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Dr Alex Wonhas
Chief System Design and Engineering Officer
Australian Energy Market Operator

By email to isp@aemo.com.au

Dear Dr Wonhas,

Submission to Draft 2020 Integrated System Plan

AusNet Services welcomes the opportunity to comment on the Australian Energy Market Operator's (AEMO) Draft 2020 Integrated System Plan (Draft ISP). AusNet Services supports the intent of the plan to provide an actionable roadmap for development of the power system during a complex transition period. AusNet Services appreciates the extensive stakeholder engagement throughout the process of developing the Draft ISP and the incorporation of stakeholder input resulting in important changes from the 2018 ISP. In particular, AusNet Services agrees with:

- Introduction of the least-regrets scenario modelling
- Recognition of the uncertainty in the pace of the energy transition and the resulting acceleration of transmission developments to accommodate this uncertainty
- Development of scenarios that define various options for future generation mix and recognise that it may be years before there is clarity on which scenario is emerging.

As the transmission network service provider for Victoria, AusNet Services has several specific comments on aspects of the plan that relate to Victoria, which include:

- Potentially enhanced variations for the VNI West interconnector options currently being considered;
- Potential for Group 2 or Group 3 projects for Victoria, specifically plans to develop Renewable Energy Zones (REZ) and developments to ensure that the network remains robust as coal plant retirements proceed in Victoria; and
- The need to plan for elements beyond capacity planning including system strength, network resilience and operational requirements to manage the network as Victorian coal plant retires.

Details on these matters specific to Victoria are included in Attachment 1. Additional comments on the overall ISP are included in Attachment 2 to this letter. In addition, AusNet Services will provide further confidential material in support of these comments to AEMO. We would be pleased to meet to discuss our comments and provide further assistance on any of the material provided. Please contact Jacqui Bridge - Manager Transmission Planning and Development to arrange these follow up discussions.

Yours sincerely,

Adrian Hill
General Manager –Transmission
AusNet Services

Attachment 1: Comments specific to Victoria

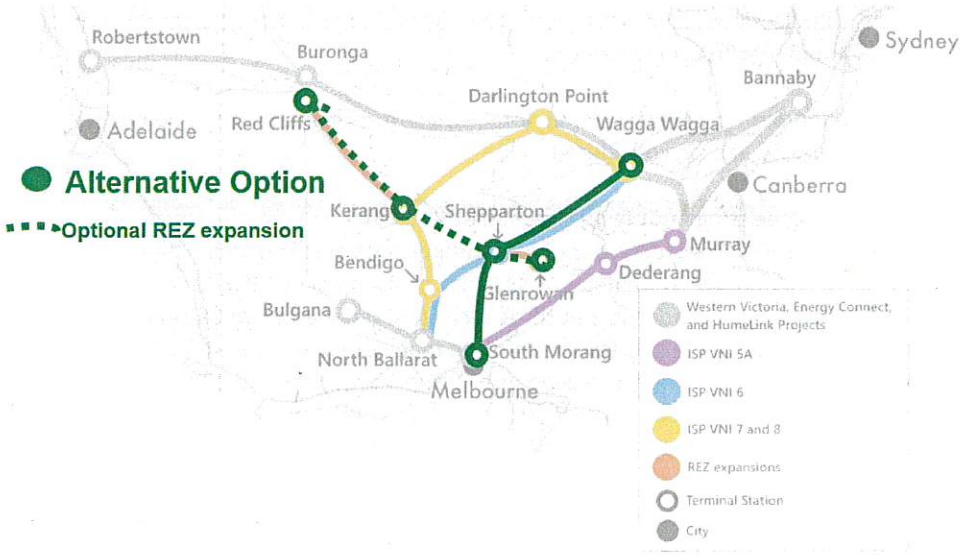
Priority Grid Project: VNI West (Victoria to NSW Interconnector)

AusNet Services believes there are potentially enhanced variations for the VNI West interconnector options currently being considered.

The Draft ISP correctly identifies the immediate need for increased transfer capacity between Victoria and NSW to provide insurance against early closure of coal in Victoria and recommends a delivery timeline of 2026-27, accelerated by more than 10 years compared to the 2018 ISP. The future VNI West will also enable efficient development and dispatch of renewable generation in both Victoria and NSW and enable efficient sharing of resources between NEM regions.

The Draft ISP currently considers two options for VNI West and indicates that the optimal route will be assessed during the consultation period. AusNet Services is concerned that the best solution may be one that is not currently being considered, and full consideration of options will not be possible in the timeframe remaining to complete the 2020 ISP.

AusNet Services has investigated several alternative options, including the more central option shown in the diagram below.



Compared to the Draft ISP options this alternative:

- is shorter in route length
- significantly lower in cost due to length and fewer terminal station connections,
- introduces lower electrical losses,
- is more feasible to build due to Greenfields location of terminal stations
- Could be delivered more quickly due to fewer outage constraints and availability of existing land and easements that form part of AusNet Services strategic land holdings
- provide other benefits including:
    - improved security of supply to Melbourne by avoiding the creation of a supercritical generation flow path between Ballarat and Sydenham,
    - enable the newly identified V6 REZ in central Victoria
    - alleviate risk to supply as a result of bushfires through route diversity
    - allows for future spurs to be constructed to enable further generation in V2 REZ.

Group 2 and 3 development plans for Victoria

The Draft ISP includes one committed project (Western Victoria Renewable Integration) and two Group 1 projects (VNI Upgrade (minor) and VNI West). These projects are welcomed to address the immediate needs in Victoria, however, in contrast to other NEM jurisdictions there are no Group 2 or Group 3 future projects currently envisaged in the draft ISP.

AusNet Services believes that future grid developments are required in Victoria specifically to address existing and emerging challenges including system strength, resilience, inertia, and to enable REZ for new generation that will be needed to replace Victorian brown coal generators. The following list provides several projects that could be included across Groups 1, 2 and 3.

1. REZ development

Group 2 and 3 projects to enable new generation connections in Victoria should be included in the 2020 ISP. Some immediate candidates include the suggested "REZ expansions" that are included in the VNI West Project Specification Consultation Report (PSCR). The REZ expansions include an upgrade of the Kerang to Red Cliffs line and an upgrade of the line from Shepparton to Glenrowan. Inclusion of Group 2 or 3 REZ development in the West Murray area would align with the conclusion in the AEMO report published in December 2019 - Power System Limitations in North Western Victoria and South Western NSW. This report concludes that "Further generation connections are not feasible without significant investment".

Future REZ development in central west Victoria, where a combination of good quality wind and solar resources exist, should also be considered.

2. Addressing existing fault level shortfall at Red Cliffs

In December 2019, AEMO issued a Notice of Victorian Fault Level Shortfall. The shortfall is defined at Red Cliffs (312 MVA), a range of modelled solutions consisting of installation of combinations of various sized Synchronous Condensers at three locations, Horsham, Red Cliffs and Kerang, is included in the notice. The timing of the shortfall declaration may not have allowed for this project to be included in the Draft ISP. However, inclusion as a Group 1 project in the 2020 ISP would provide a more complete view of the needs in the Victorian network and would be consistent with the inclusion of the SA System Strength remediation project for South Australia in the 2018 ISP.

3. System Integrity Protection Scheme (SIPS)

AEMO has recently announced a call for expressions of interest for a System Integrity Protection Scheme (SIPS) service capable of enabling an additional import capacity of up to 250MW on the existing Victoria - New South Wales interconnector. This project should be added to the Group 1 or 2 projects included in the 2020 ISP.

System planning beyond capacity planning

There is a clear need to plan for elements beyond capacity planning including system strength, network resilience and operational requirements to operate a network as Victoria's coal plant retires and new generation connects.

1. Future system planning for network operation with reducing coal generation

A comprehensive integrated system development plan for Victoria is needed to consider current and future operational issues and limitations that the system will face as the energy transition proceeds.

The operation of the system will change continuously as Victorian coal plant retires and new generation sources connect. A long term view of how the system will operate without coal generation is needed so that current developments can be planned with future system needs in mind. This category should include a view on protection schemes, communication systems and other monitoring that will be required to safely operate networks.

2. System strength, system security, network resilience (beyond capacity planning)

Group 2 and 3 projects to address system strength, voltage management, and network resilience should be developed and included in future ISPs both for Victoria and other jurisdictions. This would require a forecast of system strength including the various factors that will degrade system strength over time such as retirement of conventional synchronous generation and connection of inverter-based generation technologies (specifically those that are not required to remediate system strength).

We understand that the Final 2020 ISP is intended to provide this information, incorporating the findings of AEMO's Renewable Integration Study (RIS), to be released in March 2020. We encourage AEMO to consider how specific locational issues can be optimally addressed, with a similar approach to that taken for the ISP. A whole of system, centrally coordinated, least regrets approach would recognise the shared nature of the technical issues arising due to the changing profile of generation technologies. These issues are shared across multiple generator connections and transferred between regions.

A centrally coordinated planning approach to address these complex technical issues would maximise the impact of each investment across multiple connections and regions. This would be a significant improvement on current processes which are not coordinated and require individual locational investments undertaken by private parties who have limited interest in enabling shared benefits (across multiple private and regulated parties) from their investments.

Connection capacity requirements for Victoria

Table 6 on page 55 of the Draft ISP outlines additional connection capacity requirements needed by 2040 for each of the NEM regions to support future VRE requirements. The additional connection capacity requirements for Victoria are surprisingly low, whilst NSW, QLD and SA appear to require large amounts of additional capacity. This result is in contrast with the current AEMO position that the Victorian network is not able to support the volume of existing new Variable Renewable Energy project proposals. More information should be provided to support the position for low connection requirements for Victoria in table 6.

1. Victorian Renewable Energy Zones

The scorecard for the Renewable Energy Zone in Central North Victoria (REZ V6) shows that it is a more promising area to develop an energy hub than the REZ in West Murray (REZ V2). There is potential to develop 3,500 MW of solar and wind in REZ V6 and 800 MW of this potential can be hosted without further augmentation while no capacity can be hosted in REZ V2 without network augmentation despite the zone having a potential of 1,100 MW of solar generation.

Despite REZ V6 advantage over REZ V2, the current Draft 2020 ISP indicates that most new renewable energy is projected to be developed in the REZ V2 area (1,100 MW of new solar development in the Central scenario in REZ V2 compared with 800 MW of mixed wind and solar in the REZ V6). The basis for these assumptions should be made clear in the ISP and the drivers of this result should be further explored.

Attachment 2: Comments on the Draft 2020 Integrated System Plan

Future capacity requirements

The Draft ISP is signalling the need for flexible, dispatchable capacity. Forecasts include a large amount of new pumped hydro and new installations of Virtual Power Plant (VPP) batteries. These technologies are dispatchable, responsive and flexible, able to respond to changing outputs from weather-driven, intermittent generation. They also provide a least cost solution to forecast large-scale generation withdrawals.

However, as with any modelling exercise, there is a question about how practically realisable these forecasts are, particularly when we consider the need to develop around 12,000 MW of pumped hydro generation over the next 20 years. These projects generally have a high impact on surrounding environmental and agricultural conditions, which can make planning approvals long and difficult.

Whilst we understand that pumped hydro provides a deeper storage capability (between 6-48 hours), we are also conscious that the study does not consider developments in battery technology (such as flow batteries) that may enable storage for up to 10-12 hours. This may be relevant when assessing longer term options for storage, where technology costs for these new battery technologies have decreased and planning approvals for pumped hydro stations prove problematic.

The medium-term assumptions do not appear to reflect the demonstrated immediate need for dispatchable capacity to support renewable generation penetration and address operational issues, such as those caused by the decreasing reliability of existing generation and increasing frequency and impact of weather events. Specifically, the draft ISP does not recognise the potential value of grid scale batteries and gas-powered generation in providing this immediate support.

While pumped storage is assumed to have a six-year lead time, batteries can be installed and operational within two years. Gas powered generation is assumed to have a four-year lead time, however, we have previously seen them built and operational within 1-2 years. This should be relevant when we consider the recent moratorium placed on new West Murray generation connections. Batteries and gas-powered generation have the ability to provide an interim solution to power system reliability and security issues, whilst longer term solutions such as pumped hydro plants and interconnectors are being developed.

We are also conscious that longer term evaluations do not consider the potential development of hydrogen generation. Both Federal and State Governments have announced hydrogen strategies and funding. We encourage AEMO to outline its plans to incorporate quantitative analysis of potential hydrogen projects in its future studies within the Final 2020 ISP. This will ensure alignment with Government initiatives and enable project developers to make informed investment decisions.

A suggestion for future ISPs is to clearly define the specific technical characteristics of firming capacity that is required to support the future energy system. This should include an outline of the new power system services expected to be required to support voltage control, system strength, frequency management, power system inertia, system restart and dispatchability. This would provide a clear, straightforward signal to generation and technology developers about the characteristics required to support system reliability and security, and the various revenue streams enabled by these

technologies. As indicated in Attachment 1, we note that the Final 2020 ISP is intended to provide this information, incorporating the findings of AEMO's RIS, expected to be released in March 2020.

Least regret planning approach

AusNet Services supports the least-regrets planning approach for the development of the ISP. This approach is more appropriate for incorporating risk and uncertainty, and planning an efficient future focussed portfolio of projects across the NEM. We agree that this approach is a step-change improvement on the generation of individual augmentation projects by separate jurisdictions.

To allow successful application of the Regulatory Investment Test (RIT-T), building on the ISP, alignment of the AER's RIT-T Assessment Guidelines is likely to be required.

Regional reserves and High Impact Low Probability (HILP) events

The Draft ISP included changes to the assumptions and modelling of generator availability in response to the significant deterioration in performance of brown coal generation in recent years. However, it is not clear whether changing rates of availability and risks to the transmission network have also been factored into the modelling.

Recent events have demonstrated that severe weather and future climate change impacts can have a high impact on the transmission network. We note that the ISP currently includes regional generation reserves, which typically cover the loss of the largest generating unit. We believe that sufficient levels of regional and sub-regional capacity reserves to enable a region to operate independently in the event of a separation (or significantly reduced ability to rely on interconnector support) for an extended period should be considered in ISP system planning. This should include any specific technology requirements to enable system restart within a region or sub-region.

Optimal timing of Marinus Link

The Draft ISP shows the Marinus Link development as a Group 3 Future Grid Augmentation project with a delivery date of 2037 under four of the five scenarios considered. The project has been classified as "shovel-ready" in recognition that under the Step Change scenario an earlier delivery date could be economic.

The Marinus Link timing in the Draft ISP does not align with the conclusions in TasNetworks' Project Assessment Draft Report (PADR) for Project Marinus RIT-T[1] which states that the project is economic in 2028.

A clear definition of "Shovel Ready" is required to better understand what this classification is intended to achieve and how the reasonable costs of "shovel ready" preparation will be determined and borne by consumers. In addition, where there are conflicting outcomes of ISP and RIT-T analysis, clarity on which assessment now takes precedence, given recent progress by the Energy Security Board and Australian Energy Regulator on developing an Actionable ISP, and how this may impact the validity of the ISP portfolio of projects.

[1] TasNetworks, *'Project Marinus, RIT-T Project Assessment Draft Report,'* available at https://www.marinuslink.com.au/wp-content/uploads/2019/12/rit-t-project-assessment-draft-report.pdf, viewed on 20 January 2020.

Coal plant refurbishments in the Slow Change scenario

The Slow Change scenario is designed to explore the system development trajectory in an environment where there is 'lower economic growth and lower overall grid consumption, with less DER and less ambition to decarbonise the energy sector, compared to the Central scenario'. The Slow Change scenario includes refurbishment and life extension of aged thermal (coal) plants.

AusNet Services has reservations about whether life extension of aged thermal plant is practically feasible and also whether this represents a prudent investment, despite the concept fitting well with the description and intention of the scenario. The assumption of 'lower overall grid consumption' under the Slow Change scenario is also likely to make conventional generators uneconomic to operate.

AusNet Services believes that further work on the feasibility of extending the life of existing thermal plant both from a technical and economic perspective is needed to validate the Slow Change scenario assumptions for the Final 2020 ISP.