2024 ISP Consumer Panel

To: **AEMO**

Attn: forecasting.planning@aemo.com.au

Report: **ISP Consumer Panel Report on AEMO's Inputs Assumptions and Scenarios Report (IASR) for the 2024 Integrated System Plan – Final Report**

- As required by Section 5.22.7 of the National Electricity Rules

September 2023

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Acknowledgement of Country

We acknowledge the many Aboriginal lands that host energy infrastructure in Australia. We acknowledge the traditional custodians of these lands and pay our respects to Elders past, present, and emerging.

Executive Summary

The first Integrated System Plan (ISP) was presented by AEMO to Energy Minsters in 2018 and has been produced every two years since. The Consumer Panel is a more recent development being first appointed for the 2022 ISP following rule changes implemented after the publication of the 2020 ISP. The 2024 ISP with be the fourth ISP and the second that has involved a Consumer Panel in its development. The Panel's role is to bring a consumer-focused perspective to the ISP development process.

The ISP has undergone significant development since the 2018 edition in both the depth and breadth of the issues it covers and the level of stakeholder involvement. This reflects increased knowledge and understanding of the complexity of the energy transition currently underway at the same time as AEMO has sought to expand its stakeholder engagement process. AEMO has recognised that education of stakeholders to be able to better participate in and contribute to the development of the ISP is a key factor in its acceptance. Through submissions like this, we see the Consumer Panel making a major contribution to improved consumer engagement in the ISP process and greater understanding of potential impacts on customers of potential ISP projects.

The Inputs, Assumptions and Scenarios Report (IASR) is a central component of the process to develop the ISP. We regard it as a two-part process. First, scenarios are developed and then a suite of modelling inputs and assumptions are developed by AEMO, including with stakeholder engagement, and expertise sought from a range of consultants. Through this engagement we make the following observations:

The Panel highlights key observations on the IASR:

1. The 2024 ISP is being developed in a period of high levels of uncertainty, including changing Australian Government policies, increasing involvement of State and Territory jurisdictions, varying expectations about paths and processes for a transition to a net zero energy future and rising energy prices for consumers that are coupled with global supply chain complexities and rapidly changing technologies. Grappling with uncertainties and how associated risks are allocated is central to ISP development. It is also very difficult.

2. Significant rises in the costs of ISP projects (eg Humelink) as well as renewable generation projects (eg Snowy 2.0) are occurring at the same time as acute affordability concerns for many consumers. The promises from energy businesses and governments of lower power prices from the transition have not yet occurred with the expectation that prices will continue to rise for some years even with the range of Government subsidies and rebates on offer.

   We observe that affordability concerns are contributing to falling support for the transition though support still remains relatively high. Willingness/capacity to pay for the transition in electricity prices is falling as energy costs rise. So the question of "who pays?" for the ISP projects, as specified in the Optimal Development Path (ODP) needs to be more closely considered than in the past. A crucial policy question is how much Governments will be willing to pay to keep consumer support for the transition – what the Panel, and others, refer to as 'consumer social licence'?

3. The 2022 ISP timeline to implement the ODP projects has been substantially disrupted by 'community social licence' issues referring to the need to obtain access to easements and land. We are seeing many reviews about how to better engage with landowners, but the negative impact of past network practices mean it will take some time to regain community trust. In the meantime, social licence delays will continue to raise cost pressures.

4. While AEMO describe the ISP as a 'whole of system' plan, it is in practice, a 'whole of transmission' plan with limited involvement of distribution networks, even those with substantial sub-transmission assets. We comment below on the benefits of expanded DNSP involvement in the future.

5. While progress has been made since the 2022 ISP in selection of the appropriate discount rates to be used, this submission shows there are still outstanding issues to be resolved on the preferred methodology. We strongly support the approach of surveying market participants and the use of different discount rates for network and generation/storage investments.

6. The ISP is a significant energy and infrastructure plan, with high-cost projects that consumers will pay for, either as energy customers or taxpayers. Engaging with a diversity of consumers remains challenging for the ISP's development but needs to continue to be a focus of additional effort, both in planning and resourcing. The efforts to better understand consumer risk preferences, a key recommendation of the 2022 ISP Panel, has been an important development in this direction during 2023.

7. Achievement of the ISP's ODP also requires policies, programs and practices that are outside the scope of the ISP. We consider orchestration to encapsulate all of these non-ISP actions that are required to enable the ODP to be optimal. Further linking the ISP with these processes that impact ISP effectiveness is increasingly significant.

In preparing this response to the IASR we have also gleaned important learnings from the process. In particular, experience highlights the importance of building the community's trust around the ISP development process, its objectives and implementation. Here are our process observations for the remainder of the 2024 ISP and looking forward to the 2026 ISP:

1. Implementation of a Consumer Engagement Plan:

   The challenge of broader engagement on such a technical matter, but a matter about which community opinions and priorities across the community may genuinely differ, requires stakeholder engagement on the plan development and transparency about the ISP development process and outcomes.

   As the 'social' and 'people' aspects of the ISP become ever more important, alongside the engineering and system planning aspects, hearing form consumers, their communities and highly informed consumer advocates needs to become a greater focus on the development of the ISP. The recently published Stakeholder Engagement Strategy is a good first step. We look forward to working with AEMO to complete the 2026 ISP Engagement Strategy in time for the start of the 2026 ISP process in July 2024.

2. The role of the Consumer Panel

   Panel members have found the working relationship with AEMO to be very productive since our appointment in October 2022. We consider the Consumer Panel process to be a very useful component of the development of the ISP. A key example of this is the greater involvement of the Panel in developing consultant scopes of work and choice of the preferred consultant. We encourage AEMO to continue and expand on this use of the Panel.

   Appointing the Consumer Panel early in the 2026 ISP development process to allow it to be fully engaged in the development of the scenarios both support the engagement plan implementation and further develop the effectiveness of the Panel's role and advice.

3. The risks that consumers bear

   The question of who bears risk and hence who pays will only loom larger in the 2026 ISP as costs continue to increase. Continued rising electricity bills risk losing consumer social licence for the transition that the ISP is seeking to drive. The work to measure Consumer Risk Preferences that has begun in the 2024 ISP will be an expanding focus in the 2026 ISP.

4. Industry engagement

   The integrity of the ISP relies heavily on the information provided to AEMO by the network companies (transmission and distribution), suppliers and external experts such as the CSIRO. We strongly support AEMO's continuing to expand its engagement with these bodies and the jurisdictional governments. In particular AEMO should expand DNSP involvement significantly for a variety of reasons e.g., DNSPs have considerable spare capacity in the sub-transmission system for connection of renewable generation that can be utilised while approvals are gained for ISP projects; DNSPs will be doing a lot of the 'heavy lifting' on the transition e.g., electrification of homes and transport, energy efficiency and CER enablement.

5. Community relationships

   The ISP is designed to benefit all consumers in the long-run in line with the overarching national energy objectives set out in the energy law. Nevertheless, there will be a more immediate impact on communities who host the ISP infrastructure - some good and some not so good - highlighting the critical and growing importance of 'social licence' through effective and targeted engagement with the most affected communities. Regaining broad community trust for energy infrastructure policy and planning is crucial.

   The importance of social licence will only increase in the 2026 ISP and AEMO will need to work with stakeholders like the Advisory Council on Social Licence to better understand how to account for these issues in ISP modelling. The Panel looks forward to further work with the Advisory Council on Social Licence and AEMO to develop ISP sensitivities to address social licence risk for the 2024 ISP.

6. The future ISP

   The Commonwealth has recently begun a review to 'supercharge' the ISP. The Panel looks forward to providing its views to the review. We encourage AEMO to support the 2026 Panel to participate through submissions and other means to the AEMC review of the ISP that is due in 2025.

At the end of this report, we conclude with some considerations for the remainder of the 2024 ISP and the 2026 ISP, commencing page 68.

Table 1 – Consumer Panel Recommendations

The following table is the Panel's summary of progress from 2022 recommendations and our recommendations for the 2024 and 2026 ISP processes. Table 1 summarises:

- Our views on how the 2022 ISP Consumer Panel's recommendations on the Final IASR for the 2022 ISP have been implemented by AEMO
- Our recommendations on what AEMO should consider both as it prepares the Draft 2024 ISP and looks forward to the IASR in the 2026 ISP.

We affirm that considerable effort has been made by AEMO, through their staff team to respond effectively to the 2022 Panel recommendations. This response has provided a strong basis for the what the Panel regards as very effective engagement on the 2024 ISP. We thank AEMO for their willingness to engage, responsiveness to our suggestions and willingness to challenge and be challenged.

Note: In the ID column, single letter ID's refer to 2022 Panel recommendations and double letter ID's refer to 2024 Panel recommendations.

Where a similar recommendation is made by both 2022 and 2024 Panels, both ID's are shown.

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ID	Headline	2022 Panel Recommendations	2024 ISP Consumer Panel comments 2024 Panel review of 2022 recommendations	2024 Recommendations for remainder of 2024 ISP and 2026 ISP
A: Further expand AEMO's Stakeholder Engagement Capability				
A1 AA1	**Capacity**	Allocate adequate resources to build AEMO's capacity for engagement	AEMO's engagement resources have increased considerably and the Panel has benefitted from much more extensive engagement with AEMO over the course of the 2024 ISP	Allocate adequate resources to further build AEMO's capacity for engagement
A2 AA2	**Evaluation**	Establish an evaluation framework for engagement	We worked with AEMO to develop the 2024 ISP Stakeholder Engagement Strategy that was recently released. AEMO has begun the process of surveying stakeholder views as an input into evaluating ISP engagement.	Use the 2024 Strategy as a base for the 2026 ISP Strategy to be developed and consulted on ahead of the start of the 2026 ISP process
A3 AA3	**Accountability**	Establish KPIs for engagement and accountability within AEMO	These are included in the Stakeholder Engagement Strategy;	Review the KPIs used in assessing the 2024 ISP for their continued use in the 2026 ISP Strategy
A4 AA4	**Plan**	Develop a more comprehensive and tailored stakeholder engagement plan for the 2024 ISP, including undertaking a stakeholder mapping exercise to identify relevant stakeholders and how to best engage with them	Delayed but now published.	The Panel to work with AEMO on co-design of the 2026 ISP Engagement Strategy; this would include a public consultation process prior to it being published early in the 2026 ISP timetable.
A5 AA5	**Manage**	Develop and maintain a stakeholder management system to regularly assess stakeholder needs and interests and identify gaps in stakeholder representation and participation	Part of the Stakeholder Engagement Strategy	Develop and maintain a stakeholder management system to regularly assess stakeholder needs and interests and identify gaps in stakeholder representation and participation
A6 AA6	**Share**	Formalise internal and external inter-relationships to share knowledge across consultations	There are a number of areas relevant here: • There has been more use of the Consumer Forum to engage on ISP matters in a more understandable way	The Panel looks forward to working with AEMO to develop more 'stakeholder friendly' versions of the ISP documents and stakeholder communication beginning with the Draft ISP

ID	Headline	2022 Panel Recommendations	2024 ISP Consumer Panel comments	
			2024 Panel review of 2022 recommendations	2024 Recommendations for remainder of 2024 ISP and 2026 ISP
			• Still an over-reliance on the role of the FRG and other specialist technical avenues for engagement	
A7 AA7	**Co-design**	Adopt a collaborative and co-design approach to engagement	The 2024 Panel has been more involved in a range of collaborative and co-designed activities including: • 2024 ISP Stakeholder Engagement Strategy • Development of the scope of work for, and then detailed engagement with the selected consultants on gas prices, discount rates and consumer risk preferences • Development of the revised Delphi Panel process	The co-design approach to be continued and expanded in 2026 ISP.
A8 AA8	**Understand**	Implement a program of social research to better understand consumer and community attitudes and perceptions about the future energy market	Partly addressed through the research on consumer risk preferences; no other attitudinal and perception survey work	Implement a program of social research, building on the initial Consumer Risk Preferences work undertaken for the 2024 ISP; this should be designed to better understand consumer and community attitudes, perceptions and uncertainties about the future energy market and the role consumers would like to play
AA9	**Social Licence**			AEMO advocate for Commonwealth, State and Territory energy ministers to establish a national engagement strategy to develop a consistent approach to landowner compensation.
AA10	**Social Licence**			Upgrade and extend ISP communications strategy to provide more frequent information about ISP projects' social licence impacts. In this context we look forward to working with AEMO and the Advisory Council

ID	Headline	2022 Panel Recommendations	2024 ISP Consumer Panel comments	
			2024 Panel review of 2022 recommendations	2024 Recommendations for remainder of 2024 ISP and 2026 ISP
				on Social Licence to develop the social licence sensitivities to be modelled in the Draft 2024 ISP.
AA11	**Enhancing consumer engagement**			Build on AEMO's Consumer Forum to establish frequent and meaningful engagement with consumer advocates more broadly, with a view to building capacity to support engagement with ISP and related processes.
AA12	**Cost risks and allocation**			That AEMO work with the 2024 Panel to understand how the risks and costs borne by consumers might be better communicated in the 2024 ISP and more effectively allocated in future ISP's
AA13	**Consistency**			The Panel work with AEMO to ensure AEMO's approach to risk in the ISP is consistent to AEMO's approach to risk in its other responsibilities, where practical.

B: Focus efforts on inputs and assumptions that are most material to the consumer interest and have most uncertainty			2024 ISP Consumer Panel comments	2024 Recommendations
B1 BB1	**Materiality**	There is an ongoing need to draw attention to the inputs and assumptions that are most material to the consumer interest	Engagement with AEMO has resulted in a shared understanding of the issues that are most material to consumers	Continue to draw attention to the inputs and assumptions that are most material to the consumer interest, recognising that current uncertainties in energy markets and with cost of living pressure result in regular materiality changes.
B2 BB2	**Complexity**	There is an ongoing need to manage the complexity and volume of information in order to foster wider engagement.	This is a work in progress - the ISP is unavoidably complex and difficult to understand for many consumer advocates, particularly where they do not have the funds to enable capacity building and preparation of submissions By our estimate there were 10 written and 9 verbal submissions on the Draft IASR that could be considered from consumer representatives; this compares to our estimate of three for the 2022 ISP Draft IASR	There is an ongoing need to manage the complexity and volume of information in order to foster wider engagement, recognising that uncertainty, particularly about how the energy transition will occur, adds to complexity. Consider alternative or additional ways of forecasting and engaging on these material, but highly uncertain, inputs and assumptions for the 2024 ISP
B3 BB3	**Public Policy**	Calibrating the ISP to Public Policy commitments, and vice-versa, must be an ongoing priority	AEMO, stakeholders and the Panel have all endeavoured to keep up with the rapidly changing public policy environment. For example, since the 2022 ISP was released we have seen more detail on “Rewiring the Nation” at the Federal level and significant jurisdictional policies announced in Queensland and Victoria AEMO is seems to be a ‘taker’ of the jurisdictional decisions on public policy commitments in the ISP under the ‘public policy clause’ in the NER; this can sometimes leave consumers confused about what a particular policy is included or not included.	AEMO continue to provide as much information as possible on its public policy’ decisions AEMO provide a clear explanation of how the build limits in the NSW Roadmap are incorporated into the ISP modelling under the ‘public policy clause’.
B4 BB4	**Gas Prices**	The use of external consultancies to provide forecasts makes engagement challenging. The balance between external and in-house capabilities should be regularly reviewed.	A new consultant, appointed to review gas price forecasts subsequent to the announcement by the Federal Government of the Mandatory Gas Code, provided a very comprehensive report	Continue to involve the Panel in development of the scope of work, selection and review of the selected consultant’s work.

B5 BB5	**Transmission Costs**	Significant progress has been made but the risk of under-estimating costs remains. Continue to improve the Transmission Cost Database	While there have been substantial improvements in the TCD, the results are still considered well below the required level of accuracy to: • Give consumers confidence in the modelling and the residual risk they face from poor cost estimate accuracy, and • Be consistent with AEMO's consideration of risk in other areas of its responsibilities	Continue to work with the Customer Panel to see how the 2024 Panel's concerns about the risk of under-estimating forecast capex can be addressed.
BB6	**Candidate Technology Build Costs**			The Panel work with AEMO to develop the scope of works for the 2026 ISP update of the CSIRO GenCost study
BB7	**Candidate Technology Build Costs**			For the Draft 2024 ISP – AEMO provide greater clarity around how it uses the CSIRO GenCost results in ISP modelling
BB8	**Candidate Technology Build Costs**			For the next iteration of the GenCost study - CSIRO provide greater clarity around how network costs are treated over the whole forecast period to 2052 and its justification for its 'reversion to normal' date
B6 BB9	**Discount Rates**	This parameter did not receive the attention it deserved in this ISP cycle. Consult earlier and wider for the 2024 ISP	The 2022 ISP consultant was engaged to provide an update on their 2021 report. Engagement with the Panel was late in the IASR process and after AEMO had decided to engage Synergies to provide an update on their 2021 report. We consider the engagement did not address the 2022 Panel's concerns about that consultant's methodology. A new consultant was appointed in 2023 and provided a report based on a methodology that the Panel felt was more consistent with the AER Guideline, though the limited time available to the	AEMO engage an expert consultant to prepare a more comprehensive report with a wide sample of network and non-network equity and debt investors prior to the commencement of modelling the Final 2024 ISP in early 2024. The Panel continue its involvement with the consultant as they finalise their report.

			consultant meant they were constrained in the sample they could survey.	
BB10	**Discount Rates**			AEMO and the Panel engage with the AER ahead of the 2026 ISP process commencing to further explore: • whether the intention in the CBA Guideline was to have only one central discount rate to cover all regulated and non-regulated investors in the NEM, and if so, on what basis • Given the findings of the Oxford Economics Australia (OEA) discount rates report, to consider whether the CBA Guideline requirement that AEMO uses the AER's 5-year network revenue WACC determination as the basis for estimating the lower bound cost of capital is appropriate for future ISP development.
BB11	**Discount rates**			For the 2026 ISP, adopt the methodology used by OEA to determine investor discount rates for the central and upper bound cases while expanding the sample size.
BB12	**Discount Rates**			AEMO ensures it engages a wider range of stakeholders on this topic and does so much earlier in the 2026 ISP process. This will enable more time for stakeholders to *effectively* engage in the process, including reviewing the expert reports.
BB13	**Discount Rates**			AEMO further investigate the OEA's 2023 survey results which point to significant

				differences in investors' discount rates for regulated and non-regulated assets and does so early in the 2026 ISP process, allowing time for engagement with all stakeholders.
BB14	**Discount Rates**			AEMO expand the consideration of discount rates to include consumer discount rates for behind the meter investments for the 2026 ISP.
B7	**Electrification**	The likely impacts on the Power System of electrification to reach economy-wide decarbonisation objectives did not receive the attention it deserved in this ISP cycle. Consult earlier and wider for the 2024 ISP	There has been a more comprehensive and timely approach to the CSIRO/Climateworks multi-sectoral modelling in the 2024 ISP which was discussed at the September 2022 FRG meeting; nevertheless, we note the AER's Transparency Review comment on the need for more explanation of the electrification assumptions.	
B8	**Hydrogen**	While stakeholders expressed a great deal of interest in the role of hydrogen in the different scenarios, there is much uncertainty in the demand for Hydrogen from Australia's future export and domestic economies. A strategic approach to further forecasting is warranted.	This is partly reflected in the changes to the hydrogen scenario in the 2024 ISP; Green Energy Exports has a lower the level of hydrogen production connected to the NEM and limits hydrogen blending with natural gas to 10%; the Panel considers that the 2024 ISP scenarios are 'about right' with respect to other hydrogen assumptions.	AEMO should continue to refine assumptions about the production and use of hydrogen for domestic applications and export with more weighting on industry developments, technology improvements and market readiness, and less weighting on policy ambition. This will likely entail assuming a lower percentage of H2 blending in residential gas networks for future IASRs.
B9 **BB15**	**Decentralisation**	Integration of forecasts and uncertainties in distribution network issues (particularly the uptake and use of customer-owned solar, batteries, EVs and other devices) has significant scope for improvement. Decarbonisation and Decentralisation are the 'megatrends' - the ISP must be calibrated to both.	While some progress has been made this time, we consider there needs to be much great involvement of DNSPs so what is currently a 'whole of transmission system plan' can become a true 'whole of system' plan.	The draft ISP for 2024 should be carefully tested with relevant experts from Distribution businesses, who should also be actively engaged early in the development of the 2026 ISP.

BB16	**Risk**			Consumer Risk Preference – Build on the commences work undertaken for 2024 ISP with development of a longer-term strategy to ascertain and apply consumer risk preferences.
C: Elevate the status of the scenario work, engage on it earlier and more widely and separate it from the ongoing forecasting and modelling work.			2024 ISP Consumer Panel comments	2024 recommendations
C1 CC1	**Earlier, Broader**	Engage early on scenarios for the 2024 ISP and use this process as an entry point for a wider group of stakeholders.	Scenarios webinars were held in July and August 2022	Engage early on scenarios for the 2026 ISP and use this process as an entry point for a broader group of stakeholders. Early engagement should include pre-scenario briefings and deliberative forums that include consumer advocates.
CC2	**DNSPs**			AEMO work with DNSPs to co-design a specific DNSP Engagement Plan for the 2026 ISP.
C2 CC3	**Consumer Panel**	Appoint the next ISP Consumer Panel before the scenario development process commences	Unfortunately, the delay in the Panel's appointment until late October 2022 meant we were unable to participate in the development of the scenarios until the publication of the Draft IASR in December 2022	Appoint the 2026 ISP Consumer Panel so they are able to participate from the start of consideration of 2026 ISP scenarios.
		D: Following the IASR, focus engagement on how uncertainty is managed prior to publishing the Draft and Final 2022 ISP		2024 Recommendations
D1 DD1	**Scenario Weights**	The relative weightings applied to scenarios is a material piece of 'judgment' to be exercised before the Draft ISP is published. AEMO should continue to engage with stakeholders prior to the Draft ISP on the *Delphi Panel* process and how the final weightings are determined.	Two members of the Panel worked closely with AEMO co-designing many aspects of the Delphi Panel; they were ring-fenced from the two members of the Panel who were Delphi participants; the 2024 ISP Delphi process was a considerable improvement in the initial Delphi process used in the 2022 ISP.	Undertake a review of the 2024 ISP Delphi process to see where improvements could be made for its application in the 2026 ISP.
D2 DD2	**Public Policy**	Governments are strongly encouraged to work closely with AEMO and provide as much	Complementary to B3/BB3	

		detail as possible for incorporation into the Draft ISP. AEMO should consult on how to incorporate any material changes in government policies that occur between the IASR and final ISP.	The 2024 Panel recognises that considerable discussion occurs between AEMO, Governments and the other Market Bodies (AEMC and AER). Engagement with consumers in particular and a diversity of stakeholders in general still needs to be improved. The topics of Social Licence and Orchestration deal with the practice of application of government policy into the ISP.	AEMO provides a clear explanation of how the build limits in the NSW Roadmap are incorporated into the ISP modelling under the public policy clause.
DD3	**Public Policy**			The Commonwealth has recently begun a review to 'supercharge' the ISP. The Panel looks forward to providing its views to the review AEMO supports the 2026 Panel to participate through submissions and other means to the AEMC review of the ISP due in 2025
DD4	**Orchestration**			ISP 2024 to include a discrete section that identifies the non-transmission projects and policies required to achieve the Optimal Development Path. (Including policy certainty, transition strategy, energy efficiency etc). Further that these orchestration measures are clearly identified in the ISP 2024 communications strategy.
D3 DD5	**Preliminary Results**	Keep the Panel and other stakeholders appraised of themes emerging from results as the modelling unfolds and sensitivities are tested in order to build confidence that material uncertainties are being captured	Yet to occur	We look forward to working with AEMO as it proceeds with the modelling for the Draft ISP to be published in December 2023. This will include working with AEMO and the Advisory Council on Social Licence to develop the social licence sensitivities.
D4 DD6	**Sensitivities**	The IASR and ISP Methodology do not set out the full list of proposed sensitivities or 'event-driven scenarios'. What these are and how they are used may have a material impact on the draft and final ISP. AEMO should engage with stakeholders on these issues prior to the draft ISP.	The Final IASR has a wide range of proposed sensitivities and, as noted above, the Panel will work with AEMO to refine those.	The IASR and ISP Methodology should set out the full list of proposed sensitivities or 'event-driven scenarios'. What these are and how they are used may have a material impact on the draft and final ISP. AEMO should engage with stakeholders on these issues prior to the draft ISP.

DD7	**Sensitivities**			The selection of the initial sensitivities should be conducted at the same time as the selection of the scenarios and then they are subject to concurrent review with the scenarios.
DD8	**Sensitivities**			AEMO engages early with the Panel over the course of the ISP process to the extent that its modelling suggests alternative scenarios or sensitivities are required. Similarly, the Panel has the opportunity to engage AEMO on alternative sensitivity testing based on emerging consumer concerns.
DD9	**Sensitivities**			AEMO is encouraged to develop the ISP modelling to enable increased analysis of 'combined sensitivities' that model two variables eg increased cost and delaying commissioning due to social licence, at the same time.

Table 1. Recommendations from ISP 2022 and 2024 Consumer Panels, Source: 2022 and 2024 Consumer Panels

2.0 Role of the ISP Consumer Panel

The ISP Consumer Panel is an advisory body set up under changes to the National Electricity Rules (NER) put in place since the 2020 ISP. The role of the ISP Consumer Panel is to bring a consumer-focused perspective to the ISP development process, with particular regard to the long-term interests of consumers.

The four members of the 2024 ISP Consumer Panel (the 2024 Panel) are:

- Bev Hughson, Advocate with a focus on promoting consumers' interests, based on 30+ years working in the gas and electricity industries.
- Craig Memery, advocate with the Public Interest Advocacy Centre's Energy and Water Consumer Advocacy Program.
- Mark Grenning, Director of Policy and Regulation at the Energy Users' Association of Australia.
- Mark Henley, long term advocate for vulnerable people and communities, recently retired from Uniting Communities as Manager Policy and Advocacy.

The 2022 ISP Consumer Panel (the 2022 Panel) described their approach to the long term interests of consumers as[1]:

> "…to ensure the ISP adequately accounts for the risks of over- or under-investment when the future, inevitably, doesn't turn out the way it was modelled today. If there is over-investment, consumers will pay more than they need to for electricity, and we know the affordability of electricity is already a major issue for many consumers. If there is under-investment, there will be an increased risk of power outages due to reduced reliability or security of supply, or failure to meet emissions reductions targets due to an inability to connect new renewable generation."

The 2024 Panel endorses this approach.

Under the Clause 5.22.7 of the NER, the Panel is required to publish two main reports:

- A report on the IASR by 28 September 2023
- A report on the Draft ISP by 15 February 2024.

AEMO must publish these reports on its website and have regard to them but is not obliged to give effect to any recommendations in these reports.

In addition to these two required reports, the Panel considers it has a role in the ongoing ISP development process and is supported by AEMO in this regard. The Panel engages closely with AEMO through formal and informal submissions and other activities. These submissions are listed on our AEMO webpage[2].

The Panel can be contacted via ISPconsumerpanel@aemo.com.au.

[1] See p.14 https://wa.aemo.com.au/-/media/files/major-publications/isp/2021/isp-consumer-panel-report-on-2021-iasr.pdf?la=en

[2] https://aemo.com.au/en/energy-systems/major-publications/integrated-system-plan-isp/2024-integrated-system-plan-isp/isp-consumer-panel

2.1 Context and Themes

In our response to the draft IASR we identified a set of contextual matters and themes that were broader than any specific topic considered in the IASR. These themes are important, in part because addressing them also assists with consideration of multiple, specific elements of the IASR. The themes that we presented were summarised as follows:

Bigger Picture Themes

1. *Cost Matters - and who pays that cost matters.*
2. *Net Zero matters – and behavioral responses will vary.*
3. *Orchestration*
4. *Uncertainty*
    a. *Uncertainty of how consumers will behave / respond, (consumer side)*
    b. *Supply side*
5. *Transparency*
6. *Policy*
    a. *Australia*
    b. *International*
7. *Social Licence*

Process Themes

8. *Role of DNSPs*
9. *Sensitivity analysis*
10. *Consumer engagement*

Topic Specific Priorities

11. *Discount rates*
12. *'Hydrogen Scenario'*
13. *Consumer Risk Preferences* *} Important and subject to separate processes,*
14. *Transmission Cost Database* *} along with ISP methodology*

While we do not re-prosecute the arguments for these themes in this submission, they remain relevant. We provide some updated commentary on some of the themes and add a couple of new ones reflecting developments since our submission on the draft IASR:

1. Cost matters – even more
2. who bears ISP risk and who pays?
3. Net Zero matters
4. Orchestration
5. ISP vs total system plan
6. Uncertainty
    a. Inconsistency in approaches to risk
7. Social Licence

Cost Matters- even more

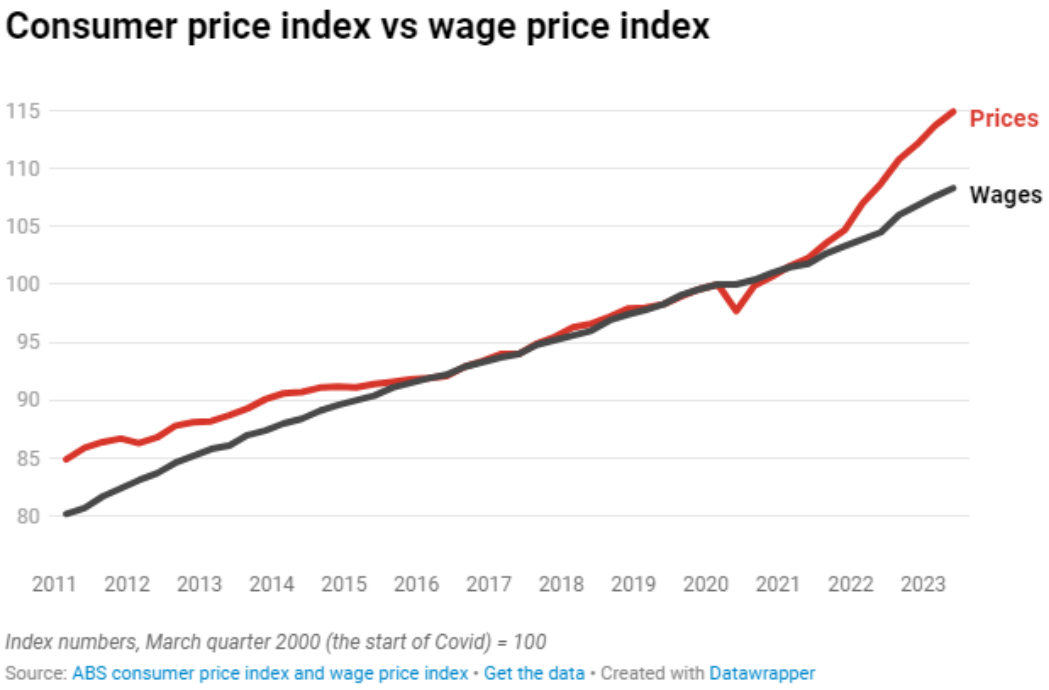
In our response to the draft IASR we observed[3] :

> "The value of the combined Regulatory Asset Base (RAB) for electricity networks in Australia is about $105 billion (transmission $23b, distribution $82b).[4] The 2022 ISP foreshadowed the need for $170 billion in new investment by 2050, this being the total weighted spend to develop, maintain and operate generator storage and future network investments. ISP specific projects, actionable and future projects, being about $7b. This means that a substantial cost will need to be met by energy consumers or taxpayers."

ISP and related projects will add a cost burden, for electricity consumers specifically and all taxpayers, in general. We discuss this further in this section under the heading "Who bears ISP risk and Who Pays".

General and energy specific cost pressures on both households and businesses were part of the context when the draft IASR for 2023 was being developed. In the months since the draft IASR, the cost of living pressure has continued to be at the forefront of public consideration, in Parliaments and in all forms of media.

A recent example is from the Conversation and re-posted by the ABC on 21st August 2023. The article written by John Hawkins is titled: "You don't have to be an economist to know Australia is in a cost-of-living crisis[5]. What are the signs and what needs to change?". The following graph of ABS data is presented:



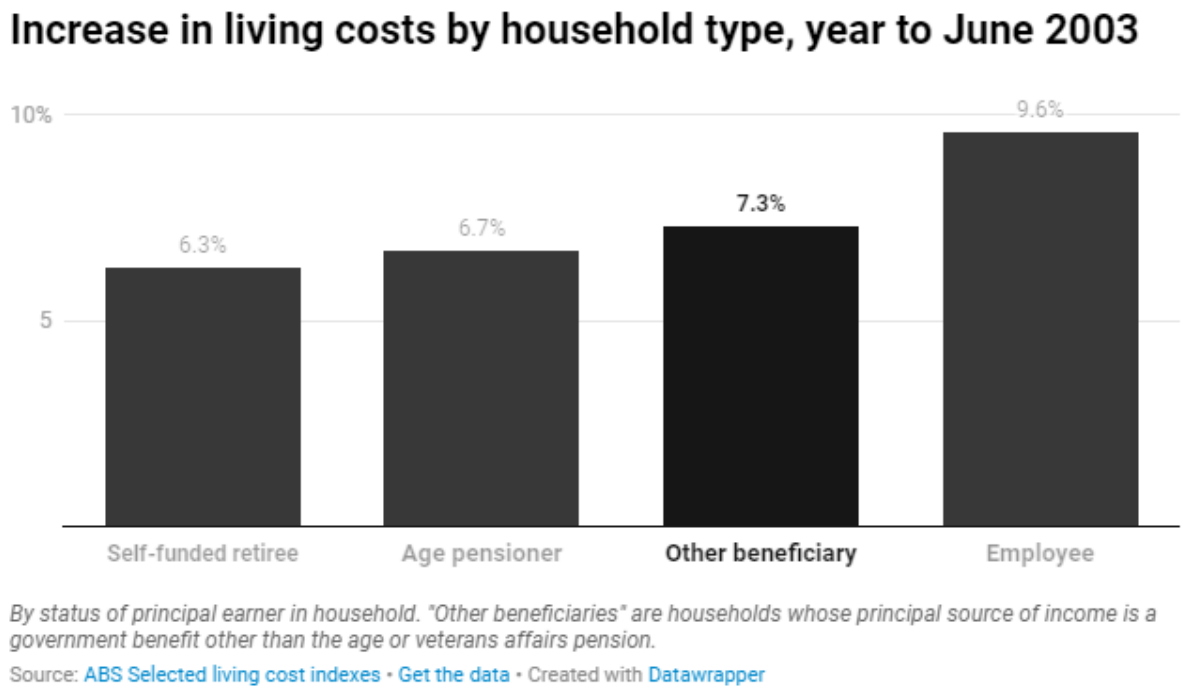
[3] See p.5 https://aemo.com.au/-/media/files/stakeholder_consultation/consultations/nem-consultations/2022/2023-inputs-assumptions-and-scenarios-consultation/2024-isp-consumer-panel-draft-2023-iasr-submission.pdf?la=en

[4] See p.61 AER https://www.aer.gov.au/news-release/aer-releases-its-state-of-the-energy-market-2022-report

[5] https://www.abc.net.au/news/2023-08-21/cost-of-living-crisis-what-needs-to-change/102748764

It is significant that over the past couple of years, wage and price indexes have diverged with prices rising more quickly than wages, which partly explains why cost pressures are being so keenly felt by households and businesses. Should this trend continue, even in the short term, cost pressures will continue to rise and create greater hardship in Australian communities.

The article also presents the following data showing that wage and salary earners are feeling the cost pressure more intensely than some other household types. Households with transfer payments as their primary source of income are lower income households and generally watch their costs closely.



Regarding retail energy prices, subsequent to the draft IASR being released, the Default Market Offers (DMO) for NSW, SE Queensland and South Australian consumers[6] and Victorian consumers[7] were released on 25th May 2023. It will apply from 1st July 2023. Price rises averaged ~20-25%. depending on location. Those not on the AER or Victorian DMO (the large majority of residential consumers) had similar or larger prices rises.

The situation for larger C&I customers is similar. Depending on their supply contracts, many saw these prices rises much earlier than residential consumers. At the same time, they have seen a doubling or trebling of their gas prices.

Careful consideration of the cost of living and cost of energy to all customers is important for the ISP because it impacts costs and cost implications for any candidate developments path, impacts consumer risk preferences and attitudes to social licence. It also influences the context in which 'who pays?' considerations apply.

[6] https://www.aer.gov.au/system/files/Default%20market%20offer%20prices%202023-24%20final%20determination.pdf
[7] https://www.esc.vic.gov.au/electricity-and-gas/prices-tariffs-and-benchmarks/victorian-default-offer/victorian-default-offer-price-review-2023-24

Who bears ISP Risk and Who Pays?

The ISP needs to be more explicit in its consideration of who bears the risk and costs associated with implementation of the ISP. This includes matters such as cost overruns in network build and delays in commissioning. It includes 'other assumptions' being substantially different to outcomes such that the net benefits are less than set out in the ISP (even with the two approaches to ODP evaluation to minimise regret) and stranded transmission network assets.

The work AEMO is doing with the Panel on consumer risk preferences is an important step in the process to understand what consumers are prepared to pay to future electricity price volatility. But that is only part of the story on consumer risks.

In considering the crucial question of 'who pays/bears the risk?" the Panel understands the ISP rules do not require AEMO to consider who funds, or who carries the risk of, ISP projects. With implementation of the ISP, consumers currently bear the 'who pays' risk in a number of ways through e.g.:

- regulated returns determined by the AER based in very large part on the asset investments made, irrespective of the efficient use of the assets.
- the competitive market where generators seek to recover their investment in the NEM
- various jurisdictional schemes like the NSW Roadmap where costs are passed through to distribution customers.
- AEMO interventions e.g., directions, RERT, FCAS which are increasing significantly as the level of renewable generation increases.

We suggest that in preparing the ISP, AEMO clearly identifies where the Rules may restrict its ability to consider the 'who bears the risk and who pays' question. Consumers are being asked to take greater risks in the transition when they are not the party best placed to bear that risk. This is in the context where the role of the ISP as a decision maker for what costs consumers bear may well expand considerably in the near future. The AEMC's final position in the recently completed Transmission Planning and Investment Review includes[8]:

> "The Commission also considers that there may be further opportunities to reinforce the ISP as the central process for considering the net benefits of the group of projects that form the optimal development path and the RIT-T to focus on improving the robustness of efficient cost estimates of an individual project identified in the ISP."

Which is saying the ISP – with its' mix of very inaccurate AACE Class 4 and 5 capex cost estimates – should be the one and only stage where net benefits to electricity consumers are considered. The RIT-T would then only be looking at the lowest cost to deliver the ISP ODP seemingly irrespective of how much the project's scope may change/cost may increase subsequent to it being incorporated into the ODP. In this situation, consumers will bear all the risk of cost increases and whether or not the ultimate project has net benefits when they have no influence over the costs. While the ISP being refreshed every two years may mitigate this, a potentially large residual risk remains.

We suggest that if the AEMC's proposal is implemented – it will be part of its upcoming review of the ISP – that AEMO risks losing consumer support for the ISP's credibility as a report that has a clarion focus on the NEO.

[8] https://www.aemc.gov.au/sites/default/files/2023-05/information_sheet-_stage_3_final_recommendations_for_the_transmission_planning_and_investment_review.pdf

Recommendation

That AEMO work with the 2024 Panel to understand how the risks and costs borne by consumers might be better communicated in the 2024 and 2026 ISPs.

Net Zero still matters

On 5th May the Commonwealth Government Announced that it will legislate to establish a national Net Zero Authority[9] *"to ensure the workers, industries and communities that have powered Australia for generations can seize the opportunities of Australia's net zero transformation."*

The Panel opines that this reflects a growing focus by Government to focus on transition to net zero carbon emissions.

We suggest that the transition pathway to net zero remains a crucial topic for the ISP, but one with arguably more uncertainty now than when the draft IASR was released in December 2022.

In our submission on the Draft IASR we said (pp 6-7):

> "There is strong public and business support for moving to net zero and for the transition to renewable electricity generation - the rate of businesses signing corporate PPAs and installation of rooftop PV is evidence. Governments at all levels have a strong role to play in supporting the transition to net zero in the energy sector, including financial support for energy consumers particularly vulnerable consumers, education about the need for orchestration and community engagement to create the conditions for social licence."

It is interesting note how the debate has shifted over the last year. General consumer sentiment surveys show still strong support for net zero and the energy transition. However, other priorities, predominantly cost of living related, are emerging as a higher priority for many[10]. Our separate experience in network engagements is that while support for net zero and the transition still remains relatively strong, support declines when respondents are asked to pay more in their electricity bills.

Consumers are seeing electricity costs increase substantially when the electricity industry and politicians have promised falling bills. They are seeing increased protests around the social licence impacts of new network and generation and are noticing supply chain bottlenecks increasing costs significantly and delaying project timetables. Social licence and supply chain issues mean 2030 interim targets are less likely to be met and attempts to speed up the pace to meet the 2030 targets in this constrained world will result in even further cost pressures.

Governments have responded to this changing public perception with a range of policies designed to lessen the cost impact on electricity consumers eg the Federal Government's Re-wiring the Nation fund and the revised funding arrangement for a scaled back Marinus. It remains to be seen whether the current level of Government funding to support the transition sufficiently offsets the costs passed on to electricity consumers to maintain consumer support for the transition. It might come to the position where many consumers say – we support the transition to net zero by 2050 as long as Governments, and not electricity consumers, pay. Which is why it is important that AEMO considers

[9] https://www.pm.gov.au/media/national-net-zero-authority
[10] https://www.secnewgate.com.au/sec-newgate-mood-of-the-nation-june-2023/

the risks and costs in its modelling of different scenarios for selection of the CDPs/ODP and is transparent about the impacts on costs and benefits.

Orchestration

The panel also explored the nature of 'orchestration' in our draft IASR submission (p.7):

> **"**The Panel considers orchestration to be the processes to implement responses to the pace, scale and utilisation of consumer energy resources (CER), which comprise small-scale embedded generation, storage technologies and 'smart systems', such as residential and commercial PV systems, battery storage, electric vehicles (EVs) and Virtual Power Plants (VPPs). CER also refers to other resources that enable greater demand flexibility, including energy efficiency for housing and appliances."

We consider orchestration to encapsulate all of the non-ISP policies, processes and programs that are required to enable the ODP to be optimal.

The ISP should not be left to do most of the 'heavy lifting' for energy policy and planning in Australia.

Also, in our draft IASR submission we said that more focus needs to be given to the non-network factors which enable the ODP, including (Energy Efficiency (EE), Distributed Energy Resources (DER), Demand Management, VPPs). We also said that the ISP needs to be integrated with other relevant policies and practice, i.e., town planning, energy efficiency, etc.

In releasing the ISP, we encourage AEMO to include a discrete section, or perhaps a companion document, that outlines the measures necessary for the ISP to be fully effective. We also suggest that this should be an important theme of the ISP communications strategy.

Recommendation

The 2024 Draft ISP to include a discrete section that identifies the non-transmission projects and policies required to achieve the ODP (Including policy certainty, transition strategy, energy efficiency etc). Further that these orchestration measures are clearly identified in the 2024 ISP communications strategy.

ISP vs total system plan

AEMO describes the ISP as a 'whole of system plan'. We would agree with the 2022 ISP Panel's description[11]:

> "The ISP primarily focusses on investment in transmission networks and transmission-*connected generation, although it is informed by inputs and assumptions regarding DER uptake and certain other distribution network issues. The distribution network is not modelled by AEMO for the ISP…"*

That Panel went on to comment[12]:

> "… we understand that AEMO and distribution network representatives meet regularly to share information that is relevant to the ISP. Forecast increases in DER and the electrification

[11] See p. 52 https://aemo.com.au/-/media/files/major-publications/isp/2021/isp-consumer-panel-report-on-2021-iasr.pdf?la=en
[12] ibid

of other sectors will mean that the two-way sharing of information between DNSPs and AEMO will become even more critical in future.

The IASR Consultation Summary Report briefly discusses the treatment of distribution network issues. But the IASR itself is silent on how distribution network issues are incorporated into the ISP. We recommend that there should be greater transparency on AEMO's approach to this issue in the 2024 ISP."

In the 2022 ISP there were no submissions from DNSPs on the Methodology, revised scenarios, Draft IASR, Final IASR or the Draft ISP[13].

Engagement with DNSPs in formulating the 2024 ISP has expanded compared to the 2022 ISP. A DNSP Steering Committee and Working Group have been involved in a number of meetings through the development of the ISP. DNSP feedback to Panel members has welcomed this additional engagement, noting it tended to be high level apart from the regulatory type discussions[14]. For some DNSPs their involvement has been either through the ENA or attending webinars that have been more information dissemination in nature. There were three short DNSP submissions on the Draft IASR – Ausgrid, AusNet and a combined Citipower/Powercor/United Energy - on a limited range of topics.

Overall, DNSPs tell the Panel they are all looking for more direct engagement across a range of issues. This would include consideration of how the DER forecasts can be accommodated and, in particular, more recognition of renewable connections to the sub-transmission network (66kV).

With social licence and supply chain barriers to ISP projects, we are seeing more focus on how to keep the transition going through the distribution system. In a recent interview[15], John Cleland, the CEO of Essential Energy, talked about how there is 2.5GW of capacity in the Essential network that can be utilised "with little or no augmentation to the network"[16].

We would encourage AEMO to continue expanding DNSP engagement for the remainder of the 2024 ISP process and establish a more extensive formal engagement process for the 2026 ISP. This would include incorporation of the work the C4Net project[17] is undertaking on integrated planning for the sub-transmission network[18].

One looming issue for consumers is how they can avoid the risk of stranded ISP assets - ISP projects are delayed, distribution expends to fill the void, ISP projects are eventually built, but expansion in

[13] The submission from AusNet Services and TasNetworks on the 2021 Draft IASR did not cover distribution issues. https://aemo.com.au/consultations/current-and-closed-consultations/2021-planning-and-forecasting-consultation-on-inputs-assumptions-and-scenarios?Submissions=4

[14] Eg the Standing Information Requests https://aemo.com.au/-/media/files/electricity/nem/planning_and_forecasting/nem_esoo/2023/aemo-standing-information-request-for-2023.pdf

[15] https://reneweconomy.com.au/cheaper-and-quicker-distributed-networks-put-case-to-host-wind-and-solar/

[16] https://reneweconomy.com.au/cheaper-and-quicker-distributed-networks-put-case-to-host-wind-and-solar/

[17] https://c4net.com.au/projects/enhanced-system-planning-project/

[18] https://c4net.com.au/projects/enhanced-system-planning-project/

distribution connected renewables leads to stranded asset risk for ISP projects. How will that be considered in the 'least-worst regrets' analysis of the CDPs[19]?

Recommendation

AEMO work with DNSPs to co-design a specific DNSP Engagement Plan for the 2026 ISP.

Uncertainty – AEMO's approaches to risk.

The Panel reflects that AEMO's approach to risk across its responsibilities seems to be inconsistent. It is interesting to contrast AEMO's approach to risk in two parts of its role – operation of electricity and gas markets and the ISP.

In the former, its' role in operating electricity and gas markets, the impression consumers have is one of extreme risk aversion. Here are some examples:

- Conservative regional maximum demand forecasts – the following graph shows the sum of the regional P10 and P50 operational "as generated" demand forecasts, adjusted for the impact of historical weather diversity, for the mainland regions provided by AEMO compared with actual monthly historical maximum demands for the last 10 years.

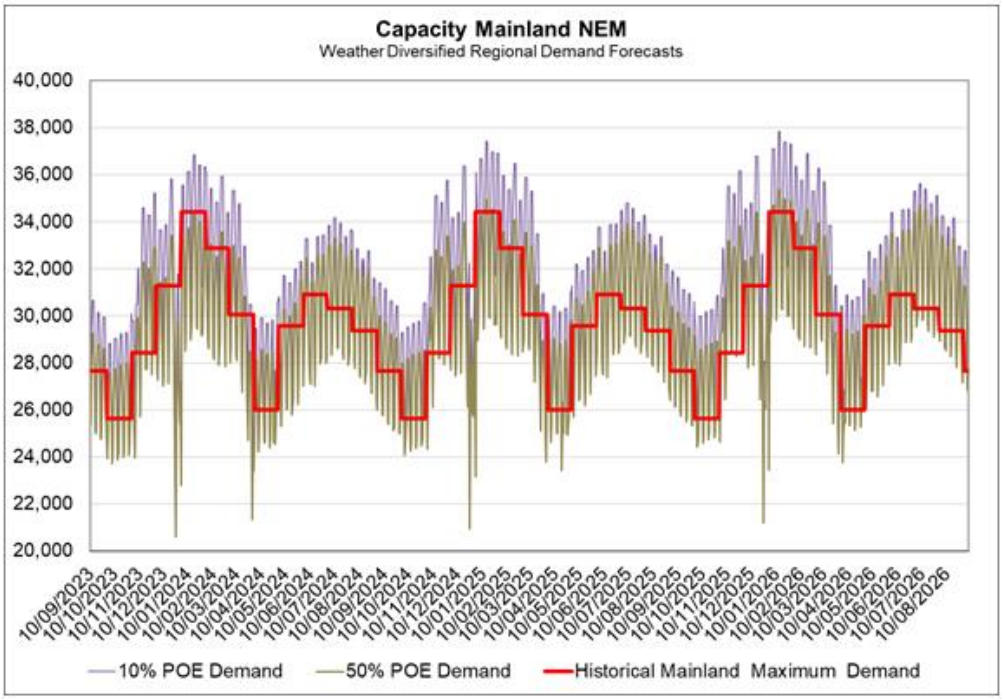


Chart 3, Sum of the regional P10 and P50 operational, as generated, demand forecasts

- The treatment of tail risk in an increasingly renewable dependent grid – AEMO supported the extension of the 0.0006% Interim Reliability Standard[20] until 1st July 2028, requested the Reliability Panel to revoke the South Australian protected event[21], supports introduction of a very

[19] See pp 84-5 https://aemo.com.au/-/media/files/major-publications/isp/2022/2022-documents/2022-integrated-system-plan-isp.pdf

[20] https://www.aemc.gov.au/sites/default/files/2023-04/Review%20of%20IRM%20Draft%20Report%20-%20AEMO%20submission%20120423_VM.pdf

[21] https://www.aemc.gov.au/sites/default/files/2023-05/REL0088%20-%20Attachment%20-%20AEMO%20request%20for%20protected%20event%20revocation_9MAY2023.pdf

conservative tail risk measure[22] in a revised form of the reliability standard and changes to the timeframes[23] for forecasting and submitting requests for RRO instruments.

- The requirements for EAAP forecasting in the 'Low thermal fuel scenario' where gas fired generators are required to report on availability for a 90% POE gas availability[24] that effectively precludes consideration of sourcing spot gas. This requirement is in addition to AEMO having recently been given extensive powers[25] to direct and if necessary, purchase spot gas to be used in gas fired generation to meet the interim reliability standard.

In the latter, the development of the ISP, the impression in the approach to transmission augmentation costs is one that is almost the opposite:

- Increased costs of existing, committed and anticipated projects are irrelevant in the ISP modelling – the IASR (p.107):

  > "Capital costs are not applied for existing, committed, and anticipated projects as these projects are included in all ISP development pathways, including the counterfactual, and therefore the calculation of net market benefits are not influenced by these project costs."

  Which means the costs of the Central West Orana REZ and Western Renewables Link, which are yet to commence construction, are irrelevant.

- The approach to measuring risk factors especially the premium for unknown risk
- A reluctance to try to estimate unknown risk factors where there is not certain information available; this led to decisions to not consider the impact of local content requirements, changes in EPC contracting approaches (no longer fixed priced contracts), smaller number of EPC contractors willing to take on large projects and locational cost impacts when there are multiple projects underway simultaneously
- The use of wide ranges of uncertainty (±50% and ±30%) for estimating capex costs that are based on limited evidence; why use a P50 capex estimate rather than seek to estimate a P90 for a project that is designed to be commissioned during the 10 year term of the ESOO?

We cannot understand why the 'tail risk' that consumers must bear in capex estimates (particularly if the AEMC's recommendation discussed above is implemented) is addressed so differently (large investment decisions based on very inaccurate capex and net benefit estimates) from the tail risk in electricity and gas reliability which leads to very conservative planning (eg reliability standard, RRO triggers, gas market controls). Just because one business is planning operations over, say the next 12-24 months, and another is looking to a much longer term, there is not a reason to differentiate – both involve costs and benefits to consumers.

Recommendation

The Panel work with AEMO to ensure AEMO's approach to risk in the ISP is consistent to AEMO's approach to risk in its other responsibilities, where practical.

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[22] https://www.aemc.gov.au/sites/default/files/2023-05/Rule%20Change%20Submission%20-%20REL0086%20-%20AEMO%20-%2020230505.PDF

[23] https://www.aemc.gov.au/sites/default/files/2023-05/Rule%20Change%20Submission%20-%20EPR0091-%20AEMO%20-%2020230504.PDF

[24] See p. 5 https://aemo.com.au/-/media/files/stakeholder_consultation/consultations/nem-consultations/2023/reliability-forecasting-guidelines-and-methodology-consultation/final/eaap-guidelines.pdf?la=en

[25] https://aemo.com.au/en/initiatives/major-programs/east-coast-gas-reforms

2.2 From the IASR

2.2.1 Scenarios and Sensitivities

Why is this important?

The 2024 ISP is a long-term planning document for the energy industry and is designed to develop the optimal development path for the electricity sector to meet its share of Australia's climate objective of net-zero carbon emissions by 2050. The focus of the 2024 ISP is planning for the period between 2030 and 2050. The ISP must also take account of the interim carbon reduction targets for the energy industry enacted by Federal, State and Territory governments for this period.

The challenge in developing that ODP for planning a path(s) towards these targets is to identify and manage the uncertainties about how the future will develop and what conditions will either hinder or promote the achievement of these carbon reduction targets.

This is the role that scenarios and sensitivities play in the ISP planning process. The AER's Best Practice Forecasting Guideline[26] (Forecasting Guideline) and Cost Benefit Analysis Guideline[27] (CBA Guideline) are central to how these scenarios and sensitivities are developed. For example, the CBA Guideline describes in some detail the mandatory requirements and discretionary recommendations for developing the scenarios and sensitivities. It outlines the purpose of scenarios as follows[28]:

> "Scenarios are different future external market environments that are used in the CBA to assess and manage uncertainty about how the future will develop. They [scenarios] are based on variations to input variables that drive supply and demand conditions. The market benefits of a given development path will change across different scenarios and this allows AEMO to understand the impacts of key uncertainties in each development path."

The scenarios are complemented by using a range of sensitivities to enable a better understanding of the impact of introducing different assumptions around key input variables. For example, in the 2024 ISP modelling, AEMO proposes to test the sensitivities of the scenario outcomes to a higher or lower discount rate. Sensitivities also allow the testing of specific government policies that are probable but do not yet meet the strict requirements of the NER 5.22.3(b).

AEMO may also choose to deploy 'event-driven scenarios' to complement or substitute for any of the core scenarios. In the Final IASR AEMO explains that event-driven scenarios are independent events (e.g., a significant load growth in demand on a section of the network for a new mining development) that may (p.16):

> "…change the benefits of a candidate development path in the 2024 ISP"

Scenarios and sensitivities therefore play a central role in the development of the ISP and the robustness of its conclusions to different futures and different assumptions, including policy options. AEMO has progressively developed and refined these scenarios and sensitivities since the 2018 ISP. In the final 2021 IASR, AEMO outlined four scenarios. AEMO also recognised stakeholders' advice to

[26] https://www.aer.gov.au/system/files/AER%20-%20Forecasting%20best%20practice%20guidelines%20-%2025%20August%202020.pdf
[27] https://www.aer.gov.au/system/files/AER%20-%20Cost%20benefit%20analysis%20guidelines%20-%2025%20August%202020.pdf
[28] Ibid p.11

retain the same or similar scenarios over successive ISPs, although acknowledging that AEMO must adapt to changing circumstances, including government policies and international events.

Since the 2022 ISP was finalised, Australian Federal, State and Territory governments have made formal commitments to stronger carbon emission targets. The new Federal Government introduced the Climate Change Act (2022) legislating an emissions target of 43% reduction against a 2005 baseline by 2030, and net zero emissions by 2050. The 2022 Powering Australia Plan of 2022 committed to achieving an 82% share of renewable generation by 2030[29]. The NEM states and the ACT have also announced stronger interim targets for emissions in the 2030-2035 period[30].

International events, climate related disasters and the impact of the Covid-19 pandemic have led to even greater uncertainty about how the future will develop across the globe including Australia. A survey conducted in 2022-23 sponsored by the World Economic Forum sought the views of a range of experts on the near (2-year) and longer term (10-years) risk conditions facing the world with the results shown in the following two figures[31].

The survey respondents indicated they expected the current global volatile conditions to continue with the potential to drive divergent outcomes for the world economies. In the near term, the expert respondents' concerns focused on the impact of the 'cost of living' crises facing countries. Over the 10-year horizon, however, their primary concerns were around the impact of climate change and environmental degradation. As an open trading nation, Australia is not immune from these global risks.

[29] See https://www.energy.gov.au/government-priorities/australias-energy-strategies-and-frameworks/powering-australia#electricity

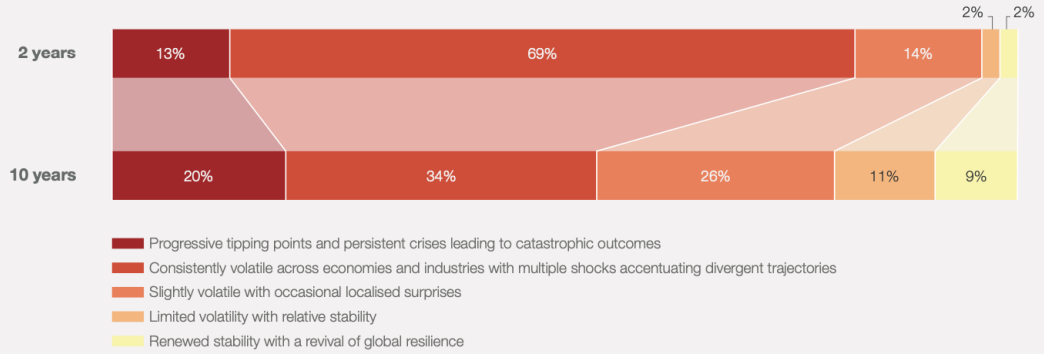
[30] For the latest update see https://www.aemc.gov.au/sites/default/files/2023-09/AEMC%20Emissions%20targets%20statement%20-%20final%20guide%20September%202023.pdf

[31] See pp 6, 9 https://www3.weforum.org/docs/WEF_Global_Risks_Report_2023.pdf

The changes in ranking the risks to the global community over time highlights the challenge for the ISP process which must address both short- and longer-term risks in the Australian energy market. The ISP approach of creating broad scenarios with specific and more time dependent sensitivity testing in each biennial ISP is an effective way of addressing this challenge.

FIGURE B **Short- and long-term global outlook**

"Which of the following best characterizes your outlook for the world over the short-term (2 years) and longer-term (10 years)?



Source

World Economic Forum, Global Risks Perception Survey 2022-2023.

The 2022 Panel encouraged AEMO to keep the same scenarios in future ISPs where possible, stating[32]:

> "There may be value in seeking to retain the same scenarios for at least two ISPs…".

However, it is apparent that the current and longer term economic, environmental, and political circumstances in Australia and globally, warrant AEMO's review of the 2022 scenarios.

It is therefore pleasing to see AEMO has engaged stakeholders in a progressive refinement of the ISP scenarios, beginning with two important webinars conducted in the third quarter of 2022 followed by further stakeholder consultation after the publication of the Draft IASR in December 2022. The consultation process on the Draft IASR resulted in AEMO adopting three distinct scenarios in the Final IASR.

In the 2021 ISPs' Delphi process, the weighting for the 'slow change' scenario was 4%, significantly below the other three scenarios. This low weighting, along with the firming of state and federal government policies and stakeholder feedback, contributed to AEMO's decision to drop the 'slow change' scenario in the Final 2023 IASR.

While the 2024 Panel was appointed too late to have an impact on the two webinars, overall, we agree with AEMO's selection of the three scenarios in the Final IASR and the renaming of the 'hydrogen superpower' scenario to the Green Energy Export scenario.

[32] See p. 38 https://wa.aemo.com.au/-/media/files/major-publications/isp/2021/isp-consumer-panel-report-on-2021-iasr.pdf?la=en

The Panel also supports AEMO's consultative approach to the 2023 Delphi process that took place after the publication of the Final IASR and we welcomed the opportunity to contribute to the design of the process. The Delphi process will provide weighting for each of the three ISP scenarios based on the assessment of some 30+ experts responding to the question:

> "Based on your knowledge of the future of the energy sector, what is the relative likelihood of a scenario eventuating?"

Nevertheless, it is important that AEMO's scenario development process be assessed against the requirements of the AER's CBA and Forecasting Guidelines. This is discussed below.

What did the 2022 Panel say?

In its submission on the 2021 Final IASR[33], the 2022 Panel accepted AEMO's selection of scenarios in the Final 2021 IASR[34] and acknowledged the significant improvement in AEMO's approach to stakeholder consultation. They concluded that AEMO's selected scenarios are both appropriate and consistent with the requirements of the AER's CBA Guideline including addressing stakeholders' feedback (pp 37-8).

However, the 2022 Panel highlighted areas where the process could be enhanced, including

- timing of the appointment of the Consumer Panel
- scenario name changes during the consultation process
- breadth of stakeholders including in the consultation
- lack of clarity on government policies, largely reflecting the quality of the information provided to AEMO for inclusion in the 2021 IASR.

More generally, the 2022 Panel noted the limitations of relying on AEMO's specialist Forecasting Reference Group (FRG) as the primary means of engaging stakeholders in the IASR/ISP processes, including scenario development. The 2022 Panel concluded its report by making two recommendations for enhancing engagement in the IASR process and '*elevating the status of the scenario work*' (p.40):

(1) Engage early on scenarios for the 2024 ISP and use this process as an entry point for a wider group of stakeholders.
(2) Appoint the next ISP Consumer Panel before the scenario development process commences.

What does AEMO propose in the Draft and Final 2023 IASRs?

Draft 2023 IASR

In its draft IASR AEMO set out five core principles for scenario development. AEMO states that having regard to the AER's CBA Guideline, the selected ISP scenarios should satisfy the following tests[35]:

- *Internally consistent* – the assumptions in a scenario must demonstrate internal consistency
- *Plausible* – the potential future described by a scenario could come to pass

[33] https://aemo.com.au/-/media/files/major-publications/isp/2021/isp-consumer-panel-report-on-2021-iasr.pdf?la=en
[34] Note, however, that AEMO subsequently reduced the number of scenarios from five to four in the 2022 ISP.
[35] See pp.17-18 https://aemo.com.au/-/media/files/stakeholder_consultation/consultations/nem-consultations/2022/2023-inputs-assumptions-and-scenarios-consultation/draft-2023-inputs-assumptions-and-scenarios-report.pdf?la=en

- *Distinctive* – individual scenarios must be distinctive enough to provide value to AEMO stakeholders
- *Broad* – the scenario set covers the breadth of possible futures
- *Useful* – the scenarios explore the risks of over- and under-investment.

Taking these principles into consideration, AEMO proposed to update the previous scenarios[36]. The four updated scenarios presented in the 2023 Draft IASR were:

- *1.5^{0}C Green Energy Exports*
- *1.8^{0}C Orchestrated Step Change*
- *1.8^{0}C Diverse Step Change*
- *2.6^{0}C Progressive Change*

AEMO removed the *'Slow Change'* scenario that was part of the 2021 IASR as this scenario was no longer plausible given the pace of transformation and the set of legislated emissions policies pronounced by most governments in the NEM. AEMO noted that a 'majority of stakeholders' supported this removal[37]. Instead, the four scenarios included a split of the Step Change scenario based on the degree of orchestration of DER across multiple individual sites (with associated changes in other scenario assumptions[38]).

To reflect the uncertainties in the forecast assumptions, AEMO proposed exploring the impact of a range of 'sensitivities' on the ISP outcomes. These sensitivities included testing higher and lower discount rates (than the central discount rate), varying the level of Victorian offshore wind generation and 'smoothed infrastructure'[39].

Final 2023 IASR

In the Final 2023 IASR, AEMO states (p.14):

> "The use of scenario planning is an effective practice when planning in highly uncertain environments, particularly through disruptive transitions. Scenarios therefore should purposefully cover the potential and plausible futures impacting on the energy sector, and capture the key uncertainties and material drivers of these possible futures in an internally consistent way."

In line with AEMO's views (above) and the comments from other stakeholders on the Draft IASR, AEMO consolidated the four scenarios into three, namely: 'Green Energy Exports,' 'Step Change' and 'Progressive Change'.

While the three scenarios each achieve the 2030 and 2050 emission targets, they do so in different ways and, crucially, have different impacts on the 'cumulative' carbon budgets (up to 2051-52) as illustrated in the Table below (p.43)[40]:

[36] Ibid p. 4.
[37] Ibid, p. 6.
[38] For example, there was lower DER orchestration in the 'Diverse Step Change, than the original central Step Change, but this was compensated for by changes in other assumptions such as the greater use of green gases to achieve the same net emissions outcome.
[39] Ibid, p. 6. AEMO describes 'smoothed infrastructure' sensitivity as "…exploring the costs and benefits of lower levels of volatility of employment demand".
[40] The NEM cumulative budget for the period 2024-25 to 2029-30 is the same for each of the three scenarios as each scenario must satisfy the federal government's emissions reductions stipulated in the Climate Change

Table 11 NEM cumulative carbon budgets in 2024 ISP modelling (Mt CO_2-e)

	Federal Government's 2030 carbon budget from 2024-25 to 2029-30	Long-term temperature-linked carbon budget from 2024-25 to 2051-52
Green Energy Exports	630	357
Step Change	630	681
Progressive Change	630	1,203

AEMO also extended the range of sensitivities. AEMO explains uncertainties could best be tested through using a range of sensitivities. This approach allows AEMO to assess a larger range of assumptions while retaining the integrity and function of a more limited range of scenarios. AEMO states that the following sensitivities would be considered in the 2024 ISP assessments (p.6):

- Rapid decarbonisation – the impact of bringing forward decarbonisation.
- Electrification alternatives
- Lower CER Orchestration
- Reduced Energy Efficiency
- Higher and low discount rates
- Constrained supply chains -the costs and potential benefits of a less volatile annual rate of transition, from lesser supply chain capacity and more limited workforce availability
- Social licence risks.

What are the 2024 Panel's observations?

Overall, the 2024 Panel supports the approach AEMO is pursuing for continued development of the scenarios and sensitivities.

We consider that AEMO has better clarified the different role of scenarios and sensitivities in the Final IASR. The replacement of the two Step Changes (Orchestrated vs Diverse) is a case in point. The Final IASR includes a single Step Change which has a relatively high level of orchestration. The impact of lower CER orchestration can then be tested as a sensitivity.

AEMO's clarification of the different roles of scenarios and sensitivities in the 2024 ISP will enable AEMO to retain some consistency about the scenarios in the 2026 ISP[41] while having the flexibility to use sensitivity testing to examine issues and risks that are priorities for the 2026 ISP. As indicated above, priorities around key risks to the forecasts will evolve over time, and AEMO must be able to take these changes into account.

A more detailed examination of the specific issues in the Draft and Final IASR follows.

The 2024 Panel's response to the Draft IASR

The 2024 Panel expressed its concern that it was appointed too late to participate in AEMO's July and August webinars where the 2021 Scenarios were reviewed for relevance to the 2024 ISP. However, in

Act (2022). AEMO has estimated the carbon budget for the NEM for the 2024-25 to 2029-30 as equal to 630 Mt CO_2-e from the Australia-wide legislated carbon budget of 4,381 Mt CO2-e from 2020-21 to 2029-30.

[41] While we take this position in principle, note that our recommendations for 2026 include a close review of the purpose of including the Green Energy Export scenario.

its submission on the Draft IASR[42], the Panel acknowledged some engagement with AEMO on the scenario selection process following the establishment of the Panel in September 2022.

The Panel noted AEMO's preference for maintaining some consistency between successive ISPs (a preference, as noted above, that was also expressed by the 2022 Panel). However, the Panel concluded that[43]:

> "Our view is this consistency should not come at the expense of accurately reflecting changes between ISPs that may influence selection and description."

The 2024 Panel supported both the change in the naming of the 'Hydrogen Superpower' to the more generic 'Green Energy Exports' and the removal of the 2022 'Slow Change' scenario. The Panel also suggested renaming the 'Progressive Change' scenario to '2.6^{0}C Slow Change' scenario as it was now the least progressive scenario.

The Panel expressed some concern that AEMO's 'plausibility' principle was defined too broadly and risked including futures that were "improbable or highly unlikely based on current technologies and trajectories",[44] an outcome that was not in the interests of consumers. If these more improbable futures were to be tested in the ISP, they would best be assessed through sensitivity analysis.
The Panel also suggested AEMO expand its proposed 'smoothed infrastructure' sensitivity to include both labour and material supply constraints[45].

In summary, the 2024 Panel proposed the following additional sensitivities in response to the Draft IASR[46]:

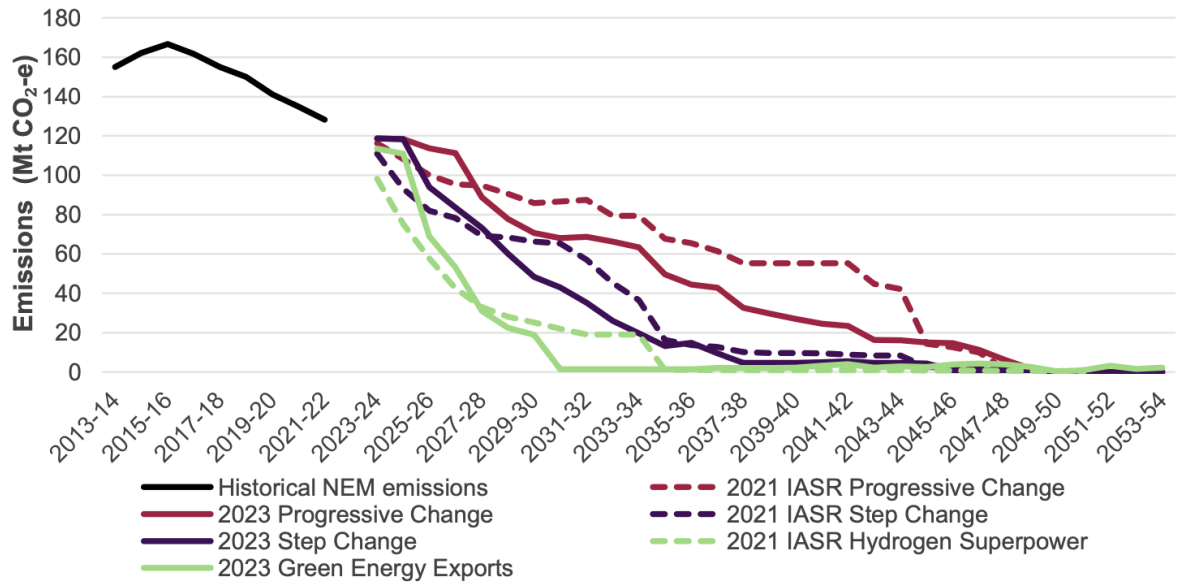
- Social licence – network commissioning delay and increased capex due to both supply chain and commissioning delay
- Increased capex:
    - The range in the capex estimates to reflect greater risk of under-estimation of costs.
    - Supply change pressures increasing capex.
- Delay in generation projects commissioning, focussing on Snowy 2.0 and the Kurri gas/hydrogen generation.

The 2024 Panel's response to the Final 2023 IASR

The Panel supports AEMO's refinement of the scenarios to three distinct scenarios and supported by extending the range of sensitivities in the Final 2023 IASR. These refinements provide greater clarity on the different, albeit related, roles of scenarios and sensitivities in the ISP process. The following Figure (p.42) illustrates that the three scenarios have distinct trajectories for decarbonisation, although all arrive at net-zero carbon emissions for the NEM by 2050.

[42] See p.36 https://aemo.com.au/-/media/files/major-publications/isp/2023/58-2024-isp-consumer-panel-draft-2023-iasr-submission.pdf?la=en
[43] Ibid, p 36.
[44] Ibid, p 36.
[45] Ibid, p 38.
[46] Ibid, p 40.

Figure 3 Actual and forecast NEM emission trajectories from multi-sector modelling, all scenarios



The three scenarios appear to satisfy the criteria of being internally consistent, plausible, distinctive, broad, and useful. The scenario 'narratives' discussed below illustrate how each scenario is distinct, internally coherent and includes credible feedback loops between electricity demand, the economy (local and world), the speed of transition (NEM and overall), technology development and the path/time frame to decarbonisation. Each scenario in turn will lead to different risks of over- or under investment in the network.

- *The Green Energy Exports* scenario envisages a rapid and widespread transformation of the economy with a very significant contribution from the electricity sector and aimed at limiting temperature rise to 1.5^0C with hydrogen strongly contributing to both domestic and international decarbonisation. *The scenario is useful because it allows AEMO to test the generation and transmission needs required during a period of rapid technological change.*

- *The Step Change scenario* involves a 'fast-paced' transformation of the energy sector with the NEM making a significant contribution to reducing overall emissions and is accompanied by significant investments by local industry and consumers investments in CER. There is a high level of success in orchestrating CER for the benefit of system security and reliability. *This scenario allows AEMO to test the potential of orchestration and rapid electrification across the economy including transport.*

- *The Progressive Change scenario* describes a world in which there are ongoing economic challenges that flows through to lower demand. The pace of decarbonisation across the economy may be inconsistent with achieving less than 2^0C temperature increase, even if the energy sector specific objectives (as currently set by governments) are met. *This scenario allows AEMO to test the effect of a slower economy, reduced demand and slower investment during the transition of the energy sector to net-zero on the risk of over-or under investment.*

Implications for 2024 and 2026 ISPs

The 2024 Panel supports AEMO's position on both scenarios and sensitivities, albeit the latter may need some refinement as AEMO moves towards the Final ISP given the speed of change in key assumptions such as government policies, supply availability and costs, fuel costs, community trust and the social licence challenges. The ongoing significant cost blowouts, technology challenges and

delays in the construction of Snowy 2.0 illustrate the interplay of these many factors on the likely timing of completion of the key ISP projects.

We also encourage AEMO to expand consultation on the development of the scenarios for the 2026 ISP building on learnings from the Delphi process. We also encourage AEMO to reflect on the results of the Delphi process conducted recently in 2023.

The Panel was actively involved in the development of the Delphi process for 2023 and is satisfied that the approach was a considerable improvement on what was undertaken in 2021.

Recommendations

1. Scenarios

    - AEMO conduct broad engagement early in the 2026 ISP process on the scenarios and key sensitivities; this should include pre-scenario briefings and deliberative forums that include consumer advocates.

    - The Consumer Panel must be appointed in time to make a meaningful contribution to the development of the scenarios and sensitivities.

2. Sensitivities

    - The selection of the initial sensitivities should be conducted at the same time as the selection of the scenarios and then they are subject to concurrent review with the scenarios.

    - AEMO engages early with the Panel over the course of the ISP process to the extent that its modelling suggests alternative scenarios or sensitivities are required. Similarly, the Panel has the opportunity to engage AEMO on alternative sensitivity testing based on emerging consumer concerns.

    - AEMO develop the ISP modelling to enable increased analysis 'combined sensitivities' that model two variables eg increased cost and delayed commissioning due to social licence risk, at the same time. We will discuss this with AEMO as we work with AEMO and the Advisory Council on Social Licence on the social licence sensitivities to be modelled in the Draft ISP.

2.2.2 Social Licence

In our submission on the Draft IASR, about a quarter of the 'key messages' dealt directly with social licence issues and about a half had social licence implications. We contend that the increased focus on social Licence is one of the main developments / changes since the 2022 ISP was released.

Close consideration of a social licence must be a crucial aspect of the 2024 ISP.

An example of the extent to which social licence has become a regular media story is the recent story on ABC's Landline program, posted online on Sunday 17th September 2023. The story headline is "The clean energy super highway has hit a roadblock. Here's why"[47].

[47] https://www.abc.net.au/news/2023-09-17/clean-energy-super-highway-hits-roadblock-farmers-lock-the-gate/102812602

The story commences with:

> When a power giant offered Katherine Myers a $500 gift card, she had no idea she was about to give away unrestricted access to her property for the next four years.
>
> A self-described naturally trusting person, it was only when a relative read the fine print that she realised what privately owned entity AusNet was after.
>
> "My father-in-law went through the agreement and said, 'No, this is actually providing unfettered access for four years for both surface [and] invasive surveys on the property'," she says.
>
> "So that $500 gift card was to allow them four years of free access to our farm."

Anger from landowners has centred on being poorly treated by energy networks with very poor consultations processes. The story says:

> “We were desperately hungry for information and it was really difficult to get good, solid, quality answers out of the organisation," says Myers, who regularly learned of crucial developments through the media.”

Crucial in the story is the theme that trust levels have broken down between primary producers and the energy system.

The story also says:

> “To help break the deadlock, New South Wales, Victoria and Queensland have started offering compensation to affected landholders, on top of the one-off payment power companies are required to make.
>
> NSW — $200,000 per kilometre over 20 years
>
> VIC — $200,000 per kilometre over 25 years
>
> QLD — on average $300,000 per kilometre over 20 years”

This story illustrates a major dilemma in framing the 2024 ISP. The ISP is regarded by policy makers, market bodies, network businesses and energy companies as the ‘blueprint’ for future energy market development. By the very nature of its key recommendation being ‘the optimal development path’ the expectation is that it will be followed to optimise the benefits to electricity consumers. Meanwhile, landowners and their communities feel that this same system is ‘riding roughshod’ over them with no regard for their deep concerns. Poor past process by governments and network businesses have contributed to a breakdown of trust.

For the 2024 ISP, the Panel also recognises this crucial aspect of social licence and regards it as more than the cost of easements too.

The Panel considers social licence to include three related but separate aspects, as applied to the ISP:

1. Permission from landowners and their communities to host energy infrastructure, including by not limited to network (specifically Transmission) easements and Renewable Energy Zones.

2. Broad community support for the development and implementation of policies and projects that help move Australia to net zero emissions. Genu9ine and open engagement with communities will be essential to achieve this, noting that trust in the energy sector is currently fractured in a number of communities.
3. Enabling consumers and their communities to be active and willing participants in applying Community Energy Resources. Noting that household consumers and both smaller and large businesses are major investors in the transition to net zero, including though investing in Australia's largest power station – rooftop PV as well as batteries, smart technologies and increasingly, electric vehicles.

Panel Draft IASR submission

In our submission on the draft IASR we identified "social licence" as a key theme recurring throughout the ISP. We proposed a language of social licence in two contexts:

Community social licence

> Community Social Licence – relates to measures including engagement of impacted communities and payments to landowners for hosting electricity infrastructure.

Consumer social licence

By this, the 2024 Panel means acceptance of the costs to all consumers of the generation and network infrastructure.

In considering the transition to net zero, we said in our response to the draft IASR:

> "Governments at all levels have a strong role to play in supporting the transition to net zero in the energy sector, including financial support for energy consumers particularly vulnerable consumers, education about the need for orchestration and community engagement to create the conditions for social licence. The Draft 2023 IASR has many core assumptions that revolve around forecasts of how consumers will behave (e.g., social licence, fast transition in an environment of high prices, DER orchestration) but there is considerable uncertainty about how consumers will actually behave and which behavioral prompts, policies and 'nudges' will be effective."

We also discussed uncertainty and identified social licence as a key aspect of addressing this:

> "Presenting truth to uncertainty is crucial for successful implementation of the ISP. For AEMO, this means continuing to give high priority to processes considering social licence and for sensitivity analysis on social licence should be applied. Social licence considerations should be extended to the methodology for developing the ISP (a separate process to the IASR). Also important in responding to uncertainty arising from the lack of a trusted voice for consumers is for AEMO to develop a communication strategy associated with all major aspects of the ISP and with end users as a major audience."

To address social licence issues directly, we made the following 'key messages' for the 2023 IASR:

- Key Message: social Licence is a crucial IASR consideration, and better engagement is needed before the Final 2023 IASR.
- Key Message: expand the Draft 2023 IASR definition to include 'consumer social licence'.
- Key Message: expand the model sensitivities to cover schedule delay and increased capex resulting from the need to obtain social licence.

- Key Message: work to rapidly improve the knowledge base of the Advisory Council on Social Licence to support them to make a meaningful contribution to the 2024 ISP."

We recognise that there has been further attention given to questions of social Licence in the time between the draft and final IASR reports and that the Advisory Council on Social Licence continues to meet and explore the nature of and responses to matters of social Licence

Social Licence in the Final IASR

While social licence is mentioned throughout the final IASR report, greatest attention is given to social licence in the context of Renewable Energy Zones (REZs).

REZ resource limits and social licence Section 3.9.3, pg 131

> "REZ resource limits reflect the total available land for renewable energy developments, expressed as installed capacity (MW). The availability is determined by existing land use (for example, agriculture) and environmental and cultural considerations (such as national parks), as well as the quality of wind or solar irradiance."

Page 134:

> "Land use reviews with governments indicate that the expansion of REZs is likely to become constrained by social licence factors, as opposed to purely on land availability (although varying between REZs).
>
> In the 2022 ISP, AEMO applied an additional land use penalty factor of $0.25 million/MW to all new VRE build costs in a REZ, which applies only if generation is modelled above the original REZ total resource limits. This penalty factor was applied to capture the expected increase in land costs or difficulties in obtaining land. For the 2024 ISP, the land use penalty factor is $0.29 million/MW."
>
> …. "Even with a land use penalty factor, an upper land use limit is also applied to the REZ resources. For the 2022 ISP, this was based on 5% of land area within a REZ for wind resources, and 1% of land area for solar resources – which will also be applied for the 2024 ISP."

AEMO concludes (pp 134-135):

> "In addition, greater insights on social licence matters would benefit AEMO in the execution of its role more generally, beyond its ISP work. This includes in its role contributing to energy policy and actions to support the energy transition. The ISP is an engineering and economic options assessment. AEMO uses three ways to quantify social licence in the economic modelling:
>
> - Transmission network augmentation costs and generator connection costs – social licence consideration may require longer routes, additional landowner compensation and consideration for under grounding of some overhead components. Additional cost can also include the cost associated with engagement activities with land holders and communities.
> - Project lead time – understanding the community concerns early can assist in reducing project delays at implementation phase but require additional activities and time during early phases of the project.

- Land use-penalty factors – a reflection that REZ development is likely to be limited by social licence rather than renewable resources (see above).
- AEMO consulted on transmission augmentation cost, generator connection costs and project lead times in the 2023 Transmission Expansion Options Report consultation."

The Panel agrees with the comments that are made in the final IASR, but observes that the focus is on the component of social licence that seeks to put a cost on transmission line and REZ construction associated with compensating landowners for new energy infrastructure.

There is less attention given to the aspect of social licence that applies to greater community wide understanding and acceptance of new energy infrastructure requirements to reach more widely accepted net zero emission goals.

The tension remains that good consumer engagement needs to start early and be given time to build trust then acceptance, particularly in locations where new infrastructure is proposed while there is mounting pressure to turbo change the implementation of the ISP optimal development project, it seems with or without social licence.

Recommendations

- AEMO advocate for Commonwealth, State and Territory energy ministers to establish a national engagement strategy to develop a consistent approach to landowner compensation.
- Upgrade and extend ISP communications strategy to provide more frequent information about ISP projects' social licence impacts.

We note our comments above about working with the AEMO and the Advisory Council on Social Licence to develop social licence sensitivities to be used in the Draft ISP modelling.

2.2.3 Fuel switching and alternative gas production.

Domestic hydrogen use

AEMO has taken on board Panel feedback from our submission to the Draft IASR. The Panel argued the assumption of a 100% upper limit for H2 in gas networks for one scenario, and 10% in the remainder, did not meet AEMO's core principle that assumptions be plausible. AEMO agreed with this reasoning and reduced this limit to 10% for all scenarios.

AEMO's final IASR still supposes up to 10% hydrogen blends by volume will be technically viable - and implicitly, economically competitive with other ways of decarbonising household energy demand - by 2030. The Panel appreciates AEMO's concession regarding higher blending rates, but notes 10% hydrogen blends are still not plausible.

AEMO cites "government aspirations and current developments" (p64) in justifying 10% blending of hydrogen. In the Panel's view:

- This is questionable reasoning, as most governments have no such aspiration.
- The current developments referred to are limited to small pilots or trials and it is in no way credible to extrapolate this more broadly to other gas users in the NEM.
- AEMO's core principle of plausibility should take primacy over the perceived aspirations of governments and businesses.

The IASR's narrative on hydrogen blending acknowledges that the future of Hydrogen in the economy is uncertain (p63), but still appears to conflate the potential for hydrogen exports with a potential for hydrogen blending in residential gas networks.

All the best evidence and independent expertise globally shows that blending hydrogen into gas networks for household is not possible without substantial, costly appliance replacement.

The Panel recommends that for the 2025 IASR, AEMO should remove hydrogen blending for households altogether.

It is increasingly accepted that a majority of existing household gas appliances will be electrified within the next 20 years, and few new homes will be connected to gas. A minority of dual fuel homes – representing perhaps 10-20% of residential gas demand – are likely to remain reliant on reticulated gas for longer. There is likely to be a role for biogas in meeting the energy needs of these homes - biogas can be used in gas networks and appliances with little or no modification - but not hydrogen.

Given distributed gas demand will be markedly lower in the same timeframe, even in the unlikely event 10% clean H2 blending proves to be economically and technically viable, the role hydrogen can play in decarbonising household energy is trivial at best. If household gas demand is 80% lower than today, as H2 has only 30% the energy density of natural gas, a 10% H2 blend would only offset 0.6% of the emissions of today's residential gas demand.

Hydrogen in gas networks is much like carbon capture and storage: an attempt by some fossil fuel businesses to stave off the existential threat of low-cost clean by repurposing their existing assets. Like CCS, it's prohibitively expensive and complicated, at best naïve and at worst a tactic for delaying effective emission reduction actions.

Recommendations

AEMO should continue to refine assumptions about the production and use of hydrogen for domestic applications and export with more weighting on industry developments, technology improvements and market readiness, and less weighting on policy ambition. This will likely entail assuming a lower percentage of H2 blending in residential gas networks for future IASRs.

Export hydrogen

AEMO's assumptions on the potential for hydrogen exports are more realistic than the previous IASR, yet remain ambitious in light of the multiple breakthroughs that are still required to make the production, transport, compression, storage, shipping and international trade of clean hydrogen a viable industry at scale.

Biogas

AEMO's assumptions about biomethane are plausible. In light of the above noted barriers to the use of hydrogen in gas networks, biogas is likely to emerge as more cost effective way to decarbonise household gas use for applications that are hard to electrify.

2.2.4 Electric storage

The Panel has considered the question of "perfect foresight" for battery operators. We understand that it is not plausible or accurate to assume batteries will be operated with perfect foresight, and therefore they cannot be assumed to have a full state of charge all the times when needed. Plexos models, for example, assume perfect foresight regarding the charge state of batteries, leading to unrealistic results that ripple through the modelling outputs.

This led us to ask what allowances/assumptions are made in the modelling in terms of the state of charge of batteries? For example, is it assumed batteries (and pumped hydro) will be operated (charged and discharged) with perfect foresight of spot prices, timing and volume for charge and discharge, or are there points in the modelling process where appropriate allowances are made for uncertainty in the operation of the batteries?

We are aware that AEMO has considered this question and has received varied feedback, with the underlying theme in this feedback being that it was that this was not an appropriate matter for ISP purposes. We are satisfied that battery operation practice is not a topic best considered in the IASR, but is appropriately considered in the ISP Methodology.

2.2.5 Demand side participation

Why is the Panel commenting on this issue?

In our submission on the Draft IASR we sought more clarity around the use of US and European data for forecasting long term demand side participation (DSP). We submitted that the 8.5% of peak demand to be used in the Green Energy Exports scenario (lower rates in other scenarios) might be plausible, but to get that level of DSP will require substantial improvement in the Wholesale Demand Response Mechanism for large users and reforms to allow aggregators to expand demand response for residential and small business. We are currently a long way from those reforms.

AEMO's approach in the Final IASR?

AEMO acknowledges information about consumer demand responses is fragmented, coming through a range of sources eg EV charging, price responses and batteries in addition to direct consumer demand response. The international studies used in the Draft were chosen to exclude flexibility from batteries/EVs to avoid double counting.

Panel's comments

We begin by noting the changing context for demand response in the NEM. From a consumer perspective the market is there to service consumers' preferred demand profiles. The way demand response is being marketed to consumers (small and large) is that they have to adjust their consumption to serve a renewables dominant market and ensure supply reliability and security. Understandably this approach can cause barriers to consumer acceptance of demand response.

While AEMO may have selected international studies to avoid double counting, that does not make the results of those studies any more relevant to the Australian situation. As we noted in our submission on the Draft, US and EU markets are quite different to the NEM as is the industry mix and hence ability to offer large scale demand response[48]. You cannot simply transfer this experience to the NEM and assume a similar outcome.

The history of AEMO's Wholesale Demand Response Mechanism (WDRM) illustrates this.

There has been a lengthy debate in Australia on wholesale demand response. Given the premise that retailers were working against the expansion of DSR, a complex administrative arrangement to underpin the WDRM eventually put in place by AEMO in 2021. It involved the participation of a 'WDR Agent'. It has been stated to the Panel that "EUAA members, who were initially keen to participate, basically gave up given the complex arrangements including the requirement to bid demand response into the spot market, they were required to put in place to participate."

[48] For example, the alumina/aluminium industry in Australia consumed ~12.3% of NEM power in 2021; the corresponding figure in the US is ~0.003%.

A recent report on the WDRM after two years operation concluded that[49]:

> "After two years only one WDRM agent is active, and, despite 2022 having the highest prices in the history of the National Electricity Market (NEM), the peak DR activated through WDRM was only 30MW, and has been even less in 2023. To say this is underwhelming is understatement. The industry put itself through a decade-long argument about whether to build a WDRM, and then invested real systems dollars in what appears to be a white elephant.
>
> With hindsight, given the strange theory that justified it, this outcome was entirely predictable. It might also tell us that while DR looks great in theory, in practice we shouldn't expect it to play more than a niche role. The prosaic truth is that customers simply have more important things to care about. Retailers have always known this, but economists tend to assume away practicalities when contemplating the elegance of a supply/demand chart."

Large consumers are now seeing participation in RERT/Interim Reliability Reserves as a much simpler way of monetising their demand response. This means the AEMO forecast of a linearly interpolated number from the current level to a maximum of 8.5% in 2052 will require a significant change in AEMO's current approach to demand response.

We note the current review of the Demand Side Participation Forecast Methodology will review the methodology used for DSP in the ISP. AEMO is seeking stakeholder views on alternative to the current literature review approach[50].

2.2.6 Costs associated with candidate technologies

Why is the Panel commenting on this issue?

In our submission on the Draft IASR we highlighted the significant materials and cost pressures at every part of the supply chain – availability of raw materials, component manufacturing and site assembly. This was not just COVID related, but a consequence of the global push to decarbonise that will demand significant resources over the next decade and beyond. We argued that historical cost trends were a poor guide to future cost trends because of the size and pace of this global push, particularly given the significant subsidies being provided by the US through the Inflation Reduction Act and the EU through its Green Deal. Imported component costs in Australia are hostage to these international developments at the same time as local component costs eg planning and civil works, are competing in a very tight labour and materials market against many other infrastructure projects.

In the case of the Draft GenCost report we argued that the assumed 'revert to normal' date of 2027 (when real cost increases would stop and costs would resume historical trends of 'technology learning' offsetting build cost rises) was too early given the expectation that strong worldwide demand would continue well beyond 2027. Other arguments included the lack of consideration of local content requirements, the move away from fixed priced contracts to cost plus contracts and the wide cost estimate range in the base year data.

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[49] https://www.energycouncil.com.au/analysis/the-wholesale-demand-response-mechanism-leading-a-horse-to-water/

[50] See p. 18 https://www.aemo.com.au/-/media/files/stakeholder_consultation/consultations/nem-consultations/2023/dsp-forecasting-methodology-and-dsp-information-guidelines-consultation/dsp-forecast-methodology-consultation-paper-final.pdf?la=en

Our analysis of the CSIRO GenCost report concluded that:

> "…the cost estimates have not adequately considered supply chain and social licence cost pressures leading to cost estimates that are likely to be considerable underestimates."

We maintain that conclusion in this submission.

Further, since publication of the GenCost final report, there has been public debate around how network costs are considered and what the report (and the ISP) prove or disprove regarding the relative costs of renewables. We seek to bring some light to the confusion underlying that debate. The GenCost report gives costs in two forms – as annual cost numbers to 2055 that are used in the ISP (which separately includes network and other costs eg fuel) and as LCOE costs which by convention do not include network costs.

This suggests a lot of caution and increased clarity around cost estimates and how they are used (and abused) in public debate on what is the cheapest form of new build generation. We are engaging with AEMO to provide more detailed comments on the GenCost report.

AEMO and CSIRO's approach

CSIRO presented its final report in June 2023. Its methodology is[51]:

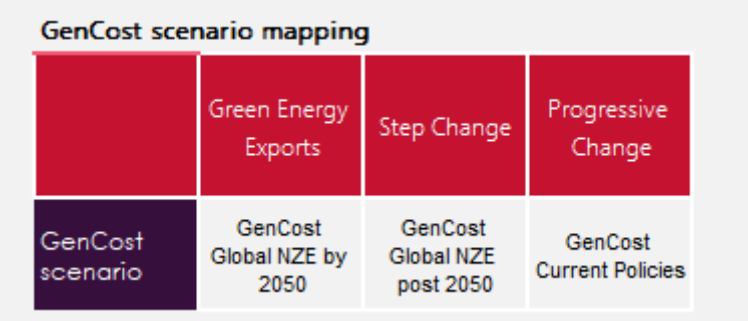
- escalate the Aurecon mid 2022 costs (± 30%) to 2023 and 2024 using
    - for the 'more commonly deployed renewable technologies' (wind, solar PV, batteries and electrolysers), projected escalation using the trend obtained from a range of S&P Global estimates of international published across 2022 estimating 'global' costs, not Australian costs
    - for other technologies a 'basket of costs' factors was used – CPI, imported equipment, domestic equipment and labour indices
- use the CSIRO GALLM model to forecast costs from the time of 'reversion to normal' (ie when costs revert to their 'normal' trend of generally decreasing in real terms) to 2055 with different costs for each scenario with results shown in Appendices B.1, B.2, B.3 and B.4
- interpolation of costs from 2023 to the 'reversion to normal' date for each scenario.

There were three changes from the Draft Report:

- the 'revert to normal' date was extended from 2027 to 2030 for two scenarios - the Global NZE by 2050 and Global NZE post 2050 - which are two scenarios are about relatively stronger global climate policy ambition supported by large deployments of low emissions technologies, and
- there was alignment on land costs with the Mott McDonald land cost index[52]
- reductions in the cost forecast for concentrated solar thermal

AEMO takes these annual costs into the ISP in accordance with the mapping table below to map the CSIRO scenarios to the AEMO scenarios. The approach is shown in the 'Build Costs' tab in the IASR assumptions workbook[53].

[51] See pp.29-30 https://publications.csiro.au/publications/publication/PIcsiro:EP2023-2548
[52] See pp. 20ff https://aemo.com.au/-/media/files/major-publications/isp/2023/teor-reference-materials/mott-macdonald-transmission-cost-database-update-final-report.pdf?la=en
[53] https://aemo.com.au/en/consultations/current-and-closed-consultations/2023-inputs-assumptions-and-scenarios-consultation



CSIRO also presents costs in an LCOE form which AEMO does not use.

Panel's comments

There are two categories:

1. There is a high risk that GenCost forecasts used by AEMO remain underestimates
2. The IASR should provide greater clarity on the GenCost data it uses

1. There is a high risk that GenCost forecasts used by AEMO remain underestimates

While CSIRO has made some changes to their Draft Report, we remain of the view that the capex estimates may still underestimate generation costs for two reasons:

- The CSIRO adjustments to the Aurecon base year mid 2022 underestimate 2023 and 2024 costs and hence do not provide a robust basis for the CSIRO forecasts to and beyond the 'reversion to normal' date, and
- CSIRO's arguments for the 'revision to normal' dates of the three scenarios are not convincing

The CSIRO adjustments to Aurecon 2022 base year costs underestimate 2023 and 2024 costs and hence do not provide a robust basis for the CSIRO forecasts

CSIRO's methodology was to escalate the Aurecon mid 2022 costs (which Aurecon says are ± 30%) to 2023 and 2024 using[54]:

- for the 'more commonly deployed renewable technologies' (wind, solar PV, batteries and electrolysers), projected escalation using the trend obtained from a range of S&P Global estimates of international published across 2022 estimating 'global' costs, not Australian costs
- for other technologies eg offshore wind, the previous years' Aurecon costs were multiplied by a 'basket of costs' factors was used – CPI, imported equipment, domestic equipment and labour indices.

First, we note that the bibliography in the final Gen Cost version refers to:

> "Aurecon 2023, 2022 costs and technical parameter review, June 2023, AEMO."

[54] See p.29-30

This gives the impression that Aurecon did an updated report with June 2023 costs. However, it did not. The Aurecon report published at the time of the Final IASR[55] is dated 12/12/2022 and is the same report published by AEMO at the time of publication of the Draft IASR. As GenCost says (p.12):

> "We have used data supplied by Aurecon (2023) which is consistent with either the beginning of financial year 2022-23 or middle of 2022."

Second, the methodology for estimating 2024 costs of the 'more commonly deployed renewable technologies' was escalating the mid 2022 Aurecon costs by the S&P global cost trend. Using the Aurecon cost base was assumed to give a better 2024 forecast. However, there was no justification provided as to why global escalation was a good indicator of domestic escalation of a combination of imported and domestic components. The message TNSPs and renewable generators are telling Panel members is one of extreme cost pressures in both capital equipment (imported and local) and local civil works. The GenCost report does not provide an explanation of how S&P global trends cover the latter.

Third, the approach to offshore wind cost estimates seem problematic for a number of reasons:

- the 'basket of costs' is based on the last 20 years ABS data on price trends plus a 2012 BREE study on the split between imported equipment, domestic equipment and labour. Why are historical costs trends a good indicator of cost rises between 2022 and 2024 when all the evidence is of unprecedented cost increases? There is no justification provided in Appendix A.1.3 (p.62) on why a 2012 report is still an appropriate guide to the split in capital cost of mature technologies between imported equipment, domestic equipment and labour
- The final CSIRO report was being prepared at a time when overseas offshore wind industry was experienced cost increases of such a level that projects had to be re-financed and developers considering stopping any development[56]; it seems strange that CSIRO thought their past approach was defensible given that information and their conclusion seems at odds with the available evidence (pp 42-3):

  > "From 2023 we've allowed the offshore wind costs to resume cost reduction consistent with a stronger climate ambition as a result fixed offshore wind costs start to reconnect with the previous 2021-22 trajectory in 2027 for Current policies and in 2030 for the Global NZE scenarios."
- CSIRO seems to ignore the particular supply chain issues confronting offshore wind highlighted in two major reports available when the GenCost report was being prepared[57].

Fourth, the CSIRO adjustments also do not seem to reflect the fact that Australian demand for generation components is a very small proportion of total world demand and developers in the US/EU may have access to better pricing through higher volume orders. But manufacturers ability to meet even a large order are constrained by an acute shortage of skilled labour. To take a simple example – one TNSP has recently advised a Panel member that 70% of the cost of a transformer is labour. But it takes 5-6 years to train a transformer winder before they can work unsupervised. While there may not be any shortage of capital to expand transformer manufacturing capacity, the availability of skilled labour constrains the pace of that expansion.

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[55] See https://aemo.com.au/-/media/files/stakeholder_consultation/consultations/nem-consultations/2022/2023-inputs-assumptions-and-scenarios-consultation/supporting-materials-for-2023/aurecon-2022-cost-and-technical-parameter-review.pdf?la=en

[56] See https://www.wsj.com/articles/soaring-costs-threaten-u-s-offshore-wind-buildout-11672474137 published on 1st January 2023

[57] https://www.nrel.gov/wind/offshore-supply-chain-road-map.html

Fifth, the basis for the domestic cost inflation is a report published in January 2021 for an Australian Gas Networks 2021-26 AER revenue reset[58]. It forecast labour and material cost increases for the gas pipeline industry in South Australia. CSIRO do not explain how this applies to building a wide range of technologies across the NEM.

Sixth, while Aurecon's mid 2022 base cost estimates are ± 30%, the GenCost estimates are a point estimate. AEMO has the very confusing explanation in the IASR Consultation Report (p.42):

> "CSIRO considers that it is more useful to stakeholders to have a single point forecast that can be tracked over time as the known actual value, although acknowledging that actual values will, in reality, represent a range."

where 'actual' really means 'point'. There is no explanation provided by CSIRO on why its point estimates out to 2055 are symmetrical cost accuracy at ± 30%.

Seventh, a key financial assumption in the Aurecon 2022 cost estimates is[59]:

> "Prices in AUD, 2022 basis for financial close in 2022. The Contractor's prices are fixed at this point for the execution of the project which may take several months or years depending upon the technology."

EPC contractors are no longer willing to enter into fixed price contracts and this has been reported in the market since at least late 2022. The original Snowy 2.0 EPC contract was fixed price/lump sum and that contributed to the bankruptcy of Clough, one of the Future Generation joint ventures with Webuild[60]. It also led to claims of $4b additional costs by the remaining EPC contractor on Snowy Hydro. Snowy Hydro recently announced that[61]:

> "The fixed-price EPC Contract was executed by Snowy Hydro and Future Generation Joint Venture (FGJV) following Final Investment Decision in a relatively benign and supportive environment. The EPC Contract is no longer fit for purpose.

and Snowy is:

> "…finalising an amendment to the existing EPC Contract to move to an incentivised target cost contract model. Snowy Hydro will also settle all outstanding claims with FGJV.

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[58] https://www.aer.gov.au/system/files/AGN%20-%20Attachment%207.8A%20-%20BIS%20Oxford%20Input%20Cost%20Escalation%20Forecasts%20to%202025-26%20-%2013%20January%202021.pdf

[59] See p. 10 https://aemo.com.au/-/media/files/stakeholder_consultation/consultations/nem-consultations/2022/2023-inputs-assumptions-and-scenarios-consultation/supporting-materials-for-2023/aurecon-2022-cost-and-technical-parameter-review.pdf?la=en

[60] https://www.theaustralian.com.au/business/mining-energy/clough-is-mostly-saved-with-webuild-deal-but-administrators-say-contracting-model-must-change/news-story/f24b1457d013cab19f06e7ddc380fd61?utm_source=TheAustralian&utm_medium=Email&utm_campaign=Editorial&utm_content=TA_BUSINESS_AM_04&net_sub_id=286354456&type=free_text_block&position=2&overallPos=4

[61] https://www.snowyhydro.com.au/news/securing-the-future-of-critical-energy-transformation-resets/

Project capex has risen from the previous estimate of $5.9b to $12b. We can present a similar story for the significant cost increases facing Transgrid for Humelink[62].

This move away from fixed price contracts was well known at the time CSIRO was preparing the Gen Cost report, even if the Aurecon base year costs assumed continuation of fixed price contracts.

Eighth, the reasoning for excluding the impact of local content is weak. The argument seems to be the lack of any objective way to incorporate means it is not possible to include[63]. Yet the GenCost study and the IASR are full of judgements that are made given the lack of objective knowledge. We have just discussed a major one in the revert to normal date assumption.

As we argued in our submission on the Draft IASR[64], there is reasonably objective information available on the impact of the NSW Roadmap and Queensland Government policy. The Victorian Government is consulting with industry on a local content policy on offshore wind[65] with an announcement due soon with developers nervous about the potential cost impact[66]. There are local content rules in the US, but developers have the ability to receive tax credits under the IRA for meeting local content rules. This is not available in Australia.

AEMO note that it is impossible to continually update capex estimates and acknowledge in the IASR Consultation Summary in response to an EA submission (p.42) the 'unavoidable time lag' for the Aurecon figures. We recognise that the ISP has to have cut-off dates for data inputs and they cannot be continually reassessing each input. But CSIRO's task in updating the Aurecon mid 2022 costs (which are ± 30%) to 2024 should have recognised the limitations of their methodology in a world of cost increases significantly above historical trends as was clear in information available at the time they were preparing their revised report. GenCost provides no analysis of how the S&P 2022 forecasts it relies on have taken that cost pressure into account and whether that is appropriate in mid 2023.

We would have expected the CSIRO forecasting methodology would have been able to account for the significant changes going on in the market in 2023 and expected in 2024 when seeking to apply 2022 forecasts. We also would have expected the methodology to take account of market developments occurring as they were preparing their final report.

Accounting for remaining uncertainty could have been achieved by using the 'unknown risk' factor used in the Transmission Cost Database. This could have provided an opportunity for CSIRO to then explain, given the 2022 base year costs are ±30%, that the point forecasts to 2055 can still be considered to have a ±30% accuracy. They seem happy to make a judgment call on generation technology costs in 2030 through the choice of 'reversion to normal' dates, but not in 2024 when there was a lot more supporting data available.

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[62] https://www.afr.com/policy/energy-and-climate/transgrid-inflated-cost-of-running-power-line-underground-farmers-20230718-p5dp2o#:~:text=HumeLink%20power%20line%20cost%20blows%20out%20to%20nearly%20%245b%3A%20Transgrid%20CEO&text=The%20cost%20of%20building%20the,a%20NSW%20parliamentary%20inquiry%20heard.

[63] See p.42 https://aemo.com.au/-/media/files/major-publications/isp/2023/2023-iasr-consultation-summary-report.pdf?la=en

[64] See p. 12 https://aemo.com.au/-/media/files/major-publications/isp/2023/isp-consumer-panel-submission-on-teorfinal-14-june-23.pdf?la=en

[65] https://www.energy.vic.gov.au/__data/assets/pdf_file/0017/622241/offshore-wind-implementation-statement-2.pdf

[66] https://reneweconomy.com.au/offshore-wind-industry-warns-against-local-content-quotas/

The CSIRO's arguments for the 'reversion to normal' dates in capex are not convincing

In our submission on the Draft IASR we argued that:

- While the economy wide inflation rate may return to normal because of local and international factors, that does not preclude strong inflationary supply chain (labour and materials) pressures continuing in capex and opex associated with building and operating the network, generation and storage required to implement the ISP well beyond 2027, and
- Continued cost pressures may offset the learning rates, particularly for mature technologies.

The final GenCost report provides commentary on the issue[67]:

> "…the central idea is that technology costs will remain relatively high due to ongoing tight supply of materials relative to demand growth."

While the final report does extend the revision to normal date out from 2027 to 2030 for the higher growth Global NZE scenarios while retaining 2027 for the Current Policies scenario, it argues that the conditions required to sustain commodity prices are very unlikely to occur.

We make three comments:

(i) This approach relies on historical commodity price trends that may no longer apply

The Cashin and McDermott study for the IMF[68] is based on The Economist industrial commodities index from 1862-1999. It provided proof for what many in the mining industry know to be the case – a lot of volatility around a long term trend of falling real prices. It is the level of volatility and how long it lasts, for example, is it a 'super cycle'? that is the most striking feature of the study (and with the Harvey et al[69] study also cited).

CSIRO argues that there is no case for believing there is a super cycle (and hence strong commodity prices might extend beyond 2030) with this simple comment:

> "When commodity price super cycles have occurred, they tended to be associated with periods of high global economic growth – that does not appear to be a feature of current and expected world conditions. As such, the central assumption of an end to inflationary pressures after a few years (i.e., a period of short cycle volatility) is reasonable in the context of historical experience. The argument for a longer cycle is based not around a period of high economic growth but growth specific to the clean energy technology sector. It is uncertain whether this would be enough to drive a super cycle as other parts of the economy may grow slower or decline, offsetting this source of faster demand growth."

We would have expected a more comprehensive analysis than this. Why is the current situation not a super cycle (however defined) given the worldwide demand flowing from many countries seeking to meet their Paris commitments? We are experiencing the equivalent of an industrial revolution in the electricity sector as many countries rebuild a significant proportion of their electricity supply chain. The onus is on CSIRO to provide more evidence than 'it is uncertain'.

[67] See pp 82-3
[68] https://www.imf.org/external/pubs/ft/wp/2001/wp0168.pdf
[69] https://cbe.anu.edu.au/researchpapers/CEH/WP201210.pdf

Why is the world's demand for 'critical minerals', where a substantial proportion of the world's supply is controlled by China[70], not going to lead to the risk of a super cycle in those critical minerals? Even where China does not control a significant part of mining eg lithium (Australia produced 44% of world production in 2022), they control a significant part of processing the minerals (almost all of Australia's production in 2022 was exported to China). China accounts for just 17 percent of global lithium extraction, but for 77 percent of global lithium hydroxide refining[71].

Certainly, the Australian Government (along with many other countries around the world) have real concerns about China leveraging its market power. The Australian Government recently releasing a critical minerals strategy[72] designed to create "…diverse, resilient and sustainable supply chains[73]". The strategy says[74]:

> "Global supply chains operate most efficiently when they are diverse and transparent. Supply chains that are highly concentrated are fragile, volatile and unreliable. In these cases, markets cannot adequately price and manage risks, meaning businesses cannot compete on a level playing field."

These supply chains take time to build. Development will face similar supply chain constraints that all new projects will face over the next decade.

If we turn to the more traditional commodities, why will the cost of aluminium and copper fall from recent levels when there is a worldwide push to source these products from sustainable sources? Energy costs are a significant proportion of the costs of refined copper and aluminium. As Australian producers convert from coal to renewable generation, we expect costs to increase significantly, at least in the short term. Will Australian renewable generation developers be happy to continue to source from suppliers that use coal fired power for refining and smelting or will they want to promote their ESG credentials with 'responsible sourcing'?

CSIRO seems to assume that commodity demand will fall back by ~2030 because Governments would have achieved their 2030 targets. Recent events suggest that there is a reasonably wide consensus that Australia is unlikely to meet its 2030 targets (and that may be the case in many other countries) so commodity demand could well extend well into the 2030s.

(ii) Aside from commodity prices, there is no evidence to suggest that the current severe international and domestic supply chain constraints in labour and materials will ease by 2030 to allow real prices to fall, even if commodity prices ease.

We would suggest that is particularly the case with offshore wind.

Our submission on the Draft IASR referred to a number of reports highlighting the problems with building multiple large projects simultaneously. The evidence since our February submission have only emphasised our argument eg the recently announced delay and doubling of cost for Snowy 2.0 and the delay in commissioning the Central West Orana REZ.

CSIRO argue:

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[70] See https://www.gmfus.org/news/chinas-role-critical-mineral-supply-chains
[71] https://www.mckinsey.com/industries/metals-and-mining/our-insights/australias-potential-in-the-lithium-market
[72] See https://www.industry.gov.au/publications/critical-minerals-strategy-2023-2030
[73] See https://www.industry.gov.au/publications/critical-minerals-strategy-2023-2030/strategy-glance
[74] See https://www.industry.gov.au/publications/critical-minerals-strategy-2023-2030/operating-environment

> "The scale of deployment in clean energy technology relative to today is not grounds alone for sustained cost pressures. Linear growth, for example, is unlikely to support sustained price pressures. Once the relevant labour and materials markets have scale up to meet a strong period of growth, a linear period of growth implies it can meet all growth without any further expansion of supply capacity. Growth has to be non-linear to present an ongoing need to scale up supply capacity or a failure of supply to meet demand (triggering price rationing)."

So the question is - how long before a linear demand growth re-emerges? CSIRO argue that the non-linear demand growth for renewable technologies will finish in 2030. We can agree with the principle that:

> "Once the relevant labour and materials markets have scale up to meet a strong period of growth, a linear period of growth implies it can meet all growth without any further expansion of supply capacity."

But CSIRO provide no justification for that occurring in 2030 apart from the argument that, post 2030[75]:

> "… there are a number of projections, including those from the IEA, indicating the rate of deployment appears to be more linear and, in some scenarios, slower than linear post-2030."

together with an assumption that all committed, anticipated and actionable 2022 ISP projects will be completed by 2030 because that is when the ISP says they need to be completed by. Yet all the evidence since the publication of the 2022 ISP in June 2022 is that there will be great difficulty in meeting that target. Perhaps CSIRO is constrained to accept the 2022 ISP assumptions? Even if it is, the GenCost report should have a discussion around risks.

Surprisingly there is no reference to the US Inflation Reduction Act (or its EU equivalent, the European Green Deal) in the final report and the potential impact they might have on generation costs in Australia. This major Brookings study on the IRA's impact on the US economy more broadly and electricity sector in particular was available when the final report was being prepared[76].

Our proposition is that non-linear growth will continue beyond 2030, particularly for offshore wind, because:

- there is considerable doubt the 2022 ISP projects will be completed by 2030 given a combination of social licence and supply chain,
- despite offshore wind not requiring ISP transmission build, supply chain, cost and social licence will create immense barriers to meeting 2030 targets, and
- the huge pipeline of other infrastructure projects outside of the electricity sector that are competing for resources that has been highlighted in report after report over the last 12 months

[75] CSIRO Gen Cost p. 83 https://publications.csiro.au/publications/publication/PIcsiro:EP2023-2548
[76] https://www.brookings.edu/wp-content/uploads/2023/03/BPEA_Spring2023_Bistline-et-al_unembargoedUpdated.pdf

- the recent Federal Government review of these projects has led to the forecast that many will be delayed or scrapped[77] given the significant cost increase over the last 1-2 years;
- the Federal Infrastructure Minister commented that there was a 'high risk' of even more cost overrun[78];
- Infrastructure Partnerships Australia has just released a report showing the value of infrastructure projects in the regions has more than doubled since January 2022 to $206b[79]; around 55% or $116b is allocated to energy projects, up from $45b in 2022; it particularly focusses on the resources needed for these regional projects – 150% increase in skilled workers in outer regional areas and a 30% increase in inner regional areas by the end of 2025
- the Victorian Premier just announced a plan to build 80,000 new houses a year for the next 10 years that is estimated to need 50,000 extra works in construction and related industries that simply are not there now.[80]; where are the trades people coming from to build VNI West, WRL, 2.6GW storage, 4GW offshore wind plus onshore renewables to meet a 2030 (65%) and 2035 (95%) renewable energy targets[81]?

This makes the trajectory to 2030 even more non-linear and suggest that non-linearity will extend well past 2030. Projects due to be completed in the next couple of years are delayed and this has a domino effect on projects due to be completed later in the 2020s that are delayed into the 2030s.

(iii) Then there is the reliance on China for many generation and transmission components in the energy transmission.

The US IRA is specifically designed to increase the US manufacturing capacity to supply the US energy transition and decrease the US's reliance on China. But decreasing that reliance will be expensive and take time given the reliance other countries supplying these components to the US have on Chinese supply[82]. In any case, increased domestic sourcing in the US will not provide greater diversity of supply options for Australia.

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[77] https://www.afr.com/politics/federal/no-new-road-rail-projects-for-next-10-years-without-major-cuts-20230917-p5e592

[78] There is a long history of major cost overruns in large infrastructure projects https://www.theaustralian.com.au/business/economics/90bn-infrastructure-blowout-threat-to-australias-big-build/news-story/2e33f96577bd648d953a519e1d0b40ac?utm_source=TheAustralian&utm_medium=Email&utm_campaign=Editorial&utm_content=TA_DAILY_AM-CUR_02&net_sub_id=286354456&type=free_text_block&position=11&overallPos=22

[79] https://www.afr.com/politics/federal/mountain-of-regional-relocation-needed-for-green-energy-transition-20231001-p5e8u0

[80] https://www.afr.com/property/residential/andrews-seizes-planning-powers-to-build-2m-new-homes-20230920-p5e67x?utm_content=politics&list_name=2F6E16F3-E586-4778-AFFF-33811F208B65&promote_channel=edmail&utm_campaign=market-wrap&utm_medium=email&utm_source=newsletter&utm_term=2023-09-20&mbnr=MjAyMDU1MTE&instance=2023-09-20-16-49-AEST&jobid=29872332

[81] https://www.climatechange.vic.gov.au/__data/assets/pdf_file/0028/635590/Victorias-2035-Climate-Target_Driving-Real-Climate-Action.pdf

[82] https://www.nytimes.com/2023/08/29/business/economy/china-us-trade-supply-chain.html?campaign_id=7&emc=edit_mbae_20230830&instance_id=101446&nl=morning-briefing%3A-asia-pacific-edition&regi_id=50462365&segment_id=143197&te=1&user_id=cb77c7237607df5b49e6a097837ed9ba

It would have been useful to get CSIRO's view on the impact of Chinese dominance in renewable generation components that the IEA has recently highlighted[83] and the US and EU reactions to that with the IRA and Green Deal respectively. China controls over 80% of all the manufacturing stages of solar panels (such as polysilicon, ingots, wafers, cells and modules)[84]. European solar component manufacturers are asking the EU to implement anti-dumping measures against Chinese solar panels just as the EU is seeking to increase local production[85]. Does CSIRO see Chinese costs as a key driver for their long term GenCost forecasts? In which case does CSIRO see the risks to that reliance as important factor in cost and delivery of clean energy targets as the US, EU and Australian Governments, as well as the IEA[86], clearly do?

In the case of wind turbines, 11 of the 15 largest manufacturers of wind turbines are Chinese owned[87]. The other four are facing a very tough trading situation especially those servicing the offshore wind sector where projects are not proceeding due to cost pressures. Siemens, one of the largest, is having severe financial problems[88] at the same time as having technical problems with its products[89]. Orsted is also facing severe financial problems[90]. A recent IEA report has highlighted the supply chain vulnerabilities due to concentration over many aspects.

2. The IASR should provide greater clarity on the GenCost data it uses

The GenCost report makes clear the role it has in supporting the ISP:

> "GenCost is a collaboration between CSIRO and AEMO to deliver an annual process of updating the costs of electricity generation, energy storage and hydrogen production (p.vii)
>
> "AEMO and CSIRO jointly fund the GenCost project by combining their own resources. (p.10)
>
> "GenCost receives unsolicited feedback throughout the year and also specifically as one of several documents supporting AEMO's December 2022 consultation on its most recent Inputs, Assumptions and Scenarios Report (IASR)." (p.11)
>
> Figure 2.3 (p. 16) shows battery LCOEs and shows 'AEMO ISP Dec 2021' and AEMO ISP June 2022/CSIRO'

[83] https://www.iea.org/reports/energy-technology-perspectives-2023/clean-energy-supply-chains-vulnerabilities
[84] https://www.iea.org/reports/solar-pv-global-supply-chains/executive-summary
[85] https://www.afr.com/world/europe/europe-s-solar-industry-faces-bankruptcy-over-chinese-imports-20230912-p5e42t?utm_content=around_the_world&list_name=58F91023-97F9-4F56-A273-0DF645106836&promote_channel=edmail&utm_campaign=afr-carbon-challenge&utm_medium=email&utm_source=newsletter&utm_term=2023-09-14&mbnr=MjAyMDU1MTE&instance=2023-09-14-10-46-AEST&jobid=29856448
[86] https://www.iea.org/reports/energy-technology-perspectives-2023/clean-energy-supply-chains-vulnerabilities
[87] https://www.blackridgeresearch.com/blog/top-wind-turbine-manufacturers-makers-companies-suppliers
[88] https://reneweconomy.com.au/its-not-going-to-be-cheap-australia-warned-on-first-offshore-wind-costs-and-supply-chains/
[89] https://www.reuters.com/business/energy/what-are-issues-with-siemens-gamesas-wind-turbines-2023-06-23/ and https://reneweconomy.com.au/siemens-scraps-profit-guidance-as-wind-turbine-problems-generate-1-6bn-bill/
[90] https://www.nytimes.com/2023/08/30/business/orsted-write-down-wind-power.html?campaign_id=2&emc=edit_th_20230830&instance_id=101562&nl=todaysheadlines&regi_id=50462365&segment_id=143325&user_id=cb77c7237607df5b49e6a097837ed9ba

There are many references to the GenCost study in the IASR eg p.102:

3.5.2 Candidate technologies

Input vintage	July 2023
Source	• CSIRO: *GenCost 2022-23 Final report* • Aurecon: *2022 Costs and Technical Parameters Review* • GHD: *2018-19 Costs and Technical Parameters Review*
Updates since Draft IASR	Renamed biomass generation – electricity and heat to reflect stakeholder feedback.

and p.104:

3.5.3 Candidate technology build costs

Input vintage	July 2023
Source	• CSIRO: *GenCost 2022-23 Final report* • Aurecon: *2022 Costs and Technical Parameters Review* • Entura: *2018 Pumped Hydro Cost Modelling* • Hydro Tasmania information on Cethana project
Updates since Draft IASR	Updated to reflect CSIRO's *GenCost 2022-23 Final report*

But the reader has to reach page 50 of the GenCost report to read:

> "Modelling studies such as AEMO's Integrated System Plan do not require or use LCOE data. LCOE is a simple screening tool for quickly determining the relative competitiveness of electricity generation technologies."

We think it would assist the public debate around 'the lowest cost generation source' if AEMO provided more clarity on the data from the GenCost study that it does use (annual costs to 2055 set out in Appendices B.1, B.2, B.3 and B.4) and what it does not use (LCOE estimates highlighted in the Executive Summary and discussed in detail in Chapter 5). There is no explicit statement in the IASR that AEMO does not use the LCOE costs.

The problem for AEMO and CSIRO in the recent public debate was that they were using different data to draw the same conclusion about renewables being the lowest cost new generation investment. AEMO is drawing on the ISP which does include network costs[91]:

> "The ISP demonstrates that new renewables with new transmission, firmed with hydro, batteries and gas – is the lowest cost way to supply electricity to Australian homes and businesses as coal fired generation retires."

This was clearly stated in its 7th August press release[92].

We think that the public debate can be better informed with AEMO being clear in the Draft ISP that it does not use LCOE data. Further given AEMO's representation of the ISP as a 'whole of system' plan (we take issue with that above) and the modelling assumptions, it may be preferrable to have the discussion with a 'whole of system' perspective. Renewables may not be the lowest cost generation everywhere all of the time but over the whole ISP they are. For example, is the cost a wind generator connecting to the yet to built and unknown cost CWO REZ that includes firming and a proportional component of the REZ costs, lower than the cost Kurri Kurri gas station that is almost

[91] https://aemo.com.au/newsroom/media-release/integrated-system-plan-reflects-whole-of-system-costs
[92] https://aemo.com.au/newsroom/media-release/integrated-system-plan-reflects-whole-of-system-costs

completed and connecting to existing network with spare capacity that has no firming and negligible network costs?

Recommendations

- For the Draft ISP – AEMO provide greater clarity around how it uses the CSIRO GenCost results in ISP modelling
- The Panel work with AEMO to develop the scope of works for the 2026 ISP update of the CSIRO GenCost study
- For the next iteration of the GenCost study – CSIRO provide greater clarity around how network costs are treated over the whole forecast period to 2052 and its justification for its 'reversion to normal' date.

2.2.7 Gas price forecasts

Why is the Panel commenting on this issue?

As we noted in our submission on the Draft IASR, forecast gas prices are one of the most significant assumptions in the ISP. Benefits measurement under the RiT-T are often dominated by savings in lower gas fired generation. A substantial proportion of the market benefits in the 2022 ISP were fuel cost savings.

The 2022 Panel's submission was very critical of the forecasting methodology of the AEMO's gas forecasting consultant. The same consultant was used for the 2023 Draft IASR and the 2024 Panel's submission on the Draft IASR was similarly critical of the consultant's methodology.

AEMO's approach in the Final IASR?

The Panel and other stakeholders' submissions on the Draft IASR recommended that AEMO appoint a consultant to prepare revised forecasts given the introduction of the Federal Government's Gas Mandatory Code. The Panel was involved in development of the scope of work provided to potential consultants and AEMO facilitated significant engagement opportunities with the selected consultant, ACIL Allen.

Panel's comments

We very much appreciated AEMO's approach. We were able to discuss a draft report with ACIL Allen which provided the opportunity to better understand their methodology and results. Extensive comments were provided by the Panel and this led to very informative discussions with the consultant. There are a range of views on whether the Code will be successful in achieving a price at or slightly above the anchor price of $12/GJ and the Panel believes the core results are based on a robust and defensible methodology.

We note the AER's comments in their Transparency Report[93] on the need for an explanation of why wholesale prices over the long term in Hobart are significantly higher ($12-14/GJ) Hobart than the rest of the NEM ($10-12/GJ)[94].

[93] See p. 5 https://www.aer.gov.au/system/files/AER%20-%20Transparency%20review%20-%20AEMO%202023%20Inputs%20Assumptions%20and%20Scenarios%20Report%20-%2028%20August.pdf
[94] See p. 22 https://aemo.com.au/-/media/files/major-publications/isp/2023/iasr-supporting-material/acil-allen-natural-gas-price-forecasts.pdf?la=en

Recommendations

Continue to involve the Panel in development of the scope of work, selection and review of the selected consultant's work.

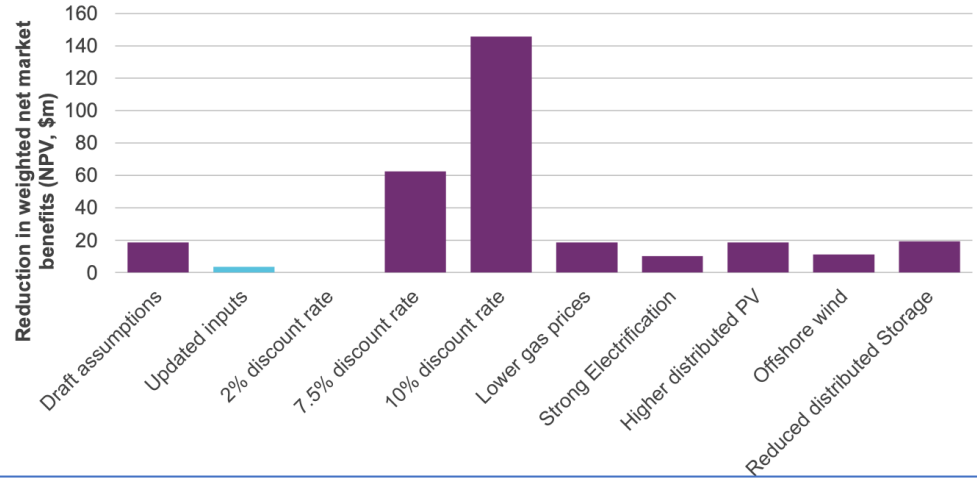
2.2.8 Discount Rate

Why is the Panel commenting on this issue?

The discount rate allows the comparative assessment of 'competing' ISP projects where the costs and benefits of different candidate projects are received at different points in time.

The chart below, from the 2022 ISP, illustrates the impact that discount rates have on the net market benefits of the CDPs relative to the selected ODP relative to the central discount rate of 5.5%[95]. They were by far the largest sensitivity in the 2022 ISP. The 2% and 7.5% discount rates represent the lower and upper bounds respectively. The 10% rate was chosen following a discussion with the 2022 Panel. Higher discount rates can decrease the relative ranking of those CDPs that include more transmission assets because of the long development and the relatively long life of these assets. Lower discount rates favour relatively, the rankings of CDPs that include more accelerated development rates, as the benefits to consumers are delivered earlier in the process. This in turn changes both the quantum and the timing of financial risks to consumers and investors.

Figure 32 Reduction in weighted net market benefits in ODP relative to top-ranked CDP, by sensitivity



The process of selecting an appropriate discount rate and/or range of feasible discount rates for input into the ISP modelling is made more complex because the CDPs include different mixes of asset classes (i.e., different mixes of generation and storage options and transmission routes), with each asset class likely to be funded by different investors with different risk/return preferences[96].

To date, AEMO has adopted a single central discount rate with single lower and upper bounds for all asset types and/or combinations of asset types in the CDPs irrespective of the mix of asset classes in each of the CDPs. We discuss below why the Panel does not accept AEMO's view that it is restricted to this approach in the selection of a discount rate.

[95] See p.91 https://aemo.com.au/-/media/files/major-publications/isp/2022/2022-documents/2022-integrated-system-plan-isp.pdf?la=en

[96] For example, pension funds with fixed schedule of payments, may prefer the security of investment in transmission assets even when the rate of return is lower than other investments.

Currently, when considering its approach to the discount rate(s) AEMO must:

- Comply with the energy market rules, regulations and guidelines, and with other relevant government policy directives; and
- Select a central discount rate(s) and a range of feasible alternative low and high discount rate(s) to test sensitivity of the CDPs/ODPs to changes in the discount rate.

There has been ongoing debate over AEMO's approach to selecting a discount rate(s), and whether this selection complies with the AER's CBA Guideline[97] and the Forecasting Guideline[98].

As discussed below, the 2022 ISP Panel was critical of the advice provided by AEMO's expert consultant and of AEMO's overall consultation process. The 2022 Panel concluded that the issues raised by the Panel about this advice were never adequately addressed by AEMO in the 2022 ISP process.

The 2024 Panel notes there have been some improvements in AEMO's approach to estimating the discount rate for the 2024 ISP as well as the level of AEMO's engagement with the Panel. However, the Panel believes there is scope for further improvement in both areas, as set out in our recommendations for the 2024 and 2026 ISPs.

The discount rate and the regulatory framework

AEMO is subject to the relevant requirements of the National Electricity and Gas Rules (NER and NGR), and National Laws (NEL and NGL). It must ensure its decisions promote the national energy objectives (NEO and NGO) and are made in the long-term interests of consumers. In September 2023 the national energy objectives were amended to include an *'emissions reduction objective'*[99].

More immediately, AEMO must decide on its approach to estimating the ISP discount rate(s) in accordance with the directions in the AER's CBA Guideline and AER Forecasting Guideline.

The AER's CBA Guideline sets out both mandatory '*requirements*' and '*discretionary guidance*' (recommendations) for AEMO to consider in its selection of the discount rate(s). The two *requirements* in the CBA Guideline are[100]:

- The ISP is required to be appropriate for the analysis of private enterprise investment in the electricity sector across the National Electricity Market (NEM), and
- The discount rate is required to be "consistent with the cash flows that the ISP is discounting". For example, if real cash flows are applied, a real discount rate must be applied.

Aside from these two mandatory requirements, the AER's '*discretionary guidance'* allows AEMO to exercise some 'flexibility' in selecting the discount rate(s). The AER provides discretionary guidance in five areas. These are summarised below:

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[97] See: https://www.aer.gov.au/system/files/AER%20-%20Cost%20benefit%20analysis%20guidelines%20-%2025%20August%202020.pdf

[98] See: https://www.aer.gov.au/system/files/AER%20-%20Forecasting%20best%20practice%20guidelines%20-%2025%20August%202020.pdf

[99] See AEMC explanation and guide to the application of the change in law (the Emissions Reduction Objectives law change). https://www.aemc.gov.au/news-centre/media-releases/aemc-applies-new-emissions-reduction-objective

[100] See p. 10 https://www.aer.gov.au/system/files/AER%20-%20Cost%20benefit%20analysis%20guidelines%20-%2025%20August%202020.pdf

- AEMO should select discount rate(s) that reflects the systematic risk associated with the costs and market benefits realised over the life of the projects.
- The lower boundary should be the weighted average cost of capital (WACC) as determined by the AER in its '*most recent'* network revenue decisions.
- The discount rate should not generally be used to manage uncertainty over predicted costs and benefits.
- AEMO's choice of discount rate should be informed by expert guidance.
- The choice of discount rate(s) should promote competitive neutrality between network and non-network options in a development path.

We discuss further the implications of this distinction between *requirements* and *discretionary guidance* in the *following sections.* In brief, AEMO has adopted a narrow interpretation of the CBA, and thus limited itself to adopting a single discount rate to apply to all asset classes in the analysis of the CDPs/ODP. The Panel considers the AER's CBA Guideline provides greater flexibility to AEMO to use its judgement and to explore whether the single discount rate is the only approach available to it under the Guideline.

Selection of Discount Rate: What the 2022 ISP Consumer Panel said.

The 2022 Panel was initially very critical of AEMO's approach to estimating the discount rate in the 2021 Draft IASR, noting that AEMO proposed to use the most recent AER network revenue determinations as the central discount rate (4.8% real pre-tax[101]).

The Panel concluded that AEMO's approach in the Draft IASR was '*not acceptable for consumers'*. The use of the AER's WACC determination as the central rate did not meet the requirements of the AER's CBA Guideline to select a private sector investor's discount rate. Nor did AEMO obtain independent expert advice or undertake an appropriate level of consultation with the Panel and other stakeholders.[102]

In response to criticisms of the draft 2021 IASR by the Panel and other stakeholders, AEMO sought advice from Synergies Economic Consulting (Synergies).[103] As required by the CBA Guideline, Synergies adopted the AER's 'most recent' regulated WACC decision (real pre-tax 2.2%) for the lower band. Synergies also used the AER's building block model as a starting point to setting the central and upper bounds of the discount rate (5.6% and 7.3% respectively). It did so by changing the methodologies/assumptions for estimating the key inputs to the WACC model. Synergies provided limited supporting evidence to justify these changes other they reflected a[104]:

> "…more risk-sensitive view about required returns on private investment in the NEM".

AEMO largely adopted Synergies' recommendations in the Final 2021 IASR. However, AEMO did include a higher discount rate sensitivity of 10% based on the recommendation of the 2022 Panel.

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[101] All references to the percentage discount rate in this submission refer to the real pre-tax discount rate. The AER's revenue decisions are expressed in terms of a nominal post-tax WACC, however, the AER also reports the real pre-tax WACC in its decisions.

[102] For further details of the Panel's concerns, see pp 58-9 https://aemo.com.au/-/media/files/stakeholder_consultation/consultations/nem-consultations/2021/iasr/submissions/isp-consumer-panel.pdf?la=en

[103] https://www.aemo.com.au/-/media/files/electricity/nem/planning_and_forecasting/isp/2021/synergies-discount-rate-report.pdf?la=en

[104] Ibid, pp 4-5.

The 2022 ISP Panel acknowledged the improvements in AEMO's approach in the Final 2022 IASR, but concluded[105]:

> "AEMO's approach was significantly improved for the final IASR, but we consider that the level of consultation and transparency was still insufficient for such a material input. AEMO only undertook targeted consultation with a small number of stakeholders, we had very limited opportunities to engage with the consultant and we do not consider our feedback was appropriately addressed."

The 2022 Panel went on to made specific recommendations to AEMO to address these issues in the 2024 ISP including:

> "We recommend that AEMO consults on this issue [discount rates] earlier and more openly for the 2024 ISP. There may also be value in the AER reviewing whether the CBA Guidelines should provide clearer guidance on this matter given this issue is much closer to the AER's area of expertise rather than AEMO's."

Developments in the 2024 ISP

While the 2022 Panel encouraged AEMO to consult on the discount rates for the 2024 ISP earlier and more openly, AEMO commenced its engagement with the 2024 Panel on the discount rate relatively late in the IASR process. This was after AEMO had again engaged Synergies to provide advice on if, and how, the lower, central and upper rates should be adjusted based on recent economic developments.

In line with AEMO's request, Synergies largely retained the same building block methodology and only updated those WACC input parameters that were more sensitive to changes in the economic cycle, namely the 10-year government bond yield (the risk-free rate), the market risk premium, debt risk premium and inflation[106].

The table below summarises AEMO's revised discount rate in the Draft 2023 IASR using the updated inputs to the building block model (p.110).

Table 28 Pre-tax real discount rates

	Central estimate	Lower bound	Upper bound
2022 ISP	5.5%	2.0%	7.5%
Draft 2023 IASR	7.0%	4.0%	9.0%

The 2024 Panel considered that AEMO's request to Synergies did not address the 2022 Panel's criticisms with the application of the AER's building block approach to estimating the central and upper bounds of the discount rate. In the discussions with AEMO prior to the finalisation of Synergies' report and the publication of the Draft IASR (December 2022), the 2024 Panel urged AEMO to seek additional advice from another consultant based on surveys of market practitioners. The Panel's response to the Draft IASR repeated these concerns:

[105] See p. 51 https://aemo.com.au/-/media/files/major-publications/isp/2021/isp-consumer-panel-report-on-2021-iasr.pdf

[106] https://aemo.com.au/-/media/files/stakeholder_consultation/consultations/nem-consultations/2022/2023-inputs-assumptions-and-scenarios-consultation/supporting-materials-for-2023/synergies-updating-the-2022-discount-rate.pdf

> "The updated report from the same consultant for the Draft 2023 IASR has the same flaws highlighted by the 2022 Panel."[107]
>
> "The 2024 Panel does not think the engagement on this fundamental matter has met the AER's Best Practice Forecasting Guidelines.[108]
>
> "The increased stakeholder engagement has not occurred in the 2024 process which the 2024 Panel, again, considers has not met the AER's Guideline. There should have been a commissioned consultant's report by a different consulting firm in order to test this important methodological issue.[109]

The 2024 Panel concluded its review of the Draft IASR with two key messages for AEMO:[110]

- "Key Message: the 2024 Panel recommends that AEMO commission a different consultant to provide data on what is the expected return on private sector investments and how that has changed over recent years.
- Key Message: the above study should be completed in time to allow stakeholder engagement prior to the publication of the Final 2023 IASR."

In response to the 2024 Panel's concerns, and the views of other stakeholders that the central discount rate in Synergies' 2022 report and the Draft IASR did not reflect the discount rate required by private investors in the NEM, AEMO engaged Oxford Economics Australia (OEA) to undertake a survey of developers in the NEM.

OEA's survey and interviews were conducted in May and June 2023 and included participants representing regulated and unregulated network assets, government representatives and independent bodies. OEA issued a draft report in early June. The Panel has an opportunity to meet with OEA to discuss the draft before its publication at the end of June [111].

The table below from the final OEA report (p.4) summarises the survey and interview participants by main asset class(es). We are concerned that the short time period available to OEA to complete its study has likely limited the sample size.

We also note that the study is exclusively focussed on upstream investors. OEA's terms of reference did not include a survey of consumers' cost of capital. However, consumers' investment decisions in 'behind-the-meter' assets are forecast to make an important and increasing contribution to achieving the carbon emission objectives as highlighted in the proposed 2024 ISP scenarios.

[107] See p. 12 https://aemo.com.au/-/media/files/major-publications/isp/2023/58-2024-isp-consumer-panel-draft-2023-iasr-submission.pdf?la=en
[108] Ibid, p 78.
[109] Ibid, p 78.
[110] Ibid, pp. 12-13.
[111] https://aemo.com.au/-/media/files/major-publications/isp/2023/iasr-supporting-material/cost-of-capital-survey-2023-for-aemo---oxford-economics---final-report.pdf?la=en

Fig. 1. Break-down of Survey and Interview Engagement by response type

	Solar	Wind	Battery/Storage	Regulated Asset	Other*	Total
Survey Response Only	1	1	-	1	2	5
Survey & Interview Response	3	3	4	4	9	23
Total	4	4	4	5	11	28

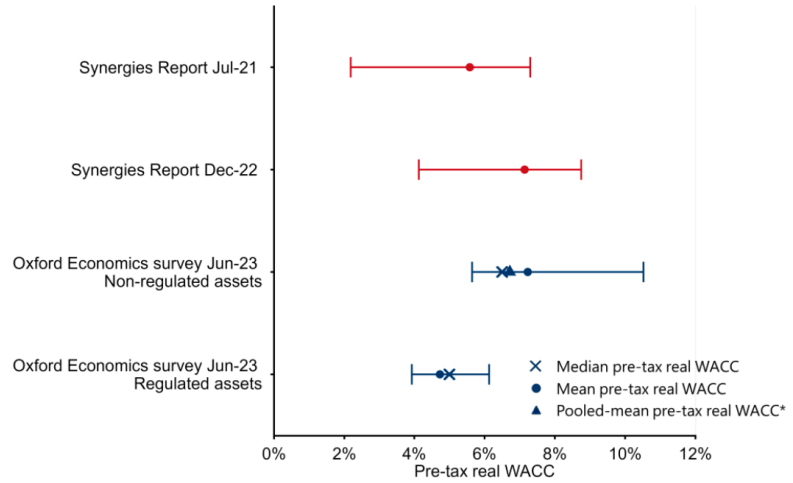
Source: Oxford Economics Australia

The key findings of the OEA report include:[112]

- A simple **average** pre-tax real WACC of approximately 7.2% for non-regulated assets
- The average pre-tax real WACC for regulated assets was 4.7%
- The average upper value for the WACC was 10.5%

OEA concluded that Synergies' central cost of capital of 7.1% (December 2022) was *"reasonable"*, notwithstanding their different methodologies. The ongoing preference of the Panel is the OEA approach. The separate investor survey indicated that the cost of capital for regulated assets was considerably lower than the central estimate. In contrast, the upper bound discount rate indicated a higher cost of capital than Synergies' 2022 building block approach. This upper value was more in line with that suggested by the 2022 ISP Panel. This figure from the OEA report (p.5) summarises these differences.

Fig. 2. Comparison of Synergies estimated pre-tax real WACC (Dec-22) vs. Survey Responses (Jun-23)



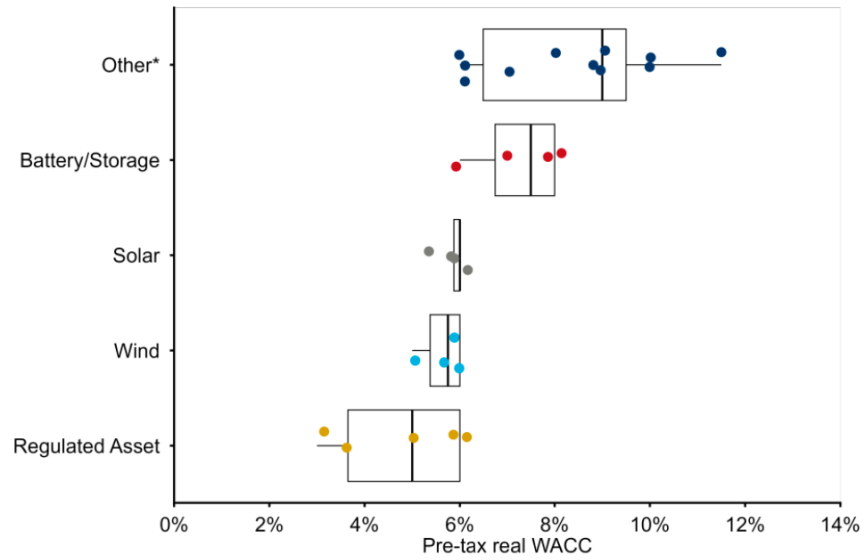
Source: Oxford Economics Australia

** Pooled mean of responses for each asset type (Wind, Solar, Battery/Storage, Other assets)*

The next figure (p.6) demonstrates the spread of the observed cost of capital for different unregulated asset types and compares this with the regulated asset class.

[112] Ibid, pp. 5 and 19.

Fig. 3. Survey response for Central Pre-tax real WACC by asset type†



Source: Oxford Economics Australia

† Please note that one participant may have provided multiple responses by technology type.

** Other denotes responses that were not discernible by technology, such as where a respondent has provided a single WACC but has a portfolio of assets. This may also include responses that could not be separated to maintain confidentiality.*

The OEA study concluded with the following recommendations to AEMO[113]:

> "Our survey of market participants indicates that Synergies' central discount rate estimate of 7% is reasonable.
>
> "Beyond the central estimate, the survey indicates that the upper bound assumption may be significantly higher than estimated by Synergies. Despite the limited response rate to the survey, we recommend that AEMO considers the use of a 3.3% increase to the central scenario when calculating the upper bound cost of capital and continue to test this assumption in future research."

AEMO's Final IASR discount rate for the 2024 ISP

In its Final 2023 IASR, AEMO accepted the findings of the OEA report. The Final IASR retained the Draft IASR's central estimate of the real pre-tax discount rate of 7%, but reduced the lower bound rate and increased the higher bound rate. The lower bound is based on the AER's most recent decision – Transgrid for 2023-28.

	Lower bound	Central estimate	Upper bound
2022 ISP	2.0%	5.5%	7.5%
Draft 2023 IASR	4.0%	7.0%	9.0%
2023 IASR	3.0%	7.0%	10.5%

[113] Ibid, p 10.

2024 ISP Consumer Panel's Conclusions

In response to the Draft IASR, the 2024 Panel concluded (much as the 2022 Panel had concluded) namely[114]:

- The updated Synergies' report did not meet the AER CBA guideline requirements, and
- AEMO's engagement on the issue did not meet the AER's Forecasting Guideline.

The Panel is not clear why AEMO 'rushed' the expert review process leading up to both the Draft IASR and Final IASR, given the importance of the discount rates in the ISP analysis. The 2024 Panel was therefore disappointed that the strong recommendations from the 2022 Panel on engagement were not followed up until the very last stage of the 2023 IASR process.

The engagement process AEMO followed to develop the Final IASR went only someway to addressing the Panel's concerns. For example, while the Panel was involved in the development of the scope of work for the OEA survey- based study and AEMO facilitated some engagement opportunities with OEA, the OEA draft report was not shared with the Panel until early June 2023, leaving limited time for the Panel to have an impact on the Final OEA Report and the Final IASR.

Having said that, AEMO's adoption of the OEA survey results in the Final IASR provides the Panel with some reassurance that the central discount rate of 7% is a reasonable reflection of the average expectations of investors in non-regulated assets, albeit we also recognise the limitations of drawing strong conclusions from such a small sample of investors.

The Panel also agrees with AEMO adopting OEA's upper bound discount rate in the 2024 ISP for the purpose of scenario testing again, however, noting the limitations of the survey.

The OEA report does raise the question of why AEMO still chooses to adopt a single discount rate for investment in all asset types (large-scale generation, storage and transmission) particularly given the diversity of investment types and clear evidence that investors apply different discount rates to different investment types.

Certainly, the OEA survey and follow-up interviews clearly identify that investors do consider regulated and unregulated assets as having different risk profiles and that this, in turn, leads to different expectations on the costs of capital for particular investment projects considered in the ISP. OEA discusses these different risks in some detail in their report (pp.6-8), identifying factors such as type of technology, different construction risks, availability of off-take agreements and government support. OEA also notes (p.7):

> "Regulated network assets are relatively insulated from these factors. Their main exposure is to regulatory risk and contestability risk (where another network is available)".

A further feature of the OEA report is its discussion on the use of WACC as a measure of the discount rate, noting that some of the interviewed respondents indicated that they evaluated their investment decisions in renewable energy projects using an internal hurdle rate rather than the WACC (p.9). OEA advises (p 21):

> "The WACC approach is not always appropriate in reflecting an investor's view about the required returns on investment in the NEM."

[114] See for example pp 77-8 https://aemo.com.au/-/media/files/major-publications/isp/2023/58-2024-isp-consumer-panel-draft-2023-iasr-submission.pdf?la=en

Overall, the OEA report, despite its acknowledged limitations, point to the need to reconsider first whether Synergies' approach of using the AER's WACC model is the most appropriate to estimate the cost of capital across some or all investment types, and if not, can the survey/interview approach be expanded.

Are their implications for the AER's CBA Guideline?

In our discussions with AEMO on the OEA's draft report, AEMO suggested that the AER's CBA Guidelines and specifically the reference to *'competitive neutrality'*, requires AEMO to use a single discount rate to apply to all the asset types considered in the ISP modelling.

As we highlighted above, our view is that the CBA Guideline does not *require* AEMO to use a single discount rate, but rather provides some flexibility in the *discretionary* clauses of the Guideline. Nor does the Guideline's reference to the discretionary clause of '*competitive neutrality'* mean, per se, that AEMO must treat all the asset types as equal in terms of investors' required cost of capital – they are not. The OEA data clearly shows that investors return requirements vary between different asset investments based on their perception of risk.

Moreover, using the same central discount rate for both network and non-network solutions risks biasing the efficient economic choice between these solutions, thus potentially failing the AER's 'competitive neutrality" *discretionary* recommendation.

The Panel also notes that AEMO Services adopts different discount rates for network and non-network options in its NSW Roadmap IIO reports[115].

Finally, as noted above, each of the three ISP scenarios set out in the 2023 Final IASR include some degree of reliance on 'behind the meter' consumer investments (albeit to different degrees), such as roof-top solar PV, DER, EVs and efficiency, to achieve the target renewables and net carbon emission outcomes in the 2024 ISP. In effect, consumer investments 'compete' with, or at least are an important complement to industry investment in the energy transformation.

The Panel suggests that consumers' cost of capital, and their perception of investment risk, is becoming an increasingly important factor for the ISP to consider.

<u>Recommendations</u>

The 2024 Panel's recommendations include references to both the 2024 and 2026 ISPs.

2024 ISP:

1. AEMO engage an expert consultant to prepare a more comprehensive report with a wide sample of network and non-network equity and debt investors prior to the commencement of modelling the Final 2024 ISP in early 2024. The Panel continues its involvement with the consultant as they finalise their report.

2. In preparation for the 2026 ISP AEMO and the Panel to engage with the AER to further explore:
   - whether the intention in the CBA Guideline was to have only one central discount rate to cover all regulated and non-regulated investors in the NEM, and if so, on what basis

[115] See p.46 https://aemoservices.com.au/-/media/services/files/publications/iio-report/2023/231604-2023-iio-report-final.pdf?la=en

- given the findings of the OEA report consider whether the CBA Guideline requirement that AEMO uses the AER's 5-year network revenue WACC determination as the basis for estimating the lower bound cost of capital is appropriate for future ISP development.

2026 ISP:

3. Adopt the methodology used by OEA to determine investor discount rates for the central and upper bound cases.

4. AEMO ensures it engages a wider range of stakeholders on this topic and does so much earlier in the 2026 ISP process. This will enable more time for stakeholders to *effectively* engage in the process, including reviewing the expert reports.

5. AEMO further investigate the OEA's 2023 survey results which point to significant differences in investors' discount rates for regulated and non-regulated assets and does so early in the 2026 ISP process, allowing time for engagement with all stakeholders.

6. AEMO expands the consideration of discount rates to include consumer discount rates for behind the meter investment for the 2026 ISP.

2.2.9 Transmission augmentation costs

Why is the Panel commenting on this issue?

Augmentation capex costs are a key variable. In our submission on the Draft Transmission Expansion Options Report (TEOR) we argued that while AEMO's approach was a considerable improvement on the capex estimation methodology in the 2022 ISP, our conclusion was that the Transmission Cost Database (TCD) may still significantly underestimate forecast network capex. We argued that the TCD underestimated supply chain constraints as well as factors such as local content requirements, the move from fixed price to cost plus contracts and a flawed adjustment to the AACE methodology through the modelling of unknown risks and the conclusion of symmetrical cost accuracy.

We note the AER's comment in its Transparency Review of the Final IASR referring to the AEMO deviating from the AACE cost estimation framework[116]:

> "In particular, while the AACE framework adopts asymmetrical accuracy bands to reflect the greater upside risks that projects face, AEMO adds a contingency allowance to the cost estimate that results in estimates with symmetrical accuracy bands.
>
> AEMO explains why it has made this variation, but they do not adequately explain how it has derived the unknown risk factor. We expect AEMO to provide further explanation on this issue."

AEMO's approach in the Final Transmission Options Expansion Report

AEMO made a number of changes in the Final TEOR in response to the Panel's and other submissions. In other areas no changes were made but the discussion informs the approach to sensitivity testing around social licence project timetable delays and capex increases.

[116] See p. 5 https://www.aer.gov.au/system/files/AER%20-%20Transparency%20review%20-%20AEMO%202023%20Inputs%20Assumptions%20and%20Scenarios%20Report%20-%2028%20August.pdf

Panel Comments

The issue raised by the AER around the evidence for symmetrical accuracy bands and the unknown risk factor in capex estimates is a major issue raised in the Panel's submission on the draft TEOR report. We look forward to more explanation from AEMO on this matter in the Draft ISP.

We look forward to working with AEMO and the Advisory Council on Social Licence on how social licence and supply chain pressures can be modelled in the sensitivities undertaken on the 2024 ISP.

AEMO decided not to include 'build limits' in the 2024 ISP[117]. AEMO Services does do so in its IIO Reports on the NSW Roadmap. AEMO Services applies build limits in its Draft 2023 NSW Roadmap Infrastructure Investment Objectives Report published in May[118]. These are designed to reflect a supply chain constraint which consideration of supply chain factors is mandated under the NSW EII Act and been a part of the IIO reports since 2021[119].

Table 7: Key modelling assumption diversions from the 2022 ISP

Assumption	2022 ISP assumption	Draft 2023 IIO Report assumption	Rationale for diversion
Annual build limit to reflect a supply chain constraint	N/A	A limit of new generation infrastructure in NSW capable of producing approximately 6,000 GWh per year was assumed until 2030. Post-2030, a build constraint of generation infrastructure in NSW capable of producing approximately 7,600 GWh per year is applied.	Explicit consideration of supply chain constraints[81]
Technology-specific and locational build limits	N/A	Technology-specific build limits for each NSW subregion informed by EnergyCo analysis of project pipeline data. This equates to ~3 GW total new VRE limit by 2024-25 and ~7 GW total new VRE limit by 2025-26, as well as 2.5 GW pumped hydro limit by 2030-31.	Updated view on near-term ability for new project development using real world data

Recommendations

- Continue to work with the Customer Panel to see how the 2024 Panel's concerns about the risk of under-estimating forecast capex can be addressed.
- AEMO provide a clear explanation of how the build limits in the NSW Roadmap are incorporated into the ISP modelling under the 'public policy clause' in the rules.

2.2.10 Hydrogen infrastructure

AEMO's assumptions on the potential for hydrogen exports are more realistic than the 2023 IASR. However, they remain ambitious in light of the multiple breakthroughs that are still required to make the production, transport, compression, storage, shipping and international trade of clean hydrogen a viable industry at scale.

Noting the challenges in mass-producing electrolysers, likely global demand and constraints on inputs, the forecast cost curve for electrolysers may prove ambitious. Noting the difficulties some energy businesses are having predicting the future costs of relatively well known technology - such as

[117] See the discussion in Section 2.2.1 in the Consultation Summary Report on Methodology https://aemo.com.au/-/media/files/stakeholder_consultation/consultations/nem-consultations/2023/isp-methodology-2023/consultation-summary-report---update-to-the-isp-methodology.pdf?la=en

[118] See Table 7 p.46 Draft IIO Report May 2023 https://aemoservices.com.au/-/media/services/files/publications/iio-report/2023/231604-2023-iio-report-final.pdf?la=en

[119] See Appendix B p.69 in the 2021 IIO Report https://aemo.com.au/-/media/files/about_aemo/aemo-services/iio-report-2021.pdf

transmission - it would be prudent to test the impact of considerably higher future H2 infrastructure and supply chain costs in the ISP. This is covered by the recommendation above relating to the Panel working with AEMO to develop the scope of work for the next iteration of the CSIRO Gen Cost study.

3.0 Considerations for the remainder of the 2024 ISP and the 2026 ISP

Recognising that the ISP process is a developing process that is regularly being tested and evaluated, we look forward to the development of the 5th Integrated System Plan to be released in mid-2026, aware that the work will commence on the all-important scenarios in mid-2024. Based on our experiences in working with AEMO we make the following suggestions for the 2026 ISP process.

1. Panel members have found the working relationship with AEMO to be very productive since our appointment in October 2022. We consider the Consumer Panel process to be a very useful component of the development of the ISP.
2. A key example of this is the greater involvement of the Panel in developing consultant scopes of work and choice of the preferred consultant. We encourage AEMO to continue and expand on this use of the Panel.
3. As the 'social' and 'people' aspects of the ISP become ever more important, alongside the engineering and system planning aspects, hearing form consumers, their communities and highly informed consumer advocates needs to become a greater focus on the development of the ISP. The recently published Stakeholder Engagement Strategy is a good first step. We look forward to working with AEMO to complete the 2026 ISP Engagement Strategy in time for the start of the 2026 ISP process in July 2024.
4. The question of who bears risk and hence who pays will only loom larger in the 2026 ISP as costs increase and consumers affordability concerns mean increasing transition costs in electricity bills risk losing what we refer to as 'Consumer Social Licence' for the transition the ISP is seeking to drive. The work to measure Consumer Risk Preferences that has begun in the 2024 ISP will be an expanding focus in the 2026 ISP.
5. The importance of social licence will only increase in the 2026 ISP and AEMO will need to work with stakeholders like the Advisory Council on Social Licence (ACSL) to better understand how to account for these issues in ISP modelling. The Panel looks forward to further work with the ACSL and AEMO to develop ISP sensitivities to address social licence risk for the 2024 ISP.
6. The Panel for the 2026 ISP needs to be appointed from mid-2026 so they can be fully engaged I the development of the scenarios.
7. While progress has been made since the 2022 ISP is selection of the appropriate discount rates to be used, this submission shows there are still outstanding issues to be resolved on the preferred methodology. We strongly support the approach of surveying market participants and the use of different discount rates for network and generation/storage investments.
8. The Commonwealth has recently begun a review to 'supercharge' the ISP[120]. The Panel looks forward to providing its views to the review. We encourage AEMO to support the 2026 Panel to participate through submissions and other means to the AEMC review of the ISP that is due in 2025[121].

[120] See https://www.energy.gov.au/terms-reference-review-integrated-system-plan#:~:text=The%20ISP%20review%20will%20determine,maintain%20affordable%20and%20reliable%20energy for the Terms of Reference

[121] See Clause 11.126.10 of the NER https://energy-rules.aemc.gov.au/ner/1/2573#:~:text=(a)The%20AEMC%20must%20complete,5.23%20by%201%20July%202025

Appendix 1. Recommendations

This table lists the recommendations made by the 2024 ISP Consumer Panel. The same

Note: In the ID column, single letter ID's refer to 2022 Panel recommendations and double letter ID's refer to 2024 Panel recommendations.

Where a similar recommendation is made by both 2022 and 2024 Panels, both ID's are shown.

ID	Headline	2024 Recommendations
AA1	**Capacity**	Allocate adequate resources to build AEMO's capacity for engagement
AA2	**Evaluation**	Use the 2024 Strategy as a base for the 2026 ISP Strategy to be developed and consulted on ahead of the start of the 2026 ISP process
AA3	**Accountability**	Review the KPIs used in assessing the 2024 ISP for their continued use in the 2026 ISP Strategy
AA4	**Plan**	The Panel to work with AEMO on co-design of the 2026 ISP Engagement Strategy; this would include a public consultation process prior to it being published early in the 2026 ISP timetable.
AA5	**Manage**	Develop and maintain a stakeholder management system to regularly assess stakeholder needs and interests and identify gaps in stakeholder representation and participation
AA6	**Share**	The Panel looks forward to working with AEMO to develop more 'stakeholder friendly' versions of the ISP documents and stakeholder communication beginning with the Draft ISP
AA7	**Co-design**	The co-design approach to be continued and expanded in 2026 ISP.
AA8	**Understand**	Implement a program of social research, building on the initial Consumer Risk Preferences work undertaken for the 2024 ISP; this is designed to better understand consumer and community attitudes, perceptions and uncertainties about the future energy market and the role consumers would like to play
AA9	**Social Licence**	AEMO advocate for Commonwealth, State and Territory energy ministers to establish a national engagement strategy to develop a consistent approach to landowner compensation.
AA10	**Social Licence**	Upgrade and extend ISP communications strategy to provide more frequent information about ISP projects' social licence impacts. In this context we look forward to working with AEMO and the Advisory Council on Social Licence to develop the social licence sensitivities to be modelled in the Draft ISP.
AA11	**Enhancing consumer engagement**	Build on AEMO's Consumer Forum to establish frequent and meaningful engagement with consumer advocates more broadly, with a view to building capacity to support engagement with ISP and related processes.
AA12	**Cost risks and allocation**	That AEMO work with the 2024 Panel to understand how the risks and costs borne by consumers might be better communicated in the 2024 ISP and more effectively allocated in future ISPs.
AA13	**Consistency**	The Panel work with AEMO to ensure AEMO's approach to risk in the ISP is consistent to AEMO's approach to risk in its other responsibilities, where practical.
BB1	**Materiality**	Continue to draw attention to the inputs and assumptions that are most material to the consumer interest, recognising that current uncertainties in energy markets and with cost of living pressure result in regular materiality changes.
BB2	**Complexity**	There is an ongoing need to manage the complexity and volume of information in order to foster wider engagement, recognising that uncertainty, particularly about how the energy transition will occur, adds to complexity. Consider alternative or additional ways of forecasting and engaging on these material, but highly uncertain, inputs and assumptions for the 2024 ISP.
BB3	**Public Policy**	AEMO continue to provide as much information as possible on its public policy' decisions

		AEMO provide a clear explanation of how the build limits in the NSW Roadmap are incorporated into the ISP modelling under the 'public policy clause'.
BB4	**Gas Prices**	Continue to involve the Panel in development of the scope of work, selection and review of the selected consultant's work.
BB5	**Transmission Costs**	Continue to work with the Customer Panel to see how the 2024 Panel's concerns about the risk of under-estimating forecast capex can be addressed.
BB6	**Candidate Technology Build Costs**	The Panel work with AEMO to develop revised scope of works for the 2026 ISP update of the CSIRO GenCost study.
BB7	**Candidate Technology Build Costs**	For the Draft ISP – AEMO provide greater clarity around how it uses the CSIRO GenCost results in ISP modelling.
BB8	**Candidate Technology Build Costs**	For the next GenCost study - CSIRO provide greater clarity around how network costs are treated over the whole forecast period to 2052 and its justification for its 'reversion to normal' date.
BB9	**Discount Rates**	AEMO engage an expert consultant to prepare a more comprehensive report with a wide sample of network and non-network equity and debt investors prior to the commencement of modelling the Final 2024 ISP in early 2024. The Panel continue its involvement with the consultant as they finalise their report.
BB10	**Discount Rates**	AEMO and the Panel engage with the AER ahead of the 2026 ISP process commencing to further explore: • whether the intention in the CBA Guideline was to have only one central discount rate to cover all regulated and non-regulated investors in the NEM, and if so, on what basis. • Given the findings of the Oxford Economics Australia (OEA) discount rates report, to consider whether the CBA Guideline requirement that AEMO uses the AER's 5-year network revenue WACC determination as the basis for estimating the lower bound cost of capital is appropriate for future ISP development.
BB11	**Discount Rates**	For the 2026 ISP, adopt the methodology used by OEA to determine investor discount rates for the central and upper bound cases.
BB12	**Discount Rates**	AEMO ensures it engages a wider range of stakeholders on this topic and does so much earlier in the 2026 ISP process. This will enable more time for stakeholders to *effectively* engage in the process, including reviewing the expert reports.
BB13	**Discount Rates**	AEMO further investigate the OEA's 2023 survey results which point to significant differences in investors' discount rates for regulated and non-regulated assets and does so early in the 2026 ISP process, allowing time for engagement with all stakeholders.
BB14	**Discount Rates**	AEMO expand the consideration of discount rates to include consumer discount rates for behind the meter investment for the 2026 ISP.
BB15	**Decentralisation**	The draft ISP for 2024 should be carefully tested with relevant experts from Distribution businesses, who should also be actively engaged early in the development of the 2026 ISP.
BB16	**Risk**	Consumer Risk Preference – Build on the commences work undertaken for 2024 ISP with development of a longer-term strategy to ascertain and apply consumer risk preferences.

CC1	**Earlier, Broader**	Engage early on scenarios for the 2026 ISP and use this process as an entry point for a broader group of stakeholders. Early engagement should include pre-scenario briefings and deliberative forums that include consumer advocates.
CC2	**DNSPs**	AEMO work with DNSPs to co-design a specific DNSP Engagement Plan for the 2026 ISP.
CC3	**Consumer Panel**	Appoint the 2026 ISP Consumer Panel so they are able to participate from the start of consideration of 2026 ISP scenarios.
DD1	**Scenario Weights**	Undertake a review of the 2024 ISP Delphi process to see where improvements could be made for its application in the 2026 ISP.
DD2	**Public Policy**	AEMO provides a clear explanation of how the build limits in the NSW Roadmap are incorporated into the ISP modelling under the public policy clause.
DD3	**Public Policy**	The Commonwealth has recently begun a review to 'supercharge' the ISP. The Panel looks forward to providing its views to the review AEMO supports the 2026 Panel to participate through submissions and other means to the AEMC review of the ISP due in 2025
DD4	**Orchestration**	ISP 2024 to include a discrete section that identifies the non-transmission projects and policies required to achieve the Optimal Development Path. (Including Policy Certainty, transition strategy, Energy Efficiency etc). Further that these orchestration measures are clearly identified in the ISP 2024 communications strategy.
DD5	**Preliminary Results**	We look forward to working with AEMO as it proceeds with the modelling for the Draft ISP to be published in December 2023. This will include working with AEMO and the Advisory Committee on Social Licence to develop the social licence sensitivities.
DD6	**Sensitivities**	The IASR and ISP Methodology should set out the full list of proposed sensitivities or 'event-driven scenarios'. What these are and how they are used may have a material impact on the draft and final ISP. AEMO should engage with stakeholders on these issues prior to the draft ISP.
DD7	**Sensitivities**	The selection of the initial sensitivities should be conducted at the same time as the selection of the scenarios and then they are subject to concurrent review with the scenarios.
DD8	**Sensitivities**	AEMO engages early with the Panel over the course of the ISP process to the extent that its modelling suggests alternative scenarios or sensitivities are required. Similarly, the Panel has the opportunity to engage AEMO on alternative sensitivity testing based on emerging consumer concerns.
DD9	**Sensitivities**	AEMO is encouraged to develop the ISP modelling to enable increased analysis of 'combined sensitivities' that model two variables eg increased cost and delaying commissioning due to social licence, at the same time.

Appendix 2. Acronyms and Abbreviations

AACE	Association for Advancement of Cost Engineering
AEMC	Australian Energy Market Commission
AEMO	Australian Energy Market Operator
AER	Australian Energy Regulator
CBA	Cost – Benefit Analysis
CDP	Candidate Development Path (options used to select the Optimal Development Path)
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CER	Consumer Energy Resource
CWO	Central West Orana (a NSW Renewable Energy Zone)
DER	Distributed Energy Resource
DNSP	Distribution Network Service Provider
DSP	Demand Side Participation
EAAP	Energy Adequacy Assessment Projection
EPC	Engineering Procurement and Construction
EU	European Union
EUAA	Energy Users Association of Australia
FRG	Forecasting Reference Group (Hosted by AEMO)
GenCost	Generation Costs
GJ	giga joule
IASR	Inputs, Assumptions and Scenarios Report
IEA	International Energy Agency
IRA	Inflation Reduction Act (Uniting States legislation, August 2022, providing large investment in climate responses)
ISP	Integrated System Plan
LCOE	Levelised Cost of Energy
NEO	National Electricity Objective
OEA	Oxford Economics Australia (Consulting Company)
ODP	Optimal Development Path
POE	Probability of Exceedance
RERT	Reliability and Emergency Reserve Trader
REZ	Renewable Energy Zone
RiT-T	Regulatory Impact Test - Transmission
RRO	Retailer Reliability Obligation
TCD	Transmission Cost Database
TEOR	Transmission Expansion Options Report’
WACC	Weighted Average Cost of Capital
WDRM	Wholesale Demand Response Mechanism
WRL	Western Renewables Link (Victorina Transmission project)