

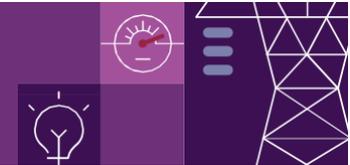


The following document represents a summary of the questions and answers presented prior to and during a Deep Dive session undertaken on the VNI West Additional Consultation Report with a technical focus including marketing modelling, cost, policies and procedures.

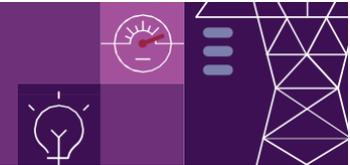
Category: Market Modelling

Submitted in Advance

Number	Question	Answer
1	You say that you have included all legislated state government obligations and include in this 200% RE for Tasmania on the basis of the TRET. But Tasmania has not legislated a 200% target. It has only legislated to monitor the growth of renewables and to report this to the Parliament. The Tasmanian Premier and Prime Minister has said that Tasmania will not build 200% renewables unless Marinus is developed. You have ignored this. Why?	TRET is legislated, refer to https://www.legislation.tas.gov.au/view/whole/html/asmade/act-2020-041 . In addition, VNI West, being an actionable ISP project, is required to follow the ISP input and assumptions, as per the AER's Cost Benefit Analysis (CBA) guidelines for actionable ISP projects. This means Marinus Link and 200% TRET are included as inputs in all scenarios modelled in the Base Cases and all option cases.

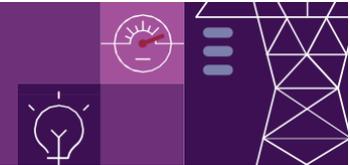


2	<p>Implausible modelling assumptions/outcomes</p> <p>The latest modelling continues to be based on the assumptions in the PADR that VNI West will somehow trigger developers to defer or avoid the construction of renewable generators/storage and gas before VNI West is commissioned, hence 'avoiding' the cost of installing this generation/storage for up to eight years. The modelling then replaces the output that would have been generated by the avoided projects by a commensurate increase from coal generation up to 2039 at no capital cost, as it is already built and operating. The model then assumes that the deferred renewable generators are built after VNI West is commissioned, but in different locations, particularly in NSW and Queensland. Not only is this an unbelievably contrived set of assumptions and outcome, it runs counter to every government renewable transition and emissions reduction policy. And the alternate interstate locations proposed are of similar resource quality and much further away from Victorian load centres.</p>	<p>The model outcomes do not show significant market benefits in advance of VNI West commissioning. Although the headline commissioning date for VNI West is 1 July 2031 in the Step Change scenario, there are several differences in input assumptions between the VNI West options and scenario Base Cases earlier than this date. For example, both Option 5 and Option 3A consider an upgrade to the WRL from 1 July 2027, which impacts the existing generation congestion in the area as well as further unlocking capacity for new renewable investment in this REZ. In addition, VNI West options consider the PEC Enhanced from 1 July 2026 which impacts the transfer limit of SWNSW to Wagga area and also the transmission capacity of SWNSW REZ (N5). VNI West options also have differences in limits between SWNSW and Wagga area after Humelink commissioning on 1 July 2028.</p> <p>Regarding increased coal generation, with the increased interconnection between Victoria and NSW, gas generation that is forecast in Victoria in the Base Case in the 2030s is forecast to be replaced by increased utilisation of lower cost generation from other technologies (including some coal generation) with the augmentation options while still meeting the carbon budget.</p> <p>Regarding government policy, all the legislated emissions and renewable energy targets for all states and nationwide are met in the model for the Base Case and VNI West options. Furthermore, most of the recent announced targets are also met, as listed in the market modelling report, Appendix A.</p>
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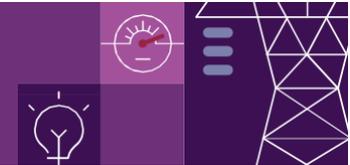


3	<p>Unrealistic Snowy 2.0 capacity factor</p> <p>The Consultation Report reveals that the latest design for VNI West will not increase the utilisation of Snowy 2.0 or its transmission capacity to Victoria, as was previously claimed to be a major reason for building VNI West (aka SnowyLink South). However, it is now claimed that VNI West will enable increased efficiency of Snowy 2.0, though this is unquantified. Even if there were such a benefit wouldn't it be more likely to flow to Snowy Hydro's bottom-line than to electricity consumers.</p> <p>The modelling continues to assume an unrealistic capacity factor for Snowy 2.0 of up to 27% generation (and hence plus 36% pumping). This equates to generating or pumping at over 1,000 MW continuously 365 days a year. Presumably, as Snowy 2.0 will be the most inefficient and inflexible storage on the NEM, other pumped hydro stations and batteries would be operating at even more unrealistic capacity factors.</p>	<p>The treatment of Snowy 2.0 and how it is modelled are addressed in the PADR submission response document, Section 2.9.3.</p> <p>Capacity factors are a model outcome in response to the operating environment of the scenario. We can't comment on the details of other studies, but changes in forecast capacity factor in studies performed over time are expected.</p> <p>We confirm that Snowy 2.0 capacity factors are forecast to be similar between the base case and VNI West options as shown in the PADR submission response document, Figure 3¹.</p>
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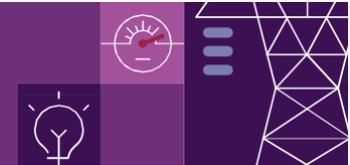
¹ https://aemo.com.au/-/media/files/electricity/nem/planning_and_forecasting/victorian_transmission/vni-west-rit-t/vni-west-padr-submissions.pdf?la=en



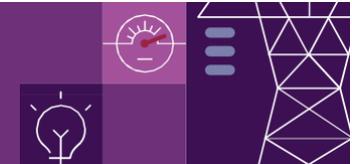
4	<p>Are the developments of PV in Gippsland prevented until 2039/40, and wind-power restricted to 500MW until 2028/29 and 2000MW from 2030/31 onwards, to force renewable developments in other REZ's, including interstate, to justify WRL and VNI West? Gippsland has good renewable resource, no spills, and its 500kV transmission network is becoming stranded as coal retires.</p>	<p>REZ representation in the modelling including REZ transmission are described in Appendix E of the market modelling report accompanying the Additional Consultation Report. The representation is the same as that in the 2022 Integrated System Plan and is described in more detail in two AEMO reports: the 2021 Inputs Assumptions and Scenarios Report, July 2021, Section 3.9 and ISP Methodology, August 2021, Section 2.3.4.</p> <p>The amount of wind and capacity and the year it is built are the model outcomes, decided on the least cost basis subject to input assumptions around wind and solar costs, REZ transmission costs with consideration of transmission, resource and land constraints.</p> <p>Regarding transmission specifically, the model considers the available network capacity which increases after coal retirements in Latrobe Valley. Furthermore, the model can build extra transmission for this REZ to allow for more renewable build in this REZ at additional cost if it is least cost to do so.</p> <p>All input assumptions come from the ISP 2022 (IASR workbook v3.4, sheet Build limits). The inputs and assumptions are developed, consulted on and finalised well before actionable ISP projects are determined in the ISP and progressed through RIT-Ts. This, in part, is to provide stakeholders with confidence that inputs are not cherry-picked or manipulated to get a predetermined outcome.</p> <p>Specifically, the modelling input assumptions for Gippsland, are as follows.</p> <ul style="list-style-type: none">- Solar build limit: 500 MW (soft limit, can be increased at cost up to solar land limit which is ~2,500MW)- Wind build limit:<ul style="list-style-type: none">- High capacity factor: 500 MW (hard limit)- Medium capacity factor: 1500 MW (hard limit as wind resource limit is in excess of wind land limit)- Available transmission limit which limits dispatch of onshore wind, offshore wind and solar in the Gippsland REZ: 2,000MW, but increases
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		<p>as coal in the area retires. Soft limit that can be increased at a cost of 0.57 \$m/MW.</p> <p>In terms of model outcomes, onshore wind build in the Gippsland REZ reaches the 2,000 MW land limit; build is not limited by available REZ transmission, but available land and the existing 500 kV transmission network is underutilised as coal retires. It is fully utilised in the offshore wind sensitivity.</p>
5	<p>Inexplicable increases to estimated benefits</p> <p>The Consultation Report now forecasts increases compared to the PADR in avoided generation/ storage cost benefits (of \$1.7bn, 130%), cumulative gross benefits (of \$1bn, 35%), and net benefits (of \$0.7bn, 100%) from building VNI West. Some background on the reasons for these substantial increases would be appreciated.</p>	<p>The main factors that increase the gross market benefits are explained in more detail in the market modelling report Section 3.2 and 3.4, which include:</p> <ul style="list-style-type: none"> - Modelling period extension (benefits continue to accumulate over time) - The upgraded WRL assumptions in the new options, allowing some benefits to be realised before VNI West is commissioned - Modelling of PEC Enhanced and its impact on the SWNSW REZ transmission limit - Changes in the carbon budget modelling.
6	<p>Your modelling assumes that Victoria's renewable electricity target is 50% by 2030. But the Government has announced new policies which it has taken to the election and has committed to legislate. These are 65% by 2030 and 95% by 2035. Why have you not used these targets (or have you – Appendix B and Appendix A have different assumptions)?</p>	<p>Appendix B of the modelling report describes model input assumptions, which include a 50% Victorian renewable energy target by 2030 in line with the AEMO ISP 2022. These are a minimum requirement.</p> <p>Appendix A describes model outcomes. This evaluation against other targets not applied as requirements on the model was added in response to PADR submissions. It shows that in the Step Change scenario, the more recently announced targets of 65% by 2030 and 95% by 2035 are forecast to be met despite not being applied as requirements.</p>



7	<p>You claim that VNI West avoids PHES construction. Please specify which PHES are avoided.</p>	<p>Without VNI West, the model forecasts a need for PHES in Victoria which is partly to firm renewable generation in this state after coal retirement. This is 24-hour PHES using cost and technical assumptions from the ISP 2022. They are not specific projects, rather the model is allowed to build PHES with different storage hours, based on the IASR, in potential locations in the NEM. With VNI West and increased Western Victoria REZ (V3) and Murray River REZ (V2) transmission capacity as well as increased interconnection with NSW, more diversified generation is forecast which supplies the demand in Victoria (as well as other states) at lower costs than building PHES in Victoria. There is a reduced need for PHES construction in Victoria.</p>
8	<p>You claim that around 2/3rd of the benefits of VNI West is avoided capex based on reduced renewables spill (and hence less capex to be incurred). This is weird: implicitly you are assuming that renewable investors will be investing in generation knowing that much (more than 50%) of their production is spilled. Surely they will not do that. Can you defend this assumption please.</p>	<p>The lower spill with VNI West is expected to reduce the need for new generation investment but it is not the main driver. Several factors which are forecast to result in the VNI West benefits include access to higher quality renewable energy in the NEM, better resource sharing, and the unlocked transmission capacity for Western Victoria REZ (V3), Murray River REZ (V2) and SW New South Wales REZ (N5).</p> <p>Furthermore, renewable spill (economic and network driven) is not unrealistic as it is currently seen in the NEM and it is expected to increase in the transition to net zero, particularly in the absence of network upgrades like VNI West.</p> <p>We have not been able to verify the spill percentages quoted in the question. The modelling forecasts total variable renewable spill of up to around 30% solar and 15% wind in the later years of the study.</p>



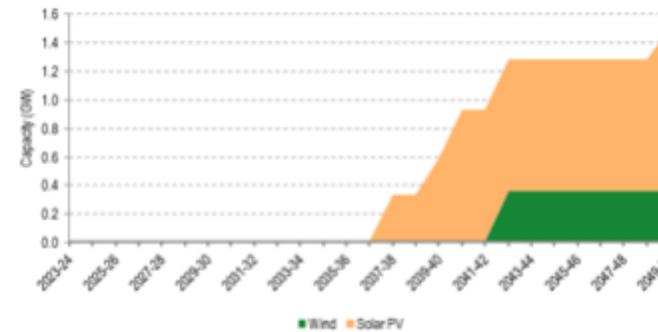
9	<p>Do the huge spillages of wind power (up to 40% pa) and PV (up to 50% pa) in the West Victorian REZ and solar (up to 36%) in the Murray River REZ, mean that WRL and VNI West are congested for ~ 4 hours a day? Are blackouts expected in Victoria when these are out-of-service?</p>	<p>The model considers the network limitation in Victoria, using a detailed network representation in the region including the network around Western Victoria (V3) and Murray River (V2) REZs. In addition, N-1 thermal limits are overlaid in the model. This is described in detail in Appendix D of the market modelling report which includes Figure 45 showing the detail of Victoria and Southern NSW.</p> <p>The dispatch of renewables in REZs across the NEM considers both network curtailment and economic spill (with the majority being economic spill).</p> <p>The 40% wind spill in the Western Victoria REZ quoted here is prior to WRL and VNI West commissioning and it is vastly reduced with these augmentations. We cannot replicate the 50% solar spill value quoted for Western Victoria REZ.</p>
10	<p>You have Vic OSW as a sensitivity. But the Vic Govt has OSW as a policy it has taken to an election and the Government has committed substantial funding to it already and has committed to legislate its achievement. Why have you not got Vic OSW in your base case, and no OSW as a sensitivity?</p>	<p>This policy is not yet committed, however the sensitivity analysis testing the impacts of the Victorian Government's offshore wind policy (if legislated) would result in Option 5 being the option that maximises net benefits for consumers.</p> <p>Further, the National Electricity Rules (5.22.3) set out 'public policy criteria' to guide AEMO's decision on whether a policy should be included in the ISP. The Victorian government offshore wind policy does not currently satisfy those criteria.</p>



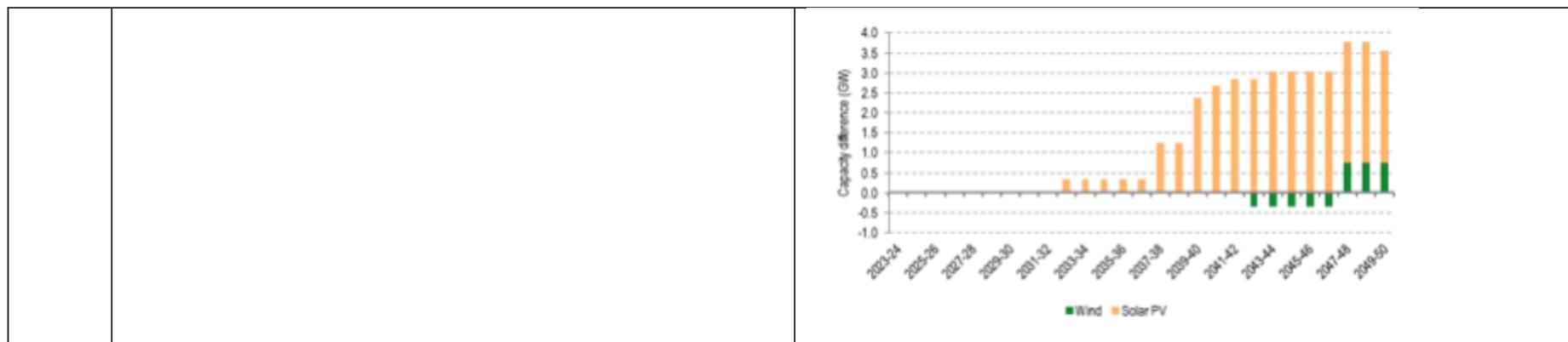
<p>11</p>	<p>Why is only 700MW of the additional 1460MW + 200MW of renewables hosting capacity in the Western Victoria REZ used in the 15 years after WRL completion and only 350MW of the additional 900MW for South-West NSW REZ used in the 6 years after VNI West is completed?</p>	<p>The additional transmission capacity of VNI West allows more efficient use of renewables and enables additional wind and solar build. However, the quantity of wind and solar capacity built in each REZ are model outcomes. The model builds different technologies in the NEM on a least cost basis, considering the costs including capex, VOM, FOM and fuel costs if applicable. For renewables, the quality of resources and expected generation availability (on an hourly basis for multiple weather pattern reference years) as well as the available transmission capacity (and if required the cost of additional transmission capacity) are considered in the modelling.</p> <p>The question is correct in the quoted numbers for the Western Victoria (V3) and South West NSW (N5) REZs (as shown in figures below) and the assertion that this means the increments in transmission capacity associated with VNI West Option 5 are not fully utilised during the quoted periods.</p> <p>Even though REZ transmission increments are not fully utilised immediately after commissioning, Option 5 is assessed as having net benefits of approximately \$1.4 billion dollars. In this assessment of costs against benefits the relative timing of the two is a key influence on net position.</p> <p>Western Victoria (V3) – Base Case, Step Change scenario</p> <table border="1"> <caption>Western Victoria (V3) – Base Case, Step Change scenario</caption> <thead> <tr> <th>Year</th> <th>Wind (GW)</th> <th>Solar PV (GW)</th> <th>Total (GW)</th> </tr> </thead> <tbody> <tr><td>2023-24</td><td>0.0</td><td>0.0</td><td>0.0</td></tr> <tr><td>2025-26</td><td>0.0</td><td>0.0</td><td>0.0</td></tr> <tr><td>2027-28</td><td>0.0</td><td>0.0</td><td>0.0</td></tr> <tr><td>2029-30</td><td>0.0</td><td>0.0</td><td>0.0</td></tr> <tr><td>2031-32</td><td>0.0</td><td>0.2</td><td>0.2</td></tr> <tr><td>2033-34</td><td>0.2</td><td>0.3</td><td>0.5</td></tr> <tr><td>2035-36</td><td>0.3</td><td>0.3</td><td>0.6</td></tr> <tr><td>2037-38</td><td>0.4</td><td>0.4</td><td>0.8</td></tr> <tr><td>2039-40</td><td>0.5</td><td>0.8</td><td>1.3</td></tr> <tr><td>2041-42</td><td>0.5</td><td>1.5</td><td>2.0</td></tr> <tr><td>2043-44</td><td>0.5</td><td>1.8</td><td>2.3</td></tr> <tr><td>2045-46</td><td>0.5</td><td>2.0</td><td>2.5</td></tr> <tr><td>2047-48</td><td>1.2</td><td>1.8</td><td>3.0</td></tr> <tr><td>2049-50</td><td>2.2</td><td>1.8</td><td>4.0</td></tr> </tbody> </table> <p>Western Victoria (V3) – Option 5 vs Base Case, Step Change scenario</p>	Year	Wind (GW)	Solar PV (GW)	Total (GW)	2023-24	0.0	0.0	0.0	2025-26	0.0	0.0	0.0	2027-28	0.0	0.0	0.0	2029-30	0.0	0.0	0.0	2031-32	0.0	0.2	0.2	2033-34	0.2	0.3	0.5	2035-36	0.3	0.3	0.6	2037-38	0.4	0.4	0.8	2039-40	0.5	0.8	1.3	2041-42	0.5	1.5	2.0	2043-44	0.5	1.8	2.3	2045-46	0.5	2.0	2.5	2047-48	1.2	1.8	3.0	2049-50	2.2	1.8	4.0
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SWNSW (N5) - Base Case, Step Change scenario

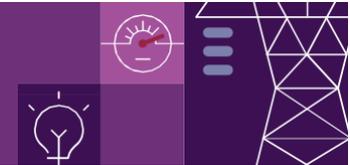


SWNSW (N5): Option 5 vs Base Case, Step Change scenario



Chat / Post-session Questions

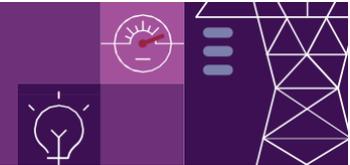
Number	Question	Answer
1	If you are using an in-house model rather than Plexos what opportunity is there to review that model to ensure there are not hidden underlying issues (compared to the well documented and analysed Plexos model)?	A detailed description of model input assumptions, model methodology and model outcomes has been published in a modelling report accompanying the main reports at both the PADR stage and for the additional consultation report. Model outcome workbooks have also been published.
2	How can you have a 2000 MW limit for Gippsland? And how can it be that wind in West Vic with average capacity factor of 27% is preferred to 36% in Gippsland?	Discussed in the specific Gippsland REZ deep dive session. Please refer to the slides provided for this session.
3	Is that a hard limit on renewables vs coal rather than renewables displacing coal to optimise the model outcomes?	No, the coal retirements are adopted based on the 2022 ISP outcomes, being scenario specific.



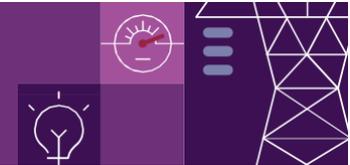
4	<p>If you use the IASR and ISP as your 'bible' for all your assumption and modelling, there is a fundamental flaw here. Maybe you need to refer the ISP to the Productivity Commission for review?</p>	<p>The AER developed and published its Cost Benefit Analysis guidelines (August 2020) for applying the RIT-T to an actionable ISP project. The guidelines state that "RIT-T proponents must... use ISP parameters for the ISP project (inputs, assumptions, scenarios, other ISP projects and weightings) in its analysis, unless it can provide demonstrable reasons why an additional or variation is necessary" (p.51).</p> <p>The IASR assumptions are themselves subject to a lengthy stakeholder consultation process. The rationale for the requirement to adopt the IASR assumptions in subsequent RIT-Ts is to avoid duplication of this consultation on input assumptions and ensure that all TNSPs use the same assumptions for assessing benefits which was intended to help build trust and confidence in the outcomes.</p>
5	<p>I note that it is the spillage relative to the counterfactual that is the basis of the claim in the EY report, that it is the reduction of this spillage that is the main source of benefits of Option 5 (and other options). In this regard in response to questions today it was claimed that REZ-zone capacity factors reflect ISP assumptions. But they do not, they are much lower in Counter Factual (as I have noted (and in Option 5 as Simon has noted, and specifically in comparison of West Vic relative to Gippsland. The obvious conclusion is that the modelling of this by EY – which they stress at length reflects instruction from AVP and Transgrid – assumes that VRE developers with the model's assumed perfect insight will make investments in full knowledge that much of their production is wasted and will prefer to investment opportunities where none of their production is wasted. This is obviously wrong and furthermore in response to the answers at the meeting it begs the question of why AEMO (and EY) insisted that its modelling is consistent with ISP assumptions on VRE capacity factors?</p>	<p>As explained during the deep dive session, the actual generation from renewable generation is forecast to be less than the available generation in many instances, due to spill. This is a driver of benefits, but not the main driver. Where there is spillage, the capacity factors reported as an output of the modelling will be lower than the input assumptions used in both this RIT-T and the ISP. The input assumptions are as per the latest IASR.</p> <p>Renewable spill is not unrealistic as it currently exists in the NEM, being due to network curtailment and economic spill. Economic spill has been an emerging trend in recent years and is expected to increase over time as distributed and large-scale renewable energy penetration has increased.</p> <p>Spill is also observed in ISP 2022 outcomes and is explained in greater detail in Section 3.5 of that report.</p>



6	<p>In the meeting, the EY representative suggested that their modelling incorporated transmission costs in its assessment. But their report says that they did not include REZ-zone transmission costs in their modelling. Can you please clarify?</p>	<p>The market modelling report describes how REZ transmission expansion is modelled. Refer to the 2021 IASR for the assumptions for the cost of transmission for each REZ.</p> <p>The cost of the VNI West augmentation option under assessment is not considered in the market modelling; the evaluation of gross benefits against the cost of these augmentations is done after market modelling is complete.</p>
7	<p>In your summation of the capacity factor discussion in the meeting, you said that diversification of supply and time profile of VRE production justifies the VRE expansion observations, which you (and EY) stressed arose as a model output. In this regard, are you meaning to suggest that somehow the profile of wind and solar production in West Vic is so different (and favourable) relative to that in Gippsland that it can justify the huge spillage assumed in West Vic. Surely not, but please can you clarify. You also claimed diversification benefits. But we know solar is perfectly correlated across the NEM and wind in Vic and NSW and SA are highly correlated. Where then does this diversification arise?</p>	<p>Hourly availability of wind and solar in each REZ considers the REZ location, which might differ in wind speed, solar irradiation and other weather data, as well as capacity factors. As such, REZs could have different profiles for wind and solar generation availability. Note that the model considers multiple reference years to create these profiles on the hourly resolution.</p>
8	<p>A large difference between Option 5 and the Counterfactual is the substitution of PHES for batteries. The EY representative clarified that "generic" PHES costs were assumed in this. What does this mean? Can you please provide details. Can you also clarify where – which REZ zone – these avoided "generic" PHES would have been located in.</p>	<p>See response to question 7 submitted in advance of session.</p>



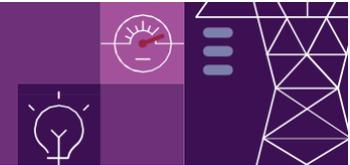
9	<p>I note the huge sensitivity of your NPV results to selection of ISP scenario (progressive change v step change v hydrogen super power), discount rates and offshore wind. On all of these the central assumption – most likely – is surely in favour of progressive change, offshore wind, and high discount rates that the now obviously fanciful 5.5% real. Any one of these in isolation drastically reduces the NPV to low levels and in concert they are likely to become deeply negative, noting also the error in the discount start date (per 5 above). Surely it would be prudent of AEMO to observe that on its own analysis consideration of the most likely outcomes of a range of uncertainties will show a large negative NPV for all options. Do you not agree?</p>	<p>We do not agree with the assertion in this question that consideration of the most likely outcomes for a range of uncertainties will show a large negative NPV for all options.</p> <p>The 2022 ISP identifies the step change scenario as the 'most likely'. The 2022 ISP scenarios are being updated as part of the current AEMO IASR consultation but retain many similarities with the 2022 ISP scenarios. Consultation on the appropriate weightings to apply to the updated scenarios is ongoing. There is nothing to suggest at this stage that the 'progressive change' scenario has become the most likely outcome. The use of the 2022 ISP scenarios, and the weighting assigned to each of them in the NPV analysis, remains consistent with the requirement of the AER's Cost Benefit Analysis Guidelines.</p> <p>The development of offshore wind in Victoria requires federal and Victorian regulatory and legislative changes, and the timing of any legislative package is uncertain. Consistent with the response to question 10 above, the Victorian government Offshore Wind policy does not yet meet the NER criteria for being sufficiently developed to be included in the base case for the assessment. It is therefore appropriate to treat this policy as a sensitivity.</p> <p>The draft 2023 IASR has proposed a central discount rate of 7.0%, which is an increase from the 5.5% in the 2022 ISP. The adoption of the 5.5% discount rate is consistent with the AER CBA guidelines. The sensitivity analysis captures the impact of changing this assumption to 7.5% and confirms that the NPV of the options (weighted across all scenarios) remains positive and that the ranking of the options is unchanged. Further, we do not agree that there is an error in the start date for the NPV analysis (see separate response).</p> <p>The robustness of Option 5 to some of the sensitivities around cost and discount rate formed part of the justification for Option 5 to be the proposed preferred option.</p>
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Category: Technical Queries

Submitted in Advance

Number	Question	Answer
1	<p>Why are the lengths of 500kV lines in Victoria 205km for option 5 less than the 229km for option 1 when everyone knows that Bulgana is much further from Euchuca than North Ballarat? Using figure 26 to measure these lengths gives 231km and 189km, much more realistic.</p>	<p>Approximate line length is the indicative total length (in kilometres) of lines between PEC (at Dinawan) and the connection point to WRL. As a route has not yet been determined, a line length has been determined from an indicative corridor within the area of interest and includes both 500 kV and 220 kV lines, where cutting into the existing 220 kV network. In calculating the line length, assumptions are made regarding the likely diversions necessary within each area of interest to avoid no-go areas / constraints, e.g. densely populated areas, national parks, RAMSAR wetlands.</p> <p>Further, Pg 75 of Consultation Report – all options involving the new substation near Bendigo include two new double circuit lines connecting into the existing terminal station at Bendigo. These have been included in the overall line length figures for those options.</p> <p>This results in Option 5 line length on the Victorian side being lower than all other options (fewer diversions are expected to be necessary and no new lines into Bendigo are required). Further work during route selection will refine line length. It should also be noted that the total system path length between nodes is longer in Option 5 than any other option, which is what impacts on impedances.</p>

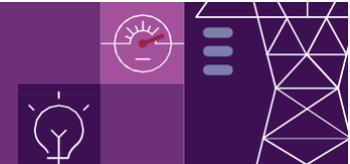


2	<p>How will blackouts be avoided in every state when the new interconnectors become so congested from the REZ's they pass through that they are useless as interconnectors. How will the lights stay on when unexpected and prolonged outages take out the single tower 500kV line due to severe lightning, destructive winds, fierce bushfires, widescale flooding or even sabotage, noting these natural disasters are already increasing with climate change?</p>	<p>The power system analysis undertaken to determine the interconnector and REZ capacity limits considers system intact and N-1 single contingency conditions. So, the market modelling and cost benefit results published in the consultation report consider single contingency events.</p> <p>For low probability occurrences such as those classified as 'non-credible contingency events in the NEM', VNI West will improve the resilience of the power system by adding to the geographical diversity of interconnection between NSW and Victoria. The diversity of energy resources across the NEM is also important to make the power system as a whole more resilient, and it's really about a combination of features that collectively contribute to power system security and resilience – and we have seen that as an important consideration in the ISP – generally it's about striking the right balance between costs to consumers and ensuring the service provided meets expectations.</p> <p>In terms of how to manage and mitigate the risks associated with those classified as non-credible outages like lightning taking out a number of lines, again it's a combination of factors or features that will contribute to making the power system secure, for example using robust asset specifications (and asset design is informed by locational factors and conditions). Some other factors include designing the assets with operational flexibility where possible, and certainly effective control schemes are important to minimise the impacts of outage events.</p> <p>In real time operations, there are mechanisms for reclassifying high impact low probability contingencies if there is an increased risk of the event occurring (such as bushfire in the area increasing the risk of multiple contingencies occurring) and the market responds pre-emptively to manage the impact if the event were to occur.</p>
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Chat / Post-session Questions

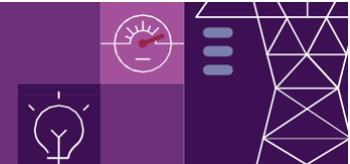
Number	Question	Answer
1	What is your loss factor for snowy 2.0 import and export?	The model assumes 76%, refer to IASR version 3.4, sheet: Storage properties. For the network losses, the model considers the nodal model with the piecewise linear loss equations in the area.
2	Why haven't AEMO and Transgrid considered multiple contingencies to option 5 - given they would probably black out Victoria and the increasing likelihood of natural disasters, sabotage and military attacks?	See response to pre-submitted Q2 above.
3	So, are we going to have 8000 MW of stranded transmission lines because a models has determined that is a better outcome for the entire NEM?	The Gippsland REZ is forecast to build up to 4,500MW wind and solar in Option 5 in the Step Change scenario. Under the offshore wind sensitivity, the transmission lines between Latrobe Valley and Melbourne continue to be heavily utilised.



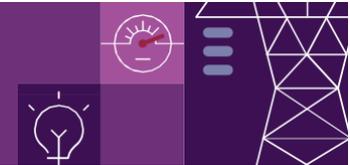
Category: Costs

Submitted in Advance

Number	Question	Answer
1	Why are the estimated capital costs of 500kV transmission lines in NSW (\$4.1m/km) around 40% higher than the same lines in Victoria (\$2.9m/km) and the Victorian substation costs similarly understated compared with Transgrid's substation capital costs?	<p>While AVP and Transgrid developed their own cost estimates separately, checks were done along the way to ensure a similar approach and input costs were being used. However, there are minor differences in approach which lead to some general/mobilisation costs being accounted for in different cost categories.</p> <p>Separately, each option includes different scope allowances on the Victorian side, i.e., lower cost spur lines, 220kV connections etc, so the per km rates are not directly comparable.</p> <p>Substation costs are not directly comparable as each state has different substation configurations and equipment quantities. However, in all options Victorian substation costs are higher than NSW, so basis of comment is not clear.</p>



2	<p>You discount back to 2021. This discounts near term costs far more heavily relative to distant benefits and distorts the calculation of net benefits than if you had correctly worked out an NPV based on the point at which substantive cash flows begin (which would be about 2025/6)?</p>	<p>Discounting future streams of costs and benefits to obtain a single 'present value' is the standard approach for comparing costs/ benefits that occur in the near term with those that occur further into the future, taking into account the time value of money and increasing uncertainty. Amounts that occur further into the future are discounted more heavily than amounts that occur in the near term.</p> <p>It is usual to consider the present value of costs and benefits from the perspective of today (rather than a date in the future), as that is the point at which the decision on the investment option is being made. Conceptually the value of a future dollar today is also easier to grasp than the value of a future dollar at a future point in time. Further, the discount rate used to calculate the PVs is also based on an estimate of discount rates at the current time, rather than at a future point in time.</p> <p>In addition, for the VNI West options there are costs incurred from 2022/23 (for early works) and minor benefits are also expected to accrue in the near term (from 2023/24). These early costs and benefits need to be taken into account in the NPV analysis.</p> <p>If the PV analysis instead discounted cashflows to 2025/26 as suggested (ie, when substantive cash flows begin), costs and benefits occurring in prior years would need to be inflated (using the same discount rate). The PV analysis would result in different PV amounts (compared to the adoption of 2020/21 as the discounting year). However, the sign (positive/negative) and relative ranking of the options (and therefore the RIT-T outcome) would not change. The change in the date used for discounting changes the point of reference for the present value calculation but does not alter the nature of the calculation itself in terms of the relative number of years the discount rate is applied for between cashflows occurring in the near term and cashflows occurring further into the future. See also response to question 3 from post-session questions below.</p>
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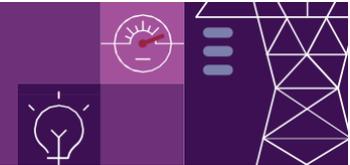
3	<p>Why are the O&M costs for VNI West only 1% of its capital costs when the AER's November 2022 TNSP Benchmarking Report indicates that TransGrid and AusNet Services have actually spent 3.5% and 3.4% annually to operate, maintain and refurbish their assets (expressed as a % of their undepreciated asset values).</p>	<p>This has been responded to in the PADR, and the Consultation Report.</p> <p>In terms of Operation and Maintenance costs, this is also the value used in the Inputs, Assumptions and Scenarios Report (IASR). During consultation on the 2021 IASR, stakeholders also questioned the appropriateness of this value. In response, AEMO reviewed recent revenue determinations, contingent project applications and RIT-Ts, and concluded that 1% was reasonable for ISP purposes as the cost of major projects in the ISP are dominated by transmission lines rather than substations. While the modelling applies operating expenditure (opex) costs consistently throughout the modelling horizon, opex costs are realistically expected to start low and grow as assets age. It is also noted that the Australian Energy Regulator (AER) will review and approve network expenditure from one revenue period to the next, so only the efficient and prudent project costs are expected to be passed through to consumers.</p>
4	<p>What are the implications for electricity bill for the average household if VNI West really delivers a net cost to customers exceeding \$1,500 million rather than a net benefit of around the same magnitude?</p>	<p>The RIT-T identifies where transmission investment is expected to provide an overall net benefit to the market as a whole. That is, investments as a result of which customers across the NEM will benefit in the long run by more than the cost of the investment incurred. The modelling of specific customer impacts has been considered by policymakers in the past to be too reliant on assumptions made about pricing to be workable.</p> <p>VNI West delivers positive net market benefits, and therefore modelling of specific customer bill impacts has not been calculated.</p>

Chat / Post-session Questions

Number	Question	Answer
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1	<p>What is the current transmission (not network cost as that includes distribution) cost component of a retail stack in Victoria? This is important as according to Bruce it's a 80% increase in the transmission component. If AEMO has not modelled the impact on household and small business power bills, how can AEMO be compliant with the NEO?</p>	<p>From the AER guidelines:</p> <p>"The RIT-T instrument requires RIT-T proponents to assess the economic efficiency of proposed investment options. Its purpose, as stated in NER clause 5.16.1 is to '... identify the credible option that maximises the present value of net economic benefit to all those who produce, consume and transport electricity in the market (the preferred option) ...'</p> <p>Further, the AER recognises in its CBA Guidelines (p. 35) that the CBA undertaken for the RIT-T is focussed on efficiency rather than distributional impacts (who receives the benefits and who pays the costs), which are instead matters for government policy.</p> <p>In undertaking a RIT-T, AEMO and Transgrid are not required to assess the impact on household bills, but rather to demonstrate that the investment maximises net market benefits by providing economic efficiencies. That said, if economically efficient, new transmission investment will increase the transmission component of electricity bills, but the wholesale cost component of the bill will be lower than it otherwise would have been, so consumers will be better off overall.</p> <p>For current break down of cost components in a typical household bill in Victoria, please refer to AEMC's 2021 Residential Price Trends Report, Figure 2.9.</p>
2	<p>How could AEMO/Transgrid be contemplating advancing the completion date of VNI West from 3031 to 2028, just to obtain the \$750m loan from the Federal government, given that the increased cost to Victorian/NSW customers will exceed \$500m</p>	<p>The reasons for expediting delivery of VNI West are articulated in the Minister's statement of reasons accompanying the February 2023 NEVA Order.</p>



3 In response to my question on discounting back to 2021, the claim was made that this would not affect option selection. Can you please provide evidence to support that claim. Can you please also provide quantification of the NPV impact if costs and benefits were discounted to 2025 – the point at which the serious cash flows begin. I suspect that the effect will be that for many/most options the NPV turns negative.

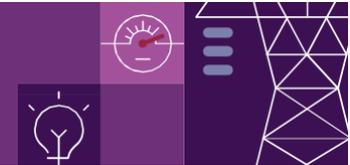
The response to question 2 above (pre-submitted questions) notes the reasons it would be unusual to adopt a future year (2025/26) as the basis for the PV assessment. Notwithstanding, to address the question raised we have re-done the NPV assessment using 2025/26 as the reference point for the PV assessment. As expected, the ranking of the options remains unchanged (based on the weighted NPV outcome across scenarios). Further, the NPV outcome for all options increases. Although there is an increase in the PV of costs, this is more than outweighed by the increase in the PV of benefits. Tables summarising the NPV outcomes using 2025/26 are provided below.

Weighted outcome

Option	2026		2021		Difference
	Weighted (\$m, PV)	Rank	Weighted (\$m, PV)	Rank	Weighted (\$m, PV)
Option 1	1,698	4	1,299	4	399
Option 1A	1,756	3	1,344	3	412
Option 2	1,498	6	1,146	6	352
Option 3	1,679	5	1,285	5	394
Option 3A	1,840	1	1,408	1	432
Option 4	1,495	7	1,144	7	351
Option 5	1,814	2	1,388	2	426

Step change scenario: PV of costs and benefits

Option	Step change scenario costs (\$m, PV)			Step change scenario benefits (\$m, PV)		
	2026	2021	Difference	2026	2021	Difference
Option 1	-2,852	-2,182	-670	5,444	4,166	1,279
Option 1A	-3,326	-2,545	-781	6,079	4,651	1,428

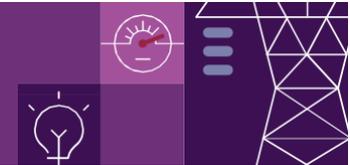


		Option 2	-3,340	-2,555	-784	5,687	4,351	1,336
		Option 3	-3,047	-2,331	-716	5,665	4,335	1,331
		Option 3A	-3,307	-2,530	-777	6,186	4,733	1,453
		Option 4	-3,277	-2,507	-770	5,699	4,361	1,339
		Option 5	-2,928	-2,240	-688	5,704	4,364	1,340

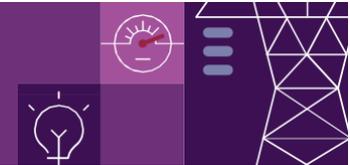
Category: Process

Submitted in Advance

Number	Question	Answer
1	Why has the Victorian government suddenly exempted VNI West and WRL from complying with the AER's Regulatory Test, using competition to drive down costs, having AER oversight of its revenue determination and transmission prices, and consulting with stakeholders on these matters? Won't this drive-up electricity prices for Victorian families and set a bad precedent for every state?	Refer to Vic Gov statement of reasons accompanying the February 2023 NEVA Order



2	<p>How can Victoria's 20% lower easement costs (in \$/km) and 50% lower transmission line hosting payments be sustainable given that Victorian land values along VNI West are higher than NSW?</p>	<p>First it is important to note that the Victorian line easement costs vary for each option, with the \$/km rate generally decreasing with the options further west due to relatively lower land values there. Land costs were based on independent valuer estimates created from recent land sales in the areas of interest, plus an added contingency, so we have a high confidence in their results.</p> <p>In terms of transmission line hosting payments:</p> <ul style="list-style-type: none"> - NSW is \$10K per year per km over 20 years - Victoria is \$8K per year per km over 25 years
3	<p>What is the completion date that AEMO is working on for VNI West?</p>	<p>Achievement of all delivery dates is subject to obtaining the necessary planning and environmental approvals, assembling land and easements, detailed design, and extensive community and landholder engagement, which is expected to take about three years to complete. This is a year earlier than expected in the PADR as the NEVA Order enables AEMO to commence early works now, working towards undertaking first Spring Surveys in 2023.</p> <p>The anticipated delivery date for VNI West differs under each ISP scenario:</p> <ul style="list-style-type: none"> - Step Change July 2031 - Progressive Change July 2038 - Hydrogen Superpower July 2030 <p>Transgrid are actively progressing opportunities to deliver the project by 2028, so the benefits can be delivered to the national network sooner.</p>
4	<p>As per AEMO's 2022 ISP the completion date for VNI West is July 2031. For a completion date of July 2031, what is the latest date for AEMO to provide advice to the Victorian Energy Minister on whether or not to apply a RIT-T to VNI West?</p>	<p>Transgrid and AEMO are still required to deliver a PACR with publication targeted for Q2 2023.</p> <p>The February 2023 NEVA Order allows AEMO to consider additional factors such as social, cultural and environmental. The consultation report recognises that Option 5 and 3A both demonstrate strong consumer benefits however, it goes on to recommend Option 5 as the proposed preferred option when those additional factors are taken into account.</p>



5	<p>The Federal Government's Rewiring the Nation has provided a concessional loan of \$750 million to the Victorian Government to enable VNI West to be completed by 2028. For a completion date of 2028, what is the latest date for AEMO to provide advice to the Victorian Energy Minister on whether or not to apply a RIT-T to VNI West?</p>	<p>Same as above.</p>
6	<p>How will the planning for VNI West consider impacts to electricity consumer bills? Does the NEVA order negate the value of economic impacts and consumer engagement when planning for VNI West?</p>	<p>Net market benefits feeding through to consumers have been modelled and AEMO and Transgrid continue to engage with consumers through this latest consultation report. The RIT-T analysis undertaken has not modelled the impacts to electricity bills specifically.</p> <p>It is important to emphasise that keeping costs down remains a priority – and this is why cost benefits have been given the highest weighing in the multi-criteria analysis.</p> <p>While there is only a 1% difference in net benefits between Option 3A and Option 5, the assessment has determined that Option 5 clearly outperforms Option 3A across the multi-criteria analysis undertaken.</p>
7	<p>Under what circumstances will AEMO recommend to the Victorian Energy Minister that the National Electricity Rules relating to contestable procurement should not be applied?</p>	<p>The February 2023 NEVA Order provides that VNI West and any variations to the WRL in order to implement an option other than the preferred option under the WRL PACR are not contestable augmentations but this does not necessarily mean the Minister will not want to make this a contestable process. AVP are yet to be advised what process the Minister wants us to follow.</p>



Category: Policy

Chat / Post-session Questions

Number	Question	Answer
1	<p>The Ministerial Order states: VNI West and any variations to the WRL in order to implement an option other than the preferred option under the WRL PACR are not contestable augmentations. Can you explain how this provides a competitive outcome?</p>	<p>The February 2023 NEVA Order provides that VNI West and any variations to the WRL in order to implement an option other than the preferred option under the WRL PACR are not contestable augmentations but this does not necessarily mean the Minister will not want to make this a contestable process. AVP are yet to be advised what process the Minister wants us to follow.</p>
2	<p>I note that you persist with the fanciful assumption in the Counterfactual that all coal in Victoria is gone by 2031. Not only is this contrary to Government policy it is also obviously implausible. AEMO has stressed that it makes assumptions that are consistent with legislated State and federal Govt policies and for that reason has ignored the Victorian Government's OSW policy (which the Government has taken to an election and committed to legislate). Yet AEMO assumes a coal closure assumption in the Counterfactual that is obviously inconsistent with the State Government's stated and legislated energy policies. Why?</p>	<p>Offshore wind policy is not committed yet, however sensitivities have been modelled to assess its impact. Coal generators are retired differently in different scenarios, mainly driven by the carbon budget constraints (which guide achievement of net zero by 2050), and profitability. Under each scenario, the retirement timings are consistent with the 2022 ISP.</p>