MUA Submission:

2021 consultation on the

Integrated System Plan Methodology

31 May 2021

Australian Energy Market Operator

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Introduction

This submission has been prepared by Maritime Union of Australia (MUA). The MUA is a Division of the 120,000-member Construction, Forestry, Maritime, Mining and Energy Union and an affiliate of the 20-million-member International Transport Workers' Federation (ITF).

The MUA represents approximately 13,000 workers in the shipping, offshore oil and gas, stevedoring, port services and commercial diving sectors of the Australian maritime industry. MUA members work in coal export ports and we are part of the Offshore Alliance representing workers working on offshore oil and gas facilities. MUA members currently handle wind turbines and solar panels in ports across Australia, and would be part of building and maintaining future offshore renewable energy projects.

MUA members are also energy consumers who have an interest in a secure, efficient and affordable energy system. Like everyone in Australia, MUA members have also had their lives and work affected by climate change. MUA members have had to contend with hazardous smoke while doing strenuous outdoor work, worked on the vessels that rescued people from bushfires in Mallacoota, sheltered a large numbers of people fleeing bushfires on commercial tugs in Eden, and a number of MUA members lost their homes bushfires.

Summary

The MUA strongly supports the development of the Integrated System Plan (ISP) for the future of the electricity system in Australia. A strong and transparent plan is essential to taking the climate action we need, and to ensuring that we do not increase inequality and social dislocation as a result.

The key aspects of the draft Methodology for the Integrated System Plan we would like to see improved:

1. **Include offshore wind.** AEMO must urgently update the available renewable energy resources used for the ISP. It should be properly incorporated into the shadow resource limits used in the capacity outlook modelling and the counterfactual model used in the cost benefit analysis. Offshore wind should also be included in processes used to map and select Renewable Energy Zones (REZs). The ISP process should no longer rely on the 2018 report by consultants DNV-GL that did not consider any offshore renewable resources.

   Without considering all the available renewable resources, we cannot be sure that the ISP's recommendations are the best possible plan. Offshore wind can make a significant contribution to peak energy demand that could reduce the need for energy storage. Much of the existing transmission grid and most population and industrial centres in the NEM are close to the coast. Before significant investment takes place, AEMO must properly test whether building offshore renewables could reduce the need for expensive transmission and storage, and reduce the climate risk in our energy system.

2. **Reflect transition costs in system modelling.** AEMO has so far undertaken modelling limited to the energy system, and not the broader social context it is embedded in. The modelling seeks to reduce costs yet its limited scope means it does not include the externalised social costs of the transition, particularly where renewable energy generation is proposed to be built at a distance from the coal fired power it will eventually be replacing. In the short term, we propose that energy system modelling should include a 'transition cost' for Renewable Energy Zones located more than 50km from an existing coal fired power station.

   The 'transition cost' should be determined in consultation with affected workers and communities, and should include the social costs of avoiding unemployment of the coal-fired power workforce, relocation and/or training of a new workforce, and the construction of new infrastructure and development of new supply chains to facilitate large-scale energy being built in new areas. In the medium term, AEMO should undertake more integrated modelling that includes employment, education, and health to better understand the challenges and opportunities of the energy transition being modelled (an example of such an integrated model is IRENA E3ME model).

> Ultimately, however, we think such costs should be avoided through holistic location planning, job guarantees, and just transition measures. In any case, these costs must not be ignored.

The MUA is working hard to prepare our membership and industries for the necessary transition to a zero-net emissions economy and society. We recognise the need to urgently reduce emissions globally and in Australia to prevent global heating from exceeding 1.5°C, but this will have a very significant impact on the jobs held by many of our members. Our ability to provide climate leadership in these industries depends on the ability of the Australian government and of our union to deliver a just transition to our members working in fossil fuel industries, and their communities. If we cannot provide such a transition, we risk significant reductions to workers' living standards, deepening inequality, and a very significant political backlash which could stall the transition we need.

We believe that a just transition will require very significant public investment and ownership in energy systems, as well as many other sectors of the economy. It will require Commonwealth, state and regional Transition Authorities with the resources to make investments in affected communities and deliver job guarantees to ensure that workers in fossil fuel industries can make a direct transition to work in low-carbon industries.

Offshore Wind in Australia

The development of offshore wind in Australia is progressing rapidly. The government carried out a consultation on the regulatory framework for offshore renewable energy in early 2020, and said that 'legislative settings and framework aim to be in place and operational by mid-2021', well before the 2022 ISP is issued. $4.8 million in funding was provided to finish developing the new framework and deal with initial licence applications in the 2020 Commonwealth budget.[1]

About eight offshore wind projects are at various stages of development in Australia. The projects are:

1. **Star of the South** off Gippsland, Victoria. 2.2 GW. $8.7 billion. Construction could begin in 2025 and last five years. Exploration licence was approved in March 2019 which has allowed the project to begin. It is funded by Copenhagen Infrastructure Partners.
2. **Oceanex NSW offshore wind**. Starting with 1.8 GW off Newcastle, with a significant port construction hub, then expanding with further locations off Wollongong, Ulladulla and Eden, potentially up to 7.5 GW. $31 billion with construction starting about 2027. Oceanex is lead by Andy Evans from Star of the South and also backed by European/Japanese investors Green Tower and Daiwa.
3. **Newcastle Offshore Wind**. Project lead by Green Energy Partners and Richard Findlay-Jones. Applied for a licence from DISER in Jan 2020. This was refused pending the new legislation.
4. **Illawarra Offshore Wind**. Lead by Green Energy Partners, who applied for a licence from DISER in Jan 2020. This was refused pending the new legislation. This project would use Port Kembla as a construction hub.
5. **The Cliff Head Wind and Solar Project** south of Geraldton in WA, being developed by Pilot Energy in a joint venture with Triangle Energy. Up to 1.1 GW in size.[2]
6. **Bass Offshore Wind Energy** off Burnie, being developed by Brookvale Energy. Initially 360 MW, possibly up to 2GW in size.
7. **Australis Energy** are linked to UK offshore wind developer Warwick Energy. They are working on three projects in Australia, all in state waters: WA Offshore Wind, a 300MW project north of Bunbury, WA $1 billion, 100 permanent jobs. 5.5 km offshore. The company has applied for environmental approval with the WA government; Vic Offshore Wind, a 495 MW project west of Portland, Vic. 5.5km offshore; SA Offshore wind, a 600 MW project in South Australia.
8. **Oceanex WA offshore wind.** 2GW project off West Australia.

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[1] The bill will be the Offshore Renewable Energy Infrastructure Bill (changed from the 'Offshore Clean Energy Infrastructure Bill'). Department of Industry, Science, Energy and Resources (DISER), Offshore clean energy infrastructure - proposed framework, 4 December 2020. DISER, Offshore renewable energy, 21 January 2021.
[2] Pilot Energy, Pilot to sell majority interest in offshore Perth Basin Permit and form Wind and Solar Joint Venture with Triangle, ASX Announcement 9 November 2020; Pilot Energy, Pilot to pursue development of offshore wind project, ASX announcement 4 September 2020.

There is very significant generation potential for offshore wind in close proximity to the current grid. A full report on the potential for offshore wind in Australia will be released in July 2021 through the Blue Economy Cooperative Research Centre (funded through the Department of Industry, Science, Energy and Resources) with collaboration from the CSIRO and the UTS Institute for Sustainable Futures.

Preliminary findings are that there is a technically-accessible offshore wind resource of 2,233 GW within 100km of existing Australian substations and transmission lines (and within 100km of the coast, in water depths of less than 1000m, and excluding environmentally restricted areas).[3] The available offshore wind resource was analysed for a number of prospective sites, selected for their location close to an existing high voltage transmission substation close to the shore line. The study showed that high capacity factors are available close to existing substations and in areas of high population and large industrial loads (Table 1).

Table 1. Capacity Factors, Selected offshore wind sites (25, 50, 100km offshore)

	25km	50km	100km
Georgetown (Tasmania)	53%	59%	62%
Hobart (Tasmania)	46%	57%	-
Latrobe (Victoria)	42%	53%	57%
Melbourne (Victoria)	46%	53%	59%
Newcastle (NSW)	43%	46%	-
Sydney (NSW)	39%	-	-
Port Kembla (NSW)	37%	-	-
Maroochydore (QLD)	32%	42%	-
Gladstone (QLD)	42%	49%	50%
Adelaide (SA)	50%	48%	51%
Perth (WA)	49%	52%	55%
Port Hedland (WA)	34%	34%	34%

Offshore wind in the Draft ISP Methodology

We have previously raised with AEMO the need to include offshore wind in the renewable resources used to select Renewable Energy Zones (REZs).[4] Although the REZs are selected through the ISP Inputs, Assumptions and Scenarios process, they play an important role in the ISP Methodology as the only locations where the model builds renewable generation. The exclusion of most offshore renewable resources from the REZs impacts on the methodology for both the ISP capacity outlook modelling, and the ISP cost benefit analysis.

[3] Assumes 15MW turbines spaced at 5 MW/km. See the Blue Economy report Offshore Wind Energy in Australia for further details.
[4] Maritime Union of Australia to the Australian Electricity Market Operator, 21 February 2020, consultation on the Draft 2020 ISP. MUA submission: 2020-21 Planning and Forecasting Consultation on Inputs, Assumptions and Scenarios, 1 February 2021.

These in turn have a significant impact on the Optimal Development Path to be recommended in the 2022 ISP.

So far, it seems that the 2022 ISP is relying on the 2018 assessment[5] of renewable energy resources and identification of REZs that only looked at onshore renewable energy resources, and did not contain a justification of why. Our submission to AEMO ISP Inputs, Assumptions and Scenarios consultation contained recommendations on the need to revise the assessment of REZs to include offshore wind.[6]

This may have been a reasonable (although short-sighted) approach in 2018, however, it now creates a risk that the 2022 ISP will be out of date and out of step with projects being planned and built in the NEM. A map of the renewable energy resources considered as part of the ISP is given in Figure 1. This should be compared with Figure 2, which shows the available wind resources in NSW (to give one example), including offshore wind.

We support AEMO's inclusion of offshore wind in the Gippsland REZ (V6).[7] However this is so far the only offshore wind location that has been included in an REZ, and we understand it was selected because of an existing development, and that offshore resources for this area are the only offshore wind data that AEMO includes in the ISP.[8] There is good reason for including offshore wind in Gippsland, but it is quite arbitrary to exclude offshore renewable resources for the rest of Australia. This seems out of step with the systematic way that the rest of the ISP is developed and the number of offshore wind projects that are currently in development.

If the 2022 ISP does not properly include offshore renewable energy in its assessment of Australia's renewable energy resources, it will be seriously out of step with the Australian legislative framework for renewable energy and projects currently being developed.

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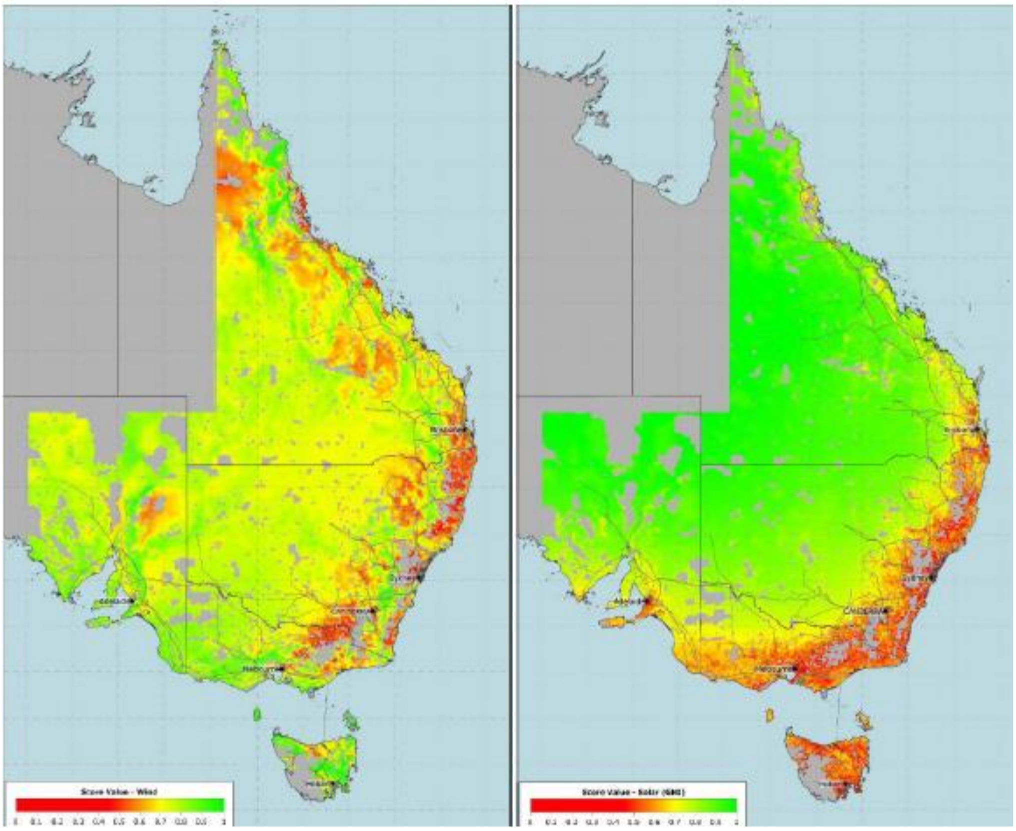
[5] Renewable energy resources and renewable energy zones were identified in the document *Multi-Criteria Scoring for the Identification of Renewable Energy Zones*, prepared by DNV-GL for AEMO in April 2018. This is further discussed in Australian Energy Market Operator, 2020 ISP Appendix 5, p. 8-12, and in Australian Energy Market Operator, Draft 2021 Inputs, Assumptions and Scenarios Report, December 2020, p.108.

[6] MUA submission: 2020-21 Planning and Forecasting Consultation on Inputs, Assumptions and Scenarios, 1 February 2021.

[7] 4GW of the potential 6GW of renewable energy AEMO has assessed as available in the REZ is offshore wind. Australian Energy Market Operator, 2020 ISP Appendix 5, p.128

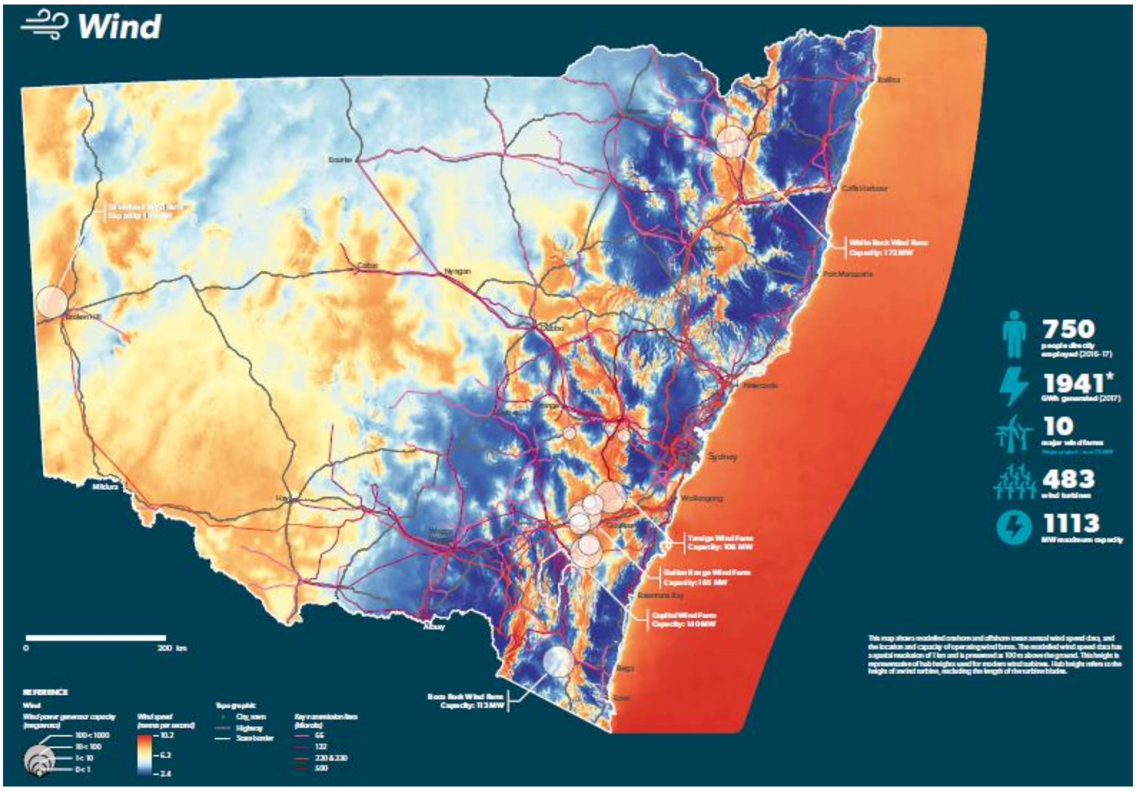
[8] Australian Energy Market Operator, Draft 2021 Inputs, Assumptions and Scenarios Report, December 2020, p.92.

Figure 1: Renewable energy resources used to evaluate Renewable Energy Zones in the 2020 Integrated System Plan, and proposed to be used in the 2022 ISP. The left map is wind and the right is solar. Green indicates the best resources, weighted with other factors outlined in the ISP.



Source: Australian Energy Market Operator, 2020 ISP Appendix 5, p.9.

Figure 2: NSW wind speed. Red indicates highest mean annual wind speed, and blue is lowest.



Source: Carter P.J & Gammidge L.C. (compilers) 2019. Renewable energy map of new South Wales (3rd Edition). Geological Survey of New South Wales, Maitland. ©State of New South Wales through NSW Department of Planning and Environment 2018.

Capacity Outlook modelling

AEMO uses capacity outlook modelling as 'the core process to explore how the energy system would develop in each ISP scenario' (ISP Draft Methodology, p. 8).

The modelling uses the resource and transmission limits calculated for each REZ, based on the renewable energy resources in the REZ and technical capacity of the available transmission to the selected REZs (ISP Draft Methodology, p. 21-27). The model only allows for renewable energy generation to be built in those REZs.

An important aspect of the ISP is comparing different development paths in order to find the optimal path. In the Draft Methodology section on 'Modelling renewable energy without REZ network expansion'. AEMO explains that:

> shadow resource limits and hosting capacities are also determined for areas of the network that have existing capacity, or where generation retirement is expected resulting in additional network capacity. These shadow resource limits and hosting capacities are included in all scenarios, not just the counterfactual studies. This ensures the capacity outlook model can determine the optimal trade-off between development of high-quality renewable resources in REZs, with associated network build, compared to developing lower quality resources in area with spare hosting capacity (ISP Draft Methodology, p. 21).

The problem here is that unless offshore wind resources are included in these 'shadow resource limits', the model is not using information that accurately reflects the available renewable resources. Some of the areas with spare hosting capacity are close to excellent offshore wind resources – such as the Central Coast south of Newcastle where the Munmorah power station[9] previously supplied the grid, and where offshore wind capacity factors are up to 46%.

Recommendation: Offshore wind resources within 100km of areas of the grid with spare hosting capacity should be incorporated into the 'shadow' resource limits used in capacity outlook modelling.

Cost Benefit Analysis

AEMO explains that the Cost Benefit Analysis is used 'to test alternative development paths and ultimately determine the ODP (Optimal Development Path)' (ISP Draft Methodology, p. 21). It uses a counterfactual model of building no new transmission to assess the benefits of building new transmission to new REZs, and this model incorporates the 'shadow resource limits' outlined above.

Our understanding is that the 'shadow resource limits' used in the counterfactual model do not incorporate the offshore wind resources that are available close to many high-voltage

[9] The Munmorah power station had a capacity of 1,400 MW and closed in 2012. It was located a few kilometers from the coast.

substations within the existing NEM. Unless the counterfactual development path includes the actual renewable resources available in close proximity to the current grid, it is not offering an accurate assessment of the costs and benefits of building new transmission and creating new REZs.

If it is the case that the counterfactual model only includes onshore renewable resources, this should be specified to improve the transparency of the ISP modelling process.

The existence of this counterfactual modelling process does offer an opportunity for assessment of the utility of offshore renewable resources for the Optimal Development Path recommended by the ISP.

Without considering all the available renewable resources, we cannot be sure that the ISP's Optimal Development Path is the best possible plan. More consistent wind offshore with a high peak-demand contribution factor and high capacity factor could reduce the need for storage. Offshore wind has been described by the International Energy Agency (IEA) as having a 'value proposition potentially comparable to that of baseload technologies such as nuclear power and coal-fired generators.' The reliability and consistency of offshore wind 'reduces the need for investment in other dispatchable capacity, including investment in combined-cycle gas turbines (CCGTs).[10]

Much of the existing transmission grid and most population and industrial centres in the NEM are close to the coast. Building renewable energy offshore virtually eliminates the climate risks of high temperature and bushfires.[11] Many of the REZs are proposed to be built in areas with a high bushfire and temperature risk. Before significant investment takes place, AEMO must update the renewable energy resources used to develop the 2022 ISP to properly test whether building offshore renewables could reduce the need for expensive transmission and storage, and reduce the climate hazards the energy system is exposed to.

Recommendation: If the counterfactual model used to make a cost-benefit analysis for building new transmission lines only includes onshore renewable resources, this should be transparently specified in the ISP.

Recommendation: The counterfactual model used to make a cost-benefit analysis for building new transmission lines should include offshore renewable resources in order to make a full and accurate assessment of the costs and benefits of building new transmission lines to new REZs.

Workforce and system transition – addressing externalised costs

AEMO's modelling in previous ISPs has made clear that Australia's electricity system will be undergoing a complete transformation in the upcoming decades.

[10] International Energy Agency, *Offshore Wind Outlook 2019*, p.12, 21, 44.
[11] The Star of the South offshore wind project is proposing to bury the transmission cable landing site and the short length of onshore transmission needed underground.

While AEMO's modelling maps out a least-cost path, we believe that the calculation of costs has been done on too narrow a basis. There will be a significant social cost to the transformation of the energy system and this should be understood and included in policy considerations and modelling to ensure the real costs are properly considered and shared across society. Small groups of workers and communities should not be left to bear the brunt of changes on their own.

Unfortunately, the history in Australia is that industrial transitions have increased inequality, with only one half to one third of displaced workers finding equivalent employment.[12] After the energy battles of the past decades, and the considerable social impact caused by closing just one coal-fired power station, we believe it is completely unrealistic to project that Australia will be able to decarbonise on the scale required by the 1.5°C and 2°C scenarios without comprehensive social programs to ensure that communities and workers can look forward to good secure jobs and improved livelihoods.

The Paris Agreement describes "the imperatives of a just transition of the workforce and the creation of decent work and quality jobs in accordance with nationally defined development priorities."[13] Specific elements of a 'just transition' that could be included in future ISP planning are:

- Giving weight to locating future energy generation near existing generation to allow for a workforce and community transition.
- Requirements for jobs created in REZs to be quality jobs, at industry rates of pay and with good job security. The Australian Council of Trade Unions has released landmark reports in 2020 on how to secure good jobs in renewable energy and on achieving a just transition.[14]
- Prioritising the use of existing transmission assets to allow for a workforce transition
- Prioritising renewable energy and other zero-emissions developments in areas impacted by coal station closures
- Prioritising procurement and development of supply chain in areas impacted by coal station closures
- Examining power supply for large industrial loads, and seeking to ensure they are supplied with lowest risk and minimal demand response (see later section in the submission). This is critical to ensuring jobs in all sectors of the economy are maintained, and that workers have confidence they will be maintained. Industrial legislation will need to ensure their rights are maintained and they are properly compensated during demand-response periods.
- Job guarantees, direct transition and re-training for affected workers, and support for communities.

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[12] ACTU, 2016, *Sharing the challenges and opportunities of a clean energy economy: A Just Transition for coal-fired electricity sector workers and communities.* https://www.actu.org.au/our-work/policy-issues/actu-policy-discussion-paper-a-just-transition-for-coal-fired-electricity-sector-workers-and-communities.

[13] UNFCC, Report of the Conference of the Parties on its twenty-first session, held in Paris from 30 November to 13 December 2015, p.21, In Australia, the creation of the LaTrobe Valley Authority following the closure of the Hazelwood coal-fired power plant and the Worker Transfer Scheme is one significant effort to establish a just transition in in Australia. The Queensland Government has also established a Just Transition Group, which will be developing a transition plan for the state.

[14] Australian Council of Trade Unions, *Sharing the benefits with workers: A decent jobs agenda for the renewable energy industry*, November 2020 *and* ACTU, Securing a Just Transition Guidance to assist investors and asset managers support a just transition, December 2020.

One output from the 2020 ISP was that for many locations in the NEM, there is a significant distance between the sites of coal-fired power stations scheduled for closure, and the sites of REZs that have been identified for development. Looking at the REZs proposed for NSW, the bulk of new generation is proposed to be built 280km-400km from current coal fired power stations, as follows:

Armidale (REZ N2) to Liddell Power Station 285km
Armidale (REZ N2) to Vales Point Power Station 376km
Dubbo (REZ N3) to Liddell Power Station 283km
Armidale (REZ N3) to Vales Point Power Station 398km

Other NSW renewable energy zones are proposed to be located even further west, north, and south.[15] Shifting the location of the bulk of a state's electricity generation does not simply involve building new transmission lines. There are significant social costs of such an enormous shift of the state's essential infrastructure, and the policy discussion should be had about whether this is a desirable outcome.

Concerns have been raised about energy models that rely 'on cost optimization formulations,' which can 'produce transition scenarios that can significantly distort the options to address the transition'.[16] The lack of a coherent energy policy in Australia means that the ISP and associated processes have effectively become our energy transition plan – but they are fundamentally technocratic in nature and lack the broader social considerations that are needed to win the public acceptance and support that the necessary reduction in greenhouse gases needs if it is to proceed without significant public backlash.

The energy transition presents us with many opportunities – but if poorly planned it could result in thousands of workers losing their jobs, communities losing long-standing industries, and potentially significant geographical shifts in where energy is generated and jobs are located. This transition also looks likely to be taking place during one of the worst economic crises that Australia has ever experienced.

Achieving social license and confidence in these measures requires meaningful consultation with the workers, unions and communities who are affected by and have an interest in these decisions, as well as the broader public. Consultation must include workers and unions who work in the current system, including in the generators scheduled to close, and workers who will be building new infrastructure.

Recommendation: That AEMO's energy system modelling include a 'transition cost' for Renewable Energy Zones located more than 50km from an existing coal fired power station. The 'transition cost' should be determined in consultation with affected workers and communities, and should reflect the social costs of avoiding unemployment of the coal-fired power workforce, relocation and/or training of a new workforce, and the construction of

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[15] Australian Energy Market Operator, Draft 2021 Inputs, Assumptions and Scenarios Report, December 2020, p.110.
[16] Xavier Garcia-Casals, Rabia Ferroukhi, Bishal Parajuli. Measuring the socio-economic footprint of the energy transition. *Energy Transitions* (2019) 3: 105.

new infrastructure and development of new supply chains to facilitate large-scale energy being built in new areas.

Costs to be modelled for this 'transition cost' include those listed below, but a proper consultation should take place with affected workers and communities to determine this:
- Training the workforce for the construction and maintenance of new generation and transmission infrastructure, including new training and education facilities.
- Costs associated with avoiding unemployment of the previous workforce and loss of jobs in those communities. We believe job guarantees, training, and a direct transition should be made available to all affected workers, and support should be provided to communities.
- Infrastructure costs – capacity of roads and bridges will likely need upgrading to deal with the transportation of turbines, towers, solar panels, and other equipment.
- International and local supply chains will need to be established.

Weight should be given to building renewable energy close to current power stations.

Recommendation: In the medium term, AEMO should undertake more integrated modelling that includes employment, education, and health to better understand the challenges and opportunities of the energy transition being modelled.

One example of such an integrated model is IRENA E3ME model, which recognises that 'the energy system is embedded into the wider economy, which in turn is embedded into the social system, and the Earth system. Standalone energy or energy-economy transitions do not exist.'[17] The outcomes of this model show that:

> Overall, the energy transition will generate more jobs in renewable energy and energy efficiency than will be lost in the fossil fuel sector. However, the geographic distribution of jobs gained and lost may not be in alignment. Similarly, new job creation may not occur within the same time scale as jobs losses, and training misalignments can also be expected, requiring additional adjustment measures. Moreover, other economic sectors than the energy sector can experience transition-related employment impacts, calling for a holistic labour policy that applies just transition considerations across all the economy.
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> It is against this backdrop—diverging transition outcomes as well as spatial and temporal adjustments needs—that policies for economic restructuring are needed to spread the benefits of the transition widely and to minimize the burdens and costs. Such policies are essential not only as a matter of fundamental fairness but also to limit the likelihood that those negatively impacted will continue to oppose policies required to render the world's economies climate-safe.[18]

[17] Xavier Garcia-Casals, Rabia Ferroukhi, Bishal Parajuli. Measuring the socio-economic footprint of the energy transition. *Energy Transitions* (2019) 3: 107.
[18] Xavier Garcia-Casals, Rabia Ferroukhi, Bishal Parajuli. Measuring the socio-economic footprint of the energy transition. *Energy Transitions* (2019) 3: 115-116.

Delivering a just transition will require whole-of-government planning, support and resources.[19]

[19] Resources on implementing a just transition include: MUA and others, Putting the Justice in Just Transition: Tackling inequality in the new renewable economy, November 2019. Australian Congress of Trade Unions, 2016, Sharing the challenges and opportunities of a clean energy economy: A Just Transition for coal-fired electricity sector workers and communities. Peter Sheldon, Raja Junankar, Anthony De Rosa Ponello. The Ruhr or Appalachia? Deciding the future of Australia's coal power workers and communities, October 2018. IRRC Report for CFMMEU Mining and Energy Division. IndustriALL, Just Transition – An idea whose time has come, 16 May 2019. Commission on Growth, Structural Change and Employment (Germany), Final Report, January 2019.

Other comments

Anticipated generation and storage projects

In relation to 'Table 3: Project commitment criteria questions' (p.40), to accommodate offshore wind projects, note that sea areas will be required (not just land) and projects in Commonwealth waters will likely have a Commonwealth licencing process.

Firm contribution factors for VRE

It should be noted that capacity factors for offshore wind are higher on average than for onshore wind, so separate numbers for offshore and onshore wind should be used in modelling (p.47).

Emission trajectory and targets

We support the inclusion of emissions trajectory and targets in modelling (p.50). This is important for transparency in planning.

Modelling hydrogen in the capacity outlook model

We support the inclusion of hydrogen modelling in the ISP, and the choice to restrict this to hydrogen made from water using electricity. We note that it is particularly important to include offshore renewable resources in ISP modelling of future hydrogen scenarios, especially where electrolysers are located in ports, and we have made this point in the ISP Inputs, Assumptions and Scenarios consultation.[20]

It should be noted that many large industrial loads that could also use hydrogen are also located in ports, for example, Bluescope Steel in Port Kembla. Very large quantities of electricity will be needed to produce hydrogen for these purposes, and offshore wind offers the potential capacity to generate power on this scale. One million tonnes of steel production requires 2.5 TWh (2,500 GWh) of electricity to produce the required renewable hydrogen.[21] Hydrogen is difficult and expensive to transport so it is advantageous to produce it near where it is being used.[22]

Preliminary results from the Blue Economy Cooperative Research Centre research project show that within 50km of the Dapto substation (close to Bluescope), there is the potential for offshore wind turbines to produce 38 TWh/year of electricity.[23] Current Bluescope production of 2-3 million tonnes of steel would require 5-7.5TWh/year, leaving plenty of scope to design a wind farm to allow for shipping lanes and to place turbines as far offshore as possible to reduce their visual impact.

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[20] MUA submission: 2020-21 Planning and Forecasting Consultation on Inputs, Assumptions and Scenarios, 1 February 2021.
[21] European Parliament, Potential of hydrogen for decarbonizing green steel production, 2020.
[22] Tony Wood and Guy Dundas, Start with Steel, Grattan Institute, May 2020, p.22.
[23] This allows for water depths up to 1000m, and assumes 15MW floating turbines spaced at 5 MW/km^2

Making hydrogen to produce one million tonnes of steel in the estimated wind available off Port Kembla would require about 50 large 15 MW offshore wind turbines, with an installed capacity of 770MW.

The Blue Economy Cooperative Research Centre report on the potential for offshore wind in Australia includes some modelling of future offshore wind and hydrogen (to be released July 2021).

Figure 27 of the Draft Methodology (p.56) indicates that Wollongong/Port Kembla would be a hydrogen export port. As indicated above, there is the potential for very significant quantities of hydrogen to be used in the steel mill located at the port.

Recommendation: Offshore wind must be included in the renewable resources considered for modelling the future production of hydrogen. There is potential for significant domestic consumption of hydrogen in Port Kembla for steelmaking.

Large industrial loads

The future of the electricity grid should be explicitly designed to ensure a reliable supply for large industrial loads. This is necessary not only to secure the future of those industries and the hundreds or thousands of jobs they support, but also to reduce community anxiety around that the future of that supply in the context of the scheduled closures of coal-fired power stations. In the absence of a clear plan that secures jobs, community anxiety can rapidly translate to an opposition to decarbonisation and emissions reduction goals.

In many cases, large industrial loads have deliberately been built close to coal-fired power stations. To give one example, the Tomago Aluminium Smelter has a constant use of 950MW or 10% of NSW's total electricity supply.[24] It currently has direct transmission lines to both the Bayswater and Eraring coal fired power stations to ensure continuity of supply.[25] As it stands, the ISP seems to contemplate shutting down those power stations and replacing them with renewable energy generation located 300-400km away.[26]

Recommendation: Specific planning should be undertaken to ensure that the future grid provides secure supply for large industrial loads. This should be explicitly addressed in future ISPs to reduce community anxiety and preserve jobs. The Sustainable Growth and Export Superpower scenarios also need to include policy to support those industrial loads.

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[24] Tomago aluminium, Tomago keeps the lights on across the state, 2020. Tomago can reduce this demand to 350MW in minutes when necessary, but this interrupts the function of the smelter.

[25] Bayswater Power Station is approximately 104km from Tomago and generates 2.665 GW across four units and is scheduled to close in 2035. Eraring Power Station is 54km from Tomago and generates 2.88 GW across four units and is scheduled to close in 2032.

[26] The distance from the Tomago Aluminium Smelter to Armidale (REZ N2) is 318km and to Dubbo (REZ N3) to is 369km.