ISP 2022 Consumer Panel

ISP Consumer Panel Report on AEMO's *Inputs Assumptions and Scenarios Report* (IASR) for the 2022 Integrated System Plan

As required by Section 5.22.7 of the National Electricity Rules

30 September 2021

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Executive Summary

Background and scope

The ISP Consumer Panel (The Panel) was established under the National Electricity Rules in November 2020 as part of the oversight framework that accompanied the introduction of the Integrated System Plan (ISP). We are five energy professionals with long histories in consumer issues and the National Electricity Market (NEM). We are paid by AEMO from the funding it receives for the role of National Transmission Planner. In turn, this funding comes from consumers as regulated charges. So, like Energy Consumers Australia, we are funded by consumers to promote the consumer interest.

The Panel must act in the long-term interests of consumers and we have considerable flexibility in the focus of our reports.

This report is in response to requirements under the National Electricity Rules for us to report on AEMO's Inputs, Assumptions and Scenarios Report (IASR) for the 2022 ISP, and we also comment on relevant aspects of AEMO's ISP Methodology, which AEMO published at the same time as the IASR. In February 2022 we will also be reporting on the draft ISP to be published in December 2021.

This report has been informed by our engagement with AEMO and stakeholders:

- We engaged with AEMO during the development of the IASR and ISP Methodology, both through public forums (e.g. attending webinars on the ISP, Forecasting Reference Group, CSIRO GenCost meetings) and through bilateral meetings.
- We engaged with consumer representatives and a broad range of other stakeholders during the development of the IASR and ISP Methodology.
- We also consulted directly with several consumer stakeholders as part of the development of this report to get their feedback on the consultation process undertaken by AEMO and the content of the IASR, and to test our key findings with them.

Overall comments

At the outset, the Panel would like to acknowledge the complexity of the ISP task and the dedication of those involved in its development.

To be clear, we strongly agree that meeting the National Electricity Objective of the long-term interests of consumers during such a period of transition requires a 'whole of system plan' that looks ahead 20+ years. AEMO's ISP is that plan, and our aim is for an ISP that electricity consumers can have confidence in. Decarbonisation and decentralisation are quickening, and

we want consumers to be confident the ISP "optimal development path" appropriately balances the risks of underinvestment or overinvestment in the power system as we make the transition.

Based on our experience so far, AEMO's approach to the 2022 ISP includes considerable improvements on the 2020 ISP from both a *process* (eg stakeholder engagement) and *content* (eg robustness of the scenarios and assumptions) perspective. Nevertheless, there is still considerable scope for further improvement in both.

We see a key role of the Panel as working with AEMO on building support for, and confidence in, the ISP process. However, the complexity of the ISP development process can make it very difficult for consumers to understand and engage in the ISP process, and this impacts the ability to build consumer confidence in the findings.

We have structured our approach to the challenge by distinguishing some fundamental requirements when pursuing the long-term interests of consumers during each two-year ISP development cycle:

- Continuously seek to **improve accuracy** of forecasts AND
- **Manage uncertainty** in order to develop a power system that is robust to a range of possible futures AND
- Capture the benefits of **good engagement**: inform consumers and other stakeholders on what the ISP means for them, taking a NEM-wide plan to local and sector-specific contexts so local and domain expertise can be channelled back to each iteration of the plan.

We acknowledge that engaging stakeholders is already a key priority in AEMO's recently published FY22 corporate plan, in which AEMO says it aims to be "*a trusted partner that puts our members and stakeholders at the centre of everything AEMO does*".[1] Further, we fully support the public statements made by AEMO's new CEO in a recent speech that " *in order to maximise the benefits of this energy transition for the whole of society, all of us need to play our role and work collaboratively, together, and learn from one another*",[2] and we are encouraged by his leadership and commitment to "*greater openness, transparency and accountability for the interactions we have with all our stakeholders as we go about our work*".

Meeting these commitments will require an investment to uplift AEMO's stakeholder engagement capacity. To this end, we have outlined eight recommendations for AEMO to

[1] fy22-aemo-corporate-plan.pdf
[2] AEMO | AEMO CEO Daniel Westerman's CEDA keynote address: 'A view from the control room'

embed engagement deeper within its corporate culture that we believe will improve engagement outcomes for consumers, AEMO and all end-users of the ISP.

Recommendations

The NER state that AEMO "must have regard to a consumer panel report but is not obliged to give effect to any recommendations". We have chosen to advance four high level "Strategic Recommendations" and a set of practical recommendations for implementing each of them:

- **Strategic Recommendation A: Further expand AEMO's Stakeholder Engagement Capability.**
    - The 'multi sector modelling' commissioned for this IASR has highlighted the significant impacts the "electrification of everything" will likely have on the power system. The 'economy-wide' nature of this impact requires a pivot in engagement to **more outreach** to a broader range of stakeholders to improve forecasts and manage uncertainty.
    - Our set of recommendations includes an increase in resources available to AEMO to build its stakeholder engagement capacity and capabilities.
- **Strategic Recommendation B: Focus efforts on the inputs and assumptions that are most material to the consumer interest and have the most uncertainty.**
    - Our experience to date has highlighted several material, but highly uncertain, inputs and assumptions where we recommend AEMO considers alternative and/or additional ways of forecasting and engaging for the 2024 ISP:
        - state, territory and national government policies
        - gas prices
        - transmission costs
        - discount rates
        - decarbonisation and electrification of other sectors
        - hydrogen
        - integration of distribution network forecasts.
    - In some cases, this includes AEMO deciding on the appropriate balance between in-house capability and relying on consultants and, if the latter, the level of internal expertise needed to appropriately manage consultants.

- **Strategic Recommendation 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.**
    - Our experience to date shows the scenarios and their narratives are a critical entry point for consumers and other stakeholders to engage with the ISP and other forecasting work. The use of similar but not-identical scenarios by some transmission network service providers (TNSPs), CSIRO and others adds to the barriers to engagement. Our view is that the ISP scenarios – and the approach taken to develop them – should become the universally adopted scenarios for energy planning in Australia. To get there, we are of the view that the scenario work needs to be separated somewhat from the ongoing AEMO forecasting work, and we recommend commencing on this process for the 2024 ISP scenarios early in 2022.
- **Strategic Recommendation D: Following the IASR, focus engagement on how uncertainty is managed prior to publishing the Draft and Final 2022 ISP.**
    - There are actions AEMO should take in the period of time before publishing the Draft ISP in December 2021 (then incorporating feedback and keeping the inputs and assumptions up to date prior to publishing the 2022 ISP in June 2022). Based on our review of the IASR and the ISP Methodology (and noting the recommendations of the AER Transparency Review[3]), we recommend AEMO focus engagement on how **uncertainty** is managed prior to publishing the Draft and Final 2022 ISP.
    - The **weightings** applied to scenarios is shaping up as a material piece of 'judgment' to be exercised before the Draft ISP is published. We are pleased AEMO has adopted the recommendation made in submissions from the Consumer Panel and other stakeholders that the **Delphi** panel should contain representatives of consumers. AEMO should continue to engage with stakeholders including the Consumer Panel prior to the draft ISP on how it will conduct the Delphi panel process.
    - We acknowledge that **government policies** are always subject to change, but encourage governments to work closely with AEMO and provide as much detail as possible before the Draft ISP. AEMO should consult on how to incorporate

[3] www.aer.gov.au/networks-pipelines/performance-reporting/transparency-review-of-aemo-2021-inputs-assumptions-and-scenarios-report

any material changes in government policies that occur between the IASR and final ISP.

- It will be important to keep 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, especially noting the consultation on the Draft ISP will be over the New Year break.
- It is also important to acknowledge that the IASR and ISP Methodology do not set out the full list of proposed **sensitivities** or 'event-driven scenarios'. The choice of these sensitivities and scenarios and how they are used may have a material impact on the draft and final ISP. AEMO should engage with stakeholders including the Consumer Panel on these issues prior to the Draft ISP.

Report structure

- Section 1 summarises our recommendations.
- Section 2 of this report introduces the ISP, the Consumer Panel and the IASR.
- Section **Error! Reference source not found.** goes into more detail of our assessment of A EMO's approach to engaging consumer stakeholders in the development of the IASR, with recommendations for improvement.
- Section 4 sets out our assessment of AEMO's evidence and reasons used in support of the IASR, with recommendations for improvement.

Appendices provide further detail on key topics.

1 Summary of recommendations

This table summarises our four Strategic Recommendations and the action recommendations under each of them, with a note on where each was discussed in the report.

ID	Headline	Description	Where to find out more
A: Further expand AEMO's Stakeholder Engagement Capability			Chapter 3
A1	**Capacity**	Allocate adequate resources to build AEMO's capacity for engagement	
A2	**Evaluation**	Establish an evaluation framework for engagement	
A3	**Accountability**	Establish KPIs for engagement and accountability within AEMO	
A4	**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	
A5	**Manage**	Develop and maintain a stakeholder management system to regularly assess stakeholder needs and interests and identify gaps in stakeholder representation and participation	
A6	**Share**	Formalise internal and external inter-relationships to share knowledge across consultations	
A7	**Co-design**	Adopt a collaborative and co-design approach to engagement	
A8	**Understand**	Implement a program of social research to better understand consumer and community attitudes and perceptions about the future energy market	
B: Focus efforts on inputs and assumptions that are most material to the consumer interest and have most uncertainty			Chapter 4
B1	**Materiality**	There is an ongoing need to draw attention to the inputs and assumptions that are most material to the consumer interest	
B2	**Complexity**	There is an ongoing need to manage the complexity and volume of information in order to foster wider engagement	

Consider alternative or additional ways of forecasting and engaging on these material, but highly uncertain, inputs and assumptions for the 2024 ISP.			
B3	**Public Policy**	Calibrating the ISP to Public Policy commitments, and vice-versa, must be an ongoing priority	4.4.4
B4	**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.	4.4.1
B5	**Transmission Costs**	Significant progress has been made but the risk of under-estimating costs remains. Continue to improve the Transmission Cost Database	4.4.2
B6	**Discount Rates**	This parameter did not receive the attention it deserved in this ISP cycle. Consult earlier and wider for the 2024 ISP	4.4.5
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	4.4.3
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.	4.4.6
B9	**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.	4.4.7
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.			Section 4.2
C1	**Earlier, Broader**	Engage early on scenarios for the 2024 ISP and use this process as an entry point for a wider group of stakeholders.	
C2	**Consumer Panel**	Appoint the next ISP Consumer Panel before the scenario development process commences	

D: Following the IASR, focus engagement on how uncertainty is managed prior to publishing the Draft and Final 2022 ISP			Section 4.5
D1	**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.	
D2	**Public Policy**	Governments are strongly encouraged to work closely with AEMO and provide as much 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.	
D3	**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	
D4	**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.	

2 About the ISP, the Consumer Panel and this Report[4]

2.1 The Importance of the Integrated System Plan (ISP)

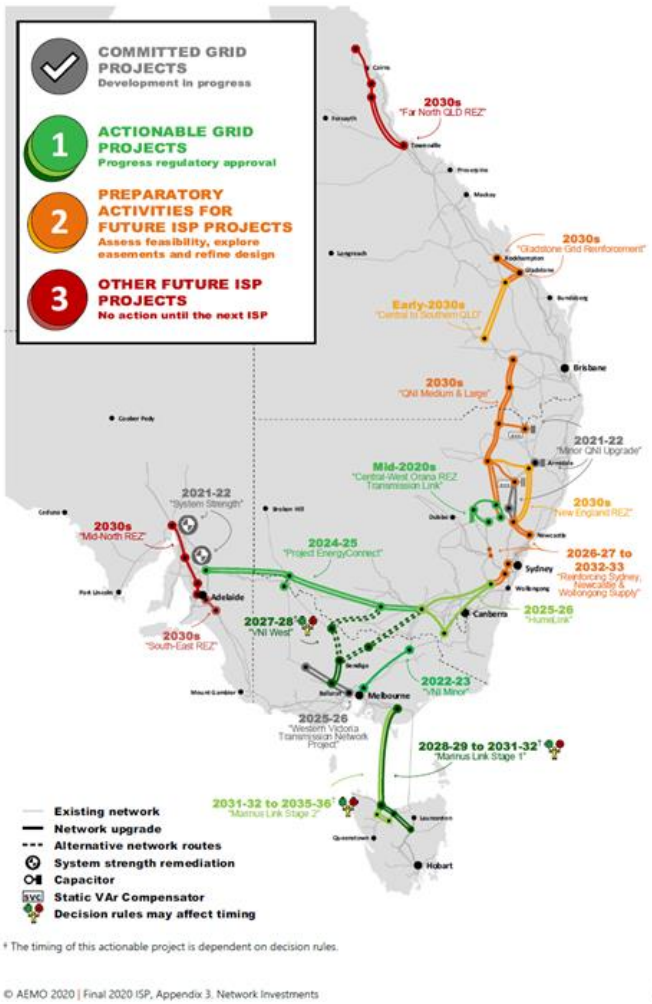
AEMO is responsible for publishing the Integrated System Plan (ISP) for the National Electricity Market (NEM) every two years and publishing an ISP Methodology at least every four years. The 2022 ISP will be the third ISP from AEMO, and the first that is subject to the full set of consultation and transparency arrangements under the National Electricity Rules (NER).

The ISP is a forward-looking roadmap for the eastern Australia's power system that seeks to optimise consumer benefits as the market transitions to a lower carbon environment. The ISP identifies the projects (both network and non-network) that are most likely to optimise net market benefits through the electricity system's transition to a lower carbon future.

The projects that offer the highest net market benefits across scenarios over the modelling horizon are likely to represent the optimal development path (ODP) for the NEM. The ODP includes 'actionable' ISP projects and future ISP projects, which can be progressed through the Regulatory Investment Test for Transmission (RIT-T) process. It also identifies future ISP development opportunities such as distribution assets, storage or demand side developments.[5]

This figure shows the 2020 ISP ODP. The 'actionable' ISP projects in the 2020 ISP were forecast to cost between $6.8 billion and $12.7 billion over the period 2022-32. If built, they would become regulated network assets and therefore funded by consumers through electricity bills. To put that in perspective, the total Regulatory Asset Base (RAB) for

Figure 3 Optimal development path

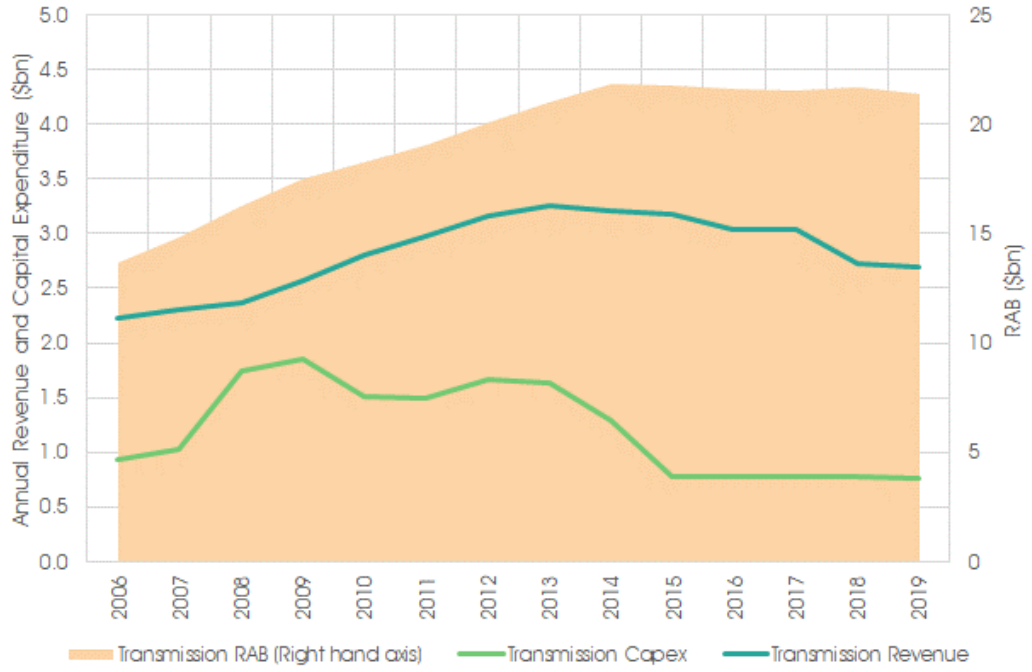


[4] See https://www.aemo.com.au/energy-systems/major-publications/integrated-system-plan-isp/2022-integrated-system-plan-isp/get-involved/consumer-panel

[5] From AER Transparency Report, available: https://www.aer.gov.au/networks-pipelines/performance-reporting/transparency-review-of-aemo-2021-inputs-assumptions-and-scenarios-report

Transmission Networks in the NEM in 2019 was around $21 billion. In recent years these networks have invested around $1 billion per annum of capital expenditure and generated around $ 3 billion in revenue. *Figure 1* shows this for the period 2006-2019.

Figure 1: Consolidated Transmission Financials (Source: AER State of the Energy Market 2020)



The 2020 ISP actionable projects therefore have the potential to increase the Transmission RAB by around 50% from $21 billion to over $30 billion. That is why the ISP is important for consumers.

2.2 What is the IASR?

The NER require AEMO to develop, consult and publish the IASR in accordance with the Australian Energy Regulator's (AER's) Forecasting Best Practice Guidelines (FBPG). AEMO published its draft IASR on 17 December 2020, taking written submissions until 1 February 2021. The Final IASR was published on 31 July. The AER's Transparency Report on the IASR was published on 30 August 2021.

AEMO introduces the IASR as[6]:

> The 2021 *Inputs, Assumptions and Scenarios Report* (IASR) details how AEMO will model the future in its forecasting and planning publications for the rest of 2021 and into 2022. It has been developed through 10 months of deep collaboration with a broad range of industry participants,

[6] 2021 IASR Executive Summary: https://aemo.com.au/energy-systems/major-publications/integrated-system-plan-isp/2022-integrated-system-plan-isp/current-inputs-assumptions-and-scenarios

governments, and consumer representatives. It reflects stakeholder feedback and significant refinement of inputs and assumptions from workshops, webinars, public forums, other engagements and more than 40 submissions.

Compared to the 2020 ISP scenarios, these scenarios have been refined with respect to the economic and technological change expected over the coming decades, specifically the pace of economy-wide decarbonisation, the ongoing consumer investment in distributed energy resources (DER), and the growth of transport and industry electrification.

It is important to acknowledge that the IASR is used, not just for the ISP, but also for other key AEMO planning publications such as the 2021 *Electricity Statement of Opportunities* (ESOO) and 2022 *Gas Statement of Opportunities* (GSOO). AEMO will generate the Draft ISP by taking the parameters of the IASR, analysing potential development paths under each scenario using a suite of energy market models, and comparing the results with a Cost-Benefit-Analysis process.

2.3 The role of the ISP Consumer Panel

The 2022 ISP Consumer Panel is a new advisory body set up under changes to the National Electricity Rules put in place since the 2020 ISP. The Panel forms part of the "ISP Oversight Framework" alongside the AER. The ISP Consumer Panel's role is to provide independent, expert advice and promote the interests of consumers during development of the 2022 ISP.

Established in November 2020, the Panel consists of five individuals with long and diverse experience in the different facets of the National Electricity Market:[7]

Dr. Andrew Nance (Chair)

Andrew is one of South Australia's most widely experienced energy specialists. He has served on the AEMC's Reliability Panel and on the AER's Consumer Challenge Panel. Currently, he is a Director at distributed energy consultancy The Energy Project Pty. Ltd. and chairs SA Power Networks Consumer Consultative Panel and Connections Working Group.

Stephanie Bashir

Stephanie is a well-known industry leader, with more than 18 years of commercial experience in complex and matrix-style environments. Stephanie has held energy sector leadership roles in technical, commercial, strategic, policy, advisory and engagement; with expertise in energy market policy and regulation, new energy technologies and service innovation, grid modernisation and electric vehicles. She is the Founder and Principal of Nexa Advisory, and

[7] For more see https://aemo.com.au/newsroom/media-release/aemo-announces-isp-consumer-panel and https://aemo.com.au/energy-systems/major-publications/integrated-system-plan-isp/2022-integrated-system-plan-isp/get-involved/consumer-panel

previously led the policy vision and strategy at AGL Energy in relation to new energy technologies & services.

Gavin Dufty

Gavin has over 30 years of leadership experience in community welfare and advocacy, along with a comprehensive understanding of consumer protection issues related to energy and water. He has participated in multiple high-level forums and working groups including the AEMC Reliability Panel and has contributed to the development of Victorian Retail Code and the National Consumer Energy Framework. Current board member Energy Consumers Australia and the Energy and Water Ombudsman Victoria

Mark Grenning

Mark is an experienced energy consultant with a focus on the medium to large consumer side. After a 30-year career with Rio Tinto with particular focus on electricity and gas supply to operations around the world, his work now includes being the Director of Policy and Regulation for the Energy Users Association of Australia. He was aa member of the Australian Energy Regulator's Consumer Challenge Panel from 2016-21.

Richard Owens

Richard has over 20 years' experience as a regulator, policy maker and adviser to regulated businesses. He brings unique experience and insights from having led the development and application of utility regulation and policy at senior levels across a range of regulated industries including electricity, gas, telecommunications, water and ports. He is currently a director at farrierswier, where he provides policy and regulatory advice across a range of regulated utility sectors. He is also an Associate Commissioner of the Utilities Commission of the Northern Territory. He previously held senior roles at the Australian Energy Market Commission overseeing AEMC rule changes and reviews and engagement with stakeholders.

Our approach to the long-term interests of consumers is 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 reduction targets due to an inability to connect new renewable generation.

The Panel is required to publish two main reports:

- This report on the IASR in September 2021
- A report in February 2022 on the Draft ISP.

AEMO must have regard to the Panel's reports as part of its decision-making, and the Draft ISP and Final ISP must include information about how AEMO has considered the Panel's reports.

At the same time as the Panel was established under the NER, the AER was tasked with completing Transparency Reports on both the IASR and Draft ISP. The AER's reports focus on the adequacy of AEMO's explanations of its inputs and assumption choices, whereas the Panel's reports focus on both *content* (ie merits of the inputs and assumptions) as well as the *process* used to arrive at them.

As well as publishing the two reports required under the rules, the Panel engages closely with AEMO through formal and informal submissions and other activities. We see our role in terms of not only the 2022 ISP but in terms of the ongoing ISP development process.

Although this report is only required to cover the IASR, we have also addressed relevant aspects of the ISP Methodology. AEMO published the ISP Methodology at the same time as the IASR. The ISP Methodology explains how AEMO will use the IASR scenarios, inputs and assumptions in preparing the draft and final ISP, including critical issues such as how AEMO will determine the weighting applied to each scenario.

The Consumer Panel can be contacted via ISPConsumerPanel@aemo.com.au.

2.4 Regulatory Framework

The ISP must promote the National Electricity Objective (NEO), which is to promote:

> *"… efficient investment in, and efficient operation and use of, electricity services for the long-term interests of consumers of electricity …with respect to price, quality, safety, reliability and security of supply".*

It is important to acknowledge that the ISP is both an instrument of NEM development and one of the few processes that aims to consider the needs of energy consumers 20+ years ahead. The constructive engagement of consumers in the process is a critical way of promoting the NEO.

Establishing and supporting the ISP Consumer Panel is a requirement on AEMO under the NER. While we are independent of AEMO, we are remunerated by them and they provide us with administrative support as required under the NER.

Our assessment of AEMO's development of the ISP is informed by the regulatory framework, in particular the AER's *Guidelines to make the ISP actionable*[8], and our comments in this

[8] See www.aer.gov.au/networks-pipelines/guidelines-schemes-models-reviews/guidelines-to-make-the-integrated-system-plan-actionable

submission are referenced back to what we understand the Guidelines require. Our focus is on three documents:

- Final Decision – Guidelines to make the Integrated System Plan actionable
- Cost Benefit Analysis Guideline, and
- Forecasting Best Practice Guideline.

Under clauses 5.22.5(c) and 5.22.5(j) of the NER, the AER specifies which parts of the Guidelines are binding on AEMO. The AER has done this through the following classification[9]:

- *Requirements* that AEMO must meet
- Considerations that AEMO must have regard to
- *Discretionary* information that does not fit into the first two categories, and where AEMO should provide further explanation or recommend best practice suggestions.

The AER notes[10]:

> "The guidelines create flexibility for AEMO in how it identifies optimal investments in the ISP, which is important in a changing market environment where there is significant uncertainty and risks do not remain the same from one ISP to the next. At the same time, this flexibility is balanced by transparency so that AEMO's decisions and reasoning are clear and informed by stakeholder engagement. Stakeholder engagement is critical for the ISP."

The AER has a compliance and enforcement role to ensure AEMO complies with the provisions set out in the NER and the binding elements of the Guidelines. The AER's emphasis is on fostering a culture of compliance to prevent the need for enforcement action. Two important parts of the compliance framework are:

- Undertaking two 'transparency reviews' – one on the final IASR and one on the Draft ISP – with a focus on key inputs and assumptions[11]. The AER's role will be more one of commentating on whether the process used to arrive at the inputs and assumptions met the Guidelines than being a merits review process for the numbers chosen.
- Establishing an "Issues Register" on AEMO's compliance with the binding guidelines in preparing the ISP[12].

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[9] Final Decision p. 15: www.aer.gov.au/system/files/AER%20-%20Final%20decision%20-%20Guidelines%20to%20make%20the%20ISP%20actionable%20-%2025%20August%202020.pdf

[10] Op cit p.1

[11] Op cit p.8

[12] Op cit pp.17-18

The Consumer Panel has regularly engaged with the AER as we each fulfill our roles under the Rules. Our formal reports on the IASR and draft ISP are due one month after the AER publishes its Transparency Reviews.

Requirements under the Rules: NER clause 5.22.7 (d)

5.22.7 ISP consumer panel

(a) In respect of the preparation of an *Integrated System Plan*, *AEMO* has the function of establishing and supporting a panel ("**ISP consumer panel**") to provide written reports to *AEMO* on:

(1) the Inputs, Assumptions and Scenarios Report that will be used to prepare a draft *Integrated System Plan*; and

(2) the draft *Integrated System Plan*,

(each a "**consumer panel report**").

(b) The ISP consumer panel must consist of at least 3 members appointed by *AEMO*, who have qualifications or experience in a field *AEMO* considers relevant to the assessment of the *Integrated System Plan* and who have experience representing consumer interests.

(c) Prior to appointing members to the ISP consumer panel, *AEMO* must publish an expression of interest for persons to apply to become a member. The expression of interest must include:

(1) the terms of reference for the ISP consumer panel; and

(2) information about the requisite qualifications and experience required to become a member.

(d) The ISP consumer panel:

(1) must, in accordance with the terms of reference, give a consumer panel report to *AEMO* within two months of *AEMO* publishing the Inputs, Assumptions and Scenarios Report and draft *Integrated System Plan* respectively;

(2) must, in preparing the consumer panel report have regard to the long term interests of consumers; and

(3) may carry out its activities, including the giving of a consumer panel report, in the way it considers appropriate but must seek to give the report by consensus.

(e) A consumer panel must:

(1) include the ISP consumer panel's assessment of the evidence and reasons supporting the Inputs, Assumptions and Scenarios Report or draft *Integrated System Plan* respectively; and

(2) state whether the report is given by consensus.

(f) *AEMO* must publish a consumer panel report on its website.

(g) *AEMO* must have regard to a consumer panel report but is not obliged to give effect to any recommendations in a consumer panel report.

2.5 Funding Transparency Statement

We are paid by AEMO from the funding it receives for the role of National Transmission Planner (NTP). This funding comes from the main transmission businesses (one per state) who, in turn, collect it from their customers as regulated charges. So, like Energy Consumers Australia, we are funded by consumers through market charges.

AEMO has an operating budget for the NTP role (Delivering an actionable ISP) of around $17 million in 2021-22. Just how much of the NTP budget is allocated to stakeholder engagement and the ISP Consumer Panel is controlled by AEMO. The total Consumer Panel allocation in 2021-22 is around 1.5% of the $17.2 million recurring ISP budget.

We are remunerated on a $/day basis (up to a cap on total days) at a rate that was similar to that paid by the AER to its Consumer Challenge Panel in 2020 and Consumer Reference Group members. More detail is included in **Appendix E**: ISP and Consumer Panel Funding

3 Effectiveness of AEMO's engagement with consumer stakeholders

3.1 Introduction

Our assessment of the effectiveness of AEMO's engagement with consumer stakeholders in developing the IASR and ISP Methodology is based on:

- A survey of consumer stakeholders in February 2021,
- observations of specific engagements undertaken by AEMO,
- our participation in Forecasting Reference Group (FRG) meetings;
- our participation in other approaches by AEMO to improve engagement, and
- direct engagements with consumer advocates and at network consumer forums.

We can all agree that the long-term interests of consumers are more likely to be met if development of the ISP harnesses the benefits of good engagement to improve the accuracy of forecasts and manage uncertainty. However, the Panel is of the view that it has been difficult for consumers and other stakeholders to engage in the development of each ISP, and this has impacted confidence in the findings of previous ISPs.

Fundamental to understanding the engagement needs is to acknowledge that while the ISP, and supporting reports including the IASR, are published on annual or biennial cycles, these are built off a near continuous engagement process that must aim to incorporate the views and inputs of stakeholders. Broad stakeholder input – from subject matter experts to those representing consumer interests that are often not energy experts - need to participate as equal partners and share expertise to assist AEMO in this process.

The other critical context is the impact of decarbonisation and electrification of all sectors of the Australian economy. A broad and diverse stakeholder collaboration is needed now more than ever. As noted by AEMO in the 2021 Electricity Statement of Opportunities[13]:

> *"Fuel-switching in the form of electrification as a direct substitution for fossil fuels is one of the most cost-effective decarbonisation options for sectors that use energy. Like hydrogen, this has the potential to materially increase electricity consumption in the NEM."*
>
> *"… ESOO analysis suggests that, in the NEM alone, fuel-switching from other fuels to electricity could be as high as 81 TWh by 2030-31, equivalent to 46% of total current operational consumption in the NEM, if there are strong incentives for electrification of transport, residential and industrial sectors.*

[13] www.aemo.com.au/energy-systems/electricity/national-electricity-market-nem/nem-forecasting-and-planning/forecasting-and-reliability/nem-electricity-statement-of-opportunities-esoo Exec Summary p 12

Electrification of heating load also has the potential to switch maximum operational demand from summer to winter, particularly in Victoria where many consumers currently use gas for heating their homes.

As the energy transition accelerates, the decarbonisation of other sectors also needs careful planning of the interface with the energy system. This will require the right incentives, policies, and technologies to make load more flexible in order to maximise the value our energy system can deliver."

The Panel welcomes AEMO's intent to build trust and continue to improve engagement with consumer stakeholders. AEMO stated in March 2021[14]:

AEMO's intention is to work as productively as possible with the Consumer Panel, as its members provide important consumer perspectives into the ISP process and will help provide AEMO with a deeper understanding of consumer preferences that help inform selection of the optimal development path. AEMO expects the Consumer Panel's extensive involvement to contribute to both an improved ISP process and the best possible final ISP.

We see our role as part of an ongoing process with AEMO to shape a collaborative and fit for purpose approach that is focused on ensuring stakeholder views and diverse inputs are considered but more importantly support AEMO in building the capability required.

This chapter discusses AEMO's overall approach to stakeholder engagement in development of the ISP and IASR as observed by the Panel. Engagement on specific inputs, assumptions and scenarios are also discussed in Section 4. In this section, we discuss:

- The engagement requirements of the AER Forecasting Best Practice Guideline (FBPG)
- the effectiveness of AEMO's engagement with consumer stakeholders in developing the IASR and the ISP Methodology, with consideration to:
    - Feedback from a stakeholder survey conducted by the Panel in February 2021
    - Engagement case studies based on Panel experience
    - Over-reliance on the Forecasting Reference Group (FRG)
    - New approaches adopted by AEMO to improve engagement.
- the effectiveness of AEMO's response to feedback from the Panel on its approach to engagement, including:
    - Insights from the Panel's submission to the Draft IASR in February 2021
    - Improvements made by AEMO since that submission.

We conclude this section with eight recommendations we believe will help AEMO embed engagement as part of its organisation and improve its approach to stakeholder engagement for the next ISP and beyond.

[14] 2022-isp-external-engagement-strategy.pdf (aemo.com.au)

3.2 AER's Forecasting Best Practice Guideline Requirements

AEMO is required under the National Electricity Rules (NER) to develop, consult and publish the IASR in accordance with the AER's Forecasting Best Practice Guidelines (FBPG). Under the guidelines, AEMO is required to[15]:

1. follow a "single stage process" when developing and updating scenarios, inputs and assumptions as set out in Appendix B which requires AEMO to take a range of engagement actions including meetings with interested stakeholders, publication of a draft IASR and receiving and responding to submissions on the draft IASR.
2. follow the forecasting best practice consultation procedures in Appendix A when developing its ISP Methodology

The FBPG also require AEMO to have regard to the following principles:

- forecasts should be as accurate as possible, based on comprehensive information and prepared in an unbiased manner
- the basic inputs, assumptions and methodology that underpin forecasts should be disclosed
- stakeholders should have as much opportunity to engage as is practicable, through effective consultation and access to documents and information.

In addition, clause 5.22.8 of the NER requires AEMO to invite submissions on the IASR and ISP Methodology, consider those submissions and publish a summary of material issues raised in submissions and AEMO's response to each issue.

While these guidelines provide high-level principles and requirements to guide AEMO in developing the ISP and the engagement, AEMO has the flexibility to go beyond these principles in order to build stakeholder trust in the ISP and ensure the ISP remains relevant and a reliable resource for industry, governments and consumers.

3.3 Consumer stakeholder survey

In February 2021, the Panel launched an online survey to understand how, when and what consumers want to be engaged on during development of the 2022 ISP. The survey was designed to collect baseline data that would influence how the Panel would interact with stakeholders during development of the 2022 ISP as well as how the Panel could advocate to AEMO to improve its consumer engagement strategy.

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[15] AER - Forecasting best practice guidelines - 25 August 2020.pdf page 7

We received 39 survey responses representing organisations and individuals of which more than half operated NEM-wide. The narrow distribution of the survey to the ISP stakeholder list by AEMO resulted in limited input from stakeholders especially those stakeholders not already engaged with AEMO on development of the 2022 ISP.

We acknowledge that since this survey was undertaken there has been some meaningful improvement to the engagement which is discussed further in this chapter.

The timing of the survey means that it primarily provides a baseline assessment of how AEMO engaged on the 2020 ISP and in the early stages of the 2022 ISP. It does not account for improvements AEMO has made to its engagement approach in the past six months. We intend to conduct a follow-up survey later in the 2022 ISP process and compare the results.

The dominant themes were:

- Stakeholders want meaningful and genuine engagement
- Stakeholders want plain English information and more information to help them provide informed input
- Stakeholders want engagement to be flexible and designed in consultation with them
- Engagement needs to be inclusive
- Engagement needs to be relevant and current
- Engagement should be undertaken in a timely way
- Engagement outcomes should be shared and transparent

Further information on each of these themes is provided in Appendix D

The Panel strongly believes both the qualitative and quantitative data would be strengthened by a more targeted engagement program with disengaged or inactive stakeholders to determine what barriers are preventing them from participating and how future engagement can be designed to be inclusive, flexible, relevant, timely, informed and accessible.

3.4 Observations of specific engagements undertaken by AEMO

3.4.1 Development of the ISP Stakeholder Engagement Plan

The 2020 ISP Consultation Summary Report published in August 2020 said[16]:

> *In addition, a Consumer Panel will be set up for the 2022 ISP and beyond. This will allow a small group of specialised consumer representatives to participate in further detail in the decision-*

[16] See p. 45 https://aemo.com.au/-/media/files/major-publications/isp/2020/2020-isp-consultation-summary-report.pdf?la=en

making processes of the ISP. The panel will also assist with the design of the 2022 ISP Consumer Engagement Plan.

In our submission on the Draft IASR in February 2021, we highlighted the lack of an ISP Stakeholder Engagement Plan (p.22):

> *AEMO's approach so far is some distance from best practice and because of this we do not believe their development so far of the 2022 ISP has met the AER Guidelines. We have yet to see the promised 2022 ISP Consumer Engagement Plan and we are four months into the process.*

The Panel was sent a first draft of the Plan only on 10 February 2021, two months after publication of the Draft IASR. We provided comments on 4 March 2021. We are unaware of any opportunity provided to other stakeholders to provide input to its development. AEMO advised on 17 March 2021 they would publish the document with an invitation for stakeholders to comment at any time, but without calling it a 'draft'. AEMO also noted that a comprehensive review of ISP engagement would occur in early 2022 of which the Plan would be part.

3.4.2 Case studies on engagement

There are several key inputs and assumptions where we consider AEMO's engagement could be significantly improved. We have included case studies on these issues in chapter 4 and the appendices, including Appendix A on gas price forecasts and Appendix C on the selection of the discount rate.

3.5 Challenges with AEMO's reliance on the Forecasting Reference Group (FRG)

AEMO has used the Forecasting Reference Group (FRG) as the main forum for engagement in preparing the inputs and assumptions for the Draft IASR. This section focusses on the challenges that arise from AEMO's reliance on the FRG.

AEMO used separate workshops and webinars for engaging on the IASR scenarios and the ISP Methodology, including additional engagement with consumer stakeholders through AEMO's Consumer Forum. Our observations related to AEMO's engagement on the scenarios are set out in chapter 4.

The FRG's Terms of Reference say it is[17]:

> *"…a monthly forum with AEMO and industry's forecasting specialists. The forum seeks to facilitate constructive discussion on matters relating to gas and electricity forecasting and market*

[17] See https://aemo.com.au/en/consultations/industry-forums-and-working-groups/list-of-industry-forums-and-working-groups/forecasting-reference-group-frg

modelling. It is an opportunity to validate assumptions, share expertise and explore new approaches to addressing the challenges of forecasting in a rapidly changing energy industry. By engaging stakeholders in this way, AEMO seeks to improve the collective insights, understanding and outcomes of forecasting used by various Forecasting reports, including the Integrated System Plan (ISP), Electricity Statement of Opportunities (ESOO) and Gas Statement of Opportunities (GSOO)."

Our observation so far, and the feedback shared, suggests there needs to be a strategic approach and review of the effectiveness of using the FRG as the main forum for the ISP. The FRG is a valuable forum for electricity forecasting experts but needs to be supplemented by other broader engagement activities for the ISP.

3.5.1 Relevance and materiality

- The FRG is a monthly webinar that covers forecasting inputs used for a range of AEMO's publications, not just the ISP. As a result, it is not often clear how the forecasts for the topics discussed in this forum will be used in the ISP and which issues are likely to be most material for the outcomes of the ISP.
- Discussion is directed at specific subject matter expertise that does not cover the depth and breadth of the IASR and broader ISP.
- Discussion is often highly technical and focussed on issues that may not be material to the outcomes of the ISP. This is partly due to format and facilitation of the forum by not drawing attendees' attention to what issues are material or identifying key areas where feedback is sought.

3.5.2 Participation and feedback

- Given the technical nature of the subject matter, it is not surprising that only a very small proportion of regular attendees are consumer stakeholders. The technical nature of the discussion acts as a barrier to consumer stakeholders and broader stakeholders and there appears to be no capacity building by AEMO to help break down those barriers.
- FRG meetings are targeted to registered attendees only limiting the reach and experience of participants. The breadth of issues covered in the IASR means that AEMO needs to engage with a much broader range of stakeholders on some inputs and assumptions, including stakeholders from outside of the energy industry who are unlikely to attend the FRG.
- Awareness of the FRG is limited to specific subject matter experts in the industry. Some of the Panel were not aware of the FRG prior to their membership on the Panel.
- Until recently the meeting time was dominated by AEMO presentations designed to 'inform' with little time left for discussion ('consult', 'involve' or 'collaborate' on the IAP2

spectrum) despite what the agenda may have indicated. The use of *slido* limited real time engagement by participants.

- Until recently the meeting time was dominated by AEMO presentations designed to 'inform' with little time left for discussion ('consult', 'involve' or 'collaborate' on the IAP2 spectrum) despite what the agenda may have indicated. The use of *slido* limited real time engagement by participants.
- AEMO presenters often adopt a defensive approach when presenting which detracts from a free and open discussion. These presenters have often worked full time for some time to prepare the reports they are presenting in a 20-30 minute slot and that FRG participants have, at best, quickly pre-read the presenters slides. There is a great asymmetry of knowledge in the FRG that good engagement recognises.
- There is an ongoing debate between AEMO and some members around how unanswered questions during a meeting should be followed up. These members argue AEMO should provide written answers to all questions post the meeting and put this Q&A on their website. AEMO has responded that it has limited resources. There is also an ongoing debate about the comprehensiveness of the minutes, with some attendees proposing they be more comprehensive to reflect the breath of the discussion and aid subsequent discussion.
- The FRG is not a forum for capacity building. The few regular consumer attendees have achieved their own capability and capacity to engage through long attendance, not through any specific actions by AEMO.

Due to AEMO's reliance on the FRG as the primary means of engaging on the inputs and assumptions, we have considered the FRG as the main engagement channel to assess AEMO engagement against the FBPG. This is discussed in Appendix D.

We acknowledge that the challenges and technical issues require collaboration and input from a highly specialised and highly technical subject matter expertise related to electricity forecasting is critical and the FRG will continue to be a useful forum to support AEMO for that specific purpose. It also enables AEMO to engage with forecasting experts and interested and knowledgeable stakeholders from within the energy sector who have significant time to devote to attending regular meetings and understanding highly technical content.

However, the challenge for AEMO is the FRG's usefulness as a tailored engagement tool on the material issues that require a broad range of stakeholders for the IASR and ISP but are technical in nature such as the electrification of other sectors. We have attempted to demonstrate this issue by highlighting the level of materiality vs accessibility to stakeholders.

Expertise required to engage meaningfully	Material	Not material
Highly technical	A	E
Technical	B	F
Moderately accessible to informed consumer stakeholders	C	G
Accessible to consumer stakeholders with support	D	H

We strongly encourage AEMO to work with the Panel and stakeholders to co-design an engagement approach that seeks to address areas of materiality that vary in their level of technical content. Some of the questions when considering the best way forward include:

- Do we need another Reference Group forum in addition to the FRG, or would targeted engagement activities on C and D issues and increased use of other existing forums such as AEMO's Consumer Forum be more effective?
- Can the Panel support AEMO with engagement on the technical but material issues (A and B) using a separate forum?
- What education/capacity building should AEMO look to do ahead of the 2024 ISP?

3.6 New approaches adopted by AEMO to improve engagement

As outlined in the Final IASR report, AEMO has attempted to engage more widely in the development of the proposed scenarios and certain aspects of the draft IASR and ISP Methodology. These attempts by AEMO, detailed below, have been a direct response to stakeholder (and Panel) feedback.

3.6.1 Additional scenario consultation round

Following extensive feedback on the Draft IASR, which revealed stakeholder concern about the proposed scenarios, AEMO undertook a further round of engagement on a revised set of draft scenarios. The process included a webinar forum and a short consultation period for additional submissions on the revised scenario set.

The revision of the scenarios and additional consultation resulted in a meaningful and transparent response from AEMO. While the genuine response from AEMO resulted in outcomes supported by stakeholders, we recommend future scenario reviews and development through a framework where future consultation is based around the principles of co-design.

3.6.2 Dedicated consumer stakeholders' feedback sessions

Consumer stakeholders expressed a strong desire for greater flexibility and alternative ways to provide input and feedback into the IASR and ISP more broadly. Many noted a lack of resources

or time to prepare written submissions and wanted to see a greater mix of formal and informal methods used. As a result, AEMO held two sessions in which consumer stakeholders could provide verbal feedback on both the Draft IASR and the revised draft scenarios.

AEMO experts participated in these sessions to provide clarifications and respond to questions. The feedback provided from the consumer stakeholders at the forum were recorded and provided as a written record of the sessions which, once verified with participants, was considered along with all other written stakeholder feedback.

3.6.3 Publication of consultation summary reports for the IASR and ISP Methodology

Stakeholders expressed a desire for AEMO to "close the loop" and provide clearer and more direct communication that details how stakeholder input has been considered in decision-making. As a result, AEMO published consultation summary reports accompanying both the final IASR and ISP Methodology. These documents summarise the consultation process and explain how each element of stakeholder feedback has been considered and/or incorporated into the final product. The documents are useful and comprehensive, but ongoing improvement needs to be considered as to how this information is presented to make it more accessible.

3.7 AEMO's response to feedback from the Panel on its approach to engagement

In our submission to the draft IASR in February 2021, the Panel proposed a set of engagement principles and recommendations for consideration by AEMO either through their engagement with stakeholders or their internal processes and approach. These principles are designed to assist AEMO in cultivating a deeper engagement experience with consumer stakeholders and meet their obligations under the AER guidelines. AEMO has since attempted to address some of these recommendations as outlined below.

Principle	Intent	Improvements AEMO have made
Design purposeful communications	• Documents seeking consultation need to be accessible, clear and "plain English" ie understandable and speak to the stakeholders to facilitate participation. • Fit-for purpose to facilitate engagement and meaningful participation from the various stakeholder groups.	The IASR and ISP Methodology were highly technical and very lengthy documents that are not in plain English and not likely to be accessible to many stakeholders. The IASR is 162 pages, which is almost three times as long as the IASR for the 2020 ISP. The ISP Methodology and the two consultation summary reports add a further 250 pages. The two-page summary of the IASR scenarios was a good initiative but too high level to be helpful for most stakeholders.

Principle	Intent	Improvements AEMO have made
Engagement based on stakeholder needs, interests and capabilities	• Consideration of the diverse needs, interests and capabilities of the different consumer representatives and other end user groups directly impacted by the decisions. • Operational or short-term stakeholder needs will require a fit for purpose engagement approach to meet the needs and expectations including resources of all stakeholder groups.	Consultation was largely 'one-size-fits-all' utilising existing AEMO forums that stakeholders needed to know about and self-nominate for. More importantly, the "push" approach to AEMO's engagement forums, coupled with the lack of reach to broader expertise, means the stakeholder engagement does not capture the views and inputs of a wide range of stakeholders needed to support the complexity of some topics covered.
Transparency	• Open approach to engagement – that is ideas and solutions are not fully formed before bringing stakeholders into the discussion to encourage meaningful participation and co-design of solutions to issues. • Measure what's working and what is not and continue to adapt and improve the consultation to suit stakeholder needs.	AEMO made some attempts at co-design of the IASR scenarios, but these occurred before the Panel was appointed so we were unable to participate in them. Most other engagement involved stakeholders being invited to comment on relatively fully formed positions by AEMO or its consultants. AEMO made material changes to the draft IASR scenarios based on stakeholder feedback, but in most other areas feedback appeared to result in only minor changes. Consultation on some key assumptions was based on consultant reports where an integral part of the forecast was a proprietary model owned by the consultant which was effectively a 'black box' to both AEMO and stakeholders. For example, on gas prices, this meant we were unable to properly interrogate the methodology and this resulted in little confidence in the outputs, and AEMO had limited ability to address stakeholder concerns about the lack of model transparency

Principle	Intent	Improvements AEMO have made
Collaboration and participation	• Providing clarity on the purpose of the engagement and what feedback is being sought. Clarity on the issues being explored from the perspective of each stakeholder to identify the challenges and where possible potential solutions. • Participants being 'engaged' doesn't mean convincing them to respond in the way we might want them to – cultural, behavioural and capability considerations require actively listen to the needs of the community and approach issues in a more participatory manner	AEMO or its consultants often presented their views to stakeholders and asked for feedback, rather than being clear about what feedback was being sought including what alternative options were considered. Consultation with the Panel on some issues, eg discount rates and gas prices, appeared to be token with a focus on convincing stakeholders that AEMO or its consultants were right rather than actively listening and providing a genuine opportunity to influence the approach.

3.8 Recommendations for a future approach to engagement

We commend the recent changes taken by AEMO to make its engagement more effective and fit-for-purpose to maintain the credibility and relevance of the ISP.

We acknowledge that engaging stakeholders is a key priority in AEMO's recently published FY22 corporate plan. AEMO aims to be[18]:

> *"… a trusted partner that puts our members and stakeholders at the centre of everything AEMO does."*

Further, we fully support the public statements made by AEMO's CEO at a recent CEDA event that[19]:

> *"in order to maximise the benefits of this energy transition for the whole of society, all of us need to play our role and work collaboratively, together, and learn from one another".*

And we are encouraged with his leadership and commitment to

> *"… greater openness, transparency and accountability for the interactions we have with all our stakeholders as we go about our work".*

However, we suggest there is great opportunity for AEMO to do more and build its capability to undertake genuine and meaningful engagement with consumers and other stakeholders for

[18] fy22-aemo-corporate-plan.pdf

[19] AEMO | AEMO CEO Daniel Westerman's CEDA keynote address: 'A view from the control room'

development of the 2022 and future ISPs. To this end, we have outlined eight practical recommendations for AEMO to embed engagement within its corporate culture that we believe could improve engagement outcomes for AEMO and the roadmap that is the ISP.

Recommendation A1: Allocate adequate resources to build AEMO's capacity for engagement

Based on AEMO's corporate priorities, the feedback from participants and our observations, there are insufficient resources allocated by AEMO to support and build robust and high-quality internal engagement systems, processes and support needed to underpin the development of such a critical piece of work as the development of the ISP. Sufficient resources are devoted to modelling and other technical skills, but relatively limited resources are available for engagement activities. AEMO only has limited staff dedicated to building an enhanced ISP engagement.

Given the pivot to the electrification of other sections and the expansion this will have on the ISP, additional resources including investment in systems and processes are needed to build appropriate engagement capacity. Resourcing should also include the right training for staff who are not naturally inclined to engage with stakeholders. While there is good intention within AEMO on this front – and some strong examples emerging - investing in engagement capacity is key to empowering staff to do what is expected. The overall workload of relevant AEMO staff may also need to be considered as effective engagement takes time.

Recommendation A2: Establish KPIs for engagement and accountability within AEMO

The responsibility of stakeholder engagement within AEMO should be a shared accountability across all the leaders within the organisation.

Establishing KPIs for engagement across AEMO will ensure new norms of discipline, transparency and awareness are embedded in AEMO's corporate culture. The Panel believes clear KPIs and accountability will embed effective engagement which is a crucial enabler for achievement of AEMO's corporate purpose, mission and strategic priorities, but more importantly, meet engagement expectations being added to regulatory investment processes such as the ISP. All AEMO staff members should see effective stakeholder engagement as an important part of their job, rather than it just being the responsibility of a dedicated stakeholder engagement team.

Recommendation A3: Establish an evaluation framework for engagement

In order to assess the efficacy and effectiveness of engagement, AEMO should establish an evaluation framework, applying quantitative and qualitative measures to assess engagement performance. This framework should be developed in collaboration with stakeholders and

needs to capture the views of all stakeholders including within AEMO and institutions such as the AEMC and the AER. This should also remind stakeholders that the ISP runs on a two-year cycle and each one will be 'better' than those that that have gone before. Proposed tools include:

- Feedback surveys following each material engagement process
- Frequency and process (input) reporting
- Regular stakeholder satisfaction surveys focusing on engagement opportunities
- Regular assessments of stakeholder participation rates, diversity and inclusion

Recommendation A4: Develop a more comprehensive and tailored stakeholder engagement plan for the 2024 ISP

An updated plan should include undertaking a stakeholder mapping exercise to identify relevant stakeholders and how to best engage with them. . It should be the outcome of a co-design process with stakeholders and completed prior to the start of engagement on the 2024 ISP. We comment further on this below.

We recommend AEMO take a geographically based approach to stakeholder assessment and relevant issues and how the outcomes impact their relevant states or areas. This is particularly important as it will help bring to life the ISP and the material issues that matter to stakeholders in their local context.

Recommendation A5: Develop and maintain a stakeholder management system to regularly assess stakeholder needs and interests and identify gaps in stakeholder representation and participation

AEMO should develop and maintain a stakeholder management system that assesses and considers the needs and interests of ISP stakeholders, the relevance of the ISP to them and to strategically seek out those voices that are not included. This will ensure that relevant voices within the industry and outside of the energy industry are appropriately captured.

Feedback from engagement participants has also highlighted the need for AEMO to be clear about what is material and what is not material and make it easier for stakeholders to engage only on the issues that are of interest to them rather than having to commit to membership of broader ongoing forums. Implementing a stakeholder management system and regular assessments will ensure targeted engagement can happen. It will also enable targeted engagement methodologies to be applied to gauge stakeholder input into what is material and allow AEMO to share their perspective on why certain things are material or not in the development of the optimal development path. This is really useful as it focuses participants to

best lift up their views and preferences and allows efficient and targeted allocation of their very valuable resources.

Recommendation A6: Formalise internal and external inter-relationships to share knowledge across consultations

Feedback from participants has highlighted the various consultation processes can be very siloed. This can create confusion and resentment among the participants as they may raise issues in one process however it is not taken into account in another process. Participants believe and expect that the internal processes within AEMO should share stakeholder input. This is particularly important as the current ISP consultation process relies heavily on the FRG as the principal engagement forum.

We recommend AEMO have more formal links with other, existing consultation forums particularly those that are convened by the various transmission and distribution companies across the NEM. We also suggest when engaging with these forums that AEMO lift up appropriate parts of the ISP relevant to the various jurisdictions and coverage of the transmission system and the consumers involved. This we believe will not only give a greater insight and understanding of the ISP that also greatly inform the development of the various inputs and ultimately the ISP itself.

Recommendation A7: Adopt a collaborative and co-design approach to engagement

The increasing complexity of AEMO's operating environment and the evolving nature of the ISP requires an engagement approach built around collaboration and participative co-design of inputs and solutions.

Co-design is a process that promotes a participatory culture which builds on engagement processes where all critical stakeholders, from experts to end users, are encouraged to participate and are respected as equal partners in sharing expertise and experiences.

We recommend AEMO commits to establishing a framework where future engagement is based around the principles of co-design[20].

Recommendation A8: Implement a program of social research to better understand consumer and community attitudes and perceptions about the future energy market

We recommend AEMO develop some social research frameworks which explore consumer and community attitudes and perceptions to better understand their aspirations: their purchasing

[20] There are many examples of frameworks in developing a co-design approach to problem-solving for example https://www.ncoss.org.au/wp-content/uploads/2017/06/Codesign-principles.pdf.

intentions for distributed energy resources and the broader landscape of the future energy market, their views on transmission and generation developments in their communities.

While this attitudinal and perception survey work may not be seen as robust as others it provides a social context to position the other work that AEMO is doing within the ISP. Many of the distribution and transmission companies are doing work in this area along with Energy Consumers Australia and we believe that such research would build confidence to consumers, the community and other stakeholders that the ISP is grounded in an understanding of consumer preferences.

4 Assessment of the evidence and reasons supporting the IASR

4.1 Our approach to assessing AEMO's evidence and reasons

The rules require that we set out in this report our 'assessment of the evidence and reasons supporting the Inputs, Assumptions and Scenarios Report'. In doing so, we are required to 'have regard to the long term interest of consumers'.

We have approached this part of our task by applying the following principles:

- **Impacts on consumers:** Our assessment has been guided by the long term interests of consumers. In particular, we have considered the risks to consumers if the scenarios, inputs and assumptions used in the ISP are inaccurate and lead to either:
    - Over-investment: For example, unnecessary costs and higher electricity prices could arise if the ISP recommends building transmission infrastructure that turns out not to be needed because the ISP over-estimated electricity demand or gas prices.
    - Under-investment: For example, there could be increased risks of blackouts in the future if the ISP does not recommend enough investment in transmission and generation to meet energy demand, e.g. due to under-estimating how many customers will switch from gas to electricity or purchase electric vehicles. Similarly, there could be increased emissions if not enough transmission is built to allow new renewable generation and storage to connect to the network, e.g. if the ISP over-estimates renewable generation build costs or under-estimates the level of ambition in future decarbonisation policies.
- **Focus on material issues:** The IASR is underpinned by an extremely large number of inputs and assumptions and thousands of pages of reports and models by AEMO and its consultants. Given our very limited resources, we have focussed our efforts on those aspects of the scenarios, inputs and assumptions that appear to be most material in terms of their potential impact on consumers. Our current views on which inputs and assumptions are the most material are set out in section 4.4 below. We (and all other stakeholders) will have a better understanding of the materiality of issues once the draft ISP is released in December.
- **Effective engagement**: Our assessment of AEMO's evidence and reasons is informed by our review of how effectively AEMO has engaged with stakeholders and addressed their feedback. Our general comments on this issue are discussed in Section **Error! Reference s ource not found.**. We comment specifically on AEMO's engagement on the scenarios, inputs and assumptions in this chapter and the appendices.

- **Transparency and robustness**: We have assessed the transparency and robustness of the scenarios and the material inputs and assumptions, including whether they are consistent with the AER's Guidelines.
- **Managing uncertainty:** We have assessed how well the IASR and ISP Methodology manage uncertainty and the resulting risks to consumers of over or under-investment when the future inevitably turns out differently to what AEMO assumed. The ISP's inputs and assumptions are all inherently very difficult to forecast over the 30 year ISP modelling period. AEMO should do the best it can to adopt robust and transparent forecasts, but no amount of effort will result in all of the inputs and assumptions turning out to be correct in hindsight, particularly later in the modelling period. This means AEMO needs to focus on managing the unavoidable uncertainty that is involved and the risks of that uncertainty for consumers.

In undertaking our assessment we have had regard to:

- both the IASR and the ISP Methodology, as the ISP Methodology plays an important role in relation to how the scenarios are used by AEMO and in managing uncertainty around the inputs and assumptions
- the requirements of the AER's Forecasting Best Practice Guidelines and Cost Benefit Assessment (CBA) Guidelines that apply to the ISP, including both the binding requirements and the discretionary elements
- the findings of the AER's transparency review of the IASR.[21]

This report has also been informed by our engagement with AEMO and stakeholders. We engaged with AEMO during the development of the IASR and ISP Methodology, both through public forums (e.g. attending webinars on the ISP and Forecasting Reference Group meetings) and through bilateral meetings. We also engaged with consumer representatives and a broad range of other stakeholders during the development of the IASR and ISP Methodology. In addition, we consulted directly with several consumer stakeholders as part of the development of this report to obtain their feedback on the consultation process undertaken by AEMO and on the content of the IASR and to test our key findings with them.

Our overall assessment and comments are set out in this chapter. More detailed comments on specific key inputs and assumptions are set out in the appendices.

[21] The AER's Transparency Review is here: www.aer.gov.au/networks-pipelines/performance-reporting/transparency-review-of-aemo-2021-inputs-assumptions-and-scenarios-report

4.2 Scenarios

4.2.1 Overview of AEMO's approach to scenarios and the AER's Guideline requirements

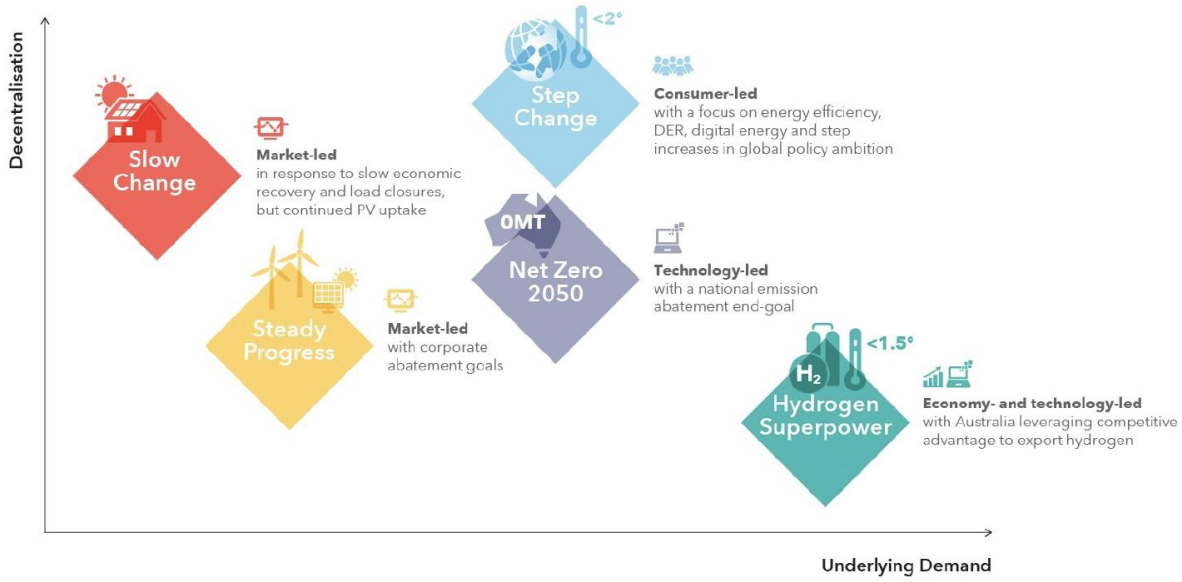
AEMO explains in the IASR that:[22]

> *The use of scenario planning is an effective practice to manage investment and business risks when planning in highly uncertain environments, particularly through disruptive transitions. Scenarios are a critical aspect of forecasting, enabling the assessment of future risks, opportunities, and development needs in the energy industry. It is vital that the dimensions of scenarios chosen cover the potential breadth of plausible futures impacting the energy sector and capture the key uncertainties and material drivers of these possible futures in an internally consistent way.*

We agree with these comments and consider that the selection of scenarios plays a critical role in illuminating and testing the key risks to customers from the ISP process and resulting investment decisions.

The IASR contains five 'core scenarios', which are summarised below.[23]

Figure 2: IASR core scenarios



Each scenario is mapped to different settings for a large number of key inputs and assumptions as set out in the IASR report and the detailed 'Inputs and assumptions workbook' spreadsheets.

The AER's CBA Guidelines require AEMO's scenarios to consider the key inputs and major sectoral uncertainties affecting the costs, benefits and need for investment in the NEM. They

[22] IASR, p7.

[23] IASR, p13.

also provide that AEMO "*should consider risks associated with under- or overdue investment and over- or premature investment*" and apply the following principles:[24]

- Explore the impact of major uncertainties affecting the costs, benefits and need for investments in an optimal development path.
- Represent a reasonable range of plausible future market environments.
- Consist of inputs that are exogenous to the development paths but relevant to investment decision making.

AEMO has supplemented the five core scenarios with:

- Several **event-driven scenarios** that '*explore clearly observable and reasonably probable independent events or investment decisions that may materiality change the market benefits of a candidate development paths'*. These scenarios relate to decisions that could affect the funding or cost recovery arrangements of major interconnector projects, e.g. the impact on Marinus Link of uncertainty around cost recovery arrangements and how the Tasmanian Renewable Energy Target will be delivered.
- Several **sensitivities** that '*test the materiality of uncertainty associated with individual input parameters or assumptions*.' Sensitivities include lower gas prices, higher DER uptake rates and different discount rates. There is also a 'Strong electrification sensitivity' that has high levels of emissions reductions similar to the Hydrogen Superpower scenario but with limited hydrogen uptake and reduced energy efficiency. A 'Queensland REZ sensitivity' tests the impact of potential Queensland government policies requiring the establishing of three Queensland REZs by 2040.

4.2.2 Our assessment of AEMO's selection of scenarios and its response to feedback

We consider that AEMO's selected scenarios are appropriate and are consistent with the mandatory requirements and discretionary principles set out in the AER's CBA Guidelines. They cover a suitably wide level of variability in the material inputs and assumptions so that they can be used to manage uncertainty and assess the risks of under or over-investment in different futures versions of the NEM that may eventuate over the next 30 years.

AEMO has adjusted the scenarios and their key input and assumption settings reasonably well to account for the major areas where the 2020 ISP's scenarios have proven with hindsight not to be accurate or to not have a wide enough range of inputs, e.g. the significant underestimation of DER uptake in most 2020 ISP scenarios.

[24] AER, *Cost Benefit Analysis Guidelines*, p11.

The scenarios are significantly improved from those proposed in the draft IASR. AEMO has addressed stakeholder feedback on the scenarios from the draft IASR well, particularly in relation to level of decarbonisation ambition and the treatment of the 'gas-led recovery'.

The key changes to the scenarios made by AEMO between the draft and final IASR were:

- Removing the 'Central Scenario' and replacing it with the 'Steady Progress' and 'Net Zero 2050' scenarios. These changes responded to feedback from a large number of stakeholders that the Central Scenario did not contain sufficiently ambitious reductions in carbon emissions and account for current and future state and territory government emissions policies. The Steady Progress scenario uses current government energy and emissions policies, while the Net Zero 2050 scenario includes more ambitious decarbonisation settings after 2030 including a 2050 net zero emissions target.
- Removing the 'Diversified Technology Scenario', which was initially called the 'Gas Led Recovery Scenario' and included reduced gas prices and an increased role for carbon capture and storage. Many stakeholders considered that this scenario was not plausible or internally consistent, but several stakeholders considered there was value in including a sensitivity to test the risk of over-investment if gas prices are lower than forecast. This scenario was replaced with a 'Low gas price sensitivity'.
- Renaming most of the scenarios. Some of these name changes were designed to make the names more similar to the scenario names from the 2020 ISP.

A more effective consultation process in the early stages of the development of the scenarios could have resulted in these issues being addressed earlier in the process rather than needing such significant changes between the draft and final IASRs.

AEMO's consultation process for the scenarios was extensive and was a significant improvement on previous ISPs. However, it was made more challenging and less effective than it could have been due to several factors:

- **Timing of appointment of the Consumer Panel:** We were appointed after the workshops on scenarios had occurred and the scenarios for the draft IASR had largely been set. AEMO held three workshops and webinars on scenario development in October and November 2011, prior to the Panel's appointment in late November.
- **Scenario name changes:** Regular changes to the scenario names occurred during the consultation process, which made it harder for stakeholders to follow. We recommend in future that AEMO seeks to minimise changes to the scenario names during the IASR process and between ISPs. There may also be value in seeking to retain the same scenarios for at least two ISPs. i.e. the inputs and assumptions are updated every ISP but the

scenarios are only changed every four years unless important changes in circumstances justify new or amended scenarios.

- **Breadth of stakeholders included in the consultation:** It was not always clear AEMO had the right stakeholders in the room when consulting on the scenarios given the breadth of issues it needs to consider, e.g. stakeholders outside of the energy sector with expertise in the electrification of other sectors and decarbonisation. This issue is related to our comments in section **Error! Reference source not found.** on the overreliance on the F orecasting Reference Group. We recommend AEMO starts work on an engagement strategy and stakeholder mapping exercise for the development of the 2024 ISP scenarios early in 2022 at the latest so it is better placed to engage effectively on these issues from the outset for the next ISP.
- **Lack of clarity on government policies:** It appears that some governments did not provide AEMO with sufficient detail on their relevant renewable energy and emissions policies to enable them to be included in the IASR scenarios. We acknowledge that government policies are always subject to change, but encourage governments to work closely with AEMO and provide as much detail as possible before draft ISP. AEMO should consult on how to incorporate any material changes in government policies that occur between the IASR and final ISP.

4.2.3 AEMO's explanations of the scenarios

The scenarios are reasonably well explained through the descriptions in the IASR and supporting materials. The descriptions of the scenarios in the IASR are necessarily somewhat abstract as AEMO has not yet undertaken the ISP modelling so it cannot yet illustrate what outcomes are expected to arise under each scenario (e.g. the location and amount of transmission investment and the mix of generation technologies under each scenario), which will be clearer after publication of the draft ISP. However, AEMO has clearly explained how each scenario maps to different settings for the key inputs and assumptions, e.g. economic and population growth, decarbonisation targets and climate change impacts, generation build costs, various aspects of DER and electric vehicle uptake, energy efficiency, electrification of other sectors and hydrogen consumption.

AEMO's descriptions of the scenarios are clearer than in the draft IASR, but some of them could still be improved. In particular, the scenario descriptions do not expressly discuss what types of changes in government energy and environmental policies are assumed to occur under each scenario. Changes in government policies are inevitable over the 30 year ISP modelling horizon and are likely to have a material impact on efficient investment decisions. Some of the scenario descriptions also appear to be overly politically influenced. For example, it is unnecessary and

unhelpful for the high-level description of the Neto Zero 2050 scenario to focus on net zero being achieved 'through technology advancements' and not contain any discussion of changes in government policies that drive net zero emissions even though later sections of the IASR show that this scenario includes a government policy imposing a binding net zero by 2050 emissions limit.

AEMO's removal of a single 'Central Scenario' and splitting it into the 'Steady Progress' and 'Net Zero 2050' scenarios is a good response to stakeholder feedback and a sensible way of addressing uncertainty, in particular the high level of uncertainty over future energy and emissions policies. However, this change means AEMO's decisions on what weighting to allocate to each scenario and which scenario is the 'most likely' will be more important than ever, but will not be made until the draft ISP.[25] This issue is discussed in section 4.5 below.

Adding the 'event-driven scenarios' and 'sensitivities' is useful to help manage the challenges of distilling such a large number of potential combinations of settings for all material inputs and assumptions into just five 'core scenarios'. However, it results in a very complex approach. It is likely to be challenging for many stakeholders to understand the differences between a 'core scenario', an 'event-drive scenario' and a 'sensitivity' and how each of them is used. Some of AEMO's judgements as to what is a scenario as opposed to a sensitivity also seem somewhat arbitrary, e.g. it is unclear why Hydrogen Superpower is a scenario but Strong Electrification is only a sensitivity and whether the distinction matters for the outcomes of the ISP.

It is yet to be seen how AEMO will use such a large number of different sets out inputs and assumptions in the ISP modelling and selection of the optimal development path. We also have some concerns that the full list of sensitives and event-driven scenarios are not set out in the IASR and there is some ambiguity in the ISP Methodology as to how they will be used in selecting the optimal development path, which limits the ability to engage on them prior to the draft ISP.

4.2.4 Recommendations for elevating the status of the scenario work (Strategic Recommendation C)

Recommendation C1: Engage early on scenarios for the 2024 ISP and use this process as an entry point for a wider group of stakeholders

Recommendation C2: Appoint the next ISP Consumer Panel before the scenario development process commences

[25] The AER's CBA Guidelines require AEMO to determine which is the 'most likely scenario'. This decision has important implications for the cost benefit assessment in the ISP and in transmission businesses' resulting regulatory investment tests.

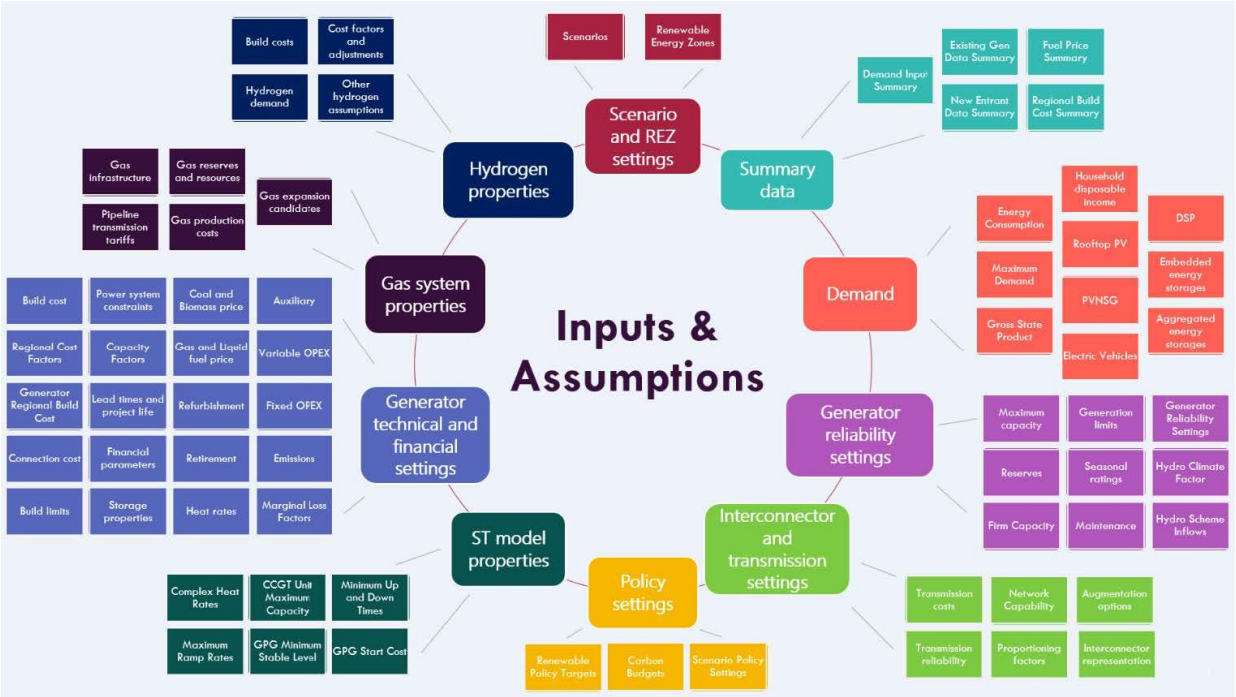
4.3 Transparency and robustness of material forecasts of inputs and assumptions

4.3.1 Overview of AEMO's approach and the AER's Guideline requirements

The ISP is at its heart a modelling exercise. AEMO uses a wide range of inputs and assumptions to forecast what combination transmission, generation and other types of investment is likely to result in the highest net benefits between now and 2050 under a range of potential scenarios. Like any modelling exercise, the reliability of the outcomes is largely determined by the accuracy of the inputs and assumptions that are used.

The ISP uses a very large number of inputs and assumptions. The key inputs and assumptions are illustrated in the following AEMO diagram.

Figure 3: Key IASR inputs and assumptions



AEMO needs to determine values for all of the inputs and assumptions at the start of the modelling period in 2022 and forecast how they will change out to 2050. That is an extremely difficult task, particularly given the current level of change in the electricity sector.

The AER's Forecasting Best Practice Guidelines set out several factors AEMO must consider in its forecasting. The AER's CBA Guidelines also set out several principles the AER recommends AEMO considers when developing the ISP inputs and assumptions:[26]

- **Internal consistency:** inputs and assumptions are applied consistently and are internally consistent when taken together.

[26] AER, *CBA Guidelines*, pp9-10.

- **Plausibility:** inputs and assumptions reflect a realistic operation of the market that is not beyond the capabilities of the system or based on data that is an outlier.
- **Verifiable sources:** inputs and assumptions are supported by reputable and independent sources.
- **Relevance:** inputs and assumptions are based on relevant and up to date information.
- **Transparency:** AEMO should explain how it derived key inputs and assumptions and the underlying range it selected the values from.

The CBA Guidelines also contain specific requirements for inputs and assumptions related to discount rates and the value of customer reliability.

4.3.2 Our overall assessment of AEMO's approach and its response to feedback

AEMO has undertaken extensive consultation on most of the key inputs and assumptions. It provided reasonably clear, comprehensive reasoning for selecting the inputs and assumptions in the IASR, the IASR Consultation Summary Report and supporting consultants' reports.

Developing the inputs and assumptions is a very challenging exercise. For almost all of the inputs, it is extremely difficult to forecast how they will change over the next 30 years. For some of them, it is even difficult to accurately estimate their values at the time of publication of the ISP in mid 2022 as they are not observable based on publicly available information (e.g. discount rates) or may change materially during the process of developing the ISP (e.g. government policies).

We consider that AEMO has generally met the requirements of the AER's Guidelines. However, there are several areas where we consider the inputs and assumptions could be improved for the 2024 ISP, primarily in relation to AER's recommended principles of 'transparency' and 'verifiable sources'. These issues are discussed in the next section, 4.4.

AEMO has improved the transparency and robustness of most of the key inputs compared with the 2020 ISP. It has made significant improvements in relation to inputs and assumptions related to DER uptake, electric vehicles, transmission costs, discount rates, emissions and climate targets, the impact of climate change, the addition of offshore wind zones, system security requirements, electrification of other sectors and hydrogen. However, for some of these matters this improvement came off a relatively low base as some of these matters were given very limited attention in previous ISPs (e.g. discount rates, hydrogen, electrification of other sectors). We encourage AEMO to continue this process of continuous improvement, with a focus on the most material inputs and assumptions.

AEMO's publication of detailed Consultation Summary Reports for the IASR and ISP Methodology was a very welcome improvement to the engagement process compared with

previous ISPs. Those reports greatly assist transparency and provide considerable additional details on AEMO's approach to specific issues raised by stakeholders and how it has responded to feedback.

This increased transparency and robustness does however create a risk of making the IASR less accessible for some stakeholders. The IASR is now 162 pages, which is almost three times as long as the IASR for the 2020 ISP. The IASR Consultation Summary Report is a further 111 pages, while the ISP Methodology and its Consultation Summary Report add a further 127 pages. Overall, this is about 400 pages of highly technical content, without including the supporting IASR workbook and consultants' report.

AEMO published a 2-page summary of the IASR, but that summary is likely to be too high-level to be useful for most stakeholders. We recommend that AEMO considers ways to make the documents more accessible for the 2024 ISP, e.g. publishing a 20 page summary report, or restructuring the IASR to have a shorter main body focussed on key issues in more accessible language with the technical detail moved to appendices.

4.4 Recommended areas of improvement for the 2024 ISP

While there has been considerable improvement compared with previous ISPs, we consider that the transparency and robustness of the material inputs and assumptions discussed below could be improved. We recommend that AEMO considers alternative or additional ways of forecasting and engaging on these inputs and assumptions for the 2024 ISP.

We also note that AEMO places considerable reliance on consultants to provide expert input on many key inputs and assumptions. There is room for improvement in the process for the selection and project management of consultants to increase the transparency of their work and the opportunities for meaningful stakeholder engagement. For example, consideration should be given to when it is appropriate to appoint more than one consultant to give a range of views (as AEMO did for DER but not for any other input), when the consultant should be appointed to ensure time for a thorough stakeholder consultation process, the level of transparency provided by the consultant (including how to address proprietary modelling methodologies), the appropriate scope of the consultant's work, AEMO's role is explaining the materiality of the consultant's findings and how they will be used in the ISP, and how the consultant's output is managed and reviewed when AEMO does not have in-house subject matter expertise.

4.4.1 Gas prices

Gas prices were a material input for the 2020 ISP because a key part of the expected benefits of some large interconnector projects was forecast reductions in the amount of money spent on gas due to increased renewable generation and reduced gas powered generation. Gas prices may

also be a material input for the 2022 ISP. Our submission on the Draft IASR was very critical of the lack of transparency in the report and the limited opportunity for stakeholder feedback did not meet the 'single stage' requirement under the FBPG.

AEMO subsequently organised one additional engagement with the consultant. Prior to the workshop AEMO circulated a survey, completion of which was required to register for the session. Apart from this requirement which falls well short of the FBPG, AEMO presented the outputs of the survey is a misleading way.

The workshop itself served to confirm the lack of transparency in the modelling expressed in our earlier submission and much greater stakeholder engagement should have occurred back in September 2020 when the draft was presented for a brief, high level FRG discussion. This may be an inherent problem for gas price forecasts given the commercial sensitivity of the inputs and the proprietary nature of consultants' models, but AEMO should consider ways to improve transparency for the 2024 ISP.

This issue is discussed in more detail in Appendix A.

4.4.2 Transmission costs

Transmission costs are likely to be one of the most important inputs to the 2022 ISP.

It is difficult to forecast the costs of possible future major transmission projects, especially given the very small sample of comparable large transmission projects that have been undertaken in Australia in the past two decades and the recent history of the costs of proposed major transmission projects increasing after the ISP or regulatory investment test process. Forecasting 'future ISP projects' that are not expected to be constructed until several years into the future is also particularly challenging given AEMO is estimating the costs of these potential projects before their detailed design has been developed or the local community has been consulted on their design and route selection.

AEMO has undertaken considerable work to improve the accuracy of its transmission cost forecasts, including publishing a Transmission Cost Report, engaging consultants to develop an ISP Transmission Costs Database (TCD) and undertaking several consultation sessions on this issue. AEMO's proposed 'Take One Out at a Time' (TOOT) analysis as part of the ISP Methodology and the 'feedback loop' that occurs as part of the regulatory investment test

process will also provide additional checks on the impacts of increases in transmission costs compared with the ISP forecasts, but those mechanisms have their limitations.[27]

Despite these improvements, forecasts of transmission costs remain a material area of uncertainty. This issue is discussed in more detail in **Appendix B**: 2021 Transmission Cost Report. The Panel's findings are summarised below:

a. The use of the AACE classification for costs estimation is welcomed but it requires a lot more work on definitions and descriptors for it to be as robust as AEMO implies

While the move to adopt a version of the AACE cost classification system is welcome, its adoption has been haphazard and confusing to consumers. Different definitions and cost accuracy ranges make it very difficult to understand and compare capex estimates.

b. The TCD 'black box' does not provide the level of support for the capex estimates that AEMO claims

We conclude that while the TCD contains a wealth of useful information, it does not provide the required support for the approach AEMO has taken on ± cost variability at different stages and selection of the mid-point of these estimates for ISP modelling.

c. The GHD proposed cost accuracy ranges at PADR/PACR Class 5, 4 and 3 are far too narrow

AEMO and TNSPs are the victims of a Catch 22 situation. Because TNSPs are only doing Class 4 type estimates even at the RIT-T project assessment conclusions report (PACR) stage, they have not completed the work on issues such as route selection and engagement with landowners to enable an accurate estimate of 'social licence' costs of land acquisition and biodiversity. It is therefore not surprising that we are seeing large changes in costs through the RIT-T and contingent project application (CPA) stages.

d. Market impact on transmission costs should not be ignored

AEMO's argument to ignore these market impact costs – where constraints on resource availability due to multiple large projects being undertaken at once results in higher than usual costs – because they will occur at some time in the future, is weak. In effect it is an 'unknown' risk and should be included. A recent Grattan Institute report of major public road and rail

[27] As part of its cost benefit assessment, AEMO performs the TOOT analysis on potential actionable ISP projects. The TOOT analysis involves a comparison of the total costs of the optimal development path with and without that transmission project. This analysis shows the maximum cost beyond which that transmission project would no longer be beneficial. The 'feedback loop' is part of the RIT-T process and requires transmission businesses to obtain AEMO's confirmation that any increase in the forecast cost of the project does not change the ISP's optimal development path.

projects over the period 2021-20 show significant evidence of cost overrun compared with the costs announced at project sanction ie effectively the CPA stage. The larger the project the greater the cost overrun, project costs can increase significantly even after contracts are let and the earlier the project (and its estimated cost) is announced, the larger the overrun.

e. The lack of transparency from TransGrid is a contributing factor to our conclusions

It is unfortunate that TransGrid, alone among TNSPs, chose to only provide confidential capex estimates to AEMO. This meant AEMO was unable to use that data to ensure a degree of consistency across TNSP estimates. What happens in NSW is central to the whole ISP and yet TransGrid has chosen to provide data in a way that leads consumers to question their commitment to a robust ISP process that can gain consumers support. We would support a consistent framework for cost estimation under the rules that would avoid these confidentiality issues and expect this will be a matter for consideration in the AEMC's current Transmission Planning and Investment Review.

f. Selection of the mid-point of network capex estimates for ISP modelling is flawed

The use of mid-point estimates and a symmetrical cost accuracy range is flawed and suffers from the same 'black box' problems of the 22 projects. AEMO's argument that it needs to compare all technologies – transmission, generation and storage – on a like for like basis and this justifies using mid-point estimates ignores the fact that the cost estimates for generation and storage are generally Class 1 or 2 estimates, not Class 3,4 or 5.

g. AEMO should publish the break-even capex cost for all ISP projects that do not have CPA approval

For the 2022 ISP, we support AEMO calculating and publishing the 'break-even' capex cost for projects in the optimal development path. We believe that TNSP concerns around this not being in consumers interests as contractors can 'game the system' can be addressed.

h. AEMO continue to develop the TCD in the lead-up to the 2024 ISP

We recommend that AEMO continues to improve its approach to transmission cost estimation for the IASR for the 2024 ISP, including addressing these issues above.

We note AEMO's comment in the IASR Consultation Summary Report that there may be value in having clearer and more consistent regulatory requirements on transmission cost estimation accuracy for the ISP and other regulatory processes. We also consider there would be value in improved clarity and consistency in how the various AACE classes of accuracy of estimates should be interpreted and applied by AEMO and transmission businesses. We recommend that the AER considers whether its CBA Guidelines should be updated to provide more clarity on

these issues and/or the AEMC considers this issue as part of its Transmission Planning and Investment Review.

4.4.3 Electrification of other sectors

Decarbonising the Australian economy will likely result in significant electrification of other sectors over the next 30 years due to the uptake of electric vehicles, switching from gas to electricity and the use of renewable electricity to produce hydrogen. These changes have the potential to lead to significant increases in electricity demand, which will require large amounts of expenditure on networks and generation that will ultimately be funded by consumers.

AEMO engaged CSIRO and ClimateWorks to provide a report on this issue as part of their confusingly named work on 'Multi-sector energy modelling'. This work forecast that electricity demand will increase by 133% between now and 2050 under the Net Zero 2050 scenario and increase by 468% under the Hydrogen Superpower scenario[28].

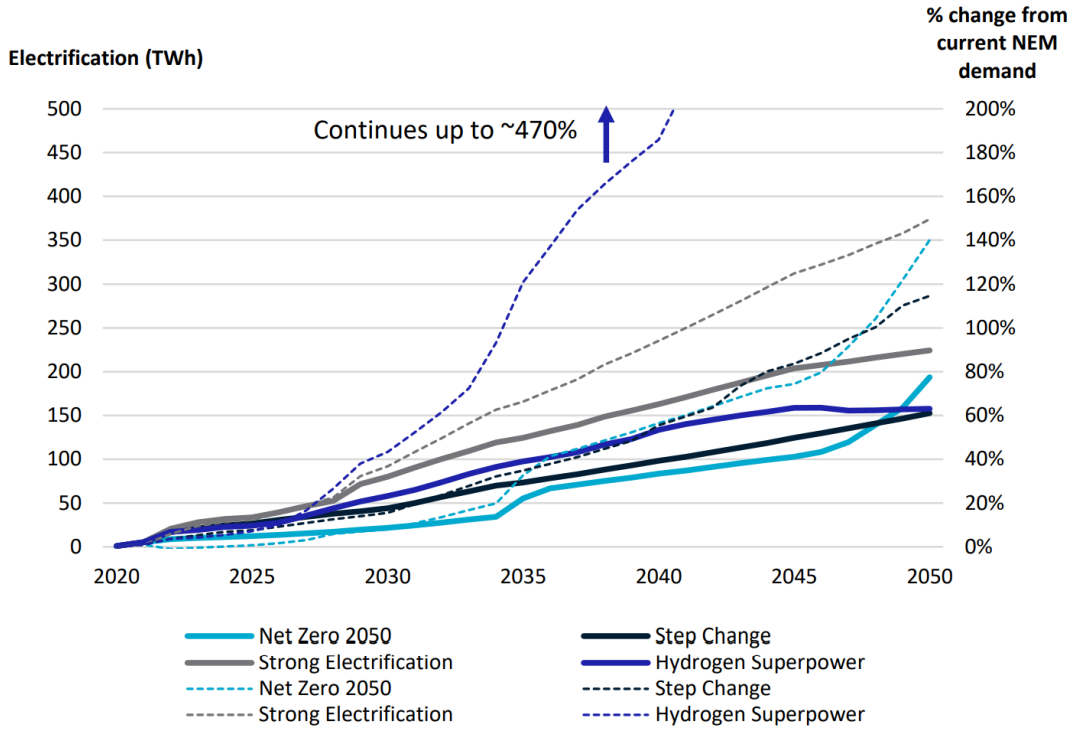


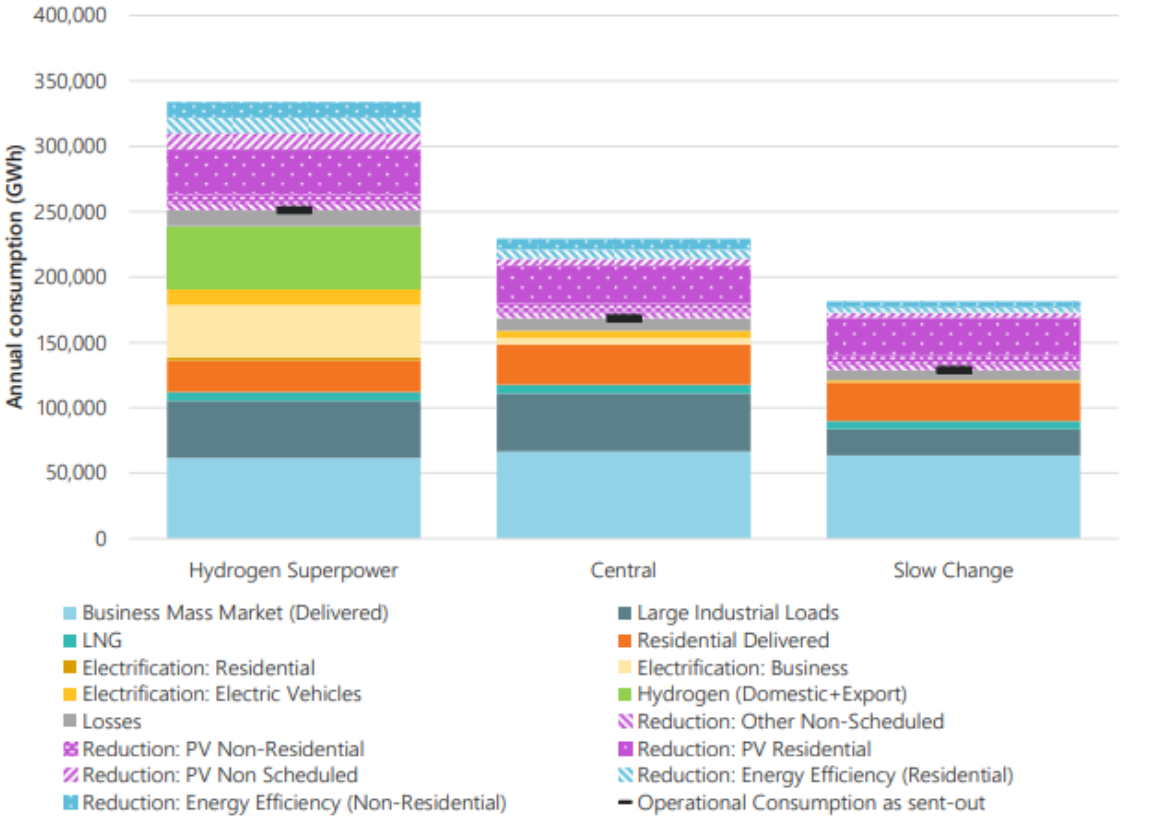
Figure IV: (Left axis) uptake of electrification in the NEM in the four modelled scenarios, shown as TWh added electricity demand per year. (Right axis) total NEM electricity demand in the end-use sectors (industry, buildings & transport), shown as % increase from NEM demand in 2020 per year

[28] Reedman, L.J., Chew, M.S., Gordon, J., Sue, W., Brinsmead, T.S., Hayward, J.A. and Havas, L. 2021. Multi-sector energy modelling, CSIRO, Australia. available from www.aemo.com.au/energy-systems/major-publications/integrated-system-plan-isp/2022-integrated-system-plan-isp/current-inputs-assumptions-and-scenarios

As noted by AEMO in the 2021 Electricity Statement of Opportunities[29]:

> *"Fuel-switching in the form of electrification as a direct substitution for fossil fuels is one of the most cost-effective decarbonisation options for sectors that use energy. Like hydrogen, this has the potential to materially increase electricity consumption in the NEM."*
>
> *"… ESOO analysis suggests that, in the NEM alone, fuel-switching from other fuels to electricity could be as high as 81 TWh by 2030-31, equivalent to 46% of total current operational consumption in the NEM, if there are strong incentives for electrification of transport, residential and industrial sectors. Electrification of heating load also has the potential to switch maximum operational demand from summer to winter, particularly in Victoria where many consumers currently use gas for heating their homes.*
>
> *As the energy transition accelerates, the decarbonisation of other sectors also needs careful planning of the interface with the energy system. This will require the right incentives, policies, and technologies to make load more flexible in order to maximise the value our energy system can deliver."*

Figure 7 NEM consumption (by component) for the three ESOO scenarios in 2030-31



Note: Components that contribute to operational consumption are drawn in solid colours while those components reducing operational consumption drawn in shaded patterns, with the operational consumption forecast marking the dividing line.

[29] www.aemo.com.au/energy-systems/electricity/national-electricity-market-nem/nem-forecasting-and-planning/forecasting-and-reliability/nem-electricity-statement-of-opportunities-esoo Exec Summary p 12

This issue could be a critical input for the 2022 ISP. However, due the rather limited and very late engagement by AEMO on this issue, we remain unsure of the robustness of the inputs and assumptions and the materiality of this issue (e.g. will it drive investment in the next decade, or only after 2030 so we have time to improve the forecasts).

AEMO first mentioned to stakeholders that it would undertake the multi-sector modelling work in March 2021. However, we were not alerted by AEMO to the potential materiality of this issue until May 2021 and there was no consultation on draft outputs of the consultants' work until late June. Consultation was limited to a discussion on modelling methodology in the May Forecasting Reference Group meeting (which had a low attendance as most stakeholders did not understand the nature or significance of this work) and a high-level slide pack on draft outputs presented to the 30 June Forecasting Reference Group.

This limited consultation made it impossible for us and other stakeholders to meaningfully engage on this issue or influence the inputs and assumptions. If this issue and its materiality had been raised earlier, we would have devoted more resources to it. This issue is also a good example of AEMO's over-reliance on the Forecasting Reference Group, as this issue requires AEMO to engage with a much broader group of stakeholders including stakeholders from outside of the electricity sector.

We also agree with the AER's finding in its Transparency Review that AEMO could have better coordinated this engagement and consultancy work on 'multi-sector modelling' with its separate engagement and consultancy work on related inputs regarding energy efficiency, DER adoption, transport electrification and fuel switching.[30] We support the AER's recommendation that AEMO better explain the relationship between these issues and consult on them in a more coordinated way in future ISPs.

This issue may also warrant additional consultation between the IASR and final 2022 ISP if it does indeed have a material impact on outcomes.

4.4.4 Government energy and emissions policies

Government policies on renewable energy and emissions are likely to have a major impact on the levels of investment in transmission and distribution networks, generation, storage, DER and electric vehicles. We acknowledge that it is very difficult for AEMO to make accurate assumptions regarding government energy and emissions policies given how rapidly they are

[30] AER, *Transparency Review: Integrated System Plan 2022 Final Inputs Assumptions and Scenarios Report*, August 2021, p17.

changing, the limited detail that is currently available on some new and proposed policies and the inevitability that major changes will occur during the 30 year ISP modelling period.

As discussed in relation to the scenarios above, the IASR cannot predict exactly government policies may change but it could do more to describe potential policy changes and their impact in general terms. The IASR does that in two specific cases (the Tasmanian Renewable Energy Target and Queensland government policies on Renewable Energy Zones) but not more broadly.

The IASR provides a clear and reasonably comprehensive list of all of the current Commonwealth, state and territory government policies it has included in its inputs and assumptions.

However, there is a risk that the IASR has too much focus on Commonwealth government policies when setting emissions budgets rather than state and territory government policies that are likely to be more important in the short to medium term. For example, the emissions budget inputs for the Steady Progress and Net Zero 2050 scenario are solely based on the current Commonwealth government emissions reduction targets to 2030 rather than state and territory targets and policies, with AEMO acknowledging this approach 'may lead to emissions trajectories that fall well below these limits to 2030'.[31]

We also agree with the AER's finding in its Transparency Review that the reasons AEMO used for deciding which government policies to include was not always clear. For example, the AER queried why the Tasmanian Renewable Energy Target is included but the Victorian Government's announcement and budget funding for the establishment of 6 REZs may not be included.[32] We support the AER's recommendation that AEMO provide more information on these issues.

4.4.5 Discount rates

Like any modelling exercise, the ISP uses discount rates to convert future costs and benefits into today's dollars. This allows cost and benefits that arise at different times to be compared on a consistent basis. The choice of discount rate can have a major impact on the outcomes of the ISP as discussed in section 3.4 below.

The AER's CBA Guidelines require AEMO to use central, upper and lower bounds for the ISP discount rate. The Guidelines set out requirements for how each of those rates is set, including

[31] IASR Consultation Summary Report, p57.

[32] AER, IASR Transparency Review, p22.

that the discount rate used in the ISP must appropriate for analysis of private investment in the electricity sector across the NEM. AEMO proposes to use discount rates of 2%, 5.5% and 7.5%, plus a high discount rate sensitivity of 10%. These rates are largely based on a consultant's report.

AEMO had given very limited attention to the setting of the discount rate until we raised this issue in our submission on the draft IASR. AEMO did not undertake any independent analysis of the appropriate discount rate for the 2020 ISP. It had a limited discussion of the issue in the draft IASR, but we considered that AEMO's draft IASR approach did not meet the requirements of the AER's CBA Guidelines. In the 2020 ISP and the draft IASR, AEMO largely based its discount rates on the ENA's RIT-T Handbook, which in turn based its estimates on AEMO's ISPs, creating a confusing circular set of references with no evidence of analysis to determine the appropriate discount rate that complied with the AER's Guidelines.

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 that our feedback was appropriately addressed. Our comments on this issue are set out in more detail in Appendix C.

We recommend that AEMO consults on this issue 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 than AEMO's.

4.4.6 Hydrogen

The 2022 ISP will include consideration of the impacts hydrogen production, consumption and export for the first time. This includes the Hydrogen Superpower scenario, which is focussed on a future with high levels of hydrogen production and export, with renewable electricity used to produce green hydrogen.

The hydrogen sector is still in its infancy in Australian and internationally. It is therefore extremely difficult to determine appropriate inputs and assumptions for how the sector will evolve between now and 2050. AEMO recognised these challenges in comments it made during the IASR consultation and stated that it is likely to give a low weighting to the Hydrogen Superpower scenario for the 2022 ISP. We are comfortable with the inclusion of this scenario as it is possible that hydrogen may play a more important role in future and this scenario provides a useful 'book-end' to test the potential impacts if such a radical change to the electricity system occurs.

However, the accuracy of the hydrogen inputs and assumptions should be treated with considerable scepticism given the limited information that is currently available to inform them. AEMO should reflect that high level of uncertainty in the weighting given to the Hydrogen Superpower scenario.

4.4.7 Integration of distribution network forecasts

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, but 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 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.

4.4.8 Recommendations for focusing efforts on inputs and assumptions that are most material to consumer interest and have the most uncertainty (Strategic Recommendation B)

Recommendation B1: Draw attention to the inputs and assumptions that are most material to the consumer interest

Recommendation B2: Manage the complexity and volume of information to foster wider engagement

Recommendation B3: Calibrate the ISP to public policy commitments, and vice-versa, as an ongoing priority

Recommendation B4: Regularly review the balance between external and in-house capabilities, because the use of external consultancies to provide forecasts makes engagement challenging.

Recommendation B5: Continue to improve the Transmission Cost Database (while significant progress has been made, the risk of under-estimating costs remains).

Recommendation B6: Consult earlier and wider for the 2024 ISP on this parameter, which did not receive the attention it deserved in this ISP cycle.

Recommendation B7: Consult earlier and wider for the 2024 ISP on the likely impacts on the power system of electrification to reach economy-wide decarbonisation objectives, which did not receive the attention they deserved in this ISP cycle.

Recommendation B8: Take a strategic approach to forecasting hydrogen (while stakeholders expressed a great deal of interest in the role of hydrogen, there is much uncertainty in demand for hydrogen from Australia's future export and domestic economies).

Recommendation B9: Calibrate the ISP to both the 'megatrends' of decarbonisation and decentralisation, with improved integration of distribution-level forecasts and uncertainties (particularly the uptake and use of customer-owned solar, batteries, EVs and other devices).

4.5 Management of uncertainty in inputs and assumptions

4.5.1 AEMO's approach to managing uncertainty in the IASR

The AER's Forecasting Best Practice Guidelines provide that:[33]

> *When developing its Forecasting Approach, AEMO must consider how it can best explain and present its… approach to reporting the uncertainties around forecasts, such as how measures of confidence and certainty will be communicated to stakeholders clearly and accessibly.*

No matter how much effort AEMO puts into developing the inputs and assumptions, it is inevitable that forecasts of those matters will not match reality, particularly later in the 30 year ISP modelling period. The aim should therefore be to develop a robust forecasting methodology that has broad stakeholder support and includes a range of mechanisms to manage the unavoidable uncertainty that is involved. For material inputs, this should include selecting a central value for the input plus a range of sensitivities to test the impact of changes in that input on the costs and benefits of potential ISP projects.

AEMO has taken a range of actions in the IASR to manage uncertainty in the material inputs and assumptions.

The reasonably large number of scenarios and sensitivities and the variation in the settings for the material inputs and assumptions in different scenarios and sensitivities will be a key tool for managing uncertainty. We welcome AEMO's decisions to include an increased spread in the values used for several highly uncertain inputs under different scenarios compared with the 2020 ISP, including gas prices, discount rates, DER uptake, energy efficiency uptake and

[33] AER, *Forecasting Best Practice Guidelines*, p15.

population growth. This will reduce the risk that these inputs are materially underestimated under most scenarios as was the case for some inputs such as DER uptake in the 2020 ISP.

We also support AEMO's use of multiple consultants for forecasting DER uptake. We recommend that a similar approach is adopted in future ISPs for other important but hard to forecast inputs. For its DER inputs, AEMO engaged two consultants that adopted different methodologies. The consultants each presented their draft results to stakeholders and sought feedback on them, and provided detailed reports that clearly set out all of their inputs, assumptions and methodologies. This contrasts with other material but hard to forecast inputs such as gas prices where AEMO only used one consultant and the consultant's report was relatively brief and its methodology relied on a number of subjective judgements and confidential information

Discount rates are also a potential tool for managing uncertainty. The choice of discount rate affects the value that is placed on benefits that are not forecast to occur until many years into the future and which may not arise if circumstances change. For example, if a new transmission interconnector was forecast to deliver $100 million of benefits in 20 years' time, that benefit would be valued at $67 million today under a 2% discount rate but only $15 million under a 10% discount rate.

We support the IASR's use of a very wide range of discount rates to test how they impact the costs and benefits of different potential development paths. As discussed above, AEMO's consultation on discount rates should be improved for future ISPs.

Despite significant improvements since previous ISPs, considerable uncertainty remains in relation to several key inputs. AEMO will need to carefully consider how to address this uncertainty in the draft ISP, for example how it uses sensitivities and how it weights the scenarios.

In particular, as discussed in section 3.3 above, the following material inputs and assumptions appear to have high levels of uncertainty:

- **Government energy and emissions policies:** Changes in government policies between the IASR and the final ISP, and over the ISP modelling period, remains a key risk that is not explicitly addressed in the IASR. AEMO should consult on how it will address the impacts of any material changes in government policies that occur between the IASR and the final ISP.
- **Transmission costs:** AEMO has made significant improvements to how it estimates the cost of transmission projects. However, there is still considerable uncertainty over those costs, particularly for large projects where there is a very limited data set of comparable

projects to inform AEMO's estimates and for future ISP projects where there has not yet been community consultation on the project and its route. Forecasts of transmission costs therefore remain a material area of uncertainty with significant potential risks for consumers if transmission costs are under-estimated and consumers face increased electricity prices to fund projects that may not have a net benefit if costs increase. We recommend that AEMO closely observes the costs of major transmission projects that are currently in the approval or development phase and updates the inputs for 2024 ISP based on those outcomes.

- **Hydrogen:** As discussed in section 3.3, the high level of uncertainty around hydrogen-related inputs and assumptions should be reflected in the weighting given to the Hydrogen Superpower scenario.

4.5.2 AEMO's approach to managing uncertainty in the ISP Methodology

The ISP Methodology is a critical document that sets out how AEMO will use the scenarios, inputs and assumptions to determine the ISP's 'optimal development path' (i.e. the set of projects that delivers the greatest net benefit) and the recommended 'actionable ISP projects' (i.e the projects that transmission businesses must progress to the regulatory investment test stage). The ISP Methodology sets out in detail AEMO's approach to market modelling, engineering assessments and the cost benefit analysis methodology for the ISP.

The publication of the ISP Methodology is a new requirement that applies to the 2022 ISP under the rules and the AER's Cost Benefit Assessment Guidelines. Consulting on and publishing a standalone ISP Methodology is a major improvement on the 2020 ISP where AEMO instead relied on a more general 'Market Modelling Methodologies' paper that set out it its approach to some aspects of its modelling for various AEMO reports at a much higher level.

AEMO published an ISP Methodology Issues Paper in February 2021 and a draft ISP Methodology in April 2021. It received submissions on the Issues Paper and Draft ISP Methodology and held consultation sessions with stakeholders to discuss those documents and the feedback it received. The final ISP Methodology was published at the same time as the IASR and we would encourage interested stakeholders to read both documents together.

As with the IASR, publishing the Consultation Summary Report was a very welcome initiative. The draft ISP Methodology was the first time AEMO published such a report as part of the ISP process. We also appreciate AEMO publishing a tracked-changes version of the ISP Methodology showing changes between the draft and final versions, which was requested by a stakeholder in its submission to the draft ISP Methodology.

We support the approaches set out in the ISP Methodology for undertaking the ISP cost benefit assessment and consider that they provide a strong base managing uncertainty.

AEMO proposes to adopt several approaches as part of the cost benefit assessment, including:

- **A 'scenario-weighted' average approach** as required by the rules. Under this approach, AEMO assesses the net benefits of various candidate development paths (i.e. each set of potential projects that AEMO is assessing) under each scenario. It then applies a weight to each scenario based on the relative likelihood of it occurring and determines a weighted average net benefit for each candidate development path using those weights.
- **A 'least worst regrets' approach**. This approach aims to identify the development path that would cause the least regret associated with under or over-investment considering the uncertainties reflected across the various scenarios. It does so by calculating the 'regret' based on the difference in net benefits between candidate development paths under different scenarios. This helps identify which development path is most resilient to changes in circumstances, e.g. a candidate development path may not have the highest net benefit under any individual scenario but be the least regret scenario because it places second under every scenario and its net benefits change very little between scenarios.
- **A 'weighted least worst regrets' approach**. This is a combination of the above approaches, where the regrets are weighted across scenarios. It can be useful so that the methodology does not rule out a development path that performs very well in almost all scenarios but has a higher regret in a very unlikely scenario.
- **Sensitivity testing**. AEMO will apply the sensitivities discussed in section 3.2 above to test how the net benefits change if key inputs such as gas prices, DER uptake or discount rates are varied.
- **A 'Take One Out at a Time' (TOOT) analysis**. This analysis involves a comparison of the total costs of the optimal development path with and without each specific 'actionable ISP project' (i.e. the recommended transmission projects). This analysis shows the maximum cost beyond which that project would no longer be beneficial to consumers.

The ISP Methodology explains these approaches reasonably clearly. However, as discussed in section 3.2 it does not set out a full list of the 'event-driven scenarios' or the sensitivities and it is not clear exactly how the scenarios and sensitivities will used and taken into account given there are so many of them.

The ISP Methodology also does not set out the weightings that will be applied to each scenario. The ISP Methodology explains AEMO's proposed approach to determining weighting. This is a good step and a significant improvement on the 2020 ISP where weightings appeared to be

determined subjectively by AEMO staff without any consultation before the draft ISP or any clarity of the process or criteria used.

The ISP Methodology explains that AEMO will determine weightings based on advice from a panel of experts and consultation with stakeholders. At the heart of this process will be a 'Delphi panel' , which is explained by AEMO as follows:[34]

> *The Delphi technique draws on an anonymous panel of up to 10 subject matter experts, both internal and external to AEMO, to rank the relative likelihood of each scenario using a questionnaire, and provide reasoning for their selection. Responses are collected, analysed, common and conflicting views identified, and shared with the panel. Panel members then have the opportunity to modify their original views based on the varying positions of other panel experts, with the goal being to reach consensus where possible.*
>
> *Following this process, a stakeholder workshop provides the opportunity for discussion with a broader range of stakeholders, seeking feedback on the reasonableness of weights proposed through the Delphi technique.*

We support AEMO's proposed approach, but how that approach is implemented will be critical and we expect to engage with AEMO further on this issue in the lead up to the draft ISP.

We are pleased that AEMO has adopted the recommendation made in submissions from the Consumer Panel and other stakeholders that Delphi panel should contain representatives of consumers. In our submission on the Draft ISP Methodology we stated that we did not consider it appropriate for the Consumer Panel to be a member of the Delphi panel but that it should contain at least one representative of small energy consumers and one representative of large energy users. We also welcome AEMO's comment in the Consultation Summary Report that it will engage further with the Consumer Panel and other stakeholders on the make-up of the Delphi panel.[35]

4.5.3 Recommendations for managing uncertainty (Strategic Recommendation D)

Recommendation D1: Continue to engage with stakeholders prior to the Draft ISP on the *Delphi Panel* process and how final weightings are set (the relative weightings applied to scenarios is a key piece of 'judgment' to be exercised before the Draft ISP is published).

[34] ISP Methodology, p88.

[35] ISP Methodology Consultation Summary Report, p25.

Recommendation D2: Consult on how to incorporate any material changes in government policies that occur between the IASR and final ISP. Governments are strongly encouraged to work closely with AEMO and provide as much detail as possible for incorporation into the Draft ISP.

Recommendation D3: 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

Recommendation D4: Engage with stakeholders prior to the draft ISP on proposed sensitivities or 'event-driven scenarios'; the IASR and ISP Methodology do not set out the full list, and what these are and how they are used may have a material impact on the draft and final ISP.

APPENDIX A: GAS PRICE FORECASTS

A.1 Introduction

The Panel's submission on the Draft IASR was very critical of the forecasts provided by AEMO's consultant:

- Failure to provide an explanation of why the forecasts differed in material ways to forecast from a different consultant 6 months earlier
- Very limited level of stakeholder engagement on the forecast
- Very limited transparency on the consultant's methodology which, apart from some high level explanation, was essentially a 'black box'
- The basis for key assumptions was opaque
- The potential impacts of key Government initiatives to bring more competition to the gas market were effectively ignored.

We were also critical of the limited stakeholder consultation allowed by AEMO – a short FRG meeting with a very high level presentation by the consultant and no opportunity for formal submissions on a proper draft report. The only option was a submission as part of a submission on the Draft IASR.

Other Draft IASR submissions also highlighted the lack of transparency. In our submission we referred to a range of questions sent to AEMO in mid-January to help us understand the consultant's report. We eventually received only some answers.

AEMO acknowledged several of these problems, some of which are likely to be inherent in any forecasts of gas prices due to the uncertainty involved and the proprietary nature of consultants' models. Despite these problems, AEMO appeared to have limited ability to get changes made to the consultant's report to provide more information addressing these matters. We understand that AEMO considered it was too late or outside the budget to commission another report.

AEMO did schedule a specific stakeholder engagement session with the consultant on 23rd April 2021, where the consultant sought to answer questions from stakeholders. AEMO declined the Panel's request for a separate session with the consultant prior to the 23rd April session.

This Appendix comments on the 23rd April engagement including AEMO's decision to undertake a low gas price sensitivity. It also makes some suggestions for improvement in the gas forecasting process in the 2024 ISP.

The overall conclusion is that the quality of stakeholder engagement on the forecasts was poor and well below expectations from the single stage process required under the Forecasting Best Practice Guidelines (FBPG)[36] .

Recommendations

ISP modelling

- Calculate and publish the 'break-even gas price' required to produce a change in the optimal development path.

Gas price forecasting in 2024 ISP

- Allow the Panel to comment on the draft consultant scope of work and participate in AEMO discussions with the selected consultant as they develop their Draft and Final reports
- AEMO to provide the selected forecaster with standard assumptions that are used elsewhere in the ISP modelling for consistency
- The forecast report to provide:
    - greater transparency on the modelling methodology to avoid the 'black box' concerns, and
    - More commentary on why forecasts have changed over recent years
- Ensure there is a single stage consultation process that provides for stakeholder submissions on a 'full length' Draft report.
- AEMO should consider developing an inhouse expertise in gas price forecasting if the 2022 ISP indicated that it is likely to continue being a material input.

A.2 Engagement webinar on 23rd April

The webinar was recorded and copies of the presentation and recording are available at https://aemo.com.au/energy-systems/major-publications/integrated-system-plan-isp/2022-integrated-system-plan-isp/opportunities-for-engagement.

Prior to the 23rd April session, participants were required to complete a questionnaire on their views about the consultant's report which was a condition of registration. This is not consistent with the FBPG and certainly not consistent with best practice engagement. Aside from that, the questionnaire did not recognise the problems with the report highlighted in submissions.

[36] See Appendix B "AER Forecasting Best Practice Guidelines" August 2020 www.aer.gov.au/system/files/AER%20-%20Forecasting%20best%20practice%20guidelines%20-%2025%20August%202020.pdf

Question 7 asked:

> "What is your view on the gas price forecasts published in the Inputs, Assumptions and Scenarios documentation?"

And we were offered the following options:

These questions did not recognise the problem that the LGA report's lack of information and black box methodology meant it was difficult to form an opinion on the forecasts. At the session AEMO presented that the questionnaire responses indicated that[37]:

> "…over 90% of attendees wanted to better understand the forecasts."

However, the reporting of the survey results from the 55 respondents during the session was misleading and used to claim that stakeholders supported the forecasts. For example, the responses to Q7:

	Too narrow	Good spread	Too wide	COUNT
Too low	2%	11%	2%	15%
About right	11%	38%	13%	62%
Too high	9%	7%	2%	18%
COUNT	22%	56%	16%	95%

showing 38% of the 55 respondents was interpreted as:

> "The stakeholder view from the pre-survey suggests the forecasts were about right with a good spread"

Further, it was claimed that:

> "This view was largely held across all stakeholder groups"

despite the 'about right/good spread' response varying from 13% for 'customer/consumer' group to 57% for 'Industry body/ T&D' (transmission and distribution) group.

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[37] AEMO "Gas Price Forecasting Webinar" 23 April 2021 slide 13 https://aemo.com.au/energy-systems/major-publications/integrated-system-plan-isp/2022-integrated-system-plan-isp/opportunities-for-engagement

Customer / Consumer	Too narrow	Good spread	Too wide	COUNT
Too low	0%	25%	0%	
About right	25%	13%	0%	
Too high	13%	0%	13%	
COUNT	38%	38%	13%	

Industry Body / T&D	Too narrow	Good spread	Too wide	COUNT
Too low	0%	0%	0%	
About right	0%	57%	14%	
Too high	14%	0%	0%	
COUNT	14%	57%	14%	

and despite variation in 'too narrow + too wide' from zero for 'Producer/Developer' group to 51% for 'Customer/Consumer' group.

Producer / Developer	Too narrow	Good spread	Too wide	COUNT
Too low	0%	38%	0%	
About right	0%	38%	0%	
Too high	0%	25%	0%	
COUNT	0%	100%	0%	

Customer / Consumer	Too narrow	Good spread	Too wide	COUNT
Too low	0%	25%	0%	
About right	25%	13%	0%	
Too high	13%	0%	13%	
COUNT	38%	38%	13%	

When participants expressed the view that the responses were of limited value, AEMO responded that 'they were not important'. Overall, the Panel considers that this was a poorly designed questionnaire that was presented in a misleading way. Including a 'Don't know' option would have allowed much greater understanding of stakeholder's understanding, and more appropriate reporting of these statistics.

The consultant's presentation on 23rd April provided some additional clarity on the sources of model inputs which should have been more fully explained in the report rather than in yet more summary slides in a presentation.

For example, the applicability of the Nash Cournot methodology to what is happening in the market was opaque. It was not clear how the realities of producer/retailer market power, repeatedly highlighted in regular ACCC gas reports, were reflected in the forecasts. In the session the author agreed that market power was not transient and:

> "…the level of competition tends to be pretty static…"

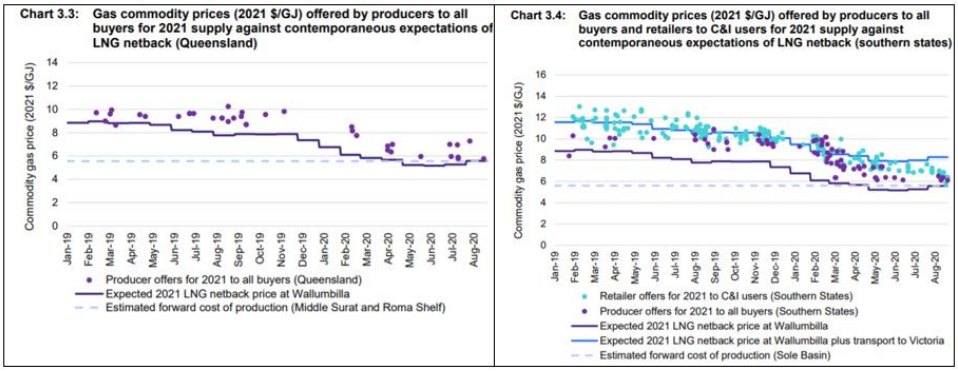
This is a very interesting observation and should have been discussed further in the report.

Another example was how LNG exports influenced the price forecasts. The LGA approach seeks to capture the impact of LNG exports on domestic prices without having to assume netback pricing. The author said:

> "Netback pricing to me is still a hypothesis. No one seems to have clearly demonstrated that it happens and certainly contract prices don't seem to vary fully up and down with the netback price... that the ACCC has definitely proved and so they are going to investigate some alternative form of calculating the netback…"

This comment was surprising given this data from the ACCC's January 2021 report[38].

[38] See www.accc.gov.au/system/files/Gas%20Inquiry%20-%20January%202021%20interim%20report_3.pdf



The ACCC's LNG netback pricing review commented[39]:

> "Our preliminary findings, presented in the January 2021 interim report, suggest that suppliers continue to view LNG spot prices as an indication of the opportunity costs of supplying the domestic market. …Further, their domestic pricing assumptions – and those of other domestic suppliers – appear to have been influenced by LNG netback prices using supplier assumptions about the prices of such LNG contracts as a reference price."

When questioned about his statement cited above, the author sought to clarify his earlier statement:

> "I didn't say it doesn't have an impact but that I have modelled it differently…I don't just assume that it has an impact and I don't assume that prices have to be exactly equal to that, I take into account all the other domestic factors as well…"

The author's logic seems to be that there would be occasions eg when netback prices are very high, that domestic prices would be below LNG netback. A review of the ACCC reports over the last few years found offer prices were rarely below forecast LNG netback whether that netback was high or low.

The most debate in the 23rd April session was around the failure of the report and the presentation to clearly discuss the two competing scenarios that are likely to drive gas prices over the forecast period – net zero by 2050 and the Federal Government's gas led recovery.

On the former, the author was asked if the model considered the impact of a significant fall in demand that would flow over the next 30 years from a net zero by 2050 target and responded that:

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[39] "ACCC Review of netback price series – Issues Paper" 18 March 2021 p. 28 www.accc.gov.au/regulated-infrastructure/energy/gas-inquiry-2017-2025/lng-netback-price-series-review

> "We didn't run any scenarios with significant falls (in demand) like you are talking about…"

The author also noted that the demand forecasts used in the price forecasts were the AEMO 2020 GSOO demand forecasts which did not show any significant decline in consumption to 2050. Such forecasts do not seem consistent with a net zero by 2050 scenario.

We were also informed in the session that the central case forecast did not include any impact from the Federal Government's gas strategy – the central case does not include any new gas production because:

> "…we don't know whether that Government policy is going to succeed…"

This approach used by LGA to account for the potential impacts of current or future government policies is at odds with the approach taken by AEMO on many other key inputs in the IASR where AEMO or its consultants explicitly considered the impacts of potential future government policies on the forecasts under each IASR scenario.

The author's explanation then referred to running scenarios eg connection of the Moranbah reserves to the Wallumbilla to Gladstone pipeline. In this case even though the gas is likely to be reasonably competitive, the modelling concluded that it would not make much difference to prices in the south (no mention was made on the impact of prices to Queensland customers). The author commented:

> "…these are things we test a lot but don't say everything that we're doing…in many ways it is too much to report…"

While we have some concerns about the forecasts themselves, our major concern is about the absence of a timely explanation of the modelling 'black box'. This detail should have been at least presented for discussion in the FRG presentation[40] and discussed in detail in the final report that was far too lightweight. Given it was not in the final report, it should have been articulated in the presentation on 23rd April without requiring detailed questioning to elicit. This would have allowed much timelier and more informed stakeholder engagement on the forecasts.

Following the consultant's presentation, AEMO briefly presented other data on gas prices to try to benchmark the forecasts against:

1. Core Energy forecasts for the 2020 ISP

[40] For example, the FRG was on 30th September 2020. The Prime Minister's Gas Fired Recovery Statement was on 15th September 2020. LGA's report was submitted in December 2020.

2. Recent ACCC Gas Inquiry data
3. Energy Quest forecasts for Electranet's case for Project Energy Connect (PEC) where gas savings were core to the PEC business case.

We consider that AEMO's engagement in relation to the use of these benchmarks was insufficient, with the comparisons offering little support for the consultant's forecasts. In any case, the use of such 'benchmarks' can be misleading.

- The Core Energy forecasts were considered 'reasonably consistent'. This was not obvious in the small graphs briefly shown but we were unable to obtain the data behind the graphs. No attempt was made to compare the forecasting methodology of the two forecasters.
- The ACCC data was only recent contract prices for 1-3 year contracts and we wonder how they can be a useful benchmark for 20 year forecast prices
- The Energy Quest data only referred to South Australia. The scaling of the graph visually suggested a small difference but it seemed to be ~$2-3/GJ which can have a material impact on the modelling. We were unable to obtain the data behind the graph from AEMO.

A.3 Low Gas Price Sensitivity

Given the timetable, AEMO had limited options to address stakeholder concerns about the transparency and robustness of the gas price forecasts. It decided to reduce the lowest forecasts by approximately $1/GJ to produce a 'low gas price sensitivity' to the modelling.

The Final IASR says (p.97) that this reduction was based on a view of increased competition in the domestic market from increased supply options and pipeline infrastructure. While there is some relationship to the Wood Mackenzie cost of production data that was prepared for the 2021 GSOO, the message at the 23rd April session was that it was 'not a forecast', simply an indication of how low gas prices could be pushed down for the purposes of a sensitivity. The price was flagged in the 2021 GSOO with the impact seen mainly in increased gas fired generation[41]. In a subsequent ISP engagement, other stakeholders expressed concern at the lack of rigor in the selection of the sensitivity price.

[41] https://aemo.com.au/-/media/files/gas/national_planning_and_forecasting/gsoo/2021/2021-gas-statement-of-opportunities.pdf?la=en See p. 17

While we have some concerns about the robustness of the assumptions used to choose the level of the low gas price sensitivity, we support the concept of a low gas price sensitivity and look forward to seeing how material it will be in the modelling of the ODP.

We would suggest that in the modelling, irrespective of whether applying the gas price sensitivity results or does not result in a change in the ODP, AEMO should calculate the gas price at which a change does occur. This will help show how sensitive the results are to gas prices. As discussed in the main body of our submission, we also recommend that AEMO provides more clarity on how it will use the various different sensitivities in its modelling, as there is currently very little information on this issue in the ISP Methodology. For example, if application of the gas price sensitivity indicates a change in ODP from DP 1 to DP 2 but application of higher DER uptake rates (another sensitivity) shows that DP 3 is optimal and the higher discount rates sensitivity shows DP4 is optimal, how will AEMO apply its judgement to make the final ODP decision?

A.4 Recommendations for the 2024 ISP

We make five suggestions:

1. Allow the Panel to comment on the draft consultant scope of work and participate in AEMO discussions with the selected consultant as they develop their Draft and Final reports
2. AEMO to provide the selected forecaster with standard assumptions that are used elsewhere in the ISP modelling that would be relevant to gas price forecasting eg oil price forecasts. At the 23rd April session LGA sought to justify use of its own oil price forecasts because credible public forecast are not available. However, many are eg US EIA and the IEA[42].
3. The forecast report to provide:
    a. greater transparency on the modelling methodology to avoid the 'black box' concerns, and
    b. More commentary on why forecasts have changed over recent years
4. A more comprehensive stakeholder engagement on the consultant's 'full length' Draft Report to meet the FBPG requirement for 'single stage' consultation. The process in the 2022 ISP did not meet this requirement – the use of the submission process on the Draft IASR was not that one stage given the LGA report was finalised prior to the publication of the Draft IASR and there was no intention of amending that final LGA report as a consequence of Draft IASR feedback.

[42] See https://www.eia.gov/outlooks/aeo/pdf/AEO2020%20Full%20Report.pdf and https://www.iea.org/reports/world-energy-outlook-2020

5. AEMO should consider developing an inhouse expertise in gas price forecasting if the 2022 ISP indicated that it is likely to continue being a material input. AEMO finds only a limited pool of forecasters available to bid on the business - private forecasters are always going to be reluctant to provide details of their modelling methodology as it is their intellectual property. A lack of in-house expertise means that:
    - stakeholders engaging with AEMO are always going to be unable to fully test the forecasts AEMO relies on, and
    - where the forecaster for one GSOO/ISP cycle is different from the forecaster used in the previous cycle, comparison of forecasts will be very difficult

    AEMO has built a high-quality in-house capability in many other aspects of the gas industry as part of its GSOO work; its forecasting methodology, like its ISP methodology would be transparent and open to discussion and challenge by stakeholders; this would also allow stakeholders to transparently compared successive forecasts to understand reasons for changes. The AEMO forecasts can then be utilised by other parts of the gas supply chain and regulatory authorities in their work.

APPENDIX B: 2021 TRANSMISSION COST REPORT[43]

B.1 Introduction

B.1.1 Background

A number of stakeholders expressed concern about the lack of AEMO engagement on capex costs during preparation of the 2020 ISP. They argued that this led to a high level of uncertainty of the cost estimates and was not consistent with a narrative that sought to justify billions of dollars of network expenditure. While AEMO sought to qualify the conclusions through comments such as[44]:

> *"Provided that the transmission investments are timely and kept at an efficient level, the combined supply and network investments proposed in the ISP are expected to deliver $11 billion in net benefits to the National Electricity Market (NEM)"*

this had little impact on the public narrative of many stakeholders around a rush to build. The RIT-T process was almost considered irrelevant in the minds of these stakeholders with complaints from some quarters that project scrutiny was getting in the way of the required investment. 'It must be built now because the ISP says so'.

The experience of Project Energy Connect galvanised many other stakeholders into seeking more robust cost estimates for the 2022 ISP. The benefits claimed in the Draft 2020 ISP were based on a capital cost estimate for PEC capex of $1.53b, the Final 2020 ISP was based on a capex estimate of $1.99b. The eventual contingent project approval was for $2.3b[45].

The experience of the PEC cost blowout led to a number of stakeholders – Energy Users Association of Australia (EUAA), Delta Electricity, Major Energy Users, Inc, ERM Power Limited (now Shell Energy Operations Pty Ltd) and AGL Energy Limited - to propose a rule change[46] around what occurs when there is a material change in network costs. This rule change is now being considered as part of the just commenced AEMC Transmission Planning and Investment Review (TPIR)[47]. The rule change proposed:

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[43] Available from www.aemo.com.au/consultations/current-and-closed-consultations/transmission-costs-for-the-2022-integrated-system-plan

[44] See p.8 https://aemo.com.au/-/media/files/major-publications/isp/2020/final-2020-integrated-system-plan.pdf?la=en&hash=6BCC72F9535B8E5715216F8ECDB4451C

[45] https://www.aer.gov.au/networks-pipelines/determinations-access-arrangements/contingent-projects/transgrid-and-electranet-%E2%80%93-project-energyconnect-contingent-project

[46] https://www.aemc.gov.au/rule-changes/material-change-network-infrastructure-project-costs

[47] https://www.aemc.gov.au/market-reviews-advice/transmission-planning-and-investment-review

- the AER, rather than the sponsoring network, should be the determining authority for the requirement to re-apply the Project Assessment Conclusion Report (PACR) stage of the RIT-T if there is a 'material' increase in costs after the PACR stage,
- a definition of 'material' that depended on the size of the project eg transmission network proposals up to $0.5b, 15% and for projects above $0.5b, 10%, and
- for transmission projects with a capital cost of less than $150m the AER would be able to waive any requirement for re-evaluation.

The prime objective of the proposed rule change was not to force networks to re-do the PACR but to provide an incentive to get more accurate capex estimates in the first place in the RiT-T cost benefit analysis. The more accurate they are the less chance there will be of having to re-do the PACR. The more accurate the capex estimate, the more accurate the decision on the preferred option. Indeed, the proponents consider that the rule change would be a success were the AER never to determine that there was a material change requiring re-opening of the PACR.

These definitions of 'material' were informed by analysis of the Association for Advancement of Cost Engineering (AACE) International classification system for defining the level of accuracy of a cost estimate based on the amount of design work that has been completed. This system has five levels of accuracy ranging from Class 5 (least accurate) to Class 1 (most accurate)[48].

Based on the rule change proponents' experiences in the private sector, they argued it was reasonable for stakeholders to expect the PACR cost estimate to be at a Class 2 estimate. In the AACE framework this would mean that 30-75% of the scope of the project has been defined and the expected accuracy range at an 80% confidence interval is negative 5-15% on the low side and positive 5-20% on the high side[49]. Then the Contingent Project Application would be a Class 1 estimate. This does not remove the chance of additional costs during construction which the TNSP can seek ex post recovery of additional costs if the AER deems them 'prudent and efficient', though the commencement of the AER's Guidance note to support efficient delivery of actionable ISP projects will hopefully reduce that risk.

HumeLink is now experiencing the same stakeholder concerns, perhaps in a bigger way. The largest ISP project has had its capital cost increased nearly 250% from $1,350m in the PADR (January 2020) to $3,317m in the PACR (July 2021). Lines and substations costs more than doubled from $1,030m to $2,380m and biodiversity costs nearly trebled from $320m to $935m.

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[48] https://web.aacei.org/docs/default-source/toc/toc_18r-97.pdf

[49] As we explain below this is a wider range than proposed by AEMO as it sought to adapt the AACE framework to the NEM.

We have seen an expansion in the use of cost classification descriptors by AEMO and TNSPs, but there is no standard approach and there is not requirement from the AER under the RiT-T rules. TransGrid self-describes the $3.3b PACR estimate as a 'Class 4' estimate though the criteria used are not the same as the AACE.

Given this background, AEMO's work, drawing on the detailed GHD analysis, to develop the Transmission Cost Database (TCD) for the 2022 ISP is to be applauded. It has been a significant amount of work that has resulted in greatly increased knowledge and transparency on transmission capex costs.

This Appendix begins by discussing AEMO's approach to transmission cost estimation and then we discuss a range of issues that arise.

B.1.2 Conclusions

a. The use of the AACE classification for cost estimation is welcomed but it requires a lot of work on definitions and descriptors to be as robust as AEMO implies

While the move to adopt a version of the AACE cost classification system is welcome, its adoption has been haphazard and confusing to consumers. Different definitions and cost accuracy ranges make it very difficult to understand and compare capex estimates.

b. The TCD 'black box' of 22 network elements does not provide the level of support for the capex estimates that AEMO claims

We conclude that while the TCD contains a wealth of useful information, it does not provide the required support for the approach AEMO has taken on ± cost variability at different stages or the selection of the mid-point of these estimates for ISP modelling to determine net benefits. The problems start with the lack of transparency around the GHD calculations for the 22 network elements chosen for analysis. Then concerns include:

- the decision to not have any factor in the accuracy band for Future ISP projects to account for any potential 'market impact' ie the potential cost pressures from multiple projects being built at the same time as other construction activity in the economy,
- the increasing importance of costs associated with the 'social licence' (property, easement and environmental offsets) to build large transmission projects and the lack of confidence in the 'known risk' allowance for environmental offsets.
- the 'megaproject' effect where recent project history in Australia suggests the larger the project, the greater the cost overrun, and
- the lack of transparency from Transgrid on cost estimates

- selection of the mid-point of capex estimates for calculation of net benefits in the ISP modelling.

We examine each of these factors in more detail.

c. The GHD proposed cost accuracy ranges at PADR/PACR Class 5, 4 and 3 are far too narrow

AEMO and TNSPs are the victims of a "Catch 22" situation. Because TNSPs are only doing Class 4 type estimates even at the final stage of the RIT (PACR) process, they have not completed important elements of the work which could increase the costs considerably e.g. route selection and engagement with landowners, to enable an accurate estimate of 'social licence' costs of land acquisition and biodiversity. So it should not be surprising that we are seeing large changes in costs from project selection in the ISP through the various RIT-T stages and finally to the and CPA stage. The cost estimates for the subsequent stage are outside of the limits proposed for the previous stage

We briefly examine three case studies – Humelink, Western Victoria Transmission Network Project (WVTNP) and Project Energy Connect. Cost accuracy ranges at early stages are far too narrow are not decreasing with each iteration of the RIT process as suggested by the GHD accuracy bands. Selection of the mid-point based on a PADR or PACR estimate cannot be justified for the calculation of the net benefits in this context. Further the WVTNP should not be an 'anticipated' project in the 2022 ISP given the uncertain land acquisition/biodiversity costs.

d. Market impact on transmission costs should not be ignored

AEMO's argument to ignore these costs for Future ISP projects – where constraints on resource availability mean high costs – because they will occur at some time in the future, is weak. We are not confident that the 'unknown' risk component is sufficient.

This is one factor in the 'megaproject' impact which GHD seems to have ignored. We draw on data from a recent Grattan Institute report showing the risk around cost blowouts even after a cost level has been approved ie the equivalent of the CPA stage for ISP projects. While the recent AER Guidance Note on the regulation of actionable ISP projects may provide some mitigation, we remain to be convinced.

e. The lack of transparency from TransGrid is a contributing factor to our conclusions

It is unfortunate that TransGrid, alone among TNSPs, chose to only provide confidential capex estimates to AEMO. This meant AEMO was unable to use that data to ensure a degree of consistency across TNSP estimates. What happens in NSW is central to the whole ISP and yet TransGrid has chosen to provide data in a way that leads consumers to question their

commitment to a robust ISP process that can gain consumers support. We would support a consistent framework for cost estimation under the rules that would avoid these confidentiality issues and expect this will be a matter for consideration in the AEMC's Transmission Planning and Investment Review.

f. Selection of the mid-point of network capex estimates for calculation of net benefits in the ISP modelling is flawed

This is because the GHD symmetrical cost accuracy range is flawed. This conclusion suffers from the same 'black box' problems of the 22 projects analysed by GHD. AEMO's argument that it needs to compare all technologies – transmission, generation and storage on a like for like basis and this justifies using mid-point estimates ignores the fact that the cost estimates for generation and storage are generally Class 1 or 2 estimates, not Class 3,4 or 5. This places non-network options at a distinct disadvantage to network options for selection as a preferred option. We consider that the selection of a single point estimate needs to reflect the uncertainty of the costs of a network option and therefore the single point estimate should be closer to the high cost point than the mid-point.

g. AEMO should publish the break-even capex cost for all ISP projects that do not have CPA approval

For the 2022 ISP, we support AEMO calculating and publishing the 'break-even' capex cost for projects in the optimal development path as was done for VNI West in the 2020 ISP. We believe that TNSP concerns around this not being in consumers interests as contractors can 'game the system' can be addressed. If project components are bid competitively, knowing the total breakeven cost point would be immaterial.

h. AEMO continue to develop the TCD in the lead-up to the 2024 ISP

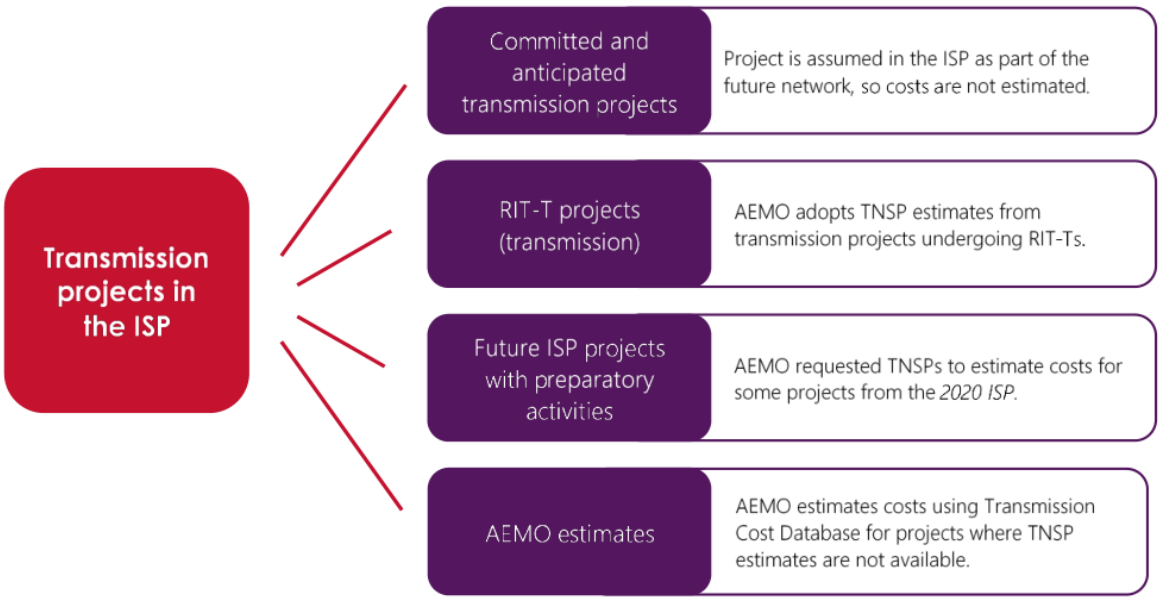
We recommend that AEMO continues to improve its approach to transmission cost estimation for the IASR for the 2024 ISP, including addressing these issues above. This would require a more comprehensive and transparent consultation process with stakeholders.

B.2 AEMO's Approach

B.2.1 Project categories

AEMO considers four project categories in assessing ISP capex:

Figure 1 AEMO's approach to incorporating transmission projects in the IASR



(i) Committed and anticipated projects eg Central West Orana REZ, QNI Minor, WVTNP and Project Energy Connect are included in all modelling scenarios with cost not a consideration.

(ii) RIT-T projects eg HumeLink, Marinus, VNI West – modelled as augmentation options with cost estimates provided by relevant TNSPs. Given the different approaches taken by TNSPs to cost estimation, AEMO reserved the right to adjust the provided costs:

"…to ensure uncertainty and risks are applied consistently across investment options."

AEMO was unable to do the same adjustment to TransGrid costs as TransGrid did not provide the required level of detail. This meant the accuracy and class of estimates are shown as 'unknown'.

(iii) Preparatory activities eg QNI medium and large, Reinforcing Sydney, Newcastle and Wollongong – these cover preparatory activities for future ISP projects eg high level design and costing. Again the TransGrid declined to provide data in a form that was transparent. So AEMO used the TCD to estimate its own costs based on the TransGrid project scope.

(iv) AEMO Cost estimates covering projects not yet examined by TNSPs and cover two categories – flow paths across the network's back-bone and REZs.

B.2.2 Methodology

The Transmission Cost Report comments (p.10):

> *"Cost estimates progress from a very early stage with little design or information known (least accurate) to a fully costed and engineered estimate built up over years (most accurate).*

In the early stages, allowances are used to account for the fact that the work scope is not well defined, project approvals have not yet been obtained, and component costs may not be market-tested. As projects mature and the scope of works is further defined, more of the cost is assigned to the base estimate, reducing the size of allowances for risks and uncertainties."

AEMO adopted the AACE classification system as the starting point for its cost estimation methodology. It is noted that current RIT-T rules do not prescribe the class or accuracy level of cost estimates through the ISP, RIT-T and contingent project application process. The TCD was used to develop two sub-categories of Class 5 costs:

- Class 5b – concept level scoping with no site specific review or TNSP input
- Class 5a – Screening level scoping including high level site-specific review and TNSP input

The table summarises AEMO's assessment of TNSP cost estimates into the AACE class estimates (excluding TransGrid) and how AEMO sourced the cost data to be used in the ISP[50]:

	Future ISP Projects	**Preparatory activities for future projects**	**Project Assessment Draft Report (PADR)**	**Project Assessment Conclusions Report (PACR)**	**Contingent Project Application (CPA)**
Class	Class 5b or 5a	Class 5a or 4	Class 4 or 3	Class 4 or 3	Class 3 or better
Cost source for ISP modelling	Transmission Cost Database (TCD)	Primary cost estimate from TNSP, cross checked with TCD	Primary cost estimate from TNSP, cross checked with TCD	Primary cost estimate from TNSP, cross checked with TCD	Not required for committed projects

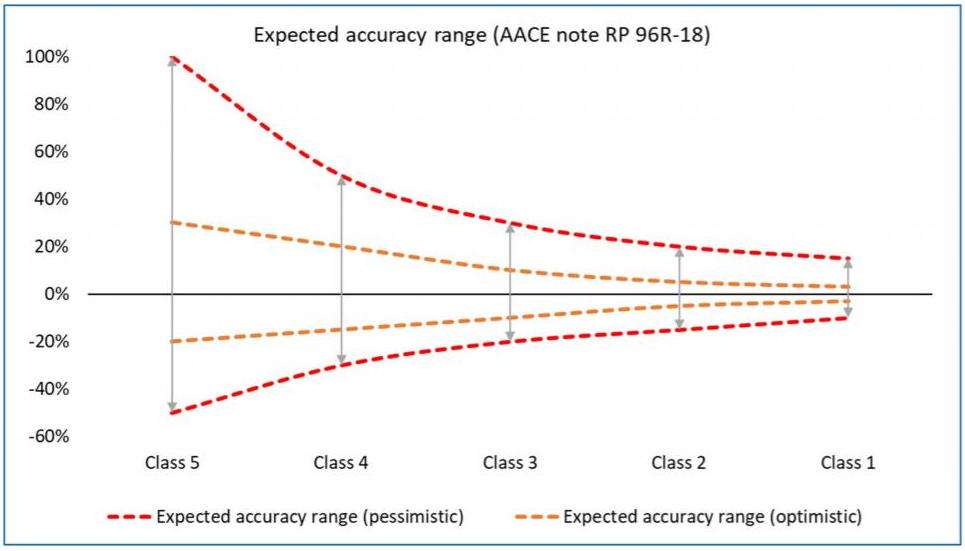
B.2.3 Developing a Transmission Cost Database (TCD)

AEMO engaged GHD to develop the TCD for the primary purpose of developing Class 5a and 5b capex estimates for Future ISP Projects. GHD's starting point was the AACE cost classification system[51]:

[50] See Table 6 in Transmission Cost Report

[51] See p. 27 https://aemo.com.au/-/media/files/stakeholder_consultation/consultations/nem-consultations/2021/transmission-costs-for-2022-isp/transmission-cost-database-ghd-report.pdf?la=en

Figure 9 Expected accuracy range – starting point



which has the following expected accuracy range with 80% of all past estimates falling within the upper and lower bounds:

Class 5	Class 4	Class 3	Class 2	Class 1
L: -20% to -50% H: +30% to +100%	L: -15% to -30% H: +20 to +50%	L: -10% to -20% H: +10% to +30%	L: -5% to -15% H: +5% to +20%	L: -3% to -10% H: +3% to +15%

GHD[52]:

> *"…used this information as a starting position which has been further informed and refined from recent Australian transmission infrastructure augmentation project cost data."*

as the project progresses from PADR to CPA stage and noted:

> *"…this is mostly based on progressive updates to these recent project cost estimates, rather than actual or incurred cost records. In few instances some elements of these project estimates were based on newly executed contracts or competitive market bids. In the remainder of cases these project cost estimates were based on increasingly detailed or updated information."*

The Class 5 estimates were based on the addition of several components:

- building block approach for each class of known costs (to build a baseline),
- adjustments for project specific attributes,
- known risks,
- unknown risks, and

[52] See Transmission Cost Database p.10

- indirect costs

Cost estimates were developed in a deterministic way. There are approximately 650 unique building blocks in the Cost and Risk Data workbook grouped into 3 network element categories (station, overhead lines and underground cables) and 26 sub-categories in total. Once the base data was assembled, 22 network elements (9 stations and 13 overhead line) were for benchmarking the cost estimation tool. The GHD database also includes components not covered by these 22 projects eg easement/ property/offsets cost components based on their data base of projects and different jurisdictional requirements eg offset costs are higher in NSW.

For the 'known risks', 9 known risk factors for each of three categories (station, overhead lines and underground cables) were used in the TCD. These were estimated based on experienced judgement and historical project data and only include risk categories that the AER will accept within final revenue determinations.

For the 'unknown risks', 4 unknown risk factors (also referred to as 'contingency') for each of the same three categories were estimated using a 'top-down' percentage of network element costs. Based on the data for the change in capex from PADR to CPA for the 22 projects, the cost changes over time were asymmetrical ie probability of overrun is higher than the probability of underrun. Of the 9 station sample, costs went down in three and up in 6. Of the 13 overhead lines, costs went down in one and up in 12. This latter result was expected as network costs are more variable. In the case of projects where cost decreases occurred, insufficient data was supplied by TNSP's for GHD to determine if initial costs had been overestimated, or if the project design requirements were downgraded resulting in cost savings.

This was considered by GHD to be:

> *"…a reasonable approach given the lack of major transmission augmentation project works in the NEM in recent history and thus the absence of actual cost information."*

This data is then used to develop an 'accuracy range' for each cost class. As the project progresses through the project development cycle, the level of known costs increases and the level of known and unknown risks falls so the level of accuracy increases ie ± bands decrease.

This led to an estimate of 15% on average to be added to the 'known' costs and 'known risks' to reflect 'unknown risks' for a Class 5 estimate to reflect a 50% probability of overrun and underrun of the expected final project cost. GHD then linearly extrapolated the 15% to get the

level of unknown risk for other classes[53]. The bands are much narrower than the standard AACE bands presented above.

Table 8 Total unknown risk factors, on average, at different cost estimate classes and associated accuracy range

Cost estimates	Class 5	Class 4	Class 3	Class 2	Class 1
Total unknown risk factor	~15%	~9%	~4%	0%	0%
Accuracy range	±30%	±20%	±15%	±10%	±5%

In commenting on the data in the table, GHD note that[54]:

> *"… the improving accuracy range as the cost estimate matures have been formed based on linear extrapolation of recent NEM projects early stage cost estimate accuracy range and the AACE RP 96R-18 optimistic accuracy range for more advanced stage cost estimate (as shown in Figure 9). We note that this representation of improving accuracy range is mostly academic and based on observation of recent NEM projects as their cost estimates matured. Given the lack of major transmission augmentation project works in the NEM in recent history and thus the absence of empirical actual cost information allowing the estimate vs actual cost analysis (with benefit of hindsight), further conclusive insight into the improving accuracy range is unavailable. As such the data in the following table should be viewed in this context."*

This gave a total Class 5 variation of ±30%. Following stakeholder feedback on the draft report Class 5 estimates, GHD differentiated actionable ISP projects (ie ones that are already under investigation in a RiT-T now or where the TNSP is required to commence a RiT-T following publication of the ISP) from Future ISP projects (ie projects that are in the ISP's optimal development path but are not required to start a RiT-T process within the next 2 years). Various cost outcomes were considered for the same 22 elements with GHD extrapolating the data and statistically calculating the accuracy band that would achieve 1 in 3 projects exceeding the original estimate by 50-100%'. This led to a second sub-category of Class 5 - Class 5(b) with a ± 50% band. The difference between Class 5(a) and Class 5(b) is the level of scope definition - greater in the former than the latter.

GHD's overall conclusion was that 80% of project estimates should fall within the following bands for Class 5 estimates[55].

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[53] See GHD May 2021 p.30

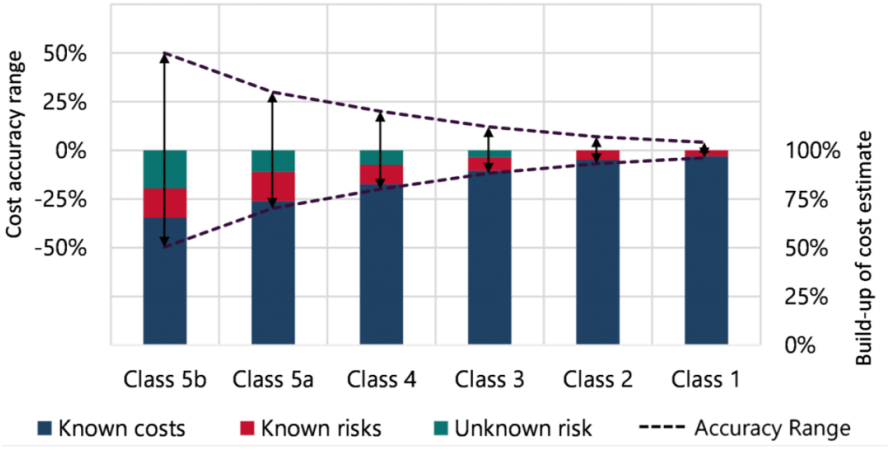
[54] GHD May 2021 p.30

[55] TCD p. 15

Table 7 Class 5 estimate sub-categories

Class	Definition	Unknown risk allowance[2]	Accuracy[1]
Class 5b	Concept level scoping with no site-specific review or TNSP input	30%	±50%
Class 5a	Screening level scoping including high level site-specific review and TNSP input	15%	±30%

This figure summarises the outputs of GHD's analysis for all classes.



The end result was lower and symmetrical accuracy bands which AEMO proposes allowed the use of the mid-point estimate for costs in the ISP modelling.

B.2.4 Property and environmental offset costs

These costs are a function of the site or land footprint needed, the locational characteristics of the land and the project risk profile.

B.3 The Panel's view

B.3.1 The use of the AACE classification for costs estimation is welcomed but it requires a lot of work on definitions and descriptors for it to be as robust as AEMO implies

While we welcome the move towards the use of a cost classification system, the proposed system is very confusing and potentially misleading, more so because there is no consistency across TNSPs.

- GHD's TCD process has purportedly resulted in narrower Class accuracy ranges than the AACE accuracy ranges despite the challenges in developing the process
- The 'indicative' classes used by TNSPs (and shown above in Table 6) are not comparable, despite AEMO's attempts to get some comparability using the TCD – they simply reflect AEMO's view of current individual TNSP practice, many of which do not formally use the AACE classification internally

- TNSPs continue to make claims about this or that project cost estimate is a 'Class x' that have accuracy ranges different again form both the AACE classification and the GHD TCD

Transgrid's description of the HumeLink PACR was[56]:

> *"We consider our cost estimates to be 'class 4' estimates, which is in-line with the level of accuracy expected at this stage of the investment process. For example, AEMO commented during the consultation process on its transmission cost database that the cost certainty at the PACR stage is typically between -30 per cent and +50 per cent ('class 4' estimates)…"*

And then Transgrid went on to say[57]

> *"We consider that the capital costs used in the PACR analysis are 'P50' estimates i.e. they have a 50 per cent expected probability of cost underrun."*

So, it is unclear if the estimate is class 4 or P50 and what is Transgrid's view of the relationship between both. If it is a class 4 with that accuracy band then it is closer to the AACE Class 4 accuracy bands (-10% to – 20% to +20% to 50%) than the GHD accuracy bands of ±~20%. The use of different terminology is very confusing to the reader. How are we to compare P50 with AACE class and then what accuracy range?

Further, while Transgrid may say that Class 4 estimates are 'in-line with the level of accuracy expected at this stage of the investment process' we consider that this is not a level of accuracy that allows consumers to express an informed view in the engagement process. It is also not consistent with our experience in the private sector project development process.

B.3.2 The TCD 'black box' of 22 network elements does not provide the level of support for the capex estimates that AEMO claims

The key challenge for AEMO in accurately estimating the costs of ISP transmission projects is that there have been no large network projects in the NEM since the completion of Basslink in 2005 and QNI in 2001. As a result, it is much more difficult to accurately estimate the cost of large ISP transmission projects. Basing the cost of large ISP transmission projects on other much smaller projects that have been undertaken in the NEM over the last 10-20 years is inherently risky.

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[56] Transgrid "Reinforcing the Southern Shared Network to increase transfer capacity to demand centres" (Humelink) PACR 29 July 2021 p 24 https://transgrid.com.au/what-we-do/projects/current-projects/Reinforcing%20the%20NSW%20Southern%20Shared%20Network/Documents/TransGrid%20HumeLink%20PACR.pdf

[57] ibid

The PEC experience shows that costs for large projects can blow out significantly. When the AER undertook its clause 5.16.6 review of the RIT-T for PEC, ElectraNet advised that the capex estimate was a Class 4 which[58]:

> *"…implies that only 1 to 15 per cent of the scope of the project has been defined."*

If it was an AACE Class 4 then the range was –30% to +50%. The proposition that cost uncertainty over time falls did not apply to PEC. When the contingent project application finally came, the applied for cost had increased to $2.33b - and increase of 52%. The proponents did not specify what class estimate this represented[59] but the 2021 Transmission Cost Report Tabe 6 suggests "Class 3 or better" which, if it was an AACE class, has a range of -10% to +30%. A $2.33b capex at the PACR stage would probably have led to the project failing the AER's 5.16.6 review.

In its recent consultation paper for the Transmission Planning and Investment Review, the AEMC identifies this increased uncertainty in estimating the costs of major transmission projects as a significant issue:[60]

> *"The design of the planning framework for ISP projects builds on the ISP canvassing options at a relatively high-level, which are then further refined through the RIT-T and subject to a single revenue determination process through the CPA."*
>
> *Embedded within this approach to planning and approving transmission investments is the assumption that uncertainty regarding project benefits and costs reduces as the project progresses through the regulatory process. However, this reduction of uncertainty may not be occurring in relation to major discrete transmission projects.*
>
> *Further, stakeholders appear to agree that actionable ISP projects are more uncertain than BAU transmission projects. This is because the unique size and scale of these projects, coupled with the pace of the energy transition, results in intrinsic uncertainty associated with both the benefits and costs of many major transmission projects. This uncertainty stems from...*
>
> - *in relation to project costs, the scale and size of the investments because:*
>   - *there has not been recent experience of projects of the scale and size contemplated, meaning there are few best practice examples off which to benchmark*

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[58] See p. 79 https://www.aer.gov.au/system/files/AER%20-%20Determination%20-%20SAET%20RIT-T%20-%2024%20January%202020.pdf

[59] See the discussion at pp 19-22 https://www.aer.gov.au/system/files/TransGrid%20-%20Project%20%20EnergyConnect%20-%20Principal%20Application%20-%2029%20June%202020.pdf

[60] AEMC, Transmission Planning and Investment Review Consultation Paper, pp21-22.

- *the specific route design of a transmission line can substantially affect its costs, but this process is dependent on external environmental approval and planning processes – the timing and cost of which may not be controllable by TNSPs."*

GHD note[61]:

> *"Given the lack of major transmission augmentation project works in the NEM in recent history and thus the absence of empirical actual cost information allowing the estimate vs actual cost analysis (with benefit of hindsight), further conclusive insight into the improving accuracy range is unavailable."*

The actual 22 network elements GHD used in its statistical analysis are confidential. We do know that they were drawn from a range of TNSP and AER sources and reflected projects from Class 5 to Class 3[62]. As GHD do emphasise[63]:

> *"In the future as the major transmission augmentation projects are delivered and completed in the NEM, this analysis should be revisited based on comparison of cost estimates with actual incurred costs."*

This hedging by GHD, the lack of details on the projects chosen and Transgrid's decision not to be transparent on costs with AEMO have contributed to stakeholders being unable to properly scrutinise the methodology. Hence the Panel is unable to share AEMO's level of confidence in the results. In particular we believe that much more data transparency is required to justify:

- a move from the 'standard' Class 5 range (0-2% project definition and low range of -20 to -50% and an upper band of +30 to +100%) to the proposed ±50% and ±30%
- the narrower expected accuracy range for other classes based in linear extrapolation, and
- use of this accuracy range to justify selection of the mid-point cost for ISP modelling.

We discuss these issues in more detail below.

B.3.3 The GHD proposed cost accuracy ranges at PADR/PACR Class 5, 4 and 3 are far too narrow

Cost increases in RiT-T projects are being driven by both changes in 'conventional' infrastructure eg line and substation costs, and increasingly by the 'social licence' costs associated with land acquisition and biodiversity. The significant increase in the latter category

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[61] See p.30 https://aemo.com.au/-/media/files/major-publications/isp/2021/transmission-cost-database---ghd-report.pdf?la=en

[62] GHD p.22

[63] GHD p.30

is why we do not accept the proposed symmetrical ± accuracy ranges that drive the selection of mid-point costs for modelling.

Social licence costs were much less of an issue back when QNI and Basslink were built and further back when other major transmission lines were being built (eg Victoria's 500kV link between the La Trobe Valley and Portland had a significant cost overrun without the current 'social licence' issues). These issues have increased significantly in importance in recent years as the scale of network construction has expanded and community expectations of compensation, land degradation and environmental amenity have changed. Networks are finding considerable hurdles in negotiating land access with increasing cost risks. Biodiversity costs are similarly increasing and increasingly uncertain as new legislative requirements come into play.

While the database does seek to account for these costs, we are not convinced that it does in a way that justifies the lower accuracy ranges developed by GHD (vs the standard AACE ranges) and choice of the mid-point cost estimate for net benefit modelling purposes. As GHD notes[64]:

> *"Biodiversity – greenfield projects impact threatened species with high offset values, not able to be fully understood until significant work is undertaken."*

So how can a Class 5, 4 or 3 class estimate have a narrow (vs AACE cost accuracy levels) symmetrical cost outcome?

AEMO and the TNSPS are caught in a 'Catch 22' situation - because TNSPs are only doing Class 4 type estimates even at the PACR stage, they have not completed the work eg route selection and engagement with landowners, to enable an accurate estimate of land acquisition and biodiversity costs. It should not be surprising that we are seeing large changes in costs between the PACR and CPA stages. Cost accuracy ranges at early stages seem to be far too narrow.

We draw on three examples to illustrate our approach:

(i) Humelink

This is the most expensive ISP project and subject to considerable dispute with a range of stakeholders about its route through the Snowy Mountains National Park and other areas considered to have significant environmental value.

[64] GHD p.5

The PACR (July 2021) estimated capex for the preferred option 3C is $3,317m[65], a nearly 250% increase compared with the PADR (January 2020) estimate of $1,350m. Lines and substations increased 230% from $1,030m to $2,380m and biodiversity costs increased nearly 300% from $320m to $935m. The PACR estimate is classified as a Class 4 estimate (thought again unclear if it is an AACE Class 4 or a GHD Class 4) and hence still has a considerable degree of uncertainty.

These costs are being driven by the level of biodiversity offset costs. The range of options presented in the PACR showed these costs varied from 24-44% of total capex – with 28% for the preferred Option 3C.

$m	1A	1B	1C	2B	2C	3B	3C
Lines and substations	1470	1990	1725	3150	2585	2560	2380
Biodiversity	1060	1320	1340	1150	815	1220	935
Total	2530	3310	3065	4300	3400	3780	3317
Biodiversity as % of total	42	40	44	27	24	32	28

The importance of these costs was recognised by TransGrid establishing an Office of the Landowner and Community Advocate earlier this year[66]. The Office's review between April and June resulted in many recommendations implemented by TransGrid to improve their engagement. It remains to be seen how implementing these recommendations impact the next capex estimate.

(ii) Western Victorian Transmission Network Project

As we noted above this is an 'anticipated' project (it has met three of the five criteria under the AER's CBA Guidelines) that is assumed to be part of the future network and hence AEMO does not estimate capex costs[67].

[65] Transgrid "Reinforcing the Southern Shared Network to increase transfer capacity to demand centres" (Humelink) PACR 29 July 2021 pp 15-16 https://transgrid.com.au/what-we-do/projects/current-projects/Reinforcing%20the%20NSW%20Southern%20Shared%20Network/Documents/TransGrid%20HumeLink%20PACR.pdf

[66] www.transgrid.com.au/news-views/lets-connect/stakeholder-engagement-program/Office%20of%20the%20Landowner%20and%20Community%20Advocate/Pages/default.aspx

[67] It should be noted that AEMO as the Victorian TNSP did carry out its assessments of the net benefit of the project before seeking tenders for it. AusNet was the successful tenderer and presumably provided a price that still resulted in net benefits assessed within the AEMO PACR for the project

There is currently a dispute between landowners and AusNet Services on the proposed route[68]. AusNet has an obligation to consider undergrounding as part of its Environmental Effects Statement as well as the RiT-T options analysis. A report commissioned by Moorabool Council concluded that[69]:

> *"It was determined that not only is a HVDC system utilising underground cables a technically feasible alternative, but it is also likely to be more reliable and efficient for the movement of renewable energy to major centres whilst presenting significantly reduced impact to social and environmental factors."*

The consultant estimated the cost of undergrounding at ~ $2.7b, or five times the cost of the preferred overhead towers option. The Council claimed that AusNet had previously indicated that undergrounding might be ten times the cost[70]. Even at five times the cost this would more than offset the claimed benefits and result in the line not being built. AEMO comments that[71]:

> *"HVAC underground cable is suited to lengths below approximately 50 km. Beyond 50 km length, AC lines at high voltage level will be subject to very large charging currents, requiring significant reactive compensation and design considerations."*

While compulsory acquisition is always the fallback, it is poor engagement practice to do so. There is a risk of significantly increased costs – either through higher land purchase costs or a change of route if the network is not willing to exercise compulsory acquisition. And those costs may not be known until late in the final design and construction phase. Although AusNet has provided a notionally 'firm' contract price for the project, if there are significant changes to meet the social licence costs then these costs will be passed through to consumers. While the risks around the more conventional parts of the TCD[72], may decrease over time as the Class moves lower, the risks around social licence costs may well increase as greater definition of the line route is finalised. AEMO's RIT-T assumed an overhead line route in calculating the net benefits that may disappear with an alternative route developed to address social licence issues

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[68] See https://www.abc.net.au/news/rural/2021-06-30/western-victoria-transmission-network-project-proposal/100254178

[69] Amplitude Consultants "Western Victorian Transmission Network Project High-Level Alternative HVDC Scoping Project" https://www.moorabool.vic.gov.au/files/content/public/about-council/large-projects-impacting-moorabool/western-victoria-transmission-network-project/wvtnp-high-level-hvdc-alternative-scoping-report.pdf

[70] See https://www.abc.net.au/news/2021-06-22/moorabool-shire-transmission-line-report/100231730

[71] Transmission Cost Report p.23

[72] See GHD "ISP Transmission cost Database" 7 May 2021 p.7

While AEMO's classification of this project as 'anticipated' may meet the AER's definition under the CBA Guidelines, we think that the project should have its cost updated to reflect current estimates of land acquisition and biodiversity costs.

(iii) Project Energy Connect

The impact of uncertain biodiversity costs can be shown by the Project Energy Connect capex forecasts submitted to the AER last year as part of the contingent project application. The table summarises the capex forecast from the initial application to the AER in June 2020[73] and the revised Best and Final Offer (BAFO) provided to the AER in September 2020[74]:

	$(2017-18) m		**% of total capex**	
	June 2020	**BAFO September 2020**	**June 2020**	**BAFO September 2020**
Property and easements	$109.5	$109.5	4.8%	5.8%
Environmental offsets	$74.7	$139.4	3.2%	7.3%
Risks - biodiversity	$122.1	$122.1	5.3%	6.5%
Sub - Total	$306.3	$371.0	13.4%	19.6%
Total Capex	**$2,290.9**	**$1,894.6**		

The updated numbers showed a significant increase in the share of these two components to nearly 20% of the total costs. These updated costs reflect[75]:

> *"…updated expert reports from Jones Lang LaSalle (JLL) and WSP on property and easement costs and environmental offset costs, which reflect the new PEC route via Dinawan, the current process of acquisition negotiations and on-site investigations"*

These costs also included the same level of biodiversity risk.

[73] See https://www.aer.gov.au/system/files/TransGrid%20-%20Project%20%20EnergyConnect%20-%20Principal%20Application%20-%2029%20June%202020.pdf

[74] See Table 2.2 p.5 https://www.aer.gov.au/system/files/TransGrid%20-%20A.5A%20-%20PEC%20-%20Supplementary%20Capex%20Forecasting%20Methodology%20BAFO%20-%2030%20September%202020.pdf

[75] Ibid p. 1

The JLL report[76] dated August 2020 makes clear that it is a complicated process as routes change and consultation is undertaken. Even at this CPA stage:

- While individual Assessments of Compensation have been assessed for Stage 3, between Balranald and Four Corners, no direct engagement and socialisation of compensation with affected property owners had yet occurred
- A high-level review of design options for Stage 4, between Four Corners and Wagga Wagga is underway but not completed
- Option agreements had only been negotiated with 30% of the 81 land owners along the NSW part of the route

Table 2.0 Number of Option Agreements per Stage

STAGE	SECTION	NO. OF OWNERS	NO. OF OPTION AGREEMENTS
1	Border to Buronga	17	12
1A	Buronga to Red Cliffs	13	1
2	Buronga to Balranald	25	11
3	Balranald to Four Corners	26	-
4	Four Corners to Wagga Wagga	TBD	-

JLL commented that time pressures on project development increase the risk of higher levels of compensation being required.

> *"The timelines for requiring access to land for construction activity (possession of site) and subsequent project delivery in general has the greatest bearing on the extent to which a proponent is prepared to negotiate a voluntary commercial agreement in excess of valuation."*
>
> *It follows that the tighter the delivery timeframe for access to land for construction purposes, the less time is allocated to negotiating voluntary commercial agreements with directly impacted landowners and subsequently agreed compensation will be inflated to a greater degree above valuation.*
>
> *Landowners and their advisors in the current environment are very astute and are more cognisant of their ability to drive a higher compensation amount if proponents are under pressure to achieve access to land in a short timeframe.*
>
> *This is particularly evident in instances where a proponent has insufficient time to acquire land and easements by compulsion."*

[76] See www.aer.gov.au/system/files/Transgrid%20-%20JLL%20Report%20Land%20Acquisition%20Costs%20Revised%20-%2025%20August%202020.pdf

Project Energy Connect is represented publicly as a project that has to be built quickly. As TransGrid notes in its CPA application to the AER[77]:

> *"The timing for the submission of this Application is driven by our commitment to meet our contractual obligations to the SA Government in accordance with our early works agreement with them."*

The AER eventually concluded that[78]:

> *"We found that the majority of the easement and land acquisition costs are likely reasonably estimated…"*

The Panel had the opportunity to meet with Re-alliance and discuss their recently released Community Benefits Handbook[79]. The need for deep engagement with local communities on social licence issues is well recognised by stakeholders. Progress is required on joint development of relevant standards that might apply to gain the support of these local communities to network investment. In the absence of these standards, cost estimation will be very difficult. We understand that AEMO has initiated discussions with Re-alliance and we encourage those discussions to continue.

B.3.4 Market impact on transmission costs should not be ignored

There is a risk of higher costs when a particular project is being built at a time of significant construction activity that means competition for inputs. AEMO's argument (see Section 2.7 p.26) is that given the Future ISP Projects are to be completed at some point into the future years, it is impossible to know whether they will be subject to multiple coincident project risk and hence there is no allowance for this risk in the Class 5(b) estimates. Class 3 and 4 estimates would have these allowances included.

AEMO notes that it has joined with Infrastructure Australia to commission the University of Technology Sydney to work on improving Government's understanding of these issues[80]. We do not consider that the 'promise to do a study' is sufficient reason for ignoring that risk in Class 5 and 4 estimates now. It should have been considered as an unknown risk.

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[77] See p. 1 https://www.aer.gov.au/system/files/TransGrid%20-%20Project%20%20EnergyConnect%20-%20Principal%20Application%20-%2029%20June%202020.pdf

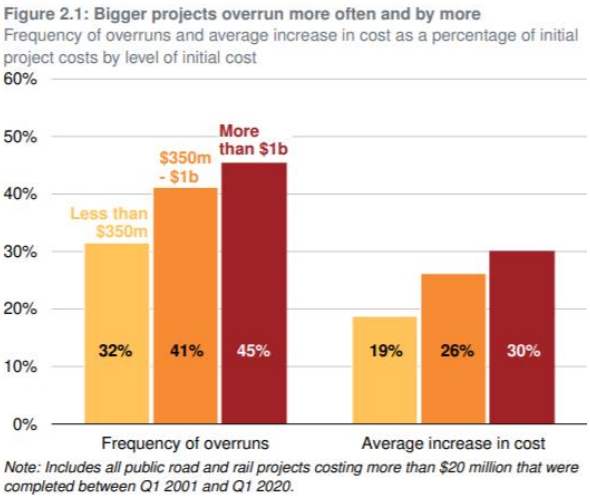
[78] See p. 21 https://www.aer.gov.au/system/files/AER%20-%20Final%20Decision%20-%20TransGrid%20-%20Project%20EnergyConnect%20Contingent%20Project%20-%20May%202021.pdf

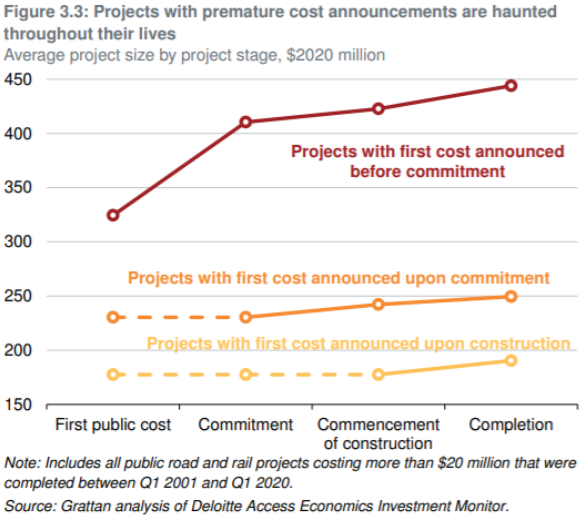
[79] See https://www.re-alliance.org.au/community_benefits_handbook

[80] ISP Methodology – Consultation Summary Report 30 July 2021, p18, 2021 Transmission Cost Report p26

It is not obvious how GHD have dealt with 'large project' risk. The Grattan Institute recently published a research paper on the risks of cost escalation on 'megaprojects'[81]. While the focus was road and rail projects, we consider the evidence very relevant to network projects. The analysis compared the published cost at the time of project sanction (effectively the equivalent of the CPA) with the published actual cost for all public road and rail projects competed form Q1 2021 to Q1, 2020. The main conclusions included:

- the larger the project the greater the cost overrun and
- a few large projects account for most of the overrun – often the overrun is equal to a large project size itself.
- costs can increase significantly even after contracts are let depending on the contract conditions
- The earlier the project (and its estimated cost) is announced, the larger the overrun





B.3.5 The lack of transparency from TransGrid on cost estimates is a contributing factor to our conclusions

We agree that TNSPs are best placed to estimate costs for all project stages beyond the Future Project stage. Given that TNSPs take a variety of approaches to cost estimation, another advantage of the database was that AEMO was able to use it to ensure a degree of consistency across TNSP estimates. However, unfortunately TransGrid's approach to only providing costs on a confidential basis meant that AEMO was unable to undertake this consistency test for two major projects – HumeLink and the NSW works on VNI West. AEMO notes that (p.8):

[81] https://grattan.edu.au/wp-content/uploads/2020/11/The-Rise-of-Megaprojects-Grattan-Report.pdf

"As the information provided did not allow AEMO to transparently confirm these classifications, the accuracy and class of the estimates are stated as 'unknown' in this report."

This is disappointing and reduces the confidence that consumers can have in the ISP modelling. As AEMO comments (p.8):

"The ISP regulatory framework is designed to be transparent and consultative for all stakeholders…"

B.3.6 Selection of the mid-point of network capex estimates for ISP net benefit modelling is flawed

In our submission on the Draft IASR we provided the following table showing the significant range of capex for a range of projects in the 2020 ISP. The upper limit was close to double the lower limit. AEMO provided no explanation on why it selected the mid-point. As we noted above, the size of this range renders consumer engagement around what is the preferred option on the basis of costs, benefits and NPV, almost meaningless.

Project	Range ($m)	Maximum as % of Minimum	Midpoint chosen in 2020 ISP ($m)
VNI West Option 6	1,211-2,249	186	1,730
VNI West Option 5	1,687-3,133	186	2,410
Marinus 2*750MW	2,209-4,102	186	3,156
QNI Medium	1,481-2,750	186	2,116
HumeLink	1,407-2,730	194	2,069
PEC	1,393-2,587	186	1,990

AEMO have addressed this issue by GHD constructing the TCD in a way that AEMO considers gives symmetrical cost accuracy ranges for each class. The same limitations of the 'black box' 22 projects and its calculation of known and unknown risks plus the discussion around social licence costs leads the Panel to conclude that there is insufficient justification for the symmetrical cost accuracy band and selection of the midpoint for net benefit modelling. The AACE classification levels are not symmetrical and have a higher upside that downside which we believe supports our concern. The PEC experience discussed above showed costs always went up as project definition went up.

In correspondence AEMO has argued that it is important to compare technologies on a like for like basis. They argue this requires using a mid-point for all cost estimates – transmission, generation and storage. We can accept this principle if the costs estimates were the same class

for all three. But they are not. The CSIRO approach to measuring the generation and storage capex is quite different to the TCD. CSIRO describe their approach as[82]:

> *"Our preferred definition of current costs are the costs that have been demonstrated to have been incurred for projects completed in the current financial year (or within a reasonable period before). We do not wish to include in our definition of current costs, costs that represent quotes for delivery of projects in future financial years or project announcements."*

This approach suggests a Class 1 estimate or at worst Class 2 for the estimation of non-network options. It seems an unequal playing field for AEMO modelling to be comparing midpoints of Class 5/4 estimates for network vs Class 1/2 estimates for batteries. We illustrate this with an example of two competing projects delivering the same outcome – one will definitely cost $1b using a non-network solution, and the other, a network option costs $975m ±50%. Under the RIT-T and ISP frameworks, we understand that the $975m project will be generally considered optimal. In the Panel's view that does not make sense, particularly when you consider that the network option is suitable only for a static location and has an extended life of 50 to 60 years vs the ability for the non-network option to be relocated if the assumptions used in the ISP needs analysis are shown to be erroneous over time.

B.3.7 AEMO should publish the break-even capex cost for all ISP projects that do not have CPA approval

For the 2022 ISP, we support AEMO calculating and publishing the 'break-even' capex cost for projects in the optimal development path. We believe that TNSP concerns around this not being in consumers interests as contractors can 'game the system' can be addressed. If project components are bid competitively, knowing to total breakeven cost point would be immaterial.

B.3.8 AEMO continue to develop the TCD in the lead-up to the 2024 ISP

We recommend that AEMO continues to improve its approach to transmission cost estimation for the IASR for the 2024 ISP, including addressing these issues above. This would require a more comprehensive and transparent consultation process with stakeholders.

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[82] See CSIRO "Gen Cost 2020-21" Final Report June 2021 p.16 https://www.csiro.au/en/news/News-releases/2021/CSIRO-report-confirms-renewables-still-cheapest-new-build-power-in-Australia

APPENDIX C: SELECTION OF THE DISCOUNT RATE TO BE USED IN THE ISP – A CASE STUDY IN ENGAGEMENT

The Panel identified the selection of the discount rate to be used in the ISP to be a significant material variable – a 'foundational' part of the analysis.

In our submission on the Draft IASR we argued that the proposed AEMO approach did not meet the requirements of the AER CBA Guideline for a range of reasons, including:

- It used a discount rate form the ENA's RIT-T Handbook as the central case rather than assessing the appropriate private sector discount rate as required by the Guideline
- There was insufficient justification for the selection of the lower rate for the Slow Growth scenario.

We recommended that AEMO should:

- commission an independent analysis of:
    - an appropriate private sector discount rate to be used as the central case which would consider the range of rates, and
    - an appropriate upper bound discount rate
    - what adjustments, if any, should be made for different scenarios
- present a transparent analysis of:
    - the calculation of the lower bound discount rate,
    - the decision to reduce the WACC by 2% for NSW Roadmap generation projects and
    - undertake stakeholder engagement on both the independent report and the transparent analysis

AEMO engaged very well with the Panel as it developed the scope of work for the consultant, particularly on the deliverables and the timetable. Our suggestions on the deliverables were driven by a desire to meet the AER Forecasting Best Practice Guideline (FBPG) and ensure stakeholders apart from the Panel had a chance to engage and provide written input within the tight timetable. Here is our view on what actually happened compared with the agreed scope of work and deliverables.

Deliverable 1 – Draft Report - On or before Friday 7 May 2021

The Consultant shall provide a Draft Report that provides the Consultant's draft determinations regarding the components to the scope of work. This includes all workings and justifications for each of the positions that the Consultant recommends for the defined scope.

In producing this Draft Report, all calculation methodologies should be clearly formulated. If appropriate the Consultant should provide the formulation of its approach to AEMO in Excel form.

It is required that The Consultant quantifies any of their own assumptions in delivering its draft determinations.

Panel's view of what occurred:

- Panel wrote to AEMO on 23 April expressing our strong desire to be involved in the discussions AEMO was having with Synergies leading up to the delivery of the Draft Report.
- Draft report provided on 9 June

Deliverable 2 – Stakeholder meeting(s) - Mid-May 2021 (to be confirmed)

The Consultant is required to participate in no fewer than three key meetings as part of the scope of work. This includes:

- *an internal workshop, including relevant AEMO staff and the ISP Consumer Panel, to discuss the applied methodology outlined in the draft assumptions report, and draft insights. This workshop's purpose would be to educate and confirm that the methodology is appropriate for the purpose, and highlight key initial views and insights*
- *A small webinar discussion with external stakeholders (who have self-selected as interested in discount rates), and/or*
- *A briefing and discussion with the Executive Joint Planning Committee (EJPC), which comprises a forum of key senior stakeholders within each transmission businesses.*

AEMO and the Consultant will agree on project commencement the details of these stakeholder meetings, and some of these may be combined. In proposing for this scope of work, the Consultant should allow at least four hours of direct stakeholder engagement, not including any preparatory activities for them.

Panel's view of what occurred:

- We were advised by AEMO on 18 May that there would be a meeting with Synergies and AEMO on 28 May and that material for review would be provided ahead of this meeting.

- AEMO provided 5 slides from Synergies on 26 May saying they had not received the Draft Report. These slides provided a very high level summary of the initial conclusions with little on the methodology so it was difficult to have a fully informed discussion on 28 May.
- The very robust and adversarial session with Synergies failed, in the Panel's view, to meet the requirements of best practice engagement. Synergies mentioned that they had a number of discussions with AEMO prior to the 28 May which may have explained why the Panel had the impression that AEMO seemed to be agreeing with the Synergies proposals. The Panel was not involved in any of these earlier discussions.
- The Panel provided feedback to AEMO on the session expressing our concern at the lack of transparency and the need for much greater detail on Synergies methodology.
- The Panel received the Draft Report on 9 June from AEMO, the same day they had received it from Synergies. In sending us the draft, AEMO said that they would use the draft to gain feedback from the Panel, the AER and EJPC and consolidate a final report from this. AEMO also indicated that they will be unable to seek broader stakeholder feedback and did not envisage a second round of consultation with the updated final report.
- This meant that there was not going to be either the webinar with external stakeholders nor a more detailed internal workshop with the Panel.
- The Panel provided a detailed submission on the Draft Report to AEMO on 24 June requesting the opportunity to engage further with Synergies and AEMO. This submission made a number of critical comments:
    - Synergies did not meet the scope requirements in drawing their conclusions; their calculation methodology for specific parameters in the WACC calculation failed to acknowledge the often contentious nature of the approach they took with other competing views either not mentioned or quickly dismissed
    - AEMO had left the consultation process to too late in the IASR development process and this was exacerbated by Synergies failure to meet the agreed scope timetable - overall the process did not meet the FBPG
- We are aware of a couple of other submissions that were made but these have never been made public.
- AEMO advised the Panel on 2 July that feedback from all parties, including AEMO, had been provided to Synergies. AEMO sought a follow-up 'information' session with Synergies some time in the next fortnight for Synergies to explain how they had taken the feedback into consideration in reaching their final position. When we questioned the benefits of a 'for information' session, given the Scope of Work, AEMO replied that the

consultation (with Synergies) had finished. AEMO did note that it is not obliged to accept what consultants recommend and hence they were still open to hear the Panel's views esp on how sensitivity testing might be used.

- The proposed 'for information' meeting with Synergies did not occur.

Deliverable 3 – Updated Report - On or before Friday 21 May 2021

- *The Consultant is required to provide an Updated Draft Report (in Microsoft Word format), building on the Draft Report in Deliverable 1, and reflecting feedback or clarity provided within the Stakeholder meetings.*
- *AEMO will provide reviews of each of the draft and updated draft reports taking into consideration the Consumer Panel's and external stakeholders input, and provide feedback to the Consultant.*

Panel's view of what occurred:

- We were provided with the Updated Draft report on 16 July and asked to comment on how Synergies had characterised our feedback and whether we were happy for the references to the feedback staying in the Synergies report.
- The Panel responded with:
    - three examples of where the Updated Draft refers to the Panel's submission and then puts its (Synergies) views
    - ten examples where the Updated Draft reflected the Panel's submission but without acknowledgement or explaining why they disagreed
    - two examples where our submission was misrepresented
- The Panel was advised on 26 July that following our feedback, various references to the Panel's submission were deleted from the final Synergies report.

Deliverable 4 – Final Report - On or before Friday 4 June 2021

The Consultant is required to develop a Final report, based on the updated draft report.

The final report must:

- *Address feedback provided to earlier reports*
- *Address insights and feedback provided by stakeholders, and incorporate any matters of clarification arising from stakeholder discussion(s)*
- *Be suitable for publishing on the AEMO website*

AEMO will review the final report and provide any further feedback to The Consultant, taking into account the Consumer Panel's input, to incorporate prior to publication on AEMO's website.

The Consultant is to assist AEMO with publication/post-publication enquiries, as needed, including from industry, government and media.

APPENDIX D: CONSULTATION FEEDBACK

Theme	Description based on open responses and consumer forums
Stakeholders want meaningful and genuine engagement	There is a perception among some stakeholders that engagement is disingenuous, either because their input is not reflected in decision-making or because engagement methods appear to be exercises in box-ticking. Those who expressed dissatisfaction with engagement activities – be it timing, facilitation, the information provided or the opportunity to provide feedback – were more likely to say they did not feel their feedback was listened to or considered during development of the 2020 ISP. Respondents expressed a desire for genuine listening, open minds, a willingness for AEMO to hear alternative views and explanations when stakeholder views were not supported.
Stakeholders want plain English information and more information to help them provide informed input	Effective stakeholder engagement provides participants with the information they need to participate in a meaningful way. Respondents indicated a need for more information provided more regularly or as it is released, especially as it related to the scope of the ISP and modelling and assumptions used. They also requested more plain English information for stakeholders without a technical background.
Stakeholders want engagement to be flexible and designed in consultation with them	There was a strong desire from those already engaging with AEMO for greater flexibility and alternative ways to provide input and feedback. Many noted a lack of resources or time to prepare written submissions and would like to see a greater mix of formal and informal methods used. This included interviews online, by phone or in person, the return of face-to-face workshops and focus groups.
Engagement needs to be inclusive	The limited sample size and distribution of the survey was reflected in the survey responses themselves, with respondents suggesting a greater need for AEMO to be inclusive of all stakeholder groups. This included a call for greater representation from developers and consumer groups and the offering of incentives for consumer advocates to be involved.
Engagement needs to be relevant and current	Stakeholders are time-poor and want to be engaged in discussions that are relevant and focused. This includes presenting materials so they are useful for stakeholders for whom electricity regulation is only part of their remit or role. They also want AEMO to focus on actual market developments and challenges and employ a less conservative approach to the ISP. For example, one stakeholder said a large number of their members are experiencing current connection delays and this meant they

Theme	Description based on open responses and consumer forums
	had no resources left for ISP type engagement on longer term planning.
Engagement should be undertaken in a timely way	This applied both to the engagement process – starting early, at significant stages or on the release of significant reports and data – and to the duration of specific engagement activities. The timing and duration of activities, especially workshops and webinars, was an issue for many people who felt there was not enough time to discuss matters or for everyone to have a say. Stakeholders expressed they also want more regular "push" communication and updates as it relates to the development of the ISP, and any available drafts provided to stakeholders early. Although this does need to be balanced with the issues of relevance, some stakeholders were more supportive of updates only when something had changed rather than at a set regular occurrence.
Engagement outcomes should be shared and transparent	Communicating to stakeholders how their input affected or influenced decision-making is a key but often forgotten requirement of effective engagement. Stakeholders expressed a desire for AEMO to "close the loop" and provide clearer and more direct communication that details how stakeholder input has been considered.

Due to AEMO's reliance on the FRG as the primary means of engaging on the inputs and assumptions, we have considered the FRG as the main engagement channel against the FBPG.

Principle	**What AEMO must consider**	**Panel's observation**
Facilitate effective discussion	Facilitate effective discussion at workshops, public forums and engagement with individual stakeholders by providing sufficient time to digest any materials or information provided to them beforehand. This aligns with the principle of recognising that adequate time and resources are necessary for consumers to engage effectively.	AEMO aimed to send materials to FRG members in advance of meetings. However, often the materials that were circulated were limited to relatively high-level slide packs. When detailed consultants' reports were circulated, they were only circulated a few days before the meeting. The information also generally did not highlight which issues were material for the ISP to facilitate effective discussion that was focussed on key issues.
Account for stakeholder time and resource constraints	Account for the time and resource constraints that consumer groups and other stakeholders face when developing a consultation strategy	AEMO undertook some targeted engagement outside of the FRG on certain issues, but most engagement on the IASR inputs and

Principle	**What AEMO must consider**	**Panel's observation**
	or program. For example, it might be valuable to facilitate consumer engagement by dedicating specialist internal resources to this task and/or by sufficiently resourcing the Consumer Panel. This aligns with the principle of proactively building consumers' capacity when a matter's complexity is hindering engagement. Capacity building, in this context, should recognise the importance of long-lasting relationships with consumers to improve their skills and understanding of the material.	assumptions occurred in the FRG. There was no capacity building to enable new stakeholders to engage meaningfully in FRG materials. Some ISP Panel members found it difficult to become registered to attend FRG meetings, despite multiple requests to join, or to engage in the often highly technical discussions.
Tailor stakeholder involvement when required	Be aware of when more stakeholder involvement or collaboration is warranted, rather than relying too heavily on more base-level forms of consultation (such as informing/reporting), so AEMO can tailor its engagement approach to achieve desired objectives. Ideally, these factors would form part of a consumer engagement strategy developed in consultation with stakeholders. In any case, it is best practice to be clear about which engagement approach is being adopted and why (for example, via reference to the IAP2 spectrum).	The FRG is a useful base-level form of consultation for AEMO's forecasting activities. It enables AEMO to engage with forecasting experts and interested and knowledgeable stakeholders from within the energy sector who have significant time to devote to attending regular meetings and understanding highly technical content. However, it is very limited in its usefulness as a tailored engagement tool for reaching a broad range of stakeholders needed for the IASR and ISP more broadly.
Employ a wide range of engagement strategies	Employ a wide range of engagement strategies to receive appropriate feedback from individual stakeholders with unique detailed perspectives up to and potentially including large facilitated workshops. In doing so, AEMO should be flexible about how it engages, with a view to meaningfully bring stakeholders into the process.	The FRG is not an effective forum for engaging with stakeholders with unique detailed perspectives. To engage effectively on the IASR, AEMO needs to look beyond the FRG to get a broad range of perspectives on key inputs and assumptions that require engagement with different stakeholders such as public policies, decarbonisation, the impacts of climate change, energy efficiency, electrification of other sectors and hydrogen. AEMO did not appear to try to identify stakeholders with expertise in those areas and proactively invite them to join FRG meetings on those issues or engage

Principle	**What AEMO must consider**	**Panel's observation**
		with them separately outside of the FRG process.
Seek regular feedback	Seek regular considered feedback from stakeholders on the efficacy of the engagement process.	AEMO sought some feedback on how to improve FRG meetings and trialled different approaches; This resulted in a number of improvements to the FRG meetings, including: allowing more time for Q&A from participants, reviewed the use of slido for questions/comments due to the technical limitations that affect the discussions and stakeholder input.
Provide information to serve stakeholder objectives	Make relevant and timely information available to stakeholders with a view to achieving stakeholder-centric objectives. For instance, information provision in the ISP context should be with the view to: • allowing stakeholders to understand the key inputs and assumptions driving the results, so that they are capable of replicating and/or interrogating the results • provide accountability by ensuring the mechanics and assumptions behind AEMO's analysis are transparent • provide stakeholders with the opportunity to provide timely input throughout the process, so they are capable of positively influencing the results • subject to confidentiality obligations, allowing stakeholders to access similar data to promote balanced discussion, where otherwise some stakeholders would have materially more influence than others.	AEMO largely complied with this principle, but could do more to allow stakeholders to understand which inputs and assumptions are most material to the ISP results and focus discussion on those material issues. This could include AEMO staff providing a short covering slide pack identifying the material issues, specific areas where feedback is sought and how the forecasts will be used in the ISP and other AEMO publications, rather than just having consultants provide detailed presentations on their methodology and results.

APPENDIX E: ISP AND CONSUMER PANEL FUNDING

The National Electricity Rules were amended in 2020 to re-allocate recovery of AEMO's National Transmission Planner (NTP) costs from Market Customers (i.e Retailers) to Transmission Network Service Providers (TNSPs), effective from 1 July 2020[83].

2.5 National Transmission Planner (NTP)

Purpose of this function

Delivering an actionable Integrated System Plan (ISP).

Revenue requirement

The 2021-22 NTP revenue requirement reflects a 15.6% increase on the 2020-21 Budget.

Table 7 National Transmission Planner revenue requirement

	Budget 2020-21	Budget 2021-22	Variance	Variance
Revenue requirement	$19.9m	$23.0m	$3.1m	15.6%

The NTP revenue requirement increase of $3.1m reflects:

- increased operating expenditure of $2.1m due to higher net labour and consulting reflecting incremental cost associated with delivering the ISP; and
- net $1.0m year-on-year increase in the deficit recovery (2021-22 budget gross deficit recovery of $5.4m due to the under recovery associated with the transitional rule change).

The 2021-22 final budget operating expenditure is $1.8m higher than the estimated cost to operate the NTP function detailed in the National Transmission Planner Charges Publication Notice, February 2021.

Charging of the NTP revenue requirement for 2021-22 is based on the GWh consumed in the year commencing 1 July 2019 in the relevant region as a proportion of the GWh consumed in all regions in that year. TNSPs are then able to recover the costs of these fees from their customers. This is then part of the network charges levied on all customers.

AEMO's estimated cost to operate the NTP function is $15.42 million in 2021-22 (NTP charges – 1 July 2021 to 30 June 2022 Published 15 Feb 2021)[84] AEMO 2021-22 AEMO Budget and Fees[85] published 04 August 2021 indicated this had increased by $1.8m to $17.2m.

This method of cost recovery is very similar to the funding arrangements for Energy Consumers Australia (ECA) revenue requirement and fees:

2.19 Energy Consumers Australia (ECA)

Purpose of this function

To promote the long-term interests of energy customers, residential and small business customers

Revenue requirement and fees

AEMO is required to recover the funding for the ECA from market participants (i.e. pass through recovery). The budgeted ECA revenue requirement to be recovered in 2021-22 is $8.6m (2020-21: $8.3m). The increase is due to an increase in administrative costs of 4.2% and deficit recovery.

The electricity ECA fee remains unchanged at $0.01185 per connection point per week in 2021-22.

The gas ECA fee is $0.03861 per customer supply point per month in 2021-22 (13% increase). The fee increase is largely due to recovery of the 2020-21 deficit.

Table 27 ECA revenue requirement and fees

	Budget 2020-21	Budget 2021-22	Variance	Variance
Electricity				
Revenue Requirement	6.34	**6.43**	0.08	1.3%
Electricity FRC - Connection Points	10.36	**10.49**	0.12	1.2%
Electricity ($/connection point for small customers per week)	0.01185	0.01185	0.00000	0.0%
Gas				
Revenue Requirement	1.95	**2.19**	0.23	11.8%
MIRN's Basic Meters - Total (Millions)	4.75	**4.73**	-0.02	-0.4%
Gas ($/customer supply point per month)	0.03429	0.03861	0.00432	12.6%

[83] https://www.aemc.gov.au/rule-changes/reallocation-national-transmission-planner-costs

[84] https://aemo.com.au/about/corporate-governance/energy-market-fees-and-charges

[85] https://aemo.com.au/about/corporate-governance/energy-market-fees-and-charges

Without disclosing actual rates, hourly rates for ISP Consumer Panel members are significantly less than even the "Officer/Intern" charge out rates for AEMO staff published for 2021-22 in the table below:

A1.4 AEMO charge-out rates

Table 35 AEMO charge-out rates

Market	2021-22	Basis
Senior Leadership	500	$ per hour
Manager/ Specialist	420	$ per hour
Principal	335	$ per hour
Senior	295	$ per hour
Analyst/ Engineer	275	$ per hour
Officer/ Intern	235	$ per hour