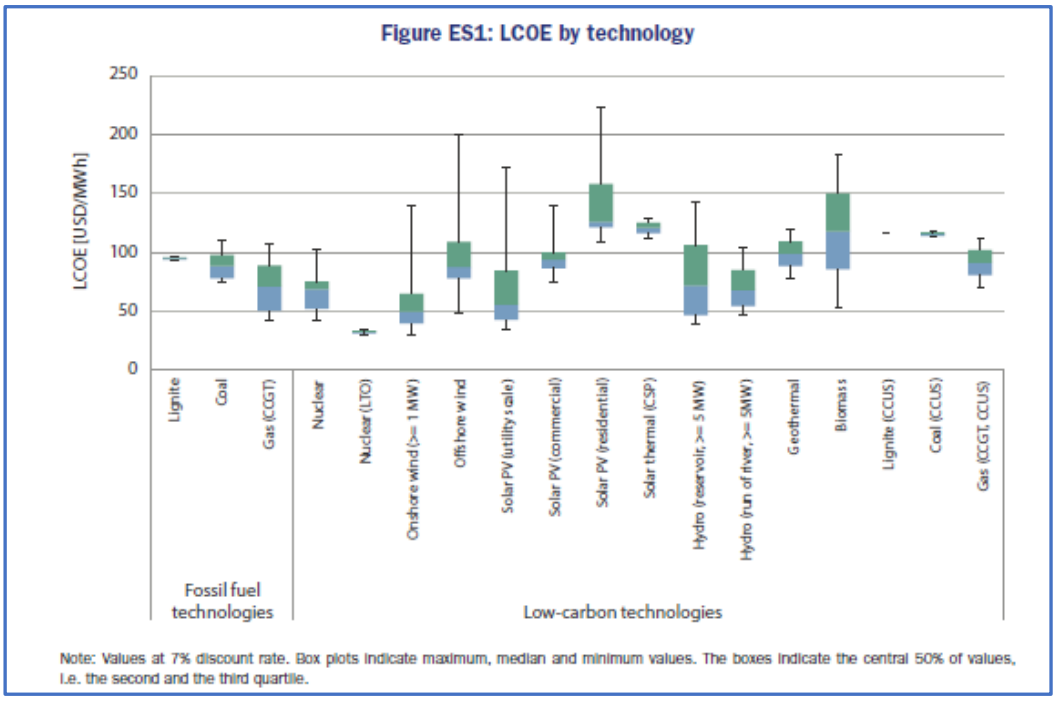

Figure 2 From Figure ES1 - Projected Costs of Generating Electricity 2020 Edition

Source IEA/NEA

The cost projection for nuclear energy in Figure 2 of US$40-US$110 (A$52-A$143)/kWh with a median around US70 (A$91)/kWh is in significant disagreement with the SMR cost A$140 - $340 in Figure 5-4 of GenCost 2020-21.

Our calculation of the likely LCOE with an 88% capacity factor for a 1GW nuclear Power plant of South Korean origin in Australia would be A$77.5/kWh as can be read from Figure 3.

2. Small Modular Reactors

No suitable small modular reactors have yet been built and there is no basis by CSIRO's own definition of "current cost" for the inclusion of an unsupported value such as A$16,487/kWh in the GEN Cost reports.

In the absence of any completed projects, we refer to the estimated costs of two vendors of light water small nuclear power plants (SMR's).

These are:

(a) Nuscale's multi SMR plant containing 77MW pressurised water nuclear modules. One configuration would contain 12 modules with a total output of 924MW.

This plant has an indicative cost of A$5,264/kW for a first of a kind based upon and estimate prepared by Fluor in the US was commissioned by Australia's SMR-NT. This would likely fall to A$4,727/kW for the Nth of a kind.

(b) General Electric's BWRX 300 small boiling water nuclear power plant containing a single 300MW constructed in a dry well below ground.

This plant has an indicative over-night cost of A$4,962/kW for a first of a kind and A$4,195/kW for an Nth of a kind.

Both plants use well proven nuclear reactor technology however there are a significant number of Generation IV small nuclear power plants that are in development. Their benefits include:

(a) Much higher efficiencies both in electrical output and in fuel use,
(b) Significantly lower production of long-lived waste,
(c) Lower cost indicators achieved through plant simplification and operations at normal atmospheric pressures,
(d) Ability to burn through nuclear wastes from current nuclear power plants
(e) Creation of higher levels of process heat for applications such as hydrogen production and desalination.

CSIRO is requested to keep abreast of the developments of these plants which are being deployed in China, Russia. Substantial funding is being supplied by the US, Canadian, French and South Korean governments to the development of these technologies.

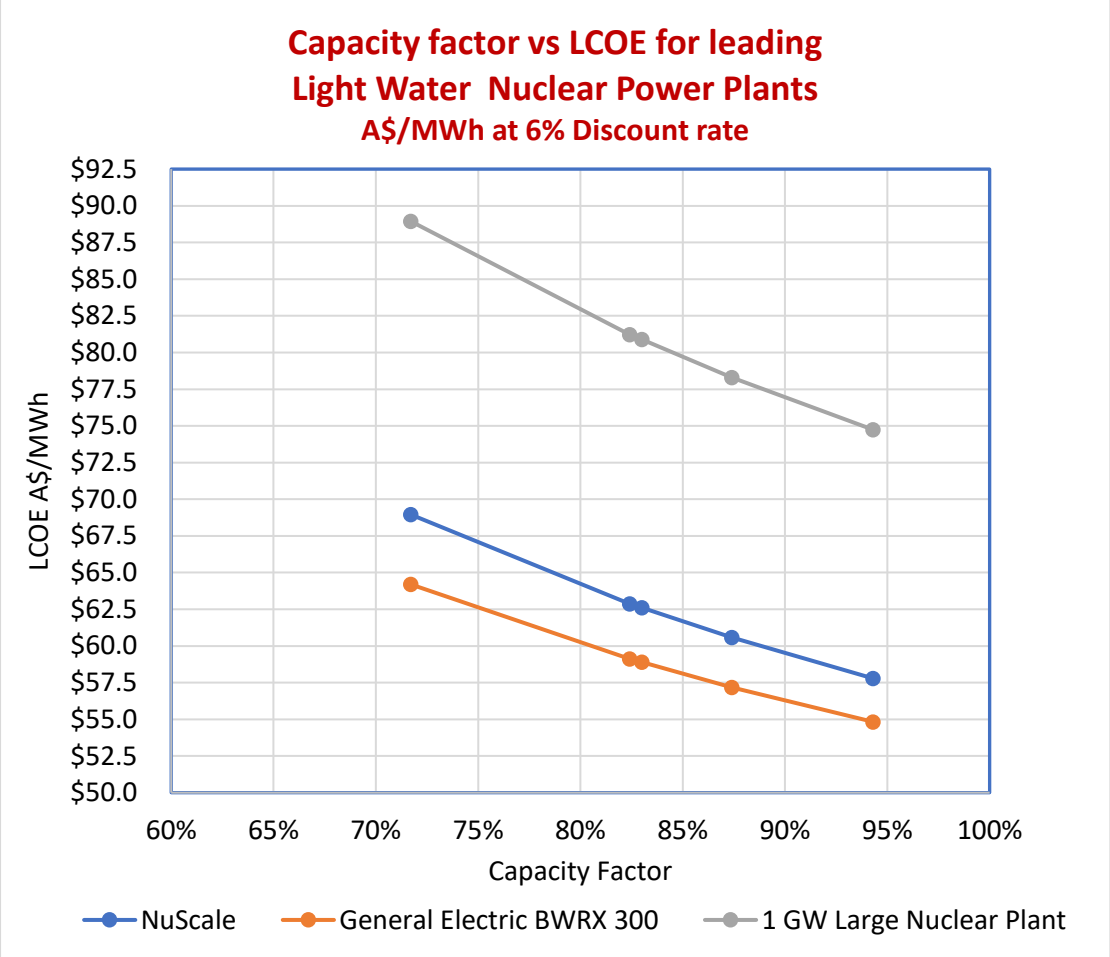

Figure 3 - Capacity Factor vs LCOE for Light Water Nuclear Power Plants in Australia

3. ISP Scenarios

CSIRO's GenCost predictions lead to excessively hopeful predictions in AEMO's ISP scenarios. For example, wind is assumed to have capacity factors of between 35 and 44%. Our calculations and those of energy analysts at a major generator indicate it is closer to 31%

Likewise, large scale solar has similar issues.

At every turn from capital costs to efficiency predictions, the ISP scenarios take the most courageous projections. Even then however, these scenarios fail to provide appropriate System Levelised Cost of Energy thereby preventing accurate forecasts of costs of energy to consumers.

Concluding Remarks

CSIRO's GenCost data is integral to the accuracy and credibility of AEMO's Integrated System Plans. These are intended to project clear pathways to transition from fossil fuels yet, all scenarios contain only variable renewable energy options. This has been caused in part by excessively high-cost projections for nuclear energy.

Dr Robert Barr's Electric Power Consulting and Nuclear For Climate have participated in the modelling of the ISP scenarios out to 2042 and found that they contain gross shortages of generating capacity to meet the specific loads. This has led to an underestimation of costs including the transmission, distribution and scale of storage required. These finding will be forwarded to AEMO for comment.

We note that CSIRO is committed to a high degree of stakeholder engagement. To date, this has not been effective in having more accurate and representative values included in the GenCost reports.

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