

4 February 2022

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

Dear AEMO,

RE: Joint Consultation on AEMO's Draft 2022 Forecasting Assumptions Update and CSIRO's GenCost 2021-22 Consultation draft

Hydro Tasmania appreciates the opportunity to comment on two important inputs to the Australian Energy Market Operator's (AEMO) key forecasting activities in 2022 - both the Draft 2022 Forecasting Assumptions Update (Assumptions Update) and the Commonwealth Scientific and Industrial Research Organisation's (CSIRO) GenCost 2021-22 Consultation draft (GenCost report).

AEMO's efforts to consult widely and transparently with stakeholders are commended and will be important in continuing to build confidence in the breadth and balance of inputs, assumptions and scenarios that inform critical AEMO forecasts including the Electricity Statement of Opportunities (ESOO), the Gas Statement of Opportunities (GSOO), and future iterations of the Integrated System Plan (ISP).


Attachment A to this submission provides a summary of several points that Hydro Tasmania wishes to clarify within the Assumptions Update, and to a greater extent, the GenCost report. The four main areas we seek to comment on are:

1. The appropriateness of including a low-emissions gas-focused scenario within AEMO's suite of scenarios given AEMO has discontinued this approach in its recently released draft ISP;
2. Pumped hydro energy storage (PHES) cost assumptions based on actual Tasmanian project costings;
3. The importance of interconnection, particularly Marinus Link; and
4. The need to ensure that battery cost assumptions account for material supply/demand imbalances, discharge rates and inverter technology costs.

We support AEMO's efforts to ensure robust and transparent planning information is available to stakeholders – this is integral to underpinning the effective transition of the National Electricity

Market (NEM). If you wish to discuss any aspect of this submission, please contact Colin Wain (Colin.Wain@hydro.com.au or 03 8612 6443).

Yours sincerely,



Colin Wain
Manager Policy Development

Attachment A – Hydro Tasmania comments on AEMO’s Draft 2022 Forecasting Assumptions Update and CSIRO’s GenCost 2021-22 Consultation draft

1. Low-emissions gas-focused scenario

Hydro Tasmania queries the need to include a low-emissions gas-focused scenario within AEMO’s existing suite of scenarios for use in forecasting and planning publications. While some industry participants and state governments (e.g. Victoria) are investigating options to shift gas infrastructure to renewable gases, this technology is still much in its infancy. We acknowledge the recent release of AEMO’s Draft 2022 Integrated System Plan (ISP) in which the *step change* scenario is considered the most likely scenario for the future development of the NEM, with a weighting of 50 per cent based on the Delphi Panel. This weighting reflects the broad industry sentiment that, while the prospects of low-emissions gases exist, they are still in the stages of early development and should not take focus away from thorough assessments of more plausible future energy scenarios. We would also note that the gas-focused *diversified* scenario developed for the 2022 ISP was removed based on stakeholder feedback to the Inputs Assumptions Scenarios Report (IASR) consultation.

2. Pumped Hydro Energy Storage (PHES) cost assumptions

We strongly support the CSIRO’s conclusion that Tasmanian PHES is of lower cost compared to mainland PHES. The GenCost report notes that, *‘Tasmania 48 hour pumped hydro storage is 46% the cost of the mainland owing to greater confidence in Tasmanian project cost estimates (and consistent with the AEMO ISP)’* (p. 46). Based on our analysis this cost assumption should be applied to 24-hour storage as well as 48-hour storage (singled out in Figures 2-2 and 2-3 of the GenCost report). Hydro Tasmania recommends CSIRO include a 24-hour comparison for Tasmanian pumped hydro in both charts. This would be more aligned with actual planned projects’ storage duration.

In December 2020, Hydro Tasmania announced Cethana as the preferred site for Tasmanian PHES development following completion of our initial feasibility work across three project sites and has progressed the feasibility study on Cethana to an advanced stage. Due to the mature stage of this feasibility study and the detailed analysis undertaken, Hydro Tasmania is confident of its PHES cost assumptions. In our submission to the 2020-21 GenCost consultation, we noted with a high degree of confidence that Tasmanian PHES will cost in the order of \$1.6 million to \$2 million per MW (including contingency costs). We would re-affirm this cost assumption but note a one-year escalation amount should be applied to this cost assumption, and more broadly to all current technology cost assumptions within the GenCost analysis.

3. Interconnector assumptions

Regarding the CSIRO’s modelling of the additional costs of variable renewables (section 5.1 of the GenCost report) Hydro Tasmania would like to reiterate the benefit provided by interconnection between NEM regions, particularly as the NEM reaches higher shares of Variable Renewable Energy (VRE). Marinus Link, representing 1500 MW of interconnection between Tasmania and Victoria, is a critical development to allow for the delivery of Tasmania’s flexible hydropower and long-duration PHES assets, and take advantage of diverse weather profiles, for the benefit of mainland jurisdictions. The Draft 2022 ISP Optimal Development Pathway (ODP) indicates that net market benefits will be maximised by delivering Marinus Link by 2027 and 2029 for Cables 1 and 2 respectively. However, due to the uncertainty (and likely acceleration) in retirement dates for coal-powered generation assets, Marinus Link should be delivered as soon as possible to the NEM. The Draft 2022 ISP forecasts that coal-fired generation will retire faster than the currently announced

schedule across all forecast scenarios, with the most likely *step change* scenario predicting 14 GW of the remaining 23 GW of coal may retire by 2030. This highlights the need to build Marinus Link as soon as feasibly possible, to ensure Tasmania's dispatchable energy resources are available to Victoria and other mainland jurisdictions before traditional thermal generators exit the market at scale.

4. Battery cost assumptions

Hydro Tasmania acknowledges that batteries have experienced high rates of cost reductions to date. The GenCost report anticipates continuing cost reductions for battery storage technologies across the forecast period to 2050. However, in Hydro Tasmania's view there is a risk that battery costs may be materially underestimated in the GenCost report due to the following variables not being appropriately considered:

- the increasingly emerging supply/demand imbalance of battery materials, putting upward pressure on battery prices;
- the practical capacity of current battery technology being substantially lower than modelled; and
- The additional costs required to achieve the associated system-level support capabilities of batteries.

These three points are discussed in further detail below.

Supply/demand imbalance of battery materials

Noting that many of the components and minerals required to produce battery assets will be in high demand into the future, for instance in the manufacturing of electronics, electric vehicles and household and grid-scale battery applications, Hydro Tasmania considers it possible the energy industry may not see as aggressive a cost reduction for batteries as anticipated within the GenCost report. The current global semi-conductor shortage is a major variable to also be considered. The combination of high demand for products requiring semi-conductors, and the current low supply of semi-conductors, which has the potential to intensify, could result in possible cost increases for batteries especially in the medium term. Hydro Tasmania considers it prudent for the CSIRO to consider the impact of potential material supply/demand imbalances within the GenCost report's future battery cost projections.

Battery charge/discharge characteristics

The GenCost report observes '*depth of discharge in batteries is (also) a relevant factor*' in the cost-competitiveness of storage technologies. However, the report states '*all Aurecon battery costs are on a usable capacity basis such that depth of discharge is 100%*' (p. 17). We encourage the CSIRO to continue to ensure that the depth of discharge for batteries assumed in the modelling is accurate and represents a capacity that can be continually utilised and is compliant with manufacturer warranty conditions. This should include consideration of whether charge/discharge patterns will affect the assumed useable life of the asset.

Further, as Hydro Tasmania has noted in previous submissions to CSIRO and AEMO, the practical limitation of modelling approaches typically assumes that energy storages are operated with perfect foresight. As noted in AEMO's Draft 2020 ISP, '*...even minor inefficiencies in real world operations lead to the need for more storage or other forms of dispatchable generation, which will be analysed in detail in future ISPs.*' It is important that forecasting activities continue to recognise this limitation when considering whole of system technology mixes and costs.

Associated costs with system-level support capabilities in batteries

Hydro Tasmania would also suggest there may be additional costs to battery technologies associated with modern inverter technology, to allow for remote system-level control for the provision of system services. It would be sensible for CSIRO to account for these costs within the final GenCost report.