# 2026 Integrated System Plan: Consumer Panel Response

## November 2024

Methodology Issues Paper Response

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## Acknowledgement of country

The 2026 Integrated System Plan Consumer Panel acknowledges the Traditional Custodians of the land, seas and waters across Australia. We honour the wisdom of Aboriginal and Torres Strait Islander Elders past and present and embrace future generations.

We acknowledge that, wherever we work, we do so on Aboriginal and Torres Strait Islander lands that have never been ceded. We pay respect to the world's oldest continuing culture and First Nations peoples' deep and recognise continuing connection to Country; and hope that our work can benefit both people and Country.

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# 1 ISP Consumer Panel Recommendations

**Table 1 Methodology Issues Paper Consultation Response: Recommendations table**

| # | Theme | Recommendation |
|---|---|---|
| **1** | ISP is about electricity | AEMO and stakeholders continue to recognise that the ISP is about electricity (repeat quote from ECMC). Focus re consumers and decarbonisation |
| **2** | Gas | The Panel accepts that one plausible gas development projection for each scenario serves the purpose of ISP development. We advise against responding to any pressure to model additional gas development projections. |
| **3** | Gas | Gas in the ISP is about securing gas for electricity generation only, recognising that as coal plants close post. 2030, there will be times when gas generation is required to satisfy operational demand, at peak demand times and/or when weather conditions and transmission constraints limit availability of renewable resources and gas generation is important in ensuring supply and system security. |
| **4** | Gas | While gas generation will be important to system security it should be seen as replacement for other supply options, including enhanced coordination of CER. |
| **5** | Gas | Understanding the future mix of natural gas, green hydrogen and biogas that addresses the specific market needs post 2035 at least cost, will require the ISP methodology to consider the development pathways and costs of all three alternatives. |
| **6** | Gas | AEMO ensure its updated methodology includes working with consumers as well as traditional gas stakeholders to ensure that the potential costs and risks (including sunk asset costs) are explained. Engagement with broader stakeholder range is crucial, for example: CEC, environmental groups, social license related groups |
| **7** | Gas | Understanding the future mix of natural gas, green hydrogen and biogas that addresses the specific market needs post 2035 at least cost, will require the ISP methodology to consider the development pathways and costs of all three alternatives. |

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| **8** | Gas | Separate domestic, commercial and industrial gas use from gas forecasts for electricity generation. However, the challenge will be to develop an appropriate gas cost base for generation purposes, absent some understanding of future gas demand for these other markets, particularly the future of large industrial gas usage such as steel manufacturing and mineral processing. |
| **9** | Gas | Understanding the future mix of natural gas, green hydrogen and biogas that addresses the specific market needs post 2035 at least cost, will require the ISP methodology to consider the development pathways and costs of all three alternatives. |
| **10** | Gas | While gas generation will be important to system security it should be seen as replacement for other supply options, including enhanced coordination of CER |
| **11** | Gas | Recognise that 'renewable gas' options, including green hydrogen, are still at relatively early stages of development, and it will be a challenge to identify their future contribution to electricity generation. |
| **12** | Gas | AEMO's modelling should include explicit modelling of the potential impact of severe weather events (e.g., renewable energy doubts) on the requirements for future gas generation |
| **13** | Gas | The Panel would welcome more clarity on this option; the development of gas specific counterfactuals for each scenario, and the role it might play in better integrating the gas projections in line with the Energy Ministers' directions |
| **14** | Gas | AEMO should consider the minimum viable role for gas as a form of back-up electricity generation, and where possible, model to meet gas needs with renewable sources, such as biogas, biomethane and green hydrogen. |
| **15** | Gas and engagement | Engagement needs to be expanded to include people with alternative views to the gas industry – separate engagement with broader stakeholders: eg CEC, environmental groups, social license related groups |
| **16** | Engagement | DER / CER engagement needs to be with a wider group than DNSP's |
| **17** | Demand Side Modelling | The 2026 ISP methodology should include modelling for the (likely growing) impact of curtailment of CER exports. |
| **18** | Demand Side Modelling | AEMO should consult more broadly that DNSPs and retailers to accurately understand the opportunities and barriers to CER and distributed energy. The innovations in energy services, programs and business models that |

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|---|---|---|
| | | will be required to achieve the desired rates of CER, DER and orchestration will need to involve a broader range of actors. |
| **19** | Demand Side Modelling | In pursuing the proposed methodology, that AEMO distinguishes between, and gives attention to, both distributed and distribution resources. |
| **20** | Demand Side Modelling. | AEMO model the potential for distribution upgrades and augmentation to reduce the need for transmission investment, as well as modelling the potential for CER/ DER to reduce or increase the need for distribution upgrades and augmentation (in different circumstances). |
| **21** | Demand Side Modelling | Update methodology to more overtly include 'mid-scale' (100kW-130MW) DER in forecasts |
| | Demand Side Modelling. - Curtailment. | The 2026 ISP methodology should include modelling for the (likely growing) impact of curtailment of CER exports. |
| **22** | Demand Side Modelling | In pursuing the proposed methodology, that AEMO distinguishes between, and gives attention to, both distributed and distribution resources. |
| **23** | Enhancing modelling approaches | AEMO should model to allow for 'foot room' in reflecting imperfect information but should not model for headroom as it is optimal for batteries to be fully charged when prices are low. |
| **24** | Modelling Wind Quality | That AEMO clarify the definition of the different quality of resource and the assumptions regarding class of turbine. |

# 2 About the Consumer Panel

The ISP Consumer Panel (the Panel) is an advisory body established under the National Electricity Rules to bring a focus on the long-term interests of consumers to the ISP development process. Each Panel member is appointed for the two-year ISP development cycle, concluding with AEMO's publication of the ISP. The 2026 ISP Consumer Panel is the third Panel.

This submission responds to the AEMO Methodology Issues Paper released on 23rd October 2024, recognising that there will be a draft methodology published in 2025, with some more detailed aspects of 2026 ISP Methodology to be considered in that paper, and our anticipated response.

# 3 General comments

The Panel is generally supportive of the directions that AEMO is proposing in the 2026 ISP Methodology Issues paper, in particular:

1. Modelling for greater levels of uncertainty
2. Enhancing the consideration of CER and DER in modelling.
3. A clearer emphasis on the role that can likely be played by distributed energy, along with DER.
4. Responding to the Ministerial Council on Energy and Climate Change (MCEC)responses to the ISP Review.

In considering the Issues Paper, the Panel has had a focus on gas, an area of MCEC advice and identified some areas where we think that further clarification would be helpful.

We also highlight that the ISP remains fundamentally focussed on electricity.

The Energy Minsters said in their response to the ISP review (2024):

*"Now in its fourth iteration, the ISP plays a crucial role in providing consistent projections about where and when investments in new electricity infrastructure will be required to support the energy transformation."*

Gas is considered where it is a fuel for the generation of electricity.

**Recommendation:** AEMO and stakeholders continue to recognise that the ISP is about electricity (repeat quote from ECMC). Focus re consumers and decarbonisation

The matter of engagement with a diversity of consumer and stakeholder interests continues to be important for all aspects of ISP development. This Issues paper has reinforced to us that engagement on DER / CER and distributed energy opportunities is a priority for further engagement.

We continue to appreciate the willingness of AEMO staff to explore a breadth of ISP matters with the Panel, including this Issues Paper. We look forward to further exploration of key topics as the draft methodology is developed.

# 4 Response to Consultation Questions

## 4.1 Cost Benefit Analysis (Section 3.5 of the Issues Paper)

The Panel is pleased to see AEMO continues to seek ways to inform the ISP with consumer risk preferences. This has been a challenging and novel area of focus for AEMO but remains important to operationalising the long-term interest of consumers in the ISP process.

The Panel supports AEMO's proposed approach to bring consumer risk preferences into the final stage of selecting an ODP. The panels expectation is that consumer risk preferences would be garnered through a new engagement project that is informed by the experience of AEMO's 2024 ISP, rather than using data from that previous project.

Regarding AEMO's framing of how consumer risk preferences will be considered, the wording used by AEMO to describe the sixth step of the CBA process - "... Reasonably reflect customers' level of risk neutrality or aversion." - could be interpreted as presupposing consumers have a negative appetite for risk.

Risk acceptance, not risk neutrality, is the opposite to risk aversion. The Panel thinks that it is important AEMO seeks to understand and reflect risk preferences.

**Recommendation**: To this end we suggest it would be more appropriate to say "... Reasonably reflect consumers' risk appetite". The panel recommends AEMO updates the framing of the approach to the CBA accordingly.

## 4.2 Integrating Gas in the ISP (Section 4 of the Issues Paper)

General Comments

The Panel notes from the Executive Summary that

*"AEMO proposes to prepare an expanded gas supply model to better reflect potential gas network, storage and supply opportunities,"* and to *"work closely with gas stakeholders to introduce at least one plausible gas development projection for each scenario assessed in the ISP"* (Page 3).

The Panel asks what the criteria will be for developing "one plausible gas development projection for each scenario"? We are also aware that there will likely be pressure on AEMO, particularly from the gas industry to explore a range of "plausible options", we are concerned about the potential for AEMO's efforts to be diverted to exploring additional options that will have limited value for the ISP, particularly when compared to the many other new matters that the 2026 ISP will need to consider.

**Recommendation** The Panel accepts that one plausible gas development projection for each scenario serves the purpose of ISP development. We advise against responding to any pressure to model additional gas development projections.

**Recommendation**: Gas in the ISP is about securing gas for electricity generation only, recognising that as coal plants close post. 2030, there will be times when gas generation is required to satisfy operational demand, at peak demand times and/or when weather conditions and transmission constraints limit availability of renewable resources and gas generation is important in ensuring supply and system security.

**Recommendation:** While gas generation will be important to system security it should be seen as replacement for other supply options, including enhanced coordination of CER.

The Panel also notes AEMO's proposal to 'work closely with gas stakeholders' (see above) in developing gas generation/gas supply and storage opportunities. The future role of gas in the energy mix and how costs and risks of any proposed gas developments are allocated, are important considerations for gas consumers as well.

**Recommendation**: AEMO ensure its updated methodology includes working with consumers as well as traditional gas stakeholders to ensure that the potential costs and risks (including sunk asset costs) are explained. Engagement with broader stakeholder range is crucial, for example: CEC, environmental groups, social license related groups

The Energy Minister's responses to the ISP view (as reproduced on page 17), with regard to gas integration into the ISP are an important context for the 2026 ISP. The proposal on *"Collating information about dates of expected gas pipeline or [gas-powered generation] closure or conversion, such as from natural gas to hydrogen*," is supported. This action is considered to be integral to understanding the potential contribution (or not) of gas – both 'natural' gas and 'renewable gas' - to post 2035 gas supply, and the consequent impacts on using gas for reliability/ security of the system.

We also note the discussion at the FRG meeting on 13th November regarding AEMO forecast of gas usage for generation where the simultaneous growth in electrification and expansion of renewable energy, alongside the rapid decline in coal fired generation, drives a potential growth in the gas market to meet peak day and annual demand for gas generation, particularly from the mid 2030s.

**Recommendation**: Understanding the future mix of natural gas, green hydrogen and biogas that addresses the specific market needs post 2035 at least cost, will require the ISP methodology to consider the development pathways and costs of all three alternatives.

In developing plausible gas generation projections, and in line with the Minister's directions AEMO's methodology needs to:

**Recommendation:** Separate domestic, commercial and industrial gas use from gas forecasts for electricity generation. However, the challenge will be to develop an appropriate gas cost base for generation purposes, absent some understanding of future gas demand for these other markets, particularly the future of large industrial gas usage such as steel manufacturing and mineral processing.

**Recommendation.** While gas generation will be important to system security it should be seen as replacement for other supply options, including enhanced coordination of CER.

**Recommendation:** Recognise that 'renewable gas' options, including green hydrogen, are still at relatively early stages of development, and it will be a challenge to identify their future contribution to electricity generation.

Trends in the weather outlook should also be a consideration. AEMO's two most recent Quarterly Energy Dynamics reports (Q2 and 3, 2024) illustrate the significant impact of events such as prolonged 'renewable energy droughts', and restricted hydro capacity, can have on the electricity market including impacts on wholesale electricity market prices and price volatility, More specifically, these events highlight the important role of gas generation and associated gas storage capacity particularly in winter periods where solar is at a minimum. Ongoing climate change may well exacerbate these challenges.

**Recommendation:** AEMO's modelling should include explicit modelling of the potential impact of severe weather events (e.g., renewable energy doubts) on the requirements for future gas generation.

Figure 3 (page 19) is a closed loop diagram and prompts the question about how many iterations of the capacity outlook, time sequential and gas supply expansion model will likely be optimal?

It would be helpful for AEMO to provide some early indication of how many iterations of the model they would expect to run. However, we also note that the purpose of the task is not to optimise the gas supply model outcomes, or to co-optimise the electricity and gas results (hence why there is no cost benefit analysis of the gas supply outcomes). For this reason, our view is that there would generally only be one iteration.

Having outlined the steps to apply the gas supply expansion option, "AEMO proposes that when assessing the ODP and the benefits of electricity transmission, it will only include costs and benefits in the CBA which are within the scope of the electricity sector" (page 19). The Panel strongly supports this approach.

The Panel notes AEMO's reference to the following: (p 20)

*"AEMO is considering the option of also developing an additional gas development projection for the counterfactual of each scenario."*

The Panel understands this to mean that AEMO is considering a specific gas development projection as part of the counterfactual CDP for each scenario, being the CDP that involves no major additional electricity transmission build for that scenario. The net benefit of all other CDPs are measured against this new counterfactual.

Does this mean AEMO developing a second counterfactual for each scenario that excludes new transmission but includes the gas development projections for each scenario and then comparing the net benefit of all other CDPs against this.

**Recommendation:** The Panel would welcome more clarity on this option; the development of gas specific counterfactuals for each scenario, and the role it might play in better integrating the gas projections in line with the Energy Ministers' directions.

**Recommendation:** Engagement needs to be expanded to include people with alternative views to the gas industry – separate engagement with broader stakeholders: eg CEC, environmental groups, social license related groups

Brief Responses to Consultation Questions

**Consultation Question 1:** ***Do you consider that the proposal to develop a gas supply expansion model appropriately addresses the action in the Energy Ministers' response to the Review of the ISP for additional***

***gas analysis to be incorporated in the ISP? If yes, why? If not, why not, and how could this action otherwise be achieved?***

Panel Answer Yes. The role of gas as a fuel for electricity generation is important but gas will not be a major source of generation for electricity from a volume perspective. It's important for the ISP to be clear that gas has a strictly limited role as a transitional fuel used to meet periods of high demand or address other supply security threats (e.g., see discussion on renewable energy droughts) rather than as a supplier of 'base load' and alternative to coal. As such, the Panel agrees that the action proposed by AEMO gives the right amount of 'importance' to the role of gas in electricity generation.

At this time, AEMO should only be considering the needs of the fossil gas supply chain to the extent required for gas powered generation. It is a higher priority to extend the ISP's attention to improving the balance of supply and demand in the electricity system than to consider other aspects of the gas supply chain.

In saying this, we recognise that natural gas may continue to have a role for some decades in direct provision of energy to 'hard to substitute' uses such as steel manufacturing. While there is hope that green hydrogen will develop sufficiently to replace current gas use in these markets, there is considerable uncertainty about the cost and pace of this latter development. In any case, this is of only indirect relevance to the ISP[1], and the direct uses of gas are better addressed as part of AEMO's GSOO

For the purposes of meeting Australia's carbon budget commitments and progressing towards net-zero targets, we think that AEMO should consider the minimum viable role for gas as a form of back-up electricity generation, and where possible, model to meet gas needs with renewable sources, such as biogas, biomethane and green hydrogen. We note industry pressure to include native forest residue as a form of renewable feedstock for gas. We strongly disagree with this, especially given the counter-productive impact native forest logging has on several issues that consumers care about such as carbon budgets, biodiversity, water quality and endangered species protection. It also presents a social licence issue.

**Recommendation:** AEMO should consider the minimum viable role for gas as a form of back-up electricity generation, and where possible, model to meet gas needs with renewable sources, such as biogas, biomethane and green hydrogen.

Furthermore, in considering future availability and use of gas, it will be important to consider the social licence implications of ongoing fossil fuel use and (in particular) any proposed supply from coal seal gas fields. Coal seam gas has been subject to intense public scrutiny and opposition, as well as significant environmental concerns. To adequately factor in the impact of these considerations on future gas supply, it is advisable to seek counsel from more broadly than incumbent gas proponents. For example, speaking with reputable social and environmental research and advocacy organisations should be considered.

**Consultation Question 2:** ***Do you agree with the proposal for AEMO to develop at least one gas development projection per ISP scenario, and apply the projection as an input to the capacity outlook model? If yes, why? If not, what method would you recommend for the inclusion of gas development projections in the ISP?***

Panel Answer Yes. But limit to one development projection per scenario, although there might be scope for separate tests around the hydrogen / biogas "green" energy options.

**Consultation Question 3:** ***What alternative approaches should AEMO consider for enhancing the incorporation of gas in the ISP to address the action in the Energy Ministers' response?***

Panel Answer. The proposed approach adequately addresses the Ministers requests within the context of the 2026 ISP timetable. Further review can take place for the 2028 ISP, particularly as more might be known about the development of 'green' hydrogen markets.

**Consultation Question 4:** ***What improvements could be made to AEMO's proposed approach to increase consideration of gas availability, considering gas transportation and storage capacity?***

Panel Answer. The most recent GSOO version of gas forecasts includes a separate forecast of gas generation and presents a picture of significant growth in gas for generation past 2034. The Panel is concerned about the risk of stranded assets but considers that this is not such a big issue in this specific case (especially compared to gas distribution investments). The risks of additional investments in gas production, storage and even transmission to fund gas generation are likely to fall on private 'unregulated' investors rather than on consumers through higher regulated tariffs. Of course, taxpayers may have to fund various incentives, although at the moment gas supply is not part of the CIS.

**Consultation Question 5:** ***What improvements could be made to AEMO's proposed approach in its capacity outlook models to improve the representation of fuel usage for gas generation, particularly for mid-merit capacity?***

Panel Answer. The Panel is interested in knowing more about the reference to 'mid- merit' gas. We think it refers to gas that is supplied to generation that is outside the peak demand period (for gas? or for electricity wholesale markets?). Mid merit gas might be required in the future if there are longer periods of renewable drought (as happened in May-June 2024 and again more recently in July – August 2024).

## 4.3 Improving Demand Side Modelling / Hydrogen Electrolyser load modelling (Section 5 of the Issues Paper)

**Consultation Question 6.** ***What are your views on AEMO's proposed inclusion of distribution network capabilities and their impact on CER within the ISP model? What further enhancements could be made?***

The Panel welcomes the increased attention to CER and DER in the 2026 ISP methodology and agree that increased input from DNSPs will be a useful starting place to enhancing the methodology of the ISP. We recognise the complexity of this task and that 2026 will, no doubt, be the beginning of an ongoing process to understand how to best source and integrate the data required for high quality visibility into CER/ DER issues.

First, assuming unconstrained export and generation conditions for CER (as was the case in the previous ISP methodology) is very misleading, as this downplays the impact of curtailment. Correcting this will be useful for accurately model future contributions CER can make. As we approach a 100% renewable energy system, the efficient level of curtailment – that being portion of otherwise-generated energy that can't be transported in the energy system, taking into account the efficient use of storage – increases exponentially. When the NEM reaches 90% generation from renewables there will likely be months where 50% of renewable generation is curtailed. This will be the case for all scales of generation, from behind the meter solar PV to Gigawatt scale wind farms, and to

avoid it would involve over-investing in batteries or other energy storage that would only be discharged for a few hours or year.

**Recommendation:** The 2026 ISP methodology should include modelling for the (likely growing) impact of curtailment of CER exports.

We understand the value of identifying the role of distribution network upgrades can make to unlocking additional CER/ DER, and the resultant upstream impact this could have on reducing the need for (or delaying) transmission investments. Conversely, in other areas of the network, appropriately located and scaled CER /DER can act to reduce the need and cost of distribution network upgrades. This also needs to be quantified.

**Recommendation:** AEMO model the potential for distribution upgrades and augmentation to reduce the need for transmission investment, as well as modelling the potential for CER/ DER to reduce or increase the need for distribution upgrades and augmentation (in different circumstances).

We welcome the inclusion of non-scheduled generation in the assessment of CER and DER. Non-scheduled generation includes distributed assets less than 30MW in size. The mid-scale (100kW-30MW) renewable generation (solar, micro hydro and wind) and storage ('neighbourhood' and 'community' batteries) is an area that has often been overlooked in Australian energy system policy and planning. However, with the increased focus on distribution networks, we recommend an explicit effort is made to understand and include the assessment of the contribution that projects at this mid-scale can make to the future electricity system. Projects at this scale are of particular interest to consumers for the following reasons:

- Consumers are often the proponents of projects at the lower end of this scale (farms, high energy using businesses, community-led renewable energy businesses, and small-scale Australian owned businesses)
- These projects connect into the distribution network and can reduce the need for line upgrades, and thereby overall system cost
- These projects can contribute to achieving target levels of CER/ DER without some of the limiting factors that rooftop solar faces
- These projects can increase energy equity by opening up ownership and benefit in solar PV and renewables more generally to people currently locked out from rooftop solar (e.g. renters, apartment dwellers)
- Smaller scale projects that are initiated by and involve local actors, as many mid-scale projects do, are far more likely to enjoy social licence, and consequent easing of development timelines and cost risk.

**Recommendation:** Update methodology to more overtly include 'mid-scale' (100kW-130MW) DER in forecasts

**Recommendation**: AEMO should consult more broadly that DNSPs and retailers to accurately understand the opportunities and barriers to CER and distributed energy. The innovations in energy services, programs and business models that will be required to achieve the desired rates of CER, DER and orchestration will need to involve a broader range of actors.

**Recommendation**: In pursuing the proposed methodology, that AEMO distinguishes between, and gives attention to, both distributed and distribution resources.

There is a common challenge within the energy transition for the natural tendency to conflate distribution and distributed resources.

In the context of the ISP, we see the distinction as being:

- **Distribution**: The notable distribution resources for ISP are sub-transmission assets, owned and operated by DNSPs, with existing capacity for the connection of storage and generation. These assets function similarly to transmission, typically at lower voltages in the range of 33-132kV. While they have less nameplate capacity than transmission, they may collectively offer Gigawatts of new connection opportunities without the need for expensive, slow-to-build new transmission assets.
  - DNSPs are the best party to engage with to understand the opportunity of these potential 'Distribution REZs'
- **Distributed**: distributed resources include CER, DER, energy efficiency and demand response. It is widely agreed these resources play a growing role in the energy system. They include non-network options that can often be deployed more quickly and cost-effectively than – and obviate the need for - network solutions. They can also be used more flexibly, provide a better range of energy services, and leverage private investment that does not add to bills in the manner of regulated revenue.
  - Unlike distribution resources, DNSPs are not the 'source of truth' for DER and CER. Their interaction with, and visibility of, CER and DER is limited. Understanding the nature and opportunity of DER and CER is best achieved by engaging with a range of proponents such as aggregators, VPP operators, consumers, advocates, and community energy organisations.
  - The panel notes that a material portion of the value of distributed resources lies in the avoidance or deferral of network costs through reduced peak demand on the system. The formula represented in Figure 4 appears to account for positive ('augmented') and neutral ('existing capability') but the panel questions if the potential savings of avoided distribution network costs are accounted for.

**A Consultation Question 7:** ***Do you agree with AEMO's proposals to improve its hydrogen electrolyser load modelling, or have further enhancements to suggest? Please provide any supporting evidence.***

The Panel supports AEMO's proposed refinements. The application of utilisation factors is particularly important in the context of clean hydrogen production coupled with renewable output. The panel notes the hydrogen production scenarios remain highly speculative and ambitious, and caution should be taken to use the best available evidence.

## 4.4 Testing for Actionability at project proponent's timing (Section 6 of the Issues Paper)

**Consultation Question 8:** ***What are your views on AEMO's proposal to test previously actionable projects for actionability at the project proponent's timing within the actionable window, and at a later re-start timing?***

The Panel considers AEMO's proposed approach to use the proponents' revised timing of a transmission projects (compared to the prevailing ISP) to be reasonable to the extent that the revised timing is based on the additional information obtained by the proponent as part of the mandated RIT-T process. We agree that this change MAY be more efficient and more appropriately respond to the actual conditions faced in implementing an ISP Project.

However, we would expect that AEMO would carefully consider the revised timings proposed by a TNSP any implications it may have on the overall efficient optimisation of the NEM-wide transition plan, particularly given AEMO's responsibilities as the national planner.

We have also considered the second proposed change, namely the approach to the TOOT analysis. We agree that the current process. That is, under the current AEMO methodology, removing a flow path (to access the economic benefit of cost of that path using the TOOT approach) also removes any REZ augmentation associated with that flow path. The proposed changes to the model appear to address this issue and we understand that the matter of costing the alternatives will be further addressed in the Network Expansion Options report.

## 4.5 Enhancing Selected ISP modelling approaches (Section 7 of the Issues Paper)

General Comments

The Panel fully supports the ISP Methodology moving from an approach characterised by "perfect foresight" to one that considers capacity for uncertainty and imperfect information as being the reality of markets, including electricity markets.

We note that economic theory assumes, amongst other criteria, "perfect information" as a requisite for markets to be perfectly competitive. This literature, for example the theory of second best, also recognises that where any prerequisite for perfect competition breaks down, results are highly unlikely to be 'as if' perfect competition assumptions applied.

As with forecasting for the ISP, assumptions of perfect knowledge / foresight may from time to time be useful for abstract or theoretical considerations but must be relaxed in dealing with the reality of any market since perfect knowledge is always going to be illusory. For the ISP which is an 'applied' process, expecting and allowing for imperfect foresight is sensible. Indeed, the overarching ISP process recognises uncertainty about the future by applying a scenarios approach, to enable a range of possible futures to be explored.

**Consultation Question 9:** ***Do you agree with AEMO's approach to model storage devices with headroom and foot room energy reserves and imperfect energy targets in the time-sequential modelling component? What improvements should be made to model energy storage limits to better reflect actual behaviour and address issues of 'perfect foresight'? Please provide any supporting evidence.***

Headroom and foot room reservation.

The Panel's view is that it makes sense to assume that 'typical' batteries will reserve some charge (ie maintain SoC above zero) in normal conditions, reserving energy that could be used for ancillary services and/or high prices approaching the MCP and also observing that repeated deep discharge shortens the asset life of batteries. We understand this to be the 'foot room' described in the Issues paper. However, the Panel contends that generally batteries would be expected to fully charge whenever spot prices are low enough (particularly when negative) or when coupled renewable energy projects are generating surplus to the needs of the market or capacity of the energy system.

Consequently, the Panel supports the proposed approach for "foot room" but does not support the proposed approach of allowing for headroom. We expect that battery owners will expect to fully charge their batteries whenever prices are favourable to optimise the benefit from their battery investment.

**Recommendation:** AEMO should model to allow for 'foot room' in reflecting imperfect information but should not model for headroom as it is optimal for batteries to be fully charged when prices are low.

Energy planning with error.

This approach applies assumptions about imperfect generator outages, renewable energy availability as well as demand conditions that factor in some 'slack' into energy planning to allow for a degree of imperfect information. The Panel is also supportive of this approach as it provides a basis for integrating realistic uncertainty provisions into ISP modelling.

- The Panel also notes that the "energy planning with error" approach will also be applied to VPP's, electric vehicle and utility scale battery system modelling. This is sensible as consistency in methodology across the ISP is crucial. We also note that this approach should also be applied to community level storage.
- The Panel suggests it is also important to consider the impact of imperfect price predictions.

**Consultation Question 10:** ***What risks should AEMO consider when assessing how inverter-based resources (IBR) can complement synchronous machines in providing system strength and inertia?***

Reformulating current system strength constraints to allow for synchronous condensers to replace retiring synchronous generation is a reasonable approach to take for the 2026 ISP, i.e. in the shorter term. The Panel understands that synchronous condensers are a partial solution to system strength issues and likely to be a relatively near-term solution with other system strength options increasing from late this decade.

In enhancing system strength and inertia analysis, the model needs to also give regard to solutions that are non-network solutions and market development options. For example, proposals for an inertia market have been on the table for some time. This could elicit the efficient provision of inertia and synthetic inertia – both to meet the minimum requirements of stability of the energy system and to support higher penetration of renewables in the generation mix – at materially lower cost than deploying dozens of synchronous condensers.

Further, it is likely the need to procure inertia of the energy system will increase as coal generators retire over the coming decade but then be lower as energy generation is increasingly inverter based, load is increasingly flexible, and the capabilities of batteries are better understood and exploited. Network solutions with longer asset lives and regulated revenue like synchronous condensers therefore run the risk of locking in higher cost solutions.

**Consultation Questions 11:** ***Do you agree with AEMO's approach for uplifting cost and modelling representation for system security services in the ISP? If not, what alternative methods would you recommend? Please provide any supporting evidence.***

**Consultation Question 12:** ***Do you agree with AEMO's proposal to model more than two wind resource quality tranches for geographically large REZs? If not, what alternatives should AEMO consider?***

The panel agrees that it makes sense to include two levels of wind resource data. However, we would like to see clarification of the range for what is considered 'highest quality' and 'remaining good quality' wind resources,

noting that this judgement will vary depending on the wind speed needs of different turbine technology. Similarly, we note it isn't appropriate to use power curves from one class of wind turbine at all wind sites. Class 1, 2 and class 3 turbines are built for different wind regimes: for example, using a Class 3 wind turbine power curve to generate assumptions in a Class 2 wind regime will materially overestimate the potential energy yield for that location.

**Recommendation:** That AEMO clarify the definition of the different quality of resource and the assumptions regarding class of turbine.