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Australian Energy Market Commission
2020-21 Planning and Forecasting Consultation on Inputs, Assumptions and Scenarios
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**2020-21 Planning and Forecasting Consultation on Inputs, Assumptions and Scenarios.**

Walcha Energy would like to thank the AEMO for the opportunity to submit this feedback for your consideration as part of the 2020-21 Planning and Forecasting Consultation on Inputs, Assumptions and Scenarios.

Walcha Energy, a joint venture between Energy Estate and Mirus Wind, is developing the Walcha Energy Project, situated within the New England Renewable Energy Zone in northern New South Wales. The largest renewable energy project in the NEM, it comprises a 4GW+ portfolio of wind, solar, pumped hydro and battery storage projects, to support NSW in the transition from coal fired generation and contribute materially to the direction established by the NSW Government Electricity Infrastructure Roadmap. New transmission and long duration storage will unlock the potential of the 8GW+ New England REZ, ensuring cheap, reliable power for NSW and create thousands of jobs for the New England region and surrounds. We have attached a brief summary presentation of the project.

Walcha Energy understands the need for AEMO's ISP planning process and has consistently sought to provide support for the initiative through constructive feedback and suggestion. Our major point for this response is that AEMO's schedule for grid augmentations is far too late to address the real risk of accelerated retirement of multiple coal and gas fired power in the 2020s. To address this risk in NSW, where retirement of 3 coal-fired power stations which are most challenged on operating cost (or a similar reduction of NSW black coal output across more of the power stations) would withdraw the equivalent of 8,840MW of generation. To address this potential shortfall the entire NSW Energy Roadmap, comprising 12,000 MW of generation and 2,000MW of appropriately located storage, would need to be delivered within the 2020s together with additional generators across the State. Grid augmentations to make this possible need to be commenced immediately in order to enhance energy security.

We have attached our response to the questions posed in the Draft 2021 IASR. We look forward to continuing the consultation process.

Yours faithfully,

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**2020-21 Planning and Forecasting Consultation on Inputs, Assumptions and Scenarios**

**Submission of Walcha Energy**

| IASR section | Matters for consultation | Response of Walcha Energy |
|---|---|---|
| 2.3.1 | **Central Scenario**<br>Acknowledging that AEMO will consider current committed policy settings within this scenario which meet the criteria outlined in Section 4.1 and clause 5.22.3 of the NER, and considering AEMO's best estimates of all key drivers, do you have any feedback on the Central scenario as proposed? | Walcha Energy endorses the scenario drivers but comments on some of them as follows:<br>Growth in the economy is an input that is likely to have a modest impact compared with state-legislated VRE policies and targets, the significance of corporate renewable energy procurement and the impacts of electrification of the transport and other sectors. The commercial impact of current LCOE values and trends is attracting very high levels of investment in new renewable energy generation and dispatchable storage assets that based on the analysis from leading consultants will result in ageing power station units being decommitted and retired well ahead of technical life-time. This is particularly relevant to the NSW Region where effective retirement dates of Vales Point B and Eraring are likely to follow Liddell within the 2020s, earlier than was assumed in the 2020 ISP. Such retirements or equivalent decommitments would remove more than 60% of the output of NSW black coal generation and necessitate the commissioning of more than 14,000 MW of new renewable energy generation in the 2020s. It must be considered that the NSW Electricity Roadmap and the passage of the Electricity Infrastructure Investment Act in December 2020 (with the support of the Coalition government, Labor Party and the Greens) will drive massive RE development in the New England REZ as well as in the other NSW priority REZ.<br>The modest Australian Paris agreement commitments have become increasingly irrelevant in the electricity sector. |
| 2.3.2 | **Sustainable Growth Scenario**<br>1. What, if any, elements of the Sustainable Growth scenario as proposed are not plausible or internally consistent, and how would you suggest they should be altered?<br>2. What approach should be used in determining the timing of coal closures in the Sustainable Growth scenario? If you consider that early retirements should be treated as an exogenous input, should this be applied consistently to all power stations, or should only specific power stations be identified and brought forward? | 1. High decarbonisation ambitions are not only plausible but are currently evident in the levels of interest of investors as well as developers. Rapidly falling costs are a reality and ongoing DER investment by customers is to be expected as well as grid connected plant. Electrification of other sectors will continue but a major acceleration depends heavily on government ambition, especially the Federal government in respect of vehicular transport. Policy changes that would drive acceleration are definitely possible, in the context of the strong and increasing global ambition, but remain uncertain and will have to be carefully monitored. Investment in hydrogen production and refuelling infrastructure is underway and we believe that the focus on the development of the hydrogen eco-system in the Hunter region will accelerate the impact on the electricity system although it is not likely to have a major impact in the eastern states in the early years of the scenario. There is a clear ambition of decarbonisation in industry and this may lead to acceleration of electricity demand with support from the state governments. The Northern NSW REZ when combined with the new NSW Hunter REZ is perfectly situated to support the decarbonisation of heavy industrials users in the Newcastle/Tomago such as Tomago alumnium smelter and Orica's ammonia plant. In our view the ISP needs to contemplate accelerated decarbonisation of industry in these scenarios and not just the Export Superpower scenario.<br>2. Walcha Energy considers that early coal closures are likely in the three eastern states, but the consequences are by far greatest for NSW. For this reason the risk to the NSW economy is the greatest and that potential impact also has great national significance. AEMO should mitigate this risk by accelerating its schedule for grid development for the New England REZ and also NSW central grid development between Bayswater and Bannaby to deliver power to Sydney from the North, West and South. We also believe that the ISP needs to go to an additional level of granularity in relation to each of the large existing coal-fired units to assess the impact of potential closure on the system and ensure that the market signals for investment in new generation and infrastructure are able to be correctly assessed. This is very relevant to the system strength and transfer limits analysis in the report. |

| | | |
|---|---|---|
| 2.3.3 | **Slow Growth**<br>1. What, if any, elements of the Slow Growth scenario as proposed are not plausible or internally consistent, and how would you suggest they should be altered?<br>2. Do you support AEMO's proposal to adjust the level of distributed PV towards a central outlook in this scenario to provide a broader range of possible minimum demand levels for assessment across scenarios?<br>3. Do you believe that the Slow Growth scenario should allow for the extension of generator retirements beyond their expected closure years if economic to do so? If so, what purpose does this achieve? | 1. The rooftop PV assumption in the scenario is endorsed. Stagnation of investment in battery storage is extremely unlikely. The boom in grid batteries has taken off globally and, together with emerging technology competition, will drive further substantial reductions in residential battery costs.<br>2. Yes.<br>3. No. Economic factors will preclude fossil fuel generator life extensions beyond technical life. Investment in huge battery storage systems at fossil fuel power station sites is likely to mitigate the extent of early complete power station retirements by partially overcoming technical limitations. On the other hand decommitments of generating units will continue after a modest delay and staged retirements are likely driven by market forces and plant failures. |
| 2.3.4 | **Diversified Technology**<br>1. What, if any, elements of the Diversified Technology scenario as proposed are not plausible or<br>internally consistent, and how would you suggest they be altered?<br>2. If the scenario as specified is not considered to be useful in assessing the costs, benefits and/or need<br>for investment in the NEM or eastern and south-eastern gas systems, are there adjustments that could<br>be applied which would increase the utility of the scenario, while exploring similar risks and opportunities? | 1. Attention is drawn to AEMO's Quarterly Energy Dynamics Report: **https://aemo.com.au/energy-systems/major-publications/quarterly-energy-dynamics-qed**. The latest QED, which covers the period 1 October to 31 December 2020, tracks falling National Electricity Market (NEM) demand, rising east coast gas prices, and the market and system impacts of record renewables output in the NEM and Western Australia's Wholesale Electricity Market. With gas use down, gas price up and electricity prices being driven down by renewables, the prospect of a gas-led recovery plan is very unlikely. However if gas prices fall, this will accelerate early retirements of coal plants. As renewables have seized a an increasing share of the market, NSW black coal stations are the ones whose output has been most reduced.<br>2. Gas will have a temporary role in the transition but this will come to an end in most locations with sufficient PHES and battery installations. The existing coal seam gas units in Queensland may be a special case depending on ongoing coal exports from the region and associated economics. The need to understand whether lower gas prices in the next decade increase the risk of over-investment in transmission is unrealistic. Overinvestment in grid to serve the incoming technologies at a time of rapid change has little impact because the rate of generation investment is certain to catch up the utilisation of grid infrastructure very quickly.<br>The main risk in grid development is overinvestment in interconnections that will not be needed if state governments meet their state electricity supply needs with generation established in their priority REZs. For this reason the strategy should be to plan and acquire easements for some interconnections but to delay commitment to their construction until the need is certain. Note that these comments are not intended to apply to the second major interconnection of South Australia, or of Tasmania, with the eastern mainland states. In each case these projects rest on unique trading conditions and interconnection reliability. |

2.3.5 **Export Superpower**

1. What, if any, elements of the Export Superpower scenario as proposed are not plausible or internally consistent, and how would you suggest they be altered?
2. Do you think the uptake of EVs (based on batteries) is likely to be affected significantly by competition with hydrogen-powered vehicles?
3. Should this scenario assume that some industries are contracting, for example, coal mining and gas exports?

1. We strongly support the inclusion of this scenario which we believe is plausible and almost certain in the longer term. Some investments have already been initiated and within the planning horizon of ISP 2022 both Australian private enterprise and overseas based enterprise have committed to invest material amounts in addition to the commitments from ARENA/CEFC. Australia is well-positioned for the renewable energy generation and for industrial enterprise growth utilising the RE asset. With government support and facilitation the investment will be accelerated and we believe that significant volumes will be manufactured for domestic and export supply well before 2030. This includes large scale new export oriented processing and manufacturing industries as well as hydrogen energy/fuels export. The best current example is the commitment made by SunMetals to hydrogen production and investment in associated grid infrastructure. Walcha Energy has participated in stakeholder forums in relation to the potential for the large scale electrification of industry and how this can be integrated with the Export Superpower scenario. Please refer to the IIEFA case study on Tomago https://ieefa.org/wp-content/uploads/2020/06/IEEFA_Why-Aluminium-Smelters-are-a-Critical-Component-in-Australian-Decarbonisation_June-2020.pdf IN assessing this scenario we believe it is also important to take account of changes in load which will occur as a result of the development of these new or revised industries. Emergence of this scenario is not very dependent on any prior population or economic growth but these will be a consequence. The candidate ports will see significant load growth from population and the development of adjacent industries. As with any transformative change, the rate of growth of this scenario must have large error bands but significant growth in RE exports and green product exports is certain.
2. It is very likely that mining industry and transport industry vehicle fleets will take up hydrogen power. This is likely to extend subsequently to public transport. It is far less likely that domestic vehicles will move significantly to hydrogen power, especially not in the south east of Australia within the current grid planning horizon. Export Superpower is important for Australia's economic strategy but the scenario needs to be re-framed to embrace domestic RE use in other sectors. Should the name be changed to Renewable Energy Superpower?
3. Yes.

2.3.5 **All scenarios (Matters summarised)**

1. Treatment of sectoral uncertainties.

2. Do you consider that the collection of scenarios adequately considers the breadth of possible futures ... ? If not, what additional scenarios would better achieve these objectives?

3. What scenarios in the proposed collection, if any, do you think should be removed ... and why?

The 2022 ISP needs to explore the impact on the requirement for QNI Medium/Large of the rapid development of REZ in New South Wales.

It is suggested that the ***Diversified Technology*** scenario be dropped and replaced by a ***Priority REZ*** scenario based on State ambitions and plans. The states should be given agreed time to refine their strategies. Region-wide electricity development strategies must also be included in this scenario.

The **Export Superpower** scenario should be reframed as **Renewable Energy Superpower** and encompass domestic industry, transport and other sectors powered by renewables as well as an export boom to replace coal exports and more. The driver can be acceleration of technology enhancement and global trends in energy generation costs, leading to fossil fuel generation being uncompetitive and rapidly displaced in Australia due to our excellent renewable resources. The scenario that should be addressed now is one that models market effects of a rapid succession of fossil fuel closures offset be transition to renewables. The ISP must ensure no disastrous increase in Unserved Energy under such a scenario involving cost and technology driven closure of a high proportion of coal and gas generation by 2030. 60% is suggested.

The scenario is similar to what was studied for coal by the Crawford School of Public Policy in 2018 and the scenario assessed recently by the Blueprint Institute. The Blueprint analysis looks at prospective power station retirements on the basis of their cost of production which leads to the possibility of retirements of Vales Point PS and Eraring PS virtually concurrently perhaps as early as 2026! Considering the lead time for major transmission lines this means we are already late in securing adequate NEW supplies - see the Blueprint figure below with TL lead time added. References:

***Coal Transition in Australia*** , Jotso et al 2018

***Phasing down gracefully, Halving electricity emissions this decade,*** **Blueprint, 2021.**
https://blueprintinstitute.s3-ap-southeast-2.amazonaws.com/PhasingDownGracefully_FINAL.pdf

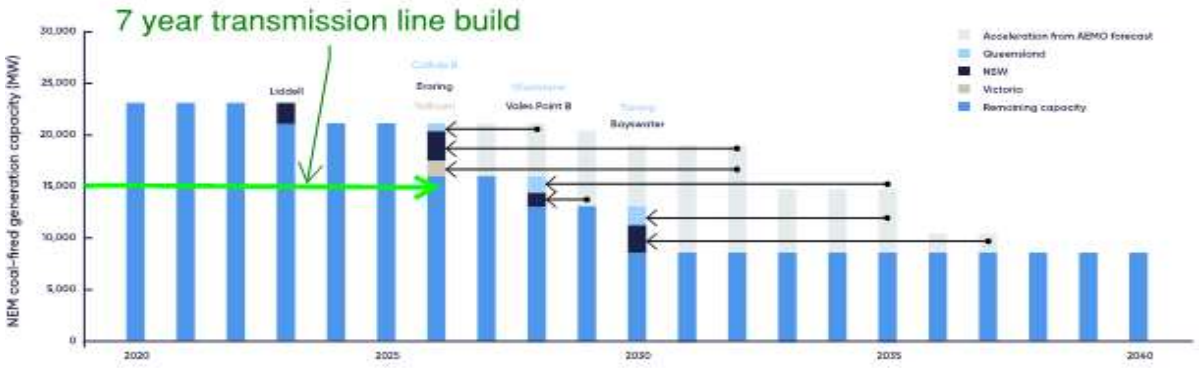


**Figure 17** A worked example of Blueprint Institute's CPM and associated reduction in coal-fired capacity over time

**Source** AEMO; Department of Industry, Science, Energy & Resources; Clean Energy Regulator; Blueprint Institute analysis

**Note** Example generators have been chosen based on their short-run marginal cost and their approximate remaining life. Those with a higher short-run marginal cost and a shorter remaining life have greater incentives to take part in the auction mechanism

2.5 **Risk Scenarios**

1. Which of these risks represents the most important considerations for forecasting and planning the NEM? Please rank the risks listed in order of importance, and separately, in order of likelihood.
2. Are there any other risks that are more material to forecasting and planning the NEM than those proposed above? If so, which of the above would be of least importance?

1.

| Risk scenario | Importance | Likelihood |
|---|---|---|
| Central with early Victorian coal closure | 2 | 1 |
| Central with early northern NSW coal closures | 1 | 1 |
| Central with Marinus Link funding arrangements not resolved | 4 | 3 |
| Sustainable Growth scenario with Central DER Uptake | 5 | 2 |
| Central with Copperstring included | 3 | 2 |

2.

Most important or most likely is 1, Least important or least likely is 5

3 Inputs and Assumptions engagement

New entrant generator assumptions.
It is recommended that AEMO, or AEMO with the assistance of TNSPs, be more proactive in seeking out intending new Generator connections, including early stage developments with evidence of ongoing ambition, and inclusion of them in the Generator Information survey.

4 **Inputs and Assumptions**

4.1 **Public Policy Settings**

NSW Electricity Infrastructure Roadmap p44-45.

The data reported for the New England REZ needs to be corrected. The REZ has more potential for wind generation than solar.

In the Walcha plateau area the wind energy that can be developed is twice the solar: of the order 4,000MW wind and 2,000MW solar assuming only best quality developable wind sites are used. With this ratio, and wind energy at night considerably more than in day-time, the synergy between wind and solar is strong. At a connection point with 2,000 MVA entry capacity, 1,000MW of solar can be added to 2,000MW of wind with very little curtailment, even before considering storage. Walcha Energy commissioned engineering consultants Aurecon to undertake a study of the expected curtailment with different levels of wind and solar generation. Expected curtailment for the aforementioned combination of wind and solar was less than 2%.

There are better solar resources in more northerly and more westerly REZ, but a predominantly solar REZ has much poorer grid utilisation unless substantial storage is included. Utilising the synergy in the New England REZ, adding solar adds little to the grid investment required to connect the major wind energy resource. The presence of PHES resources adds to the synergy of this Priority REZ.

Delayed development of the grid to connect the New England REZ forces solar developers to include huge extra amounts of battery (or other energy storage) to reduce curtailment. Furthermore considering the ongoing investment in solar PV DER it is appropriate at this time to focus early REZ development on those REZ which have strong wind resources.

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| 4.2 | **Scenario Alignment to International climate outcomes**<br>• Do you consider the proposed scenario alignment to the IEA scenarios appropriate?<br>• Do you consider the proposed scenario alignment to the SSPs appropriate?<br>• Do you consider the global temperature pathways proposed to be assigned to each scenario<br>appropriate?<br>• Would you support the use of the AR6 updated climate assessments, if available ahead of the final<br>2021 IASR? | President Biden has already begun a campaign for all nations to increase their ambition in mitigating climate change. The IEA scenarios will need to be adjusted to reflect Europe and the new stance of the USA on climate and emissions. The ISP should anticipate and incorporate updates to the current IEA scenarios that reflect increased ambition.<br>In other respects we are in broad agreement on each point, subject to our view that the Diversified Technology Scenario should be dropped and replaced with a **Priority REZ** scenario, and with the redefined **Renewable Energy Superpower** scenario we propose. The Priority REZ scenario will impact more on the sequence of grid development in the "Optimal Development Plan" than on alignment to International climate outcomes where it will be similar to the Sustainable Growth scenario but with greater aspiration, reflecting state government energy strategies. This should result in greater emissions reduction in the 2020s. The Renewable Energy Superpower scenario should target the recommended 1.5°C global temperature increase. |
| 4.3 | **Domestic emission targets and reduction**<br>• Do you consider the proposed Australian pathway and proposed NEM budgets appropriate for each<br>scenario?<br>• Do you have an alternative proposed method to decompose global emission pathways to a NEM<br>target? What is it? How would you account for emission reductions in other sectors, and the<br>contribution of the LULUCF sector? | Australia's domestic emissions in the energy sector depends on state strategies for electricity and for other emissions sources as well as national strategies. Ultimately Australia-wide emissions reduction will be the aggregate of outcomes in each state and territory as illustrated in 4.3.1.<br><br>We do not agree with the NEM emissions budget being set by direct proportion of Electricity sector emissions to total emissions. Electricity sector emissions reduction must substantially lead total emissions reduction as it is the sector most capable of rapid delivery of emissions reduction.<br><br>Electricity emissions must also incorporate emissions from mining of coal and extraction of gas to the extent that these fuels are applied to domestic power generation. |
| 4.3.1 | **State-based emissions targets**<br>• Do you believe AEMO should implement high-level, state-based emission targets in any scenarios, if not legislated?<br>• In your view, what is the best way to implement such targets? How would you estimate the contribution of “carbon sink” sectors, such as LULUCF, and the use of carbon offsets? | It is not the role of the NEM to set state-based targets, but NEM analysis and scenarios must take into account state-based targets in whatever form they are set.<br><br>The **Priority REZ** scenario proposed in this response is the appropriate way to incorporate state-based targets. |
| 4.4 | **Consumption and Demand** | No response considering the complexity of the matters. |
| 4.5 | **Existing generator and storage assumptions** | No response as a Developer. Existing generators should respond. |
| 4.6 | **New entrant generator assumptions (1)** | Planning for new generation entrants has yet to be properly addressed in the ISP. It has been impaired by the formation of the NEM without any defined long-term planning function, by the loss of state-based power system and grid planning (due to the manner that privatisations were delivered) and with NEM Rules suitable only for incremental change and with the incorrect assumption that market forces could always optimise development. The Finkel report led to initiation of the ISP to address the NEM planning problem but, until now, the timing was too late for the ISP to adequately *lead and facilitate* the rapid transition that the industry is delivering. ISP Planning and Forecasting has faced and is facing an enormous challenge as the scale and pace of change continues to increase, driven by rapid changes in generation costs, and continually evolving technology.<br>A major flaw in assessing the optimal grid development for the entry of new generation, that must increasingly be addressed, is the chicken-and-egg problem. Generators proceed with developments where the existing and committed grid enables their connection. These are not necessarily optimal locations from a planning viewpoint. Where grid development required for viable connection is not yet prioritised, the development remains "not committed", including at the weaker **generation information** criteria. "Generation information" data is not yet delivering in a manner that aligns with Priority REZ development. |

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| 4.6 cont'd | **New entrant generator assumptions (2)** | The emergence of gigawatt scale individual developments and multi-gigawatt priority REZ developments has exacerbated the chicken-and-egg problem. Transition to Priority REZ planning can greatly mitigate the problem. But until now the states have relied primarily on AEMO's ISP for major grid planning to connect their Priority REZs. Can this continue?<br><br>Priority REZ development and grid connections have to take account of state economic strategies. States have to manage impacts and social licence. These factors have to be taken into account in grid development planning. ISP lines on maps joining existing nodes are regularly amended. Line routes are changed and new nodes are created in RIT-T stages. With actionable projects bypassing some of the RIT-T stages, the project needs to be better defined and optimised. It has to be ensured that project briefs given to TNSPs are reasonable starting points and deliverable. How will the detailed project evolution be managed?<br><br>Where a Priority REZ lies on an interregional connection and has much greater prospective generation capacity than is needed for the interconnections, as is the case for the NSW New England 8,000MW REZ, the dependence of Priority REZ development on AEMO's ISP grid development plan may need to be reversed. This will require ongoing close consultation between Priority REZ planners and ISP grid planners, and planners sourcing plans and site-specific information with relevant generation developers. |
| 4.6.3 | **Technology build costs**<br>1. Do you agree with AEMO's proposal to use the same regional cost factors used in the 2020 ISP for its 2021-22 modelling? If not, please provide suggestions for improvements or alternative data sources.<br><br>2. Are there other social licence or competing land-use cost considerations that should be factored into these regional cost factors, or that would require use of more granular sub-regions? | 1. We believe that AEMO should not use the same regional cost factors used in the 2020 ISP for the 2021-22 modelling.<br>In relation to Figure 28 – Locational Cost Map, we believe the approach taken does not reflect the different cost structures which are found across regional towns and cities in the NEM. It seems to be drawn based purely on distribution of population along the coast and major inland centres rather than the presence of existing industries and in particular industrial communities and competing land-use and social licence.<br>We believe that the locational cost factors used in Table 24 are materially incorrect and in particular the approach taken in relation to Victoria on the one hand and Queensland and NSW on the other. From the Walcha Energy Project and the projects Energy Estate are developing across the NEM we see no justification for installation costs in NSW to 18% higher than Victoria in the low grouping. Similarly, there is no justification that the installation costs in Victoria in medium and high are 1.03 and 1.05 respectively but 1.27 and 1.44 for Queensland and 1.30 and 1.42 in NSW. This indicates to us that there has been insufficient data collected by AEMO's adviser or other factors have been taken into account which do not reflect the experience of the people who are developing, constructing and operating projects across the NEM.<br>We recommend for the 2022 ISP further analysis is done by AEMO's advisers including engagement with existing developers, owners and operators across the NEM requested to provide details of their actual and expected costs so AEMO has better information to inform the regional cost factors.<br><br>2. We strongly believe that the ISP should explicitly take into account social licence and competing land-use cost assumptions in regional cost factors and more generally when assessing the viability of the REZs and the new infrastructure and augmentations contemplated by the ISP.<br>We have already seen in Victoria the issues caused at a local level when there is a hostile reaction to new transmission infrastructure and what impact this can have on the cost of development (and the cost to the system of delays through continuing curtailment, reduced MLF, increased cost of capital and economic development).<br>There are materially different competing land-use across each of the REZs and the NEM generally. These have material impact on the costs of development including land acquisition, planning, community and stakeholder consultation and engagement.<br>A critical factor in the costs of new generation is the risk of delays in obtaining the necessary planning consent which includes the necessary grid infrastructure.<br>Walcha Energy has spent considerable time and effort in growing and sustaining social license across the plateau, and because of this the project has wide community support. We believe this will have a positive impact on costs moving forward, despite additional 'up front' expense.<br>An important factor for the viability of a project and each REZ is the focus that corporate and State Government offtakers now place on the social licence of a project. Major corporates are now the largest procurers of renewable energy in Australia, followed by the State Governments. Over the last 2 years the gentailers have been far less active. The buyer principles espoused by organisations such as Business Renewables Centre-Australia encourage corporates to support projects with demonstrable social licence such as using low grade or industrial land rather than prime agricultural land. https://businessrenewables.org.au/state-of-the-market-report-2020/ |
| 4.7 | **Fuel assumptions** | No comment |
| 4.8 | **Financial parameters** | No comment |

4.9 **Renewable Energy Zones**

This response endorses the first 3 dot points for identification of an efficiently located REZ.
The fourth point is an important point to be considered in prioritisation. but it is unclear and should be omitted from these select few points or be re-worded. Presumably it relates to problems such as poor system strength at a location, however this is remediable. Would the following wording be suitable: "Does not require excessive measures to meet power system security requirements." ?
A general comment on the REZ selection process is that AEMO's half theoretical approach to REZ identification needs to be validated by cross-checking against early stage development proposals, not just committed projects. Also one must ask what kind of resource is needed within the lead time for grid augmentation. Where augmentation is needed, does it fit well with rational grid development. Remember also that there is so much more to picking a good site and REZ than just the resource and existing grid.

4.9.1 **REZ Geographic Boundaries**

• Do you have specific feedback on the proposed updates to the candidate REZs?
• Do you have specific feedback on whether REZ definitions should change further in the Export
Superpower scenario?

No comment on the boundaries.

We consider that *Export Superpower* does not apply equally to the various NEM Regions and suggest *Renewable Energy Superpower* would be a more appropriate scenario name. Export is an important aspect of being a Renewable Energy Superpower and it applies to manufactured good and industry as much as to (say) hydrogen export.

4.9.2 **REZ resource limits (1)**

Do you have specific feedback on the proposed REZ resource limits?

**Specific feedback: Wind and solar resource limits for the Walcha plateau**
With the benefit of site specific analysis and extensive community consultation, this responder has identified lands on the Walcha plateau (part of the New England REZ to the south of Armidale) suitable for development that complies with community and landholder impact requirements and anticipated social licence, after selection of best individual WTG sites, that is suitable for development of **wind farms** of the following capacities:

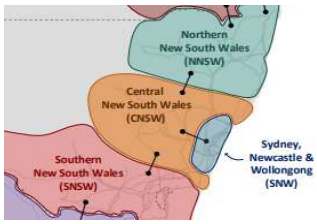
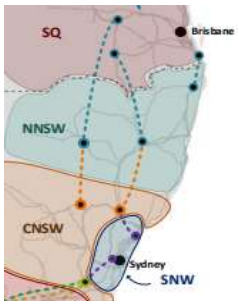
| | | | |
|---|---|---|---|
| Winterbourne WF | 700MW | Ruby Hills WF | 700MW |
| Topdale WF | 400MW | St Leonards WF | 700MW |
| Brackendale and Tia WFs | 1,200MW | Walcha SW WF | 240MW |
| **TOTAL (High quality)** | **3,940MW** | | |

Other developers have selected sites for development of at least a further **790MW** of wind energy in the same area.
There are also proposals to develop **up to 2,000MW of solar farms** in this area and **up to 2,000MW of PHES** on the escarpments.
**It would be realistic to provide for the development of 10,000MW of renewable energy and pumped hydro generation in this area alone.**
**Specific feedback: Pumped hydro**
Good PH sites are rare and nowhere near as common as the surveys and some developers claim. The hydrology, access & constructability have to be assessed. At least two substantial developments appear to be viable in the Dungowan area.
*This responder would be pleased to provide further information.*

4.9.2 cont'd **REZ resource limits (2)**

Is the addition of a resource limit land use penalty factor reasonable?
Is the value proposed for the penalty factor reasonable, and should it be applied equally to all REZs?

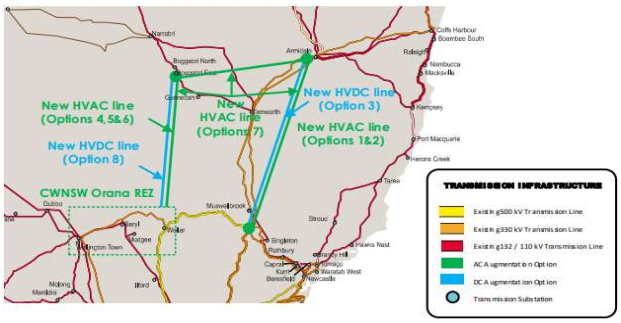
Resource limit land use penalty:
The Export Superpower scenario, covering hydrogen fuels and new green industry, points to developing more and differently sited REZ. Siting for export must focus on resource quality and low cost delivery (e.g. availability of ports.) More REZ with huge resources will be developed for this scenario. The factors pointing to Export oriented REZ development are so obvious that consideration of a land use penalty for all REZ in south east Australia is inappropriate. It has little bearing on grid development and in any case such grid development would not require ISP guidance in advance of identification of the prospective export oriented REZ. This factor is not considered reasonable for the ISP of the NEM.
It is also likely that some of the RE resource in south east Australia will in future be applied to hydrogen for domestic purposes in southern and eastern Australia. This is not Export Superpower and does not need a scenario in the 2022 ISP. It is the application of RE to other sectors such as transport and industry. A scenario for a more rapid rate of RE development than the sustainable growth scenario is needed but Export Superpower is not what the NEM and ISP should focus on.
A new scenario is required. The scenario that should be addressed now is the risk of rapid fossil fuel transition with cost and technology driven closure of a high proportion of coal and gas generation by 2030 similar to what was studied for coal by the Crawford School of Public Policy and the scenario presented by the Blueprint Institute. The driver would need to be technology LCOE accelerated trends making fossil fuel generation completely uncompetitive.
References:
> ***Coal Transitions in Australia*** , Jotso et al, Crawford School, 2018
> ***Phasing down gracefully, Halving electricity emissions this decade.***
https://blueprintinstitute.s3-ap-southeast-2.amazonaws.com/PhasingDownGracefully_FINAL.pdf

| | | |
|---|---|---|
| 4.9.3 | **REZ Transmission Limits** | The current/short-term limits are noted. |
| 4.11 | **Network modelling**<br>  | No comments on data in these sections:<br>4.11.1 ISP Zones - however comments in 2.3.5, 4.6 and 4.9 are relevant.<br>4.11.2 Existing transmission capability<br>4.11.3 Committed transmission projects |
| 4.11.4 | **Anticipated transmission projects**<br>• Do you have any specific feedback on the treatment of anticipated transmission projects in the ISP? | No comments on the existing treatment, except that the ambition of 2020 ISP has been too limited. |
| 4.11.5 | **Inter-zonal augmentation options (1)**<br>General comments<br>  | The deficiency of the inter-zonal approach is that it fails to address the ability of the augmentation plans to connect REZ, especially the priority REZ. A key driver for national grid augmentation design is the development of priority REZs.<br><br>The inter-zonal approach makes Priority REZ connection incidental to the basic grid planning process instead of central to grid development planning. What the network modelling must do is to identify the implications for the wider grid of development of Priority REZ. In significant instances the planning of interzonal grid augmentations may work against the desire of states to focus development on their Priority REZ, gaining the efficiencies of the REZ development strategy recognised initially by Professor Finkel and now also by AEMO.<br><br>This approach has resulted in incremental planning that is delivering hundreds of MW power transfer increments and only now exploring options for 1 or 2 thousand MW transfer increments. The grid connection of a well located priority REZ such as the New England REZ needs to be planned to deliver in coherent stages to ultimately deliver the output of 8,000 MW or perhaps 12,000MW of generation to the Sydney load centre as well as being involved in QLD/NSW power transfer. This longer term planning must not be neglected as Priority REZ development needs to lead Inter-Regional and Intra-Regional grid development.<br><br>Also we note that the interzonal links do not include intrazone works essential interzone power transfer. |
| 4.11.5 | **Inter-zonal augmentation options (2)**<br>Strategy questions | The RIT-T process looks at options for meeting a well defined need. This Inter-zonal strategy invites comments on diverse options to meet undefined needs with a huge range of sizes. They are not comparable. Is it intended to consider the options as possible stages of development? In the 2022 ISP they will need to be tied down to relate to stages of REZ developments.<br><br>What is the strategy underlying the interzonal DC link options? Why focus on 300km links between neighbouring zones when they might better serve links between zones much further apart? Are terminal points for DC intended to support a particular REZ? Are they intended to segregate inter/intraregional power transfers from generator connections? If so, have other strategies been considered? |
| 4.11.5 | **Inter-zonal augmentation options (3)**<br>NNSW - SQ development p139-140 | The options are noted. The upgraded Directlink option clearly merits further examination at this time. |

4.11.5 cont'd **Inter-zonal augmentation options (4)**
CNSW - NNSW p140 - 142

The CNSW–NNSW corridor represents a portion of the network which forms part of the QNI. Development options on this corridor include the southern sections of proposed QNI upgrades. Comments on the options in Fig 42 are provided below

Figure 42 CNSW–NNSW development corridors




4.11.5 cont'd **Inter-zonal augmentation options (5)**
**CNSW - NNSW p140 - 142**

**General comments:** This response from the developer of the greatest portion of the resource of the New England REZ, all located in the CNSW - NNSW Zone is pleased to see AEMO exploring a range of solutions in this area. Walcha Energy has been master planning development of the renewable energy resources of the Walcha plateau area since 2010 has progressively adapted its proposals to accommodate the evolution of technology, generator costs, market forces, and national grid planning in northern NSW.

In the present IASR consultation this response has proposed that a scenario be adopted in the 2022 ISP that explicitly addresses **Priority REZ** development.

TransGrid's preparatory activities commissioned in respect of this area in 2020 ISP is welcomed. It is urged that these activities give explicit focus to the development and connection of the Walcha plateau, including early full development of the wind resources, and the pumped hydro on the escarpments around Dungowan. With regard to the extent of the resource to be developed attention is drawn to our responses to sections 4.1 and 4.9.2 in respect of the prime resources that can be developed. The preparatory activities should also have regard to the impacts on social licence of an excessive concentration of power lines.

4.11.5 cont'd **Inter-zonal augmentation options (6)**
**CNSW - NNSW p140 - 142**

**Strategic considerations:**
The following strategic points are made in respect of the connection of up to 10GW of renewable and PHES generation in a concentrated zone.

1. Several RE Hubs will be required to connect the resources of the Walcha plateau area including the Uralla hub now planned, a Walcha hub proposed in the 2020 ISP and a Dungowan or Topdale hub to connect PHES and the wind projects at the southern end of the plateau.
2. Both 330kV and 500kV grid connections are required just to connect the Walcha plateau renewable resources.
3. The development of the national grid to the south of Armidale must maximise the capability of the 330kV grid in NNSW, not only to enable Walcha plateau RE connection, but also to support the REZ area north of Armidale, and to maximise the capability of the 330kV interconnection. Appropriate sequencing of this work will facilitate the development of both the 330kV capability and the 500kV roles and capabilities.
4. There are several ways to manage the sharing of parallel grid paths including:
   > load flow control for the 330kV and 500kV developments, as indicated in 2020 ISP,
   > adoption DC links to bypass AC connections and control flows between specific nodes,
   > providing only radial double circuit connections from groups of generators to a strong (strengthened) Hunter Valley grid,
   > limiting interconnection of 330kV and 500kV networks to the load end and keeping the generation ends separate,
   > various combinations of the above

4.11.5 cont'd

**Inter-zonal augmentation options (6)**
**CNSW - NNSW p140 - 142**
**Table 49 CNSW - NNSW development options**,
Options 1, 2 & 3

**Connection "options" at Uralla for the northern Walcha plateau area:**

Considering the lead times required to construct major power lines, and the risk of early closure in the 2020s of both Vales Point and Eraring power stations (in addition to Liddell) due to economic forces, work should begin immediately on Option 1 (double circuit 330kV from Liddell to Uralla) and Option 2 (double circuit 500kV from Bayswater to Uralla). Option 3 (DC between Bayswater and Uralla) is more expensive than Option 2 and will not facilitate the generation connections as well as an AC line. It is considered that the DC solution would better suit a much longer interconnection, between NSW and QLD, where the reduced cost per km of the transmission line will defray the cost of the high capacity converters at the terminals. **Options 1 & 2 are preferred.**

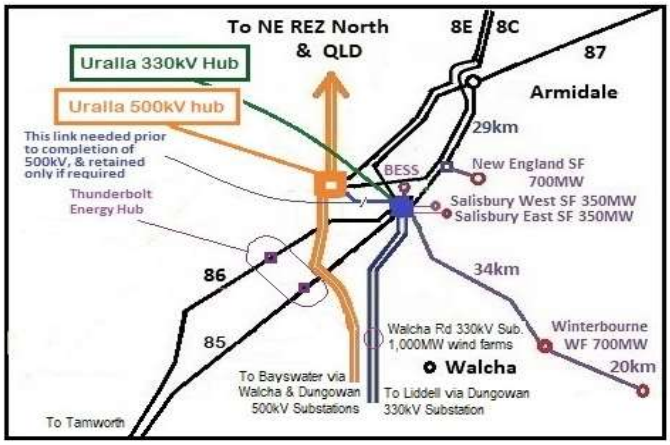
Generator connections to the Uralla 330kV hub will include a 330kV line from Winterbourne Wind Farm SW of Uralla, a high capacity double circuit 330kV line from Liddell picking up wind generation connections south of Uralla, and a double circuit 132kV line connecting the Salisbury Solar Farm close to Uralla from the SE side. Additional grid connections will access the hub from the west.

To avoid excessive **physical congestion of lines** at the Uralla 330kV hub it is proposed that the Uralla 500kV Substation (see ISP 2020) be separated some 10 to 12km from the Uralla 330kV RE connection hub, by locating this 500kV substation adjacent to **TL 86** on its western side, the 330kV hub being on **TL 85** route.

Planning in terms of Inter-zonal connections excludes mention of other relevant intra-zonal components, such as double circuiting the 330kV connections between Uralla and Armidale. These new circuits can be used to connect QNI directly to the Uralla 330kV hub, reducing the functions and loading on the Uralla - Armidale connections.

Separating the Uralla 330kV hub from the 500kV substation also presents the opportunity to close a cross-connection during a circuit outage.

The following sketch illustrates some of these concepts.



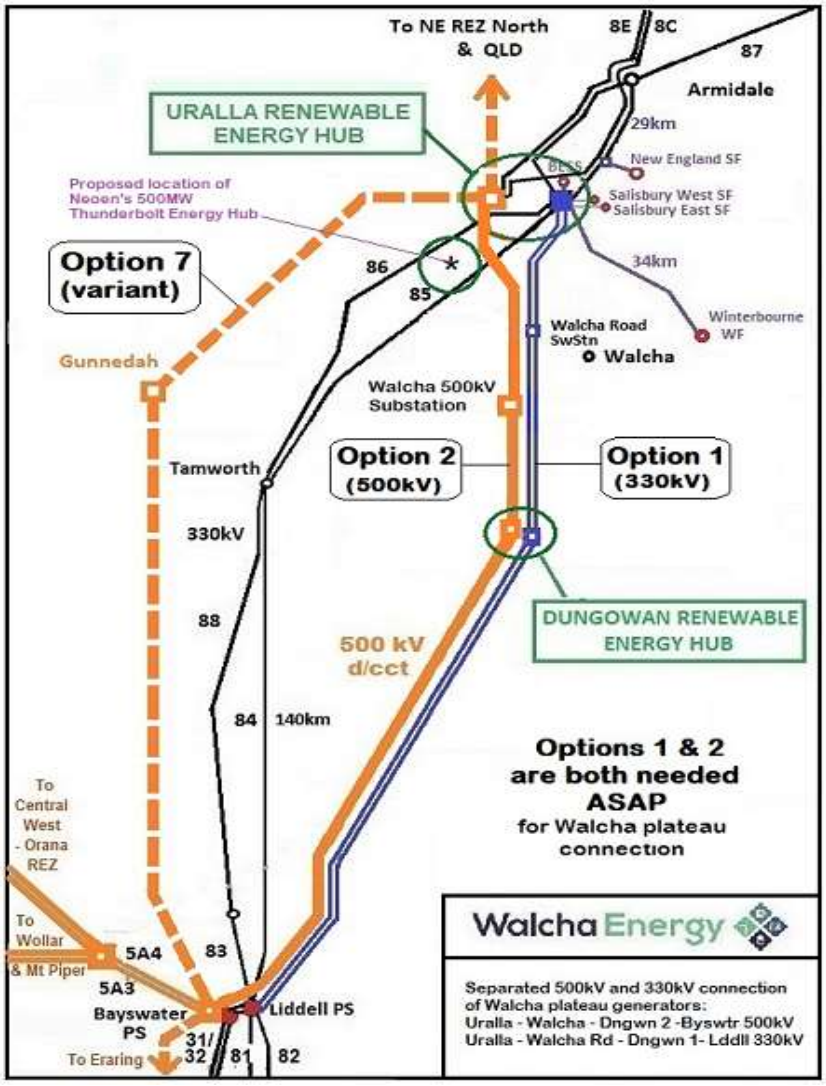

Options 1 , 2 and 7

The combination of Options 1 and 2 supported above is not sufficient to dispatch the envisaged full development of the generating capacity of the whole New England REZ to the Hunter Valley and NSW load centres. The extent of needed grid development will depend on the extent of development of PHES and the functional modes of PHES operation.

A further 500kV connection to the Hunter Valley will be required. In **Option 7** this is proposed as a single circuit from Uralla to Bayswater on a route west of the existing 330kV lines. A single circuit electrically in parallel with the double circuit of Option 2 results, with N-1 security, in 3 circuits with the capacity of 2. A route should be selected very soon for a 70m 500kV easement. Option 7, the western Uralla - Bayswater connection, will be required. Planning studies are needed to optimise reactive plant and identify whether option 7 should be a double circuit line and the stage at which each circuit would be required.

Walcha Energy looked at western route options from Bayswater to Uralla. Our preliminary view, albeit focused more on the needs of the New England REZ (REZ N2 of Figure 32), is that a more suitable route would be via the Gunnedah area rather than Boggabri. At the southern end the line could be terminated at Bayswater or to the existing 500kV line at a *suitable point* north of the Goulburn River National Park. The NSW Energy Roadmap has now made public its study area for the connection of the Central West - Orana REZ (N3) with the eastern connection point to the 500kV grid consistent with this suggested *suitable point*. That connection point, broadly south of Merriwa, might also be an appropriate southern terminal for a future bipolar DC interconnection with Queensland if required. This response does not further address **Options 4, 5 and 6**, the connection of REZ N3 and NW NSW REZ N1, except to submit that new lines facilitating connection of REZ N1 should follow, not precede, connection of REZ N2 and N3 which are NSW Priority REZ, closer to the NSW load centre and to the grid connecting the retiring fossil fuel generation of NSW.

**Three renewable energy hubs on the Walcha Plateau:**
One possible way to connect the prospective generators of the Walcha plateau is illustrated in the following sketch. Walcha Energy would be pleased to provide further information to AEMO and to discuss alternative options. This "separate development" option seeks to maximise the utilisation of four 330kV lines from Uralla to Liddell (or 3 to Liddell and one to Bayswater) so that the 330kV network (with appropriate passive and possibly dynamic reactive plant) can carry approximately as much as the double circuit 500kV line.




**Connections to D/Cct Armidale - Uralla - Liddell 330kV Transmission Line**
and TLs 85 & 86 at Uralla Hub

*Armidale - Uralla 330kV TL*

Power flows from Armidale and TL87
New England SF + BES 720MW

*Uralla 330kV Energy Hub*

SF + WF + Grid BES 1,400MW

*Walcha Rd Sw' Stn*

WF + WF 950MW

*Dungowan 330kV Energy Hub*

WF + PHES 1 400MW

**Connections to D/Cct Uralla - Walcha - Bayswater 500kV Transmission Line**

*Uralla 500k/330kV Substation*

Power flows from QNI up to 1200MW

*Walcha 500/330kV Substation*

WF + WF + WF + WF 1,500MW

*Dungowan 500/330kV Substation*

WF + PHES 2 700MW