

21 March 2019

Australian Energy Market Operator (AEMO)
Via email: forecasting.planning@aemo.com.au

Dear AEMO

Planning and Forecasting Consultation Paper

Hydro Tasmania welcomes the opportunity to provide a response to AEMO's Planning and Forecasting Consultation Paper. This paper outlines a variety of assumptions and inputs that underpin key publications including the Electricity Statement of Opportunities (ESOO) and the Integrated System Plan (ISP), which play a critical role in guiding investment decisions in generation and transmission assets across the National Electricity Market (NEM). Given the importance of these publications, Hydro Tasmania appreciates AEMO's open and transparent approach to consultation and its proactive approach to engaging with industry. The consultation process that AEMO has outlined in the paper provides industry with a good platform to engage with AEMO.

The NEM is in a period of rapid transformation driven by a number of fundamental shifts including through changes to demand, supply, technology and consumer preferences. It is expected that in the coming decades the NEM will rely less on coal and rely more on low and zero emission generation sources such as wind and solar firmed by either pumped hydro, traditional hydro, gas or batteries.

As the 2018 ISP confirmed, the timing of coal-fired station retirements is one of the most significant influences on the power system development needs over the next 20 years. There is a high degree of uncertainty regarding the timing of station closures and the long lead times associated with the implementation of large scale transmission investments. Hydro Tasmania therefore strongly supports AEMO assessing the "reliability of ageing thermal plants and the timing and scale of existing thermal generators retiring and what new energy sources will replace them". In this context, a credible option would be to explore whether a 1200MW Marinus Link could be built in full from 2025 to mitigate against the market risk of early retirements, either technical or economic. Hydro Tasmania is particularly keen to continue to work with AEMO to ensure that Tasmania's full capability is understood and represented in the ISP.

Hydro Tasmania broadly supports the scenarios and input assumptions included in the Planning and Forecasting Consultation Paper and associated workbooks. Hydro Tasmania however would like to raise some issues for AEMO's further consideration, which are contained in Appendix A. The comments in the Appendix are grouped under *specific* issues (such as hydro generation modelling, connection and storage technology modelling) and comments on more *general* themes (such as the treatment of renewable targets, emissions and scenarios) to help enhance the value of AEMO's planning and forecasting documents.

Hydro Tasmania thanks AEMO for their open and inclusive approach to developing the inputs for the ISP and ESOO. Hydro Tasmania strongly supports AEMO's work on the Insights Paper and the work being completed to assess the potential ancillary services benefits of batteries and pumped hydro storage options and looks forward to continuing to work with AEMO in the development of this information.

Please contact John Cooper ((03) 6230 5313 or john.cooper@hydro.com.au) if you have any questions.

Yours sincerely



Steve Davy
CEO

Appendix A: Hydro Tasmania's comments on the Planning and Forecasting consultation paper

Specific issues

Hydro generation modelling

We appreciate AEMO's work to date in improving representation of Tasmanian hydropower, and look forward to continuing to work with AEMO to ensure the updated model is representative of the Tasmanian system.

Hydro Tasmania notes that the assumptions workbook shows reduced Tasmanian capacity, both compared to previous years and compared to data provided for the purpose of the new 7 pond model. The workbook also includes summer de-rating of a number of Tasmanian hydropower plants, which is inconsistent with the capabilities of Tasmanian system.

Storage technology modelling

Section 4.3.3 outlines inputs for storage technology modelling including storage build limits for pumped hydro. Hydro Tasmania would like to query AEMO's proposed methodology, which potentially restricts the potential build of pumped hydro. There are a number of variables that influence the capacity and storage capability of pumped hydro. It is likely that pumped hydro developers would reconfigure their opportunity to maximise benefit. For example, a 400MW pumped hydro with 12 hours of storage could make better economic sense if the cost of 100MW of 48hour storage is too high. **Hydro Tasmania therefore recommends that AEMO reconsider the storage build limits methodology that is more reflective of the investment decisions faced by developers.** For example, limits could be lifted for initial model runs, and if the limits are breached, limits aligned to the model-identified optimal storage duration could be applied for future runs.

Connection costs for pumped hydro

For the pumped hydro cost modelling¹, an allowance has been included for transmission connection to the nearest transmission substation. **Hydro Tasmania suggests that AEMO's assumed connection costs are a duplication to what is already assumed in the pumped hydro cost model.** Hydro Tasmania recommends that AEMO review these assumptions to address this duplication.

Build limits

The build limits for renewable energy do not seem to reflect the full opportunity – at least for Tasmania. Hydro Tasmania, through Battery of the Nation, has identified many more than 4000 MW of potential wind development. This is only likely to be material in later years and would require substantial interconnection strengthening. However, if the modelling finds that this is a binding limit, we would recommend that it is reconsidered.

¹ Prepared by Entura - <https://projectmarinus.tasnetworks.com.au/wp-content/uploads/2019/02/Report-Pumped-Hydro-Cost-Modelling.pdf>

Round trip efficiency

Tasmania's pumped hydro opportunities have a better round trip efficiency than AEMO's assumed efficiency of 77.5%; this is because Tasmania's opportunities tend to have shorter conveyances than other major pumped hydro opportunities. The typical round trip efficiency in Tasmania is approximately 80% and can be slightly better in some locations.

Pricing profile

Hydro Tasmania would like to commend AEMO for adopting a pricing profile for pumped hydro based on an internally consistent modelling approach applied across opportunities in each region. It is likely that individual projects may be found that are more or less expensive, yet the nature of long-term planning means that getting the trajectory right is the key to encourage the right transmission plan and generation mix.

Capacity expansion model

Previous modelling has used a capacity expansion model to establish the generation mix and transmission placement. To manage the computational challenges, simplifications are made. Simplifications reduce variability, and therefore underplay the need for capacity, transmission, diversity and storage. **It would be preferable to create an optimal outcome at the end of the period with a high resolution model and then test that against the approach developed with the capacity expansion approach.** We suspect that the two outcomes would be very different and would likely result in very different long-term economics – with the ideal long-term outcome being preferred. We would welcome a discussion with AEMO on this issue.

Build costs

There are no build costs for Aero Derivative Engines in AEMO's modelling assumptions. Hydro Tasmania queries why these generation options are not included.

In the Storage Properties section of the Input and Assumptions Workbook, it appears that the headings for "economic life" and "technical life" are switched. Hydro Tasmania suggests that AEMO considers and addresses this matter.

General Themes

Renewable policy targets

Hydro Tasmania notes that AEMO proposes to include state and Federal government policy targets as key inputs across all scenarios. The Federal Renewable Energy Target (RET) is likely to have limited impact for modelling outcomes given that the target is likely to be easily met. The state targets, however, may have a very significance influence in determining where variable renewable energy projects are developed over the long term yet the full scale of these targets is not fully legislated and may change over time. **Previous feedback at ESB forums has suggested that policies should be considered by AEMO through the use of sensitivities in the modelling. As the intent of the ISP is to provide a long-term plan for the energy industry, Hydro Tasmania recommends that modelling**

scenarios should not be excessively influenced by individual state policies but be considered as a sensitivity.

Emission reduction objectives

The consultation paper proposes that emission reduction objectives vary between the scenarios. As outlined in Table 6, the emission reduction objectives are reflected in various scenario parameters including coal retirement and generator cost trajectories.

- Compared to the 2018 ISP, the Forecasting and Planning paper proposes focusing on changes in the generation mix that may impact the power system, “with emission reduction being an output of the simulations rather than a driver”. **This approach may provide a credible proxy for an emissions constraint provided the sequence of coal retirements mimics what a carbon constraint does. However, this approach may not provide flexibility to assess various emission or demand profiles.** For example, the electricity sector could be expected to address more than its share of emissions reductions while also having a substantial increase in demand from the electrification of the vehicle fleet. This approach also relies on identifying and agreeing upon a basis for changes to station retirement schedules.
- As noted in Section 4.4.2, AEMO’s “coal retirement schedule” assumes a 50 year life; however recent retirements of coal generators in Australia have an average life of 43 years². Retirements earlier than 50 years could be driven by a variety of factors including technical and safety issues as well as financial viability. Given the risk that coal will retire earlier than the assumed 50 year life, **Hydro Tasmania supports AEMO’s consideration of the revenue sufficiency of existing coal-fired generation.** As a part of this assessment it will also be important to examine whether proposed life extension measures of coal generators extending life beyond 50 years are plausible.
- AEMO propose to use the CSIRO 4 degree scenario for all scenarios except the fast change scenario (which uses the 2 degree scenario). **A 4 degree scenario is not reflective of the international Paris Agreement which Australia has committed to. It is therefore reasonable to assume that 2 degrees should be the baseline.** The slow scenario could possibly be considered to represent a future scenario where the world economy is difficult and commitments are not met. This is reasonable to consider as an outlier scenario, but probably should not be part of the core assumptions.

Scenarios

The consultation paper proposes the following broad scenarios: fast change, neutral change, slow change and high Distributed Energy Resources (DER). Each scenario considers a range of inputs including the influence of policy on investment decisions and demand profiles for each region. **Given the degree of change underway in the energy sector, it is suggested that a broader range of scenarios could be considered.** This may be more of a thought-experiment to identify major trends and to explore the bounds of plausible scenarios. This would be in line with long-term planning in some other power markets around the world (e.g. Western Electricity Coordinating Council in the USA). Trends that could be considered in broader scenarios include:

² Analysis of Australian coal generators ceasing operation since 2012.

- **A move to a hydrogen-export economy** is relevant in terms of present planning. Commentary on how international drivers may change the security, reliability and price of our electricity system should be included
- **A form of carbon pricing mechanism is a credible future scenario.** Hydro Tasmania recognises the political sensitivity of this issue, but notes that emission reduction in the energy sector may be constrained in the future by a price based mechanism. It is important that this is covered by the modelled scenarios as it is would be expected to reveal the relative technology generation shares for a particular target as well as providing an indication of the marginal cost of abatement in the electricity sector. Understanding the plausible generation share and marginal abatement cost would be an important tool for long-term planning.
- Solar is identified as the cheapest source of energy in the consultation paper and associated workbooks. It may also be credible for **AEMO to consider a future where solar PV and wind are similarly priced.** Internationally, wind is still a lot cheaper than solar (the Energy Supply Integration Group has information about relative power purchase agreement prices in the USA). This indicates that the assumption of global capital cost patterns may not be valid which could drive the wrong modelling outcomes for the ISP and ESOO.
- **Substantial electrification – particularly of vehicles – would be a plausible future scenario** that may have a substantial impact on the power system.