

10 February 2022

Mr Daniel Westerman  
Chief Executive Officer  
Australian Energy Market Operator

Email: [ISP@aemo.com.au](mailto:ISP@aemo.com.au)

## AEMO Draft 2022 ISP

Dear Mr Westerman,

Energy Networks Australia (ENA) welcomes the opportunity to provide a response to the Australian Energy Market Operator (AEMO) on the Draft 2022 Integrated System Plan (ISP).

ENA is the national industry body representing Australia's electricity transmission and distribution and gas distribution networks. Our members provide more than 16 million electricity and gas connections to almost every home and business across Australia.

Many of our transmission members are providing separate more detailed responses to the ISP.

Transmission is an important enabler for the move to a lower emissions economy. New transmission is an essential backbone to keep consumer costs down and support the reliability and security of the electricity system as we transition to renewables.

ENA broadly supports the directions and the scenarios of the Draft 2022 ISP and commend AEMO for the extensive development and engagement effort to date.

The draft optimal development path (ODP) proposes significant network investment that is expected to deliver over \$29b in net market benefit or a 2.5 times return. This investment is key to enabling variable renewable energy (VRE) development, storage and gas fired generation while fulfilling public policy, security, reliability and sustainability though what is a complex transition.

ENA has provided a detailed response in the Attachment. In summary:

- » It is important that the local Transmission Network Service Providers (TNSP) continue analysis to ensure the right transmission investment projects proceed through the further regulatory and investment processes and are ultimately in the long-term interests of consumers;
- » It is appropriate for the TNSPs to plan and engage with local communities at the more detailed level during and after the Regulatory Investment Test – Transmission (RIT-T) to ensure meaningful engagement and a no surprises approach;
- » There is a global movement to decarbonize and materials and resources will be in demand across the world. AEMO correctly point out that the demand for concrete, steel and key staff is likely to lead to increased costs and delays. It would be naive to consider that all project timings are going to be delivered as planned in the current environment;
- » Investment risk is quite asymmetric. The risk of under investing in transmission is far greater for consumers than the risk of over investing.
- » There is considerable work in generation and transmission development in Australia, not to mention other government infrastructure projects. Sequencing of ISP projects delivery and

state policy work can be considered but planning for just in time delivery is likely to be risky in this environment;

- » The Draft ISP rightly notes the option value from staging where a project may be delayed, however there is also benefit in considering option value if other projects are also delayed;
- » It should also be noted gaining social license, managing project delivery and cost risks are not solved by contestability;
- » AEMO has provided a balance of large variable renewable energy (VRE) with transmission and also small scale distributed energy resources (DER). Transmission and distribution connected generation both have a significant role to play in the scenarios, it is not a double up when compared to large generation and transmission. The uptake of small scale DER and the ability to control millions of devices is similarly not without challenges;
- » Moving projects such as Humelink from actionable ISP projects to staged actionable projects creates numerous challenges. A staged actionable creates uncertainty and potential for the project to lose some momentum, adding to cost and risks. Proceeding as an actionable ISP project with staged contingent project applications (CPAs) may be preferable, noting this is the approach agreed between TransGrid and the Australian Energy Regulator (AER) for Humelink;
- » The ISP should consider the insurance value of aiming to deliver VNI West at the earliest date 2027-28 so Victoria has access to deep storage. This would diversify the risk across VNI West and Marinus Link should one project be delayed. The risks of Victoria being a significant importer of energy and reliant on two key interconnectors should also be considered;
- » Renewable Energy Zone (REZ) design parameters should be aligned to and supported by the state before the final 2022 ISP triggers REZ design reports;
- » The role of transmission lines in the Hydrogen Superpower scenario should be tested and the weighting of this scenario adjusted accordingly. A combination of both pipeline and electrical infrastructure may be required. Scheduled/dispatchable hydrogen electrolyzers may play a positive role in balancing supply and demand in a high renewables future. It would be useful to split the domestic hydrogen and export driven network costs out to ensure that electricity consumers only fund network that supports domestic electricity consumption; and
- » ENA is supportive of the further work AEMO will undertake in preparing the final 2022 ISP on distributional impacts and network resilience.

Should you have any queries on this response please feel free to contact Verity Watson, [vwatson@energynetworks.com.au](mailto:vwatson@energynetworks.com.au).

Yours sincerely,



Andrew Dillon

CEO

## Attachment

The ISP undertakes extensive modelling to develop an ODP based on a set of inputs which have undergone extensive consultation. The ISP identifies an investment need with potential market benefits, not a preferred solution. The RIT-T has an important role to develop options and ensure any project that does proceed is subject to a rigorous cost benefits test in its own right. It is important that the local TNSPs continue analysis to ensure the right transmission investment projects proceed through the further regulatory and investment processes and are ultimately in the long-term interests of consumers. It is appropriate for the TNSPs to plan and engage with local communities at the more detailed level during and after the RIT-T to ensure meaningful engagement and a no surprises approach.

The ISP is a portfolio of projects that are robust to a range of scenarios and tested against a least regrets approach. The three main scenarios Step Change, Progressive Change and Hydrogen Superpower lead to substantive increases in demand as parts of the economy electrify to reduce emissions. However, the role of transmission lines in the Hydrogen Superpower scenario should be tested and the weighting of this scenario adjusted accordingly. A combination of both pipeline and electrical infrastructure may be required. Scheduled/dispatchable hydrogen electrolysers may play a positive role in balancing supply and demand in a high renewables future. It would be useful to split the domestic hydrogen and export driven network costs out to ensure that electricity consumers only fund network that supports domestic electricity consumption. This should also drive efficient utilisation of electricity transmission networks.

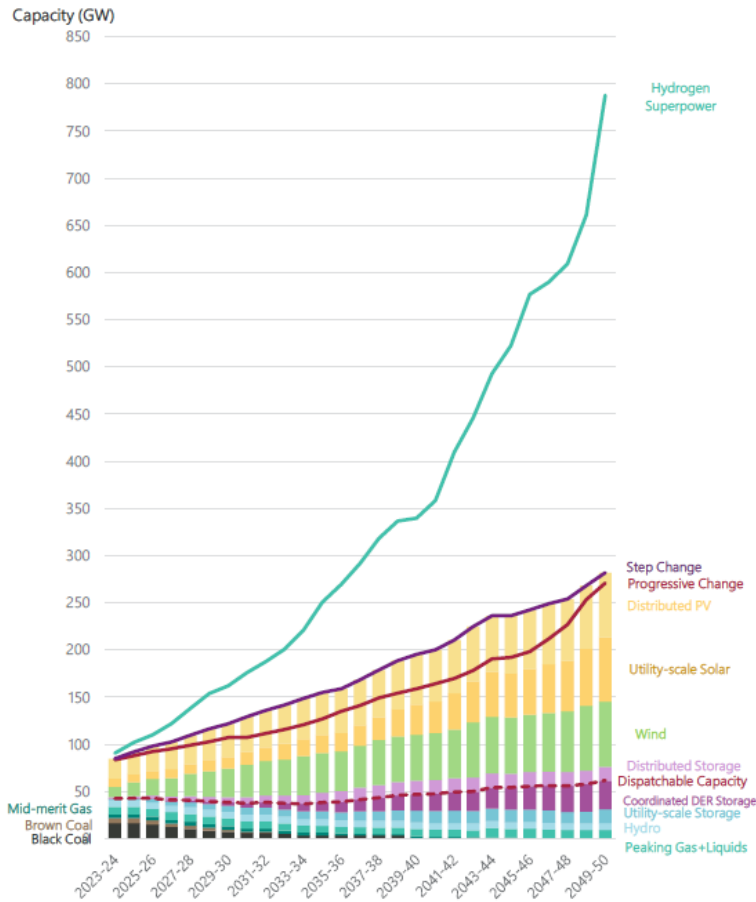
The Draft ISP (and earlier inputs) has been developed by AEMO with significant stakeholder engagement, based on independent expert reports, challenged by a range of consumer and industry experts in the Consumer Panel with AER review of the robustness of the process. The portfolio of projects on the ODP seeks to manage risk for consumers given the uncertain future.

These actionable ISP projects serve to strengthen the essential transmission backbone of the National Electricity Market (NEM). Doing nothing is not an option as the thermal generation fleet ages, nearing the end of economic or equipment life. The ISP envisages that brown coal generation retires by 2031 and black coal generators by 2040.

Gas, hydro generation and utility scale are important for dispatchable firm supply to meet consumer demand. Coordinated DER with storage that are able to provide firm generation when needed are also part of the dispatchable supply mix, Fig 1.

It is important to strengthen the essential backbone transmission network to diversify the generation mix across regions. Under the scenarios outlined below new transmission is essential, it is not a matter of if they are needed but when. The risk of under investing in transmission is far greater for consumers than over investing.

Fig 1: Development opportunities to 2050 in Step change compared to Progressive change and Hydrogen Superpower<sup>1</sup>



**The Draft ISP rightly notes delivery risks**

There is a global movement to decarbonise; materials and resources will be in demand across the world. AEMO correctly point out that the demand for concrete, steel and key staff is likely to lead to increased costs and delays. It would be naive to consider that the project timings outlined in the Draft 2022 ISP<sup>2</sup> are going to be delivered as planned in the current environment.

There is considerable work in generation and transmission development in Australia, not to mention other government infrastructure projects. Sequencing of ISP project delivery and state policy work can be considered but planning for just in time delivery is likely to be risky in this environment. The risk of late delivery versus early delivery are not symmetrical, late delivery has the potential to result in less reliable energy delivery for consumers at higher cost.

<sup>1</sup> AEMO Draft 2022 Integrated System Plan, Fig 11, p34

<sup>2</sup> AEMO, Draft 2022 ISP, Table 1 p13

The Draft ISP rightly notes the option value from staging where a project may be delayed, however there is also benefit in considering option value if 1 or more other projects are delayed. Staging can also lead to higher costs and delays.

Securing social licence for large transmission investments is also essential. ENA concur with AEMO that participants and jurisdictions need to consolidate and align appropriate compensation mechanisms for affected land owners and communities. Any changes in approach need to also be reflected in approved project cost recovery.

### ***Sense checking the balance of small and large scale***

AEMO envisages a mix of large VRE with transmission and also small-scale distributed energy systems in Fig 1. Both transmission connected and distribution connected generation and storage have a significant role to play in the range of possible futures, it is not a double up when compared to large generation and transmission.

The assumed level of orchestrated DER is becoming material by the mid 2030's. The Draft ISP is assuming that all DER generation can be exported into the distribution network, however there will be a point where these resources need to be actively managed to avoid issues on the power system. The social licence for DER also needs to be secured. To enable optimisation of benefits for all consumers, some consumers will need to allow control of their devices and met any needed technology and communications requirements.

Millions of rooftop solar, distributed storage and orchestrated DER play a significant part of the generation mix by 2050 under Step change and Progressive change scenarios. The interaction of these devices on the distribution network with the transmission network and the ability to maintain essential system services needs to be considered further. The uptake of small scale DER and the ability to control millions of devices is similarly not without challenges. There is benefit in elaborating the timing of technology development and control of these devices and likely penetration to ensure that the levels of control and coordination required is achievable. ENA welcome the efforts to provide further input into the final 2022 ISP and improved analysis into the 2024 ISP, presumably into the Draft Inputs, Assumptions and Scenarios Report (IASR) in December 2022.

The Draft ISP, Fig 21 indicates the importance of firm dispatchable generation in the NEM (exc Qld) in the form of hydro, gas and storage for a winter week. Large scale firming resources and transmission play a strong role during low renewable energy periods, it is important to get the balance right.

### ***Moving projects like HumeLink to staged actionable projects creates a number of risks***

AEMO suggest that HumeLink be a staged actionable ISP project in the Draft 2022 ISP with decision rules to confirm whether there has been an increase in expected dispatchable capacity in NSW or whether the total projects costs have increased. The final 2020 ISP had HumeLink as an actionable project on the ODP. To avoid uncertainty and increasing project costs, HumeLink should remain an actionable project in the final 2022 ISP.

Based on the 2020 ISP, TransGrid has been in discussions with the AER and they have agreed to undertake a staged Contingent Project Application (CPA) approach to reduce the uncertainty in project costs and allow more detailed planning. Both the early works and the implementation stage CPAs will be subject to the AEMO feedback loop to ensure the project remains on the OPD if the total project cost varies.

Snowy 2.0 is expected to complete its delivery of 2,000MW of on demand energy generation by 2026<sup>3</sup>.

The Draft 2022 ISP recognises that project delivery dates and commissioning dates can slip for major projects and also thermal generators could retire earlier or later. The NSW Infrastructure Investment Objectives Report (IIR) also notes these risks in relation to the NSW portfolio of infrastructure projects and retirement of generators.<sup>4</sup> HumeLink is seen as an important project in the IIR, it is needed for the reliability standard to be maintained and is assumed that it will not be delayed from 2026/27.

Given the tight market conditions, the HumeLink early works would be seeking to refine procurement and material costs and timings to ensure the earliest date of 2026/27 can be achieved. This is likely to extend to finalising contracts and booking production slots to deliver as soon as practical.

ENA do not agree that there will not be a change in cost or delivery date by increasing the complexity of the staging decisions. More complexity and staging introduces new risks and slippage potential. Increasing the decision making between stages could mean that a project that has ramped up resources to meet an early delivery date is left with uncertainty. Effort to refine costs and finalise contracts to deliver to a target date would change if the project were placed on hold.

#### ***The Draft ISP identifies significant benefits in Marinus Link progressing***

Partly due to Tasmanian Government's Renewable Energy Target, Marinus Link contributes the highest net market benefits (\$4.6 billion) to the Draft ODP (\$26 billion) and should proceed as a single actionable ISP project. As identified in the Draft ISP, Marinus Link enhances system reliability through enhanced geographic diversity between Tasmania and mainland Australia. The entire 1500 MW interconnector is needed in all the scenarios identified. Similar to other large infrastructure projects, Marinus Link has experienced COVID related delays, with the first 750 MW stage to be fully available by July 2029 (with 200 MW available from December 2028). The second stage could be available from July 2030 onwards. TasNetworks is competing on the world stage for manufacturing, construction, and commissioning converter stations and cables. Therefore, any change in the status of Project Marinus in the Final ISP will have a material impact on project cost, reaching Financial Investment Decision (FID) and in-service dates, therefore with the potential to further deviating the NEM from its least-cost pathway.

While the Design and Approval phase of the project is funded until June 2024, the cost recovery of the project remains a key project risk.

#### ***Consider the insurance value of delivering VNI West at the earliest date***

In the Draft 2022 ISP, VNI West is targeting early works in 2026 and a target implementation date of July 2031. VNI West contributes about half the net benefits of Marinus Link and if/when implemented in mid 2031 will provide access to Snowy 2s deep storage. In the Final 2020 ISP VNI West was an actionable ISP project with decision rules with target implementation of 2027/2028, this date still remains the earliest commissioning date.

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<sup>3</sup> <https://www.snowyhydro.com.au/snowy-20/progress/>

<sup>4</sup> AEMO Services, 2021 Infrastructure Investment Objectives Report, p11

The VNI West project has narrowed down the options with the Project Assessment Draft Report extended with publication by end August 2022. This allows the latest ISP inputs data to be used and allows time to also reflect the earlier closure of the Yallourn generator in Victoria.

Victoria has the oldest coal generation and yet nearly all new renewable generation in Victoria is intermittent. Star of the South offshore wind, yet to be commissioned would provide some diversity of wind resource. AEMO has not included offshore wind due to the higher costs compared to onshore. Land utilisation and social licence factors may make offshore wind more feasible.

Given the population and size of Victoria, AEMO should consider offshore wind in a more meaningful way in future ISPs.

AEMO should consider the insurance value of aiming to deliver VNI West at the earliest date 2027-28 so Victoria has access to deep storage, increased locational generation diversity and resilience. Fig 21 indicates the importance of hydro, gas and storage in the NEM (exc Qld) for a winter week. Firming resources and transmission play a strong role during low renewable energy periods.

This would diversify the project delivery risk across VNI West and Marinus Link should one project be delayed. The risks of Victoria being a significant importer of energy and reliant on two key interconnectors should also be considered. For example, it would be useful to consider how Victoria might ride through non-credible contingencies in future.

***Ensure Renewable Energy Zone (REZ) design parameters aligned to and supported by the state before the Final 2022 ISP triggers REZ design reports***

The Draft ISP notes that 9 REZs may require REZ design reports in the Final 2022 ISP. Rule 5.24.1 (a) (2) requires that AEMO have reasonable support from the jurisdictions to prepare these reports. It is important that AEMO have the jurisdictions support for the REZ location, sizing and timing and other key REZ design parameters to ensure that it is aligned with state policies and avoid any wasted expenditure. The IASR update notes that some aspects of the Victorian energy policy are not yet firm enough for consideration.

Timing of REZ design reports should also consider the level of interest from developers in the REZ location when assessing which to trigger in the 2022 ISP. Consideration of sequencing of the REZ design reports and effort may be helpful.

***Sense check the role of transmission network of the Hydrogen Superpower***

ENA is supportive of domestic use of hydrogen as an alternative to natural gas and also supports hydrogen exports. The introduction of hydrogen enables sector coupling between traditionally separate electricity and gas sectors. This creates a number of cross sector opportunities to increase reliability of the energy system.

The Hydrogen Superpower scenario is highly ambitious as it is the only scenario consistent with limiting global warming to 1.5°C while also considering replacing gas with hydrogen for domestic use and building a hydrogen export industry. While this scenario has the fastest emission reductions in the NEM (Fig 8 of draft ISP), it also reduces emissions from the use of gas by replacing that with hydrogen. The Draft ISP 2022 rightly describes the scale of development in this scenario as monumental. A 10-fold increase in the current NEM capacity is required in this scenario.

ENA is supportive of green hydrogen, however, it may be that hydrogen electrolysis is not co-located with renewable generation to allow gas transport vs electricity transport. the underlying assumption of the role of electricity transmission lines for hydrogen exports should be tested for each REZ.

The underlying electricity demand for hydrogen export is 816 TWh which is more than double the total underlying demand of 394 TWh in the Step Change scenario. Scheduled/dispatchable hydrogen electrolyzers may play a positive role in balancing supply and demand in a high renewables future. Future ISPs should differentiate between the infrastructure that is needed for domestic consumption of hydrogen and what infrastructure needs to be built to support a new export industry. While there may be a role for grid connected hydrogen production to provide grid services, it is unlikely that hydrogen export projects will be grid connected, as this will incur additional costs for hydrogen production compared to pipeline alternatives.

Whether Australia develops and maintains significant hydrogen export capability compared to capability that will also inevitably be developed around the world should be tested.

***Supportive of further work AEMO will undertake in preparing the final 2022 ISP***

ENA welcome the further work that AEMO intends to complete prior to the final ISP;

- » Distributional effects of the ODP;
- » Impacts of the marginal loss factors on REZs; and
- » Climate scenarios and extreme weather events.

The distributional impacts will broadly identify how the costs and benefits are distributed across NEM regions and customer types for the ODP. This is to do with the equity of customers who in one region may pay for infrastructure vs another region where customers receive benefits from the infrastructure. This is important to resolve as noted above for projects like Marinus.

AEMO will also consider the analysis on network resilience and vulnerabilities to extreme events. As noted above extreme heatwaves across SA and Vic often place stress on the power system. Victoria's future reliance on key interconnectors once the last brown coal generators in Victoria retire could be considered in this work.