21 February 2020

ISP@aemo.com.au

Dear AEMO ISP team,

Re: Hydro Tasmania response to Draft Integrated System Plan (ISP)

Hydro Tasmania welcomes the opportunity to provide a submission to AEMO's Draft ISP. We strongly support robust and strategic system planning to assist with setting a pathway for future investment and to ensure security and reliability of supply in Australia for the long term. Given the rapidly changing nature of energy supply and markets in Australia we also support the process of providing regular updates to the ISP, acknowledging the long-term nature of these assets and lead times required for their development.

It is critical that the ISP provides a strong pathway that continues to support the energy transition that is occurring in the NEM. The ISP needs to signal least cost options that give clarity to the market to deliver flexible, reliable and secure solutions. The ISP should present a set of short-term 'actions' and a longer-term roadmap of options to support future investments. It is not the responsibility of AEMO to carry forward all subsequent actions and decisions. Consultation on the underpinning inputs, assumptions and scenarios that inform the ISP are critical to refining the roadmap, and we welcome the opportunity to provide this submission to support the ISP development process.

Tasmania is uniquely placed to support Australia through the transition to cleaner sources of energy. We have over 100 years of experience in managing a renewable power system, with storages and assets that can be repurposed or complemented to maximise capabilities for the future market. Further interconnection coupled with Tasmanian pumped hydro and wind resources can substantially contribute to a future that's clean, reliable and affordable.

Tasmania offers flexible renewable energy generation and deep energy storage (both conventional and pumped) combined with diverse supply options and a contrasting demand profile. Sharing such services and resources with the rest of the NEM will be valuable under nearly all plausible energy futures. These are investments that should be supported and accelerated now to ensure that they are available and can be delivered as the NEM needs. Delayed or late delivery of critical transmission, energy storage and additional flexible capacity represents a significant risk for energy consumers if not

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managed proactively. The ISP has a decisive role in clearing the pathway for these projects to advance, preparing the NEM for transition to a cleaner fuel mix.

Hydro Tasmania recommends that AEMO continue to engage directly with market participants on the commercial consequences of future pathways and how to consider these effects within the ISP. This is fundamentally about how the model operates and how the end results are obtained rather than just being focussed on the inputs. Certain modelled outcomes, such as investing with perfect timing (and no notable investment hurdle to account for uncertainty) or energy resources operating at a loss reduce the credibility of the outcomes, yet could be addressed with commercial insight.

Significant generation and storage investment decisions will flow from the development of ISP transmission projects, highlighting the impact of 'non-market' processes, such as the ISP, to shape and impact markets themselves. It is our preference that the ISP be presented as a set of short-term actions and a longer-term roadmap providing information to support investment decisions rather than as a specific plan with detailed timing and preferences.

Hydro Tasmania's response to the Draft ISP is structured as follows:

- Importance and strategic context of the ISP as Attachment A;
- Specific responses to the questions contained in the Draft ISP document as Attachment B; and
- Detailed response on the representation of Marinus Link as Attachment C.

We trust that the responses below are valuable to AEMO. For further information or follow-up, please contact Cameron Potter (cameron.potter@hydro.com.au).

Yours sincerely,

Andrew Catchpole
Chief Strategy Officer

Attachment A – Importance and strategic context of the ISP

Developing a robust plan in the face of uncertainty

Hydro Tasmania supports the ESB's view[1] that the AER's cost benefit analysis guidelines for the actionable ISP should *"recognise the risks to customers associated with uncertainty including risks associated with over-investment, under investment and investment that is too early or too late."* Hydro Tasmania has consistently argued that understanding and preparing for these risks is a key justification for, and benefit of, the ISP process and efficient system planning. It is also worth noting that the principle of ignoring wealth transfer as part of the least cost planning passes additional risk to the customer in the form of scarcity pricing. Without explicit consideration of competition benefits and scarcity avoidance (including mechanisms to encourage investment) the customer will pay higher prices than necessary through wealth transfer. Hydro Tasmania believes that future modelling must cater for and understand the competition benefits of pathways identified in through the ISP as this can increase the value of system planning to energy consumers.

Equally, it is also critical to communicate the degree of uncertainty in the modelling assumptions and outcomes[2]. There is a danger in over-optimisation of differences in cost-benefit analysis that are smaller than the degree of uncertainty. Where AEMO's cost-benefit modelling is used to select between transmission development pathways, small variations in assumptions or inaccuracies in modelling will feed through into cost-benefit analysis and ultimately into the identification of a preferred development path. While the mix of energy sources and overall reliability of the NEM may be similar between transmission pathways, the specifics of what is built, where it is built and when it is built may vary substantially. While this may have less importance for an insights report or a statement of opportunities, it matters greatly for a plan and the investments it supports.

> For example, if fuel costs had an error of 10% (which would be considered extremely accurate for a 20 year projection) the impact on the present value of the net market benefits could change by over $2.5b in the Central scenario. This is more than five times greater than the differences between the values of the five candidate development paths examined in the draft ISP.

It is considered beneficial to be more strategic in consideration of the kinds of resources needed. The economic consequence of inaction is much greater than the relative cost of over-investment in projects at this scale – particularly since the modelling does not consider the broader benefits outside the electricity industry or the difficulty of fast-tracking investment decisions. The business case assessment

[1] ESB Consultation on Draft ISP Rules, November 2019

[2] Hydro Tasmania has completed a white paper exploring the challenges of modelling a changing NEM in detail that is due for release shortly as part of the Future State NEM Analysis, supported by ARENA.

for Marinus Link[3] handles both of these questions very well in identifying a small but justified increase in cost to the system to be substantially more robust to future uncertainties as well as recognising the broader economic impacts.

Opportunities that offer services that are valuable for all credible assumptions should receive additional recognition. Structurally, the following services from interconnection are likely to be valuable in all situations:

- Access to under-utilised or stranded assets;
- Access to flexible supply options;
- Access to diverse supply options (contrasting both ends of the interconnector); and
- Access to diversity of load/demand (contrasting both ends of the interconnector).

Interconnectors that provide these services are unlikely to lose value. Interconnectors reliant on obtaining benefits from a single generator or load – particularly aging assets – are far more at risk of becoming stranded themselves and being a regretful investment.

Expansion model optimisation of costs and benefits

There is great complexity in carrying out detailed cost-benefit analysis, particularly at a system planning level. We support AEMO conducting transparent and rigorous consultation on the inputs, assumptions and scenarios as well as the use of sensitivity analysis to develop a clear statement on valuable services and developing a roadmap to support strategic decisions that underpin reliability and resilience. The shorter-term plan has reasonably little uncertainty and should have enough clarity to be actionable. The longer-term roadmap should only be detailed enough to encourage the market to find the best specific projects and solutions.

There are several issues that may continue to be difficult to capture under the existing modelling approach[4], these include:

- The competition benefits for consumers arising from additional interconnection, particularly increased competition for different market participants to be price setters in each NEM region;
- The hour-by-hour benefits that stem from diversity when the expansion plan is being established using a very coarse long-term model. This underestimates the benefits of diversity from both demand and generation sources;
    - The benefits of 'deep storage' (12+ hours) complements variable resources: increased storage duration will increase the likelihood of supply being available at critical times, particularly in light of imperfect foresight – see Figure 1;

[3] https://www.marinuslink.com.au/business-case-assessment/

[4] Hydro Tasmania commend AEMO on their transparency in recognising a number of these shortcomings in the Draft ISP. Unfortunately, these issues could materially affect outcomes and while they continue to exist the outcomes and recommendations of the ISP remain questionable.

Figure 1: Storage operation during a wind drought

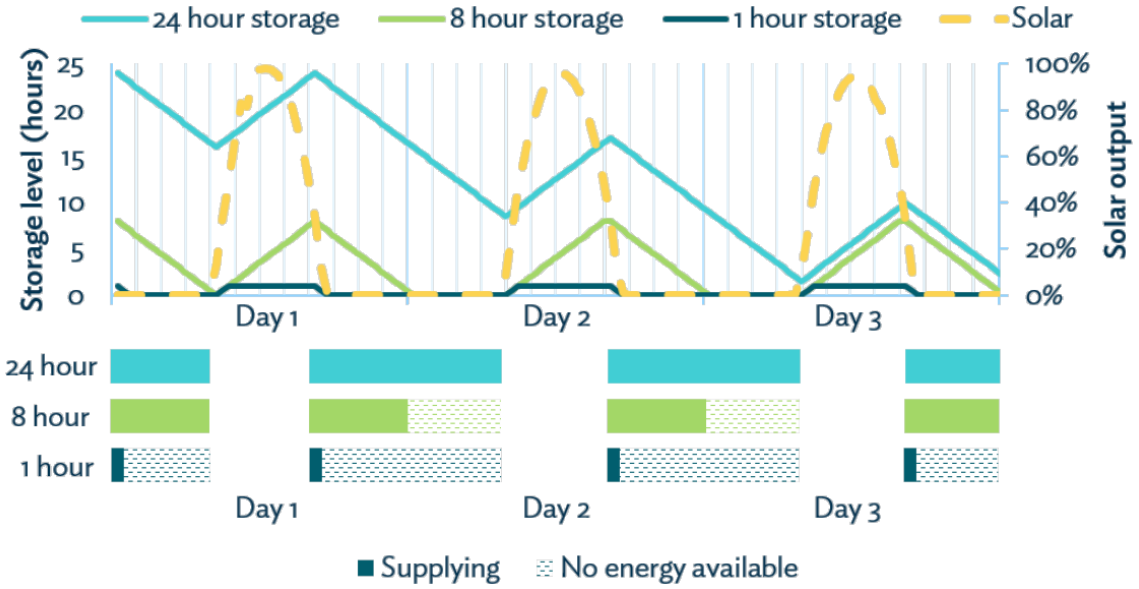

Figure 1. Demonstrating the operational capabilities of storages with different duration during a wind drought; extract from "Unlocking investment in storage for a reliable future NEM", a white paper due to be released shortly as part of Hydro Tasmania's Future State NEM Analysis, supported by ARENA.

- The lack of perfect foresight in the real world which assumes that all energy resources, demand side participation and energy storage can be dispatched efficiently and optimally to meet system peaks. This can be shown to underestimate the amount of energy, demand side or storage resources needed[5];
- Uncertainties associated with construction risks (costs and timing) – particularly without perfect knowledge of the ideal timing of the investment;
- Limits within Australia on the number and scale of projects that can be resourced, developed, constructed and commissioned within a set period of time – particularly for complex non-modular developments such as hydropower; and
- That modelling may select theoretical energy resources before credible development opportunities (which already have a proponent and expenditure). It is Hydro Tasmania's view that announced, 'real-world' projects should be given additional consideration over and above theoretical modelled proposals in the ISP and that, where relevant, AEMO should engage directly with project proponents to accurately represent development opportunities. In particular, there is a notable difference between a theoretical desktop study and site-based technical feasibility study for pumped hydro. See call out box below.

[5] Hydro Tasmania have produced a white paper on this topic that is due to be released shortly as part of the Future State NEM analysis supported by ARENA. It uses a mathematical model to understand the impact of imperfect foresight and leverages over a century of experience in operating an energy constrained system and balancing resources to manage power system requirements.

Project Readiness Check: "Credible Project" category

Hydro Tasmania recommends the use of a project readiness check to establish increased credibility of development options and costs. AEMO differentiates committed projects, but treats everything else as equal. This proposal would encourage a project readiness assessment to increase confidence in costs for projects that have invested money to reduce uncertainty thereby creating a new "credible project" category to differentiate from generic projects that may or may not be real.

While some asset classes have little uncertainty in their cost projections, others are much more variable. Pumped hydro is a good example. For pumped hydro, one of the main drivers of the construction cost uncertainty is the geological model. Entura's pumped hydro cost model assumes that the geological models of Australia are accurate and has identified and costed sites accordingly. Evidence in the market shows that the geological models are frequently in need of updating for specific sites and this can have substantial cost impacts. Entura have reviewed this uncertainty and have noted that project costs can increase by 50% or more between desktop and site-based assessments. This often results in the abandoning or delaying of an investment.

Projects that have completed technical site assessments have a higher degree of confidence in cost and can be viewed as a more credible project. Without this onsite information, it is reasonable to assume that the costs of the project will be substantially higher. Similarly, environmental assessments (including specific plan for access to water) should also be considered in determining whether a project is credible or remains high risk.

For example, Hydro Tasmania has extensive experience in Tasmanian geology near its existing power stations, and yet still identified a need to adjust the geological model for one of the three pumped hydro opportunities that have had onsite geotechnical investigations.

It is also worth noting that project uncertainty is not limited to pumped hydro. The ISP identifies renewable energy zones with very high capacity factors without any existing developments. The appetite for investment, support for development and even the resource is yet to be tested for these zones. If the opportunity was very strong, it is likely that they would already have seen development. Therefore a similar project readiness assessment could be undertaken for these uncertain opportunities.

<u>Understanding the cost of public policy on least-cost modelling outcomes</u>

Hydro Tasmania acknowledges that Federal, State and Territory policies will have an impact on ISP modelling. While it is not the role of AEMO to determine public policy decisions, it could be granted the flexibility to consider how the NEM would develop in the absence of some or all federal or state-based policy interventions. This would also serve to acknowledge that policy positions may change over time or may be hard to meet in current proposed timeframes. Gaining a full understanding of policy impacts can improve scenario planning and cost assessment. In parallel, AEMO should consider

sensitivities that test the input assumptions about distributed energy resources by instead modelling the likely DER build-out on a cost-reflective investment basis. Testing these amendments would provide additional insights into the optimal and least-cost development pathway for consumers – consistent with the National Electricity Objective. The analysis could be used to highlight the transmission development paths, energy resources and geographic areas that are best suited to further development in the absence of other influences.

Hydro Tasmania also believes that AEMO must consider international experience of market trends and developments. This includes technology costs, asset closure, re-investment schedules and the plan for complete decarbonisation of energy systems in other jurisdictions. Reference to these international developments is important when considering what sensitivity analysis to conduct in the Australian context.

Application of "least worst cost" approach to determine least regrets

Achieving the least-regrets outcome relies on the flexibility and responsiveness of the investors in the system being properly understood. If the flexibility of response and confidence of investors is over-stated, the risks will be understated and the delayed investment will be regretful. The risk of overbuild is unchanged, yet the risk of underbuild is understated since the response is coordinated to minimise the cost of the system while maintaining reliability – all with perfect knowledge of future requirements.

Proposed pathway forward

Hydro Tasmania recognise that the quantity of work required to accommodate and respond to the changes raised in this submission cannot be completed in three months. Indeed, even when a subset of these issues was raised towards the start of the Draft ISP modelling process it was considered to be highly challenging to address many of these concerns. Nonetheless, it remains important to acknowledge that the draft ISP results are affected by these issues. Hydro Tasmania strongly suggests that the final ISP focuses less on optimisation of a prescriptive plan and instead put more energy into the roadmap concept, explaining the impact of decisions and uncertainties in influencing the direction of investment in the NEM.

Attachment B - Specific responses to the questions contained in the Draft ISP

1. Has AEMO considered the most appropriate development options for Australia's future energy system? If not, what other credible options should AEMO consider for the 2020 ISP?

- The ISP recognises a range of potential development options including both network and supply infrastructure. At this stage, Hydro Tasmania is not seeking to expand the range of considered options, however, the key challenge of the ISP is how the various development options are considered, both qualitatively and quantitatively.

- We believe that the network options considered in the ISP are appropriate; although it is worth noting that the detailed costing for some projects appear more certain than others. Hydro Tasmania would propose that uncertainty is recognised as a cost increment in the model.

We believe there continue to be issues with the underlying (modelled) supply options considered. The following points relate to the supply options that the ISP considers in selecting both network and generation options.

- Our experience as a hydropower developer indicates that there continue to be issues with the pumped hydro build limits in NEM states and the assumed available resource. Due to the technical, geological, economic and locational difficulties in developing pumped hydro sites we recommend that identified sites are preferenced[6] over theoretical (modelled) sites. This is a view we have also put forward in recent submissions to the ESB and AER consultation.

  > *"With respect to the interpretation of "technically feasible" Hydro Tasmania's view is that announced, 'real-world' projects should be given additional consideration over and above theoretical modelled proposals. Having an actual proponent attached to a project or project investigation should elevate the likelihood of that project being considered and selected as part of AEMO's development pathways. To do this, AEMO could consider an appropriate threshold test, such as: feasibility studies; formal steps towards development approvals; material spend (e.g. greater than $5m); community information sessions and/or consultation."*
  > (Hydro Tasmania submission to AER Guidelines to make the ISP Actionable)

- Similar to the point above, we believe that modelled, theoretical REZs selected by AEMO modelling are being included in the ISP on the basis of capacity factors that have not been tested and may not be credible at this stage. If a REZ has not had active development it is

[6] The preferencing could be via a priority system or could be applied through a cost penalty based on observed challenges in progressing projects with major unknown components.

certainly higher risk than REZs with established resources and where opportunities have been determined to be commercial.

It is recommended that the uncertainty of the REZ should be recognised as a cost until the resource and opportunity is clearly established. For example, Queensland's wind capacity factors appear unrealistically high compared with evidence of development appetite. Queensland's only fully-commissioned large wind farm, Mount Emerald, has been observed to have a capacity factor of just 29% of registered capacity despite being a new wind farm. However, the nearby REZs assume an average capacity factor of 45% (North Queensland Energy Hub) to 56% (Far North Queensland). AEMO should test whether the assumed capacity factors across the NEM are appropriate and preference REZs with identified, and invested in, developments.

- Each energy technology will bring different characteristics to the future NEM. The increasing role, dependence and focus on energy storage means that it is critical to accurately represent this technology class. There are significant differences between shallow and deep storage including how it will operate and contribute to secure and reliable NEM operation. We recommend AEMO continue to improve their representation and understanding of the role of deep storage and seek to include reference to imperfect foresight in their modelling.

  Specifically, we believe AEMO should consider the propensity for storage to be available coincident with supply shortages/peak demand. The availability of storage and likelihood of it being available for dispatch at critical periods is reflective of the storage duration of the resource. This is recognised on page 46 of the Draft ISP:

  > *"The Draft ISP analysis assumes optimal operation of the installed storage with perfect foresight. However, 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."*

  Analysis by Hydro Tasmania has identified that with more realistic forecasts, more and longer duration storages are likely to be required to deliver similar system outcomes. To achieve a similar value to that predicted by a model with perfect foresight, a storage with 2-3 times the duration would be required when using real (imperfect) forecasts – and that is not including the relative price impact of scarce long-duration options. Hydro Tasmania intends to publicly release this analysis shortly.

- AEMO should consider realistic concurrent build limits per technology. During periods with little change in the power system, the likelihood of projecting developments beyond deliverability limits is considered low. However, the NEM is undergoing a notable transition and there are periods where development is projected to substantially outpace likely construction capacity.

For example, to build at a rate of 1 GW of pumped hydro storage per year would require many concurrent tunnelling projects – especially if the projects are 250 MW in capacity and take 4-5 years to complete. Under ISP projections the Central scenario could peak at 21 concurrent pumped hydro construction projects.

Recognising potential construction constraints would allow strategic consideration of build profiles including whether some identified investments may need to be sequenced earlier in order to deliver a least-cost supply mix. This could materially change the projected builds across the NEM – particularly in the case of pumped hydro which requires tunnelling, a scarce and specialised skillset.

- Hydro Tasmania recommends engaging a specialist consultant to provide advice in this matter and on what concurrent build limits may be practical – both within jurisdiction and across the entire NEM.

2. Has AEMO properly described the identified need for upcoming actionable ISP projects? If not, how can that description be improved?

- As noted, there is considerable uncertainty in future demand, technology costs and the longevity of existing resources. Hydro Tasmania considers AEMO's role to be identifying a roadmap that balances the economic needs of consumers with this uncertainty and informs decision makers in investing and building suitable policy. We agree that the development options should seek to minimise both costs and risks for consumers in light of an uncertain future. Aligned with this is the need to make least-regret decisions including accessing transmission and generation options that perform well and are needed under a range of future scenarios.

  It is particularly important to recognise the consequence of delayed investments. Uncertainty introduces risk and this leads to challenges in making investment decisions resulting in a structural preference for scarcity in the market – resulting in wealth transfer from consumers to others in the market.

  It is Hydro Tasmania's opinion that flexible renewable energy resources and energy storage will be a critical part of the future NEM under the full range of future scenarios and developments that will bring forward such investments will be valuable in all plausible futures.

- We welcome the reference in the recent AER Issues Paper to the need to "mitigate the risks of over-investment, under-investment, premature or overdue investment."[7] This is a useful lens under which to consider the identified need for ISP investments. The National Electricity Objective (NEO) is intended to maximise benefit for the consumer. To meet the intent of the

[7] AER Issues Paper – Guidelines to make the ISP actionable

NEO AEMO should fully consider the need for investment that can safeguard against poor consumer outcomes including competition issues (lack or insufficient competition in the provision of a particular resource, service or contract type) and explicitly considering wealth transfer from consumers to others. Understanding the benefits and costs of investments also needs to be tested against High Impact, Low Probability events through scenario testing to ensure that suitable outcomes are achieved for "price, quality, safety and reliability and security of supply of electricity".

3. What, if any, additional factors should AEMO consider when identifying which Renewable Energy Zones are best suited to further development?

- There are benefits in diversity in both the type and location of generation sources available. This is particularly true for variable renewable generation development. The development of REZ with complementary energy resources should also be prioritised. This should not be based on existing demand patterns or supply patterns, but instead considered as part of the overall optimisation using a fine temporal resolution model that can understand the benefits of diversity when selecting candidate transmission options. Hydro Tasmania understands that the LT model requires some compromises; yet in a system driven by variable renewable energy supply, it is not suitable to forego an adequate understanding of time-based behaviour.

- As stated in our submission to the recent AER Issues Paper: *It is important to reflect the externalities of increased and adverse weather events, such as the risks of fire, flood and wind impacting on transmission assets. Local TNSPs are best placed to understand and advise on these risks, nonetheless, Hydro Tasmania believes that consideration of these impacts on the NEM should be included in the selection of the optimal development path. This could be done through the HILP framework or through a similar mechanism and can ensure that system planning increases resilience to these future risks.*

- As noted above (in the response to Q1): the available resource, environmental outcomes and commercial outcomes of some REZs are more certain than others. It is recommended that this certainty/uncertainty is explicitly considered as part of the modelling exercise – either through a priority classification or through costing the uncertainty.

4. Has AEMO combined the development options into the most likely candidate development paths? If not, what other combinations should AEMO consider?

- Hydro Tasmania believes that the ISP should also include consideration of what a least cost system plan would look like against the pure National Electricity Objective (NEO) and without variations induced by state-based policy considerations. Given that policy is itself a key uncertainty it would be useful to remove that lens and, for transparency, to provide information on costs and benefits for customers.

While we acknowledge that it is not the role of AEMO to determine public policy decisions, it could be granted the flexibility to consider how the NEM would develop in the absence of Federal or state-based policy interventions. This could provide additional insights into the optimal and least-cost development pathway for consumers. This analysis would build on AEMO's established work on Renewable Energy Zones and could highlight the transmission development paths, energy resources and geographic areas that are best suited to further development in order to minimise costs to consumers. It may also provide insight into any additional costs and/or benefits imposed by having locational based constraints in generation or resource development. Hydro Tasmania believes that providing advice on least-cost supply in this manner would be consistent with the National Electricity Objective.

- Related to the above there are current initiatives that are ambitious in scope and are understood through the lens of the ISP to be delivered against reported timeframes. This may be unrealistic as there may be technical or resource constraints that prevent all projects being delivered on schedule. To successfully inform future options, the ISP must be conscious of these potential technical, environmental and/or social challenges all of which could result in delays or cost increases. The candidate development paths should be tested against these uncertainties; Hydro Tasmania acknowledge that AEMO would struggle to resolve the site or zone specific risks, but could call upon support from jurisdictional planners. For example, recent experience across the NEM has already shown substantial challenges in REZ developments (both wind and solar), overland transmission corridors and geotechnical challenges for pumped hydro.

- As noted in question 6 on VNI West the ability of key infrastructure to be delivered in assumed timeframes needs to be robustly tested – particularly in light of potential social and environmental concern regarding new large-scale overland transmission corridors. The interrelated nature of proposed ISP investments mean that differences in timing could have significant impact on the viability and need for other options. The Draft ISP identifies that delays in VNI West would be a strong driver for earlier commitment to Marinus Link.

5. Are there any other factors that AEMO should take into account when assessing the merits of candidate development paths?

- We strongly believe it is in consumer interests that the ISP include robust analysis of the competition benefits to consumers of the proposed development paths. This should include analysis of the market impacts of additional interconnection, the benefits of sharing resources between regions, and adding to the pool of potential price setters in each NEM region.

  It is Hydro Tasmania's view that *'under-investment risk'* could cause not just the over-use of more expensive forms of generation, but could also lead to potential consumer costs from diminished competition resulting in wealth transfer. The cost benefit analysis guidelines for the ISP and for RIT-Ts should appropriately consider and weigh the competition benefits that transmission investment can bring. This includes: the ability to protect against or minimise

price shocks in the event of plant closure or changes in market concentration; increased market liquidity; and greater customer choice (among others).

- Representation of small and non-scheduled (SaNS) generation: To be "actionable" it is critical that the ISP and associated forecasts represent the system as accurately as possible. One present oversimplification is the treatment of Tasmania's Small and Non-Scheduled (SaNS) generators[8]. At a system-wide level this may appear to be of minimal consequence, yet may substantially impact the understanding of the value of Marinus Link – a major infrastructure investment currently under assessment. Tasmania has a comparably high proportion of flexible and dispatchable SaNS supply options that already operate in response to price signals. This is presently not recognised in the modelling of the system. It would be a notable improvement to subtract the operation of these assets from the aggregated net demand trace and then model the hydropower SaNS responding to the appropriate market signals.

- Various input assumptions are also highly relevant when considering candidate development paths. These are further detailed in Hydro Tasmania's submission on assumptions and inputs:
    - Better recognition of the cost of capital, particularly for capacity-focused supply options will magnify the cost differences between technologies and projects. Interconnection that can access cheaper resources will become more valuable.
    - The regional cost multipliers need serious consideration as they may inadvertently be biasing outcomes in unintended ways. Substantial development in regional locations will strengthen infrastructure for future projects.
    - The risk of transmission outages is credible and could influence the valuation of candidate development paths.

- There needs to be consistency in the modelling with respect to demand assumptions. Tasmania's present economic performance is among the strongest in the country and the long-term economic forecast of a widening gap between the rich and poor states does not appear to be based on present state performance or account for Tasmania's economic opportunities. Hydro Tasmania would recommend reviewing the economic forecasts for the states to ensure that the fundamentals that drive demand are well-justified.

6. What, if any, additional factors should AEMO consider to assess the development and timing of VNI West?

- Market participants understand the challenges of developing and commissioning significant infrastructure within required timeframes. While this is true of any project, the scope and

[8] *Unlocking Tasmania's energy capacity through interconnection*, Dec 2018, https://www.hydro.com.au/docs/default-source/clean-energy/battery-of-the-nation/unlocking-tasmania's-energy-capacity_december-2018.pdf?sfvrsn=8d159828_6

location of VNI West has its own unique challenges. It is therefore reasonable to consider the risks of project delivery within the 2026/27 timeframe and also test the accuracy of the present cost projections, particularly in light of environmental and social challenges for overland transmission.

- If the timeframe above is considered ambitious in some scenarios, should these risks as well as the insurance value of actioning alternative pathways be more fully considered? As has been demonstrated in both AEMO and TasNetworks analysis, a 1500MW Marinus Link provides additional flexible resources for the NEM and can provide significant insurance value against other project delivery timeframes and/or unforeseen changes in demand or plant availability. Uncertainties of this type should be considered in the central scenario as well as through sensitivity testing of all scenarios.

7. Are there any aspects of the Draft 2020 ISP that require further or clearer explanation so that results are transparent and can be easily understood?

- On the whole Hydro Tasmania believes that Draft 2020 ISP is both clear and transparent. There are some low level details on how certain years are arrived at (for example, Central, High DER and Fast Change scenarios all show very different value for Marinus Link – and yet all recommend the same year for development). However, for the purposes of developing a roadmap to help inform and influence decisions the results are clear. Hydro Tasmania would particularly like to commend AEMO on its openness in discussing and identifying the limitations of the model and its underlying assumptions (such as the impact of perfect foresight) and how these may change the outcomes if better represented.

8. What, if any, modifications should AEMO consider for the proposed 2020 ISP stakeholder engagement plan and timeline?

- The ISP is a challenging undertaking and delivering this breadth of analysis requires substantial effort. Unfortunately this has also meant that at several key points AEMO has been forced to defer analysis or improvements in the modelling due to time constraints.
    - It may be beneficial to utilise some simplifications that would allow more iterations and improved responsiveness to feedback and suggestions.
    - The broad outcomes are more useful than the optimisation of the model, particularly beyond the accuracy of its assumptions. This could also allow a wider set of scenarios covering more plausible futures.

Attachment C – Representation of Marinus Link in Draft ISP

There are a range of uncertainties and modelling inconsistencies that likely underestimate the value of Marinus Link, yet very few (if any) that overestimate its value. Removing even a few uncertainties changes the optimal development path as identified by the ISP. This is recognised in the Draft ISP:

- *"Draft ISP analysis assumes optimal operation of the installed storage with perfect foresight. However, 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."*
- If *"state-based schemes finish early, REZ development in New South Wales, South Australia and Tasmania will be accelerated."*

Hydro Tasmania has analysed the cost to deliver a new and 100% firm supply of energy to Victoria using a first principles approach. By repurposing Tasmania's existing hydropower assets from energy provision to capacity provision and through utilising Tasmania's low cost deep storage and high capacity factor (diverse) wind, Tasmania can provide services at a notably lower cost to the customer (including the cost of transmission across Bass Strait) . This would also increase competition in Victoria.

Figure 2: Comparison of Tasmania options against alternative firm supply to Victoria

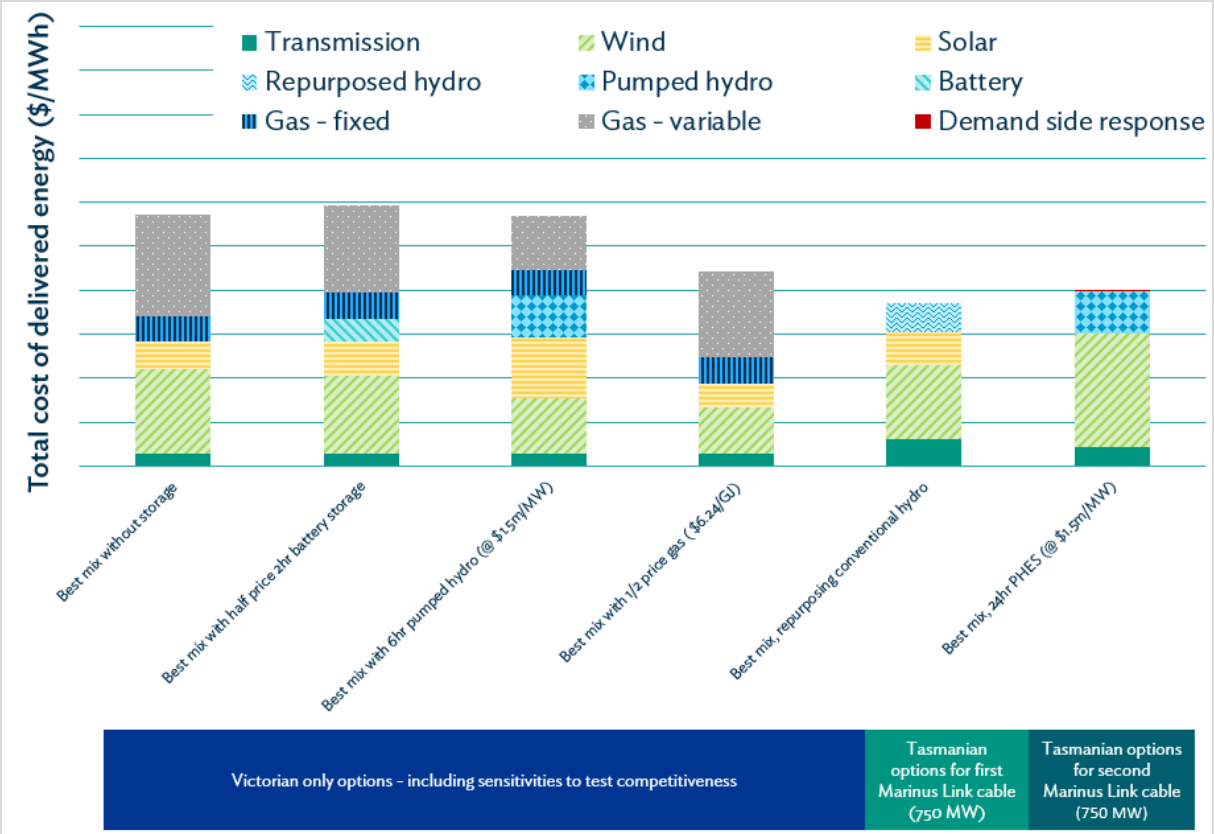

Figure 2. Integrated cost estimates to deliver 750 MW of new firm energy to Victorian load centres, including testing for sensitivities.

More accurately representing the following issues would improve the understanding of the value of Marinus Link:

- Recognition of the importance of deep storage – particularly in light of imperfect foresight. Hydro Tasmania would welcome the opportunity to discuss this further with AEMO.
- Acknowledging the challenges associated with building overland transmission due to social and environmental concerns.
- Representation of hourly diversity of both supply (e.g. wind) and demand in long-term planning – intra-day variability is expected to be the major driver of system requirements, not a subordinate issue to be tested in post-processing or secondary model simulations.
- Appreciation of the different nature of Tasmania's large proportion of flexible and dispatchable "small and non-scheduled" (SaNS) generation that is presently inaccurately represented as flat negative demand.
- Potential impacts of a scenario where the electricity sector is required to do more than its 'share' of carbon abatement (e.g. a trajectory towards net-zero emissions by mid-century).
- The concurrent construction limitations on complex asset development, particularly pumped hydro.
    - It should be noted that a potential solution to limits on concurrent resource development could be to bring forward some projects, spreading the construction requirements over a longer period of time. Assessing opportunities to pull forward asset development could form part of the ISP roadmap and would strongly align with consumer interests over the longer-term through maintaining access to a least-cost supply technology mix.
- Recognition of "credible projects" through a project readiness assessment – both in terms of geotechnically tested pumped hydro and proven high value, high diversity wind.
- Recognising the competition benefits of more strongly joining the Tas and Vic NEM regions.
- An increased valuation of wind compared with solar (which appears to be in line with information provided by a range of market modelling consultants) – AEMO's ratio of wind to solar appears to be somewhat of an outlier.
- A broader and more representative range of scenarios to better reflect the intention of "Scenarios and sensitivities to span all plausible operating environments". Scenarios to balance the existing set should include a low distributed energy scenario (e.g. "*a Fast Change scenario with greater investment in grid-scale technology*" that limits the driver for residential response) and also a high electrification scenario (e.g. a scenario where demand increases substantially).
- Providing additional insight through modelling a least-cost mix of technologies that is not influenced by policy overlays – consistent with the NEO.
- Understanding of the impact of the loss of interconnection and transmission as a credible contingency – bushfires, high winds and insulation failures make this particularly relevant.
- Recognition of the cost of distributed energy resources in the plan – for example, in the High DER scenario there is over 35 GW of behind the meter batteries installed as an input assumption, battery costs alone would total to almost $100b – many times the investment cost of centralised storage in any scenario. Customers would be exposed to this cost and would be a notable inefficiency for Australia's economy. Similarly, this is only possible with

assumptions of aggregation and centralised control, likely via a highly reliable communications network.

  - This risk is recognised in the Draft ISP, although not sufficiently tested. “Without urgent and well targeted reforms, the high levels of DER projected in this ISP would not be achievable and limits may have to be imposed on DER instead.”

- Understanding of the consequence of investment uncertainty on how the system investments will be made. “The Draft ISP assumes generation investments will be guided by a well-functioning market that has appropriate signals to guide timely investments.” However, market structures reward the maintenance of scarcity resulting in high prices and at times reliability challenges such as those experienced in 2019.
- There is a high expectation of energy conservation and efficiency which is projected to flatten overall energy consumption, generally reducing peak and raising minimum demand over the outlook period. This assumption is not proven and acts to minimise the need for action – a potentially risky assumption to make if not counter-balanced with an understanding of what may occur if the assumption was not accurate.
  - We recommend a sensitivity where the distributed energy resources are not centrally controlled. It is understood that this may result in imposed limits or additional resources to help manage the variability; it is important to understand this risk.
- Implementing an approach that follows through on the concept of not weighting any scenario over another. The Draft ISP states that, “A potential ISP development path is only considered justified when it is assessed as likely to deliver benefits under the Central scenario.” As all sensitivities are tested against the Central scenario, clearly the Central scenario holds a dominant position among the scenarios. A more even, less prescriptive, approach to scenario evaluation would be beneficial in understanding the breadth of possible futures, noting that the reality is that scenario influences will change over time.
- Recognising the impact of risk-weighted discount rates. 5.90% discount rate may be suitable for regulated investments; however, generation assets, especially capacity-focussed assets, have a very different risk profile. Lower cost options will be more robust to the discount rates that recognises the inherent cost of uncertain revenues.