EY's submission to AEMO's 2019 Planning and Forecasting Consultation

Australian Energy Market Operator

20 March 2019

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Thank you for the opportunity to make a submission in AEMO's 2019 Planning and Forecasting Consultation, as detailed on the website https://www.aemo.com.au/Stakeholder-Consultation/Consultations/2019-Planning-and-Forecasting-Consultation?Convenor=AEMO%20NEM.

EY would like to raise the following suggestions for the input data assumptions proposed, with the reasoning provided for each.

- **Provide DC/AC ratio for solar PV**: The capital cost for solar PV (single-axis tracking or fixed plate) in $/MW AC is inherently tied to the DC/AC ratio as this determines how much capacity of DC panels are installed relative to the AC inverter capacity. Could AEMO consider providing the assumed DC/AC ratio that was used in the solar PV capital costs provided?

- **Provide additional parameters for solar thermal**: Similar to above, the capital cost of a solar thermal plant is inherently tied to the solar multiple, where the number of mirrors installed allows excess heat to be generated than is required to produce the rated power output by the turbine. Could AEMO consider providing the assumed solar multiple that was used in the solar thermal capital costs provided?

- **OCGT FOM**. It appears that in the 2019 Planning and Forecasting assumptions the FOM for existing OCGTs has been reduced from approximately $14,000/MW to approximately $4,000/MW compared with the 2018 ISP assumptions, while the new entrant OCGT FOM has been kept unchanged at approximately $4,000/MW. Current owners and developers of OCGTs in Australia would be well placed to provide input in to this assumption and the basis of the assumptions. However, the FOM for OCGTs may be more appropriately estimated at approximately $14,000/MW for existing and new entrant OCGTs, based on the following sources:

  - NREL 2018 ATB. A recent published estimate of generic OCGT FOM costs can be found in the NREL 2018 Annual Technology baseline[1], which is $12,000 USD/MW. NREL's outlook for this cost is for it to remain fairly stable.

  - New Zealand's Electricity Demand and Generation Scenarios (EDGS) costs. The official figure for the NZ electricity scenarios in the Ministry of Business, Innovation and

[1] https://atb.nrel.gov/electricity/2018/

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Employment's EDGS[2] modelling is $16,000 NZD/MW. These costs last underwent consultation with industry in 2015.

- AEMO WA's Benchmark Reserve Capacity Price (BRCP) calculations[3] are based on an OCGT FOM of approximately $14,000/MW and this has been the case for many years.

- **Provide more information as to how the locational cost factors can be used** to calculate the Generator Regional Build Costs based on the generator costs for each scenario. Generator regional build costs have been provided for the 4 Degrees Cost Scenario without any formulae, making it difficult to work out how to compute these from the numbers in the sheets 'Build costs' and 'Regional Cost Factors', and hence difficult to compute these for other scenarios.

- **Wind and solar capacity factors**. The 2019 consultation data set does not give sufficient detail on how REZ capacity factors are determined to assess their reasonableness. Can further detail be provided? How was the transformation from DNV-GL's resource quality maps transformed into time-sequential availability traces and how were the capacity factors set for the two tranches?

- **New entrant technologies**. Could AEMO consider including three additional new entrant technologies? These could be excluded in the ISP modelling as a trade-off considering materiality in the outcomes and computation time, but it would be useful to have them as options for modelling. These additional technologies are:

  - **Reciprocating engines**. Whilst aero-derivative OCGTs have been the gas peaking technology used historically, reciprocating engines are the technology being installed in the NEM for both Barker Inlet and the Newcastle peaker as announced by AGL. As such, this technology is potentially of important consideration for long-term planning modelling studies.

  - **Solar PV – fixed plate**. Fixed plate solar PV may be a competitive technology in some modelling studies in conjunction with single-axis tracking solar PV. The amount of competitive fixed plate solar PV may tend to be greater in the southern states in conjunction with when the amount of storage (from batteries or pumped hydro) becomes significant.

  - **Battery storage with 4 hours of storage**. The economics and operational capability of battery storage with 4 hours of storage is quite different to 2 hours and could be a more preferable configuration for large-scale batteries in the future. Whilst it would be impractical to consider many different battery sizes, having two options; 2 and 4 hours may capture a sufficient range of possibilities for long-term planning studies. Would AEMO consider providing the new entrant parameters for 4 hours of storage as well as 2 hours?

- **Aggressive build scenario capital costs**. Why does solar thermal cost more in the Aggressive build scenario, when most other technologies are generally less? This applies to as early as 2018-19 for solar thermal. Similarly, with battery storage – why does it cost more in the longer term in the Aggressive build scenario? In the 2018 ISP the Rapid scenario (assumed to be a

[2] https://www.mbie.govt.nz/building-and-energy/energy-and-natural-resources/energy-statistics-and-modelling/energy-modelling/electricity-demand-and-generation-scenarios/

[3] https://www.aemo.com.au/Electricity/Wholesale-Electricity-Market-WEM/Reserve-capacity-mechanism/Benchmark-Reserve-Capacity-Price

similar scenario to the 2019 ISP's Aggressive build scenario) had consistently lower capital costs for the more emerging technologies.

- **Biomass emissions**. Why does Biomass have a combustion emissions factor that is higher than brown coal? Is this correct?

Yours sincerely

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