ISP 2022 Consumer Panel

AEMO

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Submission: DRAFT 2021 Inputs, Assumptions and Scenarios Report

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1 Executive Summary

This submission serves two purposes:

1. to introduce the ISP Consumer Panel and its role as part of the oversight framework for the 2022 Integrated System Plan (ISP), as well as
2. providing a submission on the Draft 2021 Inputs, Assumptions and Scenarios Report (Draft 2021 IASR).

We were appointed by AEMO under recent amendments to the National Electricity Rules. We have a formal role under the rules to provide two submissions to AEMO – one on the ISP Inputs Assumptions and Scenarios Report (due mid-2021) and one on the Draft ISP (due in December 2021). We have decided to also provide this submission on the Draft IASR to assist AEMO's consideration of and engagement on key issues leading up to the publication of the final IASR. Given our appointments were not finalised until late November 2020, this submission has been prepared within the constraint of not being able to participate as a Panel in the workshops and webinars around the development of the scenarios and the tight submission timetable. More issues will inevitably arise in the coming few months.

Publication of the Draft 2021 IASR in December 2020 was a key milestone in AEMO's development of the 2022 ISP. It commenced the formal consultation on the scenarios, inputs and assumptions proposed for use in AEMO's 2021-22 forecasting and planning activities, including the 2022 ISP. The Draft 2021 IASR also provides detail on the process by which any inputs and assumptions will be updated and consulted on prior to publication of the Final IASR and modelling commencing.

The Panel would like to firstly acknowledge the complexity of the ISP task and the dedication of those involved in its development. It is a very comprehensive document showing significant improvement on the information and transparency from the 2018 version. The ISP is a welcome overlay for the NEM's regulatory framework.

Section 2 provides more context on the purpose of the ISP, the ISP oversight framework under the AER Guidelines on how AEMO prepares the ISP, and the Panel's approach to its role. All our comments in this submission are referenced back to what we understand the Guidelines require and we will regularly engage with the AER as the ISP progresses. We see our role as much wider than simply preparing submissions. We see ourselves as a 'critical friend' of AEMO as it implements its consumer engagement strategy, as encouraging and facilitating engagement of consumer stakeholders in the process, as well as participating in and observing this engagement. The ISP is a very complex piece of work – both process and content – and we hope

to reduce barriers to consumer engagement. We want consumers and their representatives to have confidence that the final ISP in mid 2022 effectively represents their interests and meets the NEO in the best possible way. There is potentially over $10b of investments that consumers will have to pay for over the next 50-60 years and we wish to minimise stranded asset risk.

Section 3 provides our initial observations on AEMO's stakeholder engagement. Overall, we consider it is far from best practice and in several respects, we consider that it does not meet the requirements of the AER ISP Guidelines. AEMO is yet to publish an ISP-specific Engagement Strategy even though ISP engagement has been underway since September 2020. We make a range of suggestions on what we believe would improve consumer engagement.

AEMO has committed to improving its stakeholder engagement through a Five-point action plan and staged capability uplift and we encourage AEMO to implement this for the ISP development process as a priority[1].

For future ISPs, we recommend that AEMO appoints the Consumer Panel earlier in the ISP process so that it can be meaningfully engaged in the development of scenarios and other key inputs and assumptions.

Section 4 focuses on the proposed scenarios. We agree with including each of the proposed scenarios, but recommend that some additional scenarios are added and some important refinements and clarifications are made to AEMO's proposed scenarios. In particular we are of the view that the Sustainable Growth scenario may not reflect sufficiently ambitious decarbonisation and decentralisation trends both domestically and internationally. We recommend that the scenarios should not be based solely on particular stakeholder polls as to which are the most likely set of future outcomes for the energy sector. Such an attempt to predict the future is risky as views on what is likely will differ, and it may undervalue key scenarios that are less likely but would have a major impact on consumer outcomes if they did occur.

We recommend that AEMO aim to include scenarios that test the widest plausible bounds of the key variables that could have material risks of poor customer outcomes due to high levels of under or over investment if the future turns out to be materially different to the central scenario. Even if some of these less likely scenarios are given low weightings, they can help demonstrate the potential risks to customers and inform AEMO's decisions, particularly if

[1] *Renewing AEMO's Engagement Model – Response Paper*, November 2020. Exec Summary and Table 1

AEMO continues to adopt a "least regrets" approach to determining the optimal development path.

We note that AEMO's previous engagement on the scenarios and a survey it published alongside the draft IASR allowed stakeholders to vote on the likelihood of the scenarios. However, there is very limited transparency of the representativeness of those who voted. We do not consider that significant weight should be placed on the results of such voting unless more effort is made to ensure the voting is representative and well-informed.

We propose two new scenarios:

- One that covers the risk of material changes in public policy – this would be the same as the central scenario except that it involves a hypothetical set of new Federal, state and/or territory government policies that results in a much higher level of investment in renewable generation, storage, DER and REZs. This approach would address a key weakness of the draft IASR, which proposes that any changes in public policies that occur between May 2020 and June 2021 would generally not be taken into account in the ISP's modelling.
- One that that tests the impacts of a more decentralised future driven by reduced DER technology costs and new government policies that promote DER and other decentralised solutions. All of the scenarios appear to envisage a future with high levels of investment in large-scale generation and interconnection. Although some of the scenarios also have high levels of DER penetration, this appears to be in addition to centralised large-scale generation, storage and transmission investment rather than as an alternative to it.

We also propose a new risk scenario to test the sensitivity of the results to the risk that the costs of transmission materially exceed the forecast costs used by AEMO, noting that AEMO proposes to use forecasts that it acknowledges could be exceeded by 50-100%.

Section 5 comments on a number of priority inputs and assumptions.

- **Decarbonisation** and **climate change impacts** on the NEM – This is a complex but fundamental set of inputs and assumptions for the ISP that requires more rigor and analysis. We strongly recommend more stakeholder and consumer engagement on these distinct but related topics. 2050 is an important year in the current policy position of every NEM jurisdiction, we recommend AEMO clearly align the IASR with this modelling timeframe. We also recommend AEMO dive deeper into the various research studies and data sets

available and seek peer review from an independent, apolitical expert to validate the facts and trends used to inform these assumptions.

- **Gas prices** – this is a major issue driving significant network investment; the LGA study report used to set these prices falls well short of the level of analysis and transparency required to justify the proposed forecast prices and the actual/proposed AEMO engagement falls well short of the AER Guidelines' requirements for such a critical issue. Significant additional engagement on gas price forecasts is required to improve current confidence in the proposed forecasts in the IASR
- **Discount rate** – we do not support AEMO's proposed discount rate. It does not meet the AER Guidelines' requirement that it is based on a commercial discount rate for private sector electricity investments. AEMO does not appear to have attempted to calculate such a commercial discount rate, and has instead placed undue weight on an ENA document and the AER's regulated 5 year WACC. We also require further analysis on the level of the decrease in the WACC for the Slow Growth Scenario and why the WACC is not higher for the higher growth Sustainable Growth/Export Superpower scenarios, and the justification of the 2% reduction for NSW Roadmap. This is a critical parameter that reflects the risks to consumers and warrants stronger engagement.
- **Transmission vs Distribution** – we do not believe the Draft IASR adequately explains how the trade-offs between transmission and distribution expenditure are treated.
- **Transmission cost forecasts** - engagement does not meet the AER Guidelines and we set out what additional engagement should occur. The nature of the forecasts that are proposed to be used means they create an unacceptable level of risk for consumers that actual transmission costs will materially exceed the estimates and consumers will be required to pay for investments that may not have been justified if more accurate estimates were used.
- **DER and the changing role of consumers** –there is a risk that the inputs, assumptions and scenarios underestimate the future uptake and nature of distributed energy resources and the impact this would have on the overall development of the ISP. We recommend AEMO consider the impact of DER optimisation being undertaken by the distribution networks on the potential hosting capacity of distribution networks and the impact this has on the various scenarios and that AEMO engage directly with DNSPs and their consumers on tis topic. We encourage AEMO to engage more widely on EV uptake as global trends suggest this would be easy to under-estimate.
- **Hydrogen modelling** - while we support the inclusion of the Export Superpower scenario, the level, robustness and transparency of the information currently available leads us to

agree with AEMO that little probability weight should be given to this scenario. This may well change in future ISPs.

We hope that this submission provides useful guidance for AEMO as to the areas where we consider the draft IASR would benefit from further analysis, explanation and engagement so that the final IASR promotes the long term interests of consumers.

There is still five months until AEMO publishes the final IASR and a further 2 months until our formal report on the IASR is due to be published. During that period we expect to work collaboratively with AEMO and consumer stakeholders to explore the issues raised in this and other submissions to the Draft IASR.

2 About the ISP Consumer Panel

2.1 The Integrated System Plan (ISP)

AEMO's Integrated System Plan (ISP) establishes a whole-of-system plan for the efficient development of the NEM. It serves as an essential roadmap and vision to inform and guide the optimal mix of energy resources to deliver affordable, sustainable and reliable energy to households and businesses in QLD, NSW, the ACT, VIC, TAS and SA.

In July 2020, AEMO published the 2020 ISP, which identified the optimal development path for investment in the Transmission Network. AEMO updates the ISP every two years and development of the 2022 ISP is already underway. 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.

The 2020 optimal development path includes "actionable ISP projects" that will allow increasing levels of renewable generation and storage to connect, while maintaining security and reliability. However, these are forecast to cost between $6.8 and $12.7 billion over the period 2022-32, would become regulated network assets and therefore funded by consumers through electricity bills. To put that in perspective, from 2019 data published by the AER Transmission Networks in the NEM have a combined Regulatory Asset Base (RAB) of around $21 billion, invest around $1bn per annum in capital expenditure and generate around $3bn in revenue. This is illustrated for the period 2006-2019 in Figure 1.

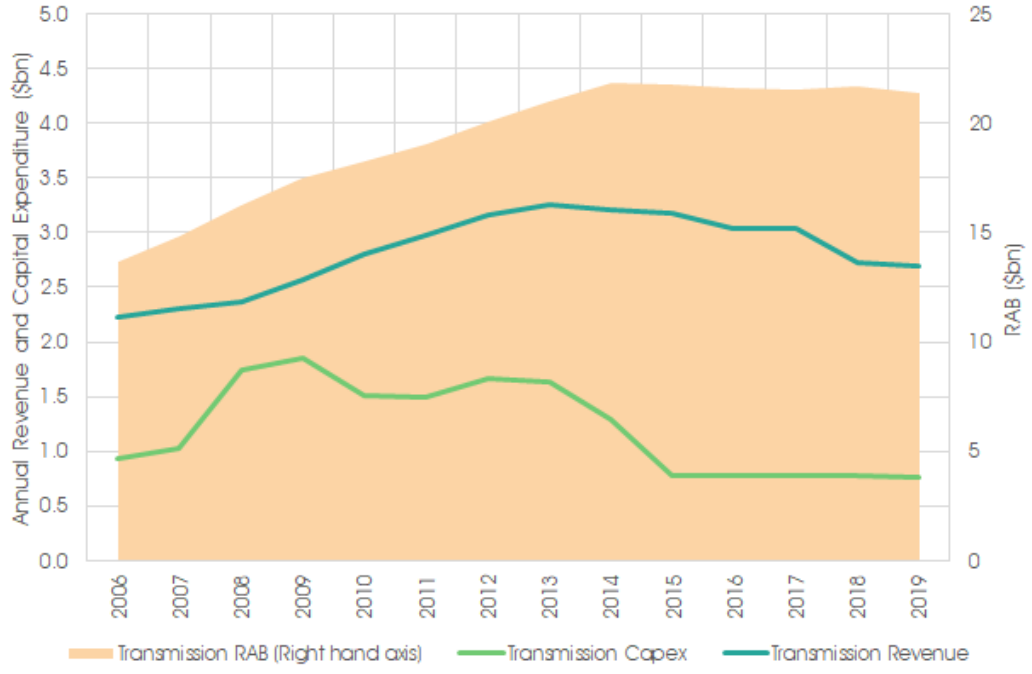

Figure 1: Consolidated Transmission Financials (Source: AER State of the Energy Market 2020)

The ISP Actionable Projects therefore have the potential to increase the Transmission RAB by around 50%from $21bn to over $30bn. That is why the ISP is important for consumers.

2.2 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. We are required under the NER to publish two main reports (on the final IASR and Draft ISP).

We are a group of five individuals with long and diverse experience in the different facets of the National Electricity Market. You can read more about each of us on the AEMO website[2].

Our role is to provide independent advice and guidance to AEMO and therefore while we are independent of AEMO, we are remunerated by them and they provide us with administrative support as required under the NER.

We were established in late November 2020 and have since sought to participate in the engagement activities already underway as well as establish our approach to the task and a basis for pursuing a consensus view as required under the NER.

We have decided to make a formal, public submission to the draft IASR as our first priority.

2.3 The ISP Oversight Framework

Establishing and supporting the ISP Consumer Panel is a requirement on AEMO under the NER. Our assessment of AEMO's development of the ISP will be informed by the regulatory framework, in particular the AER's recently published *Guidelines to make the ISP actionable*[3].

All our comments throughout this submission are referenced back to what we understand the Guidelines require. Apart from providing advice to AEMO, these comments are also designed to provide input that the AER may consider as it prepares its IASR Transparency Review. Our focus will be on three documents:

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

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[2] https://aemo.com.au/newsroom/media-release/aemo-announces-isp-consumer-panel

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

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[4]:

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

The AER notes[5]:

> "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 will have 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 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[6]. 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[7].

The Consumer Panel will regularly engage with the AER as the ISP progresses and we expect the AER will draw on our submissions as they fulfill their roles under the Rules. Our formal

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[4] See 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

[5] Op cit p.1

[6] Op cit p.8

[7] Op cit pp.17-18

reports on the IASR and ISP are due one month after the AER publishes their Transparency Reviews.

2.4 Our approach

Our aim is for an ISP that electricity consumers can have confidence in. We want consumers to be confident it identifies an optimal development path that appropriately considers the risks of underinvestment or overinvestment in the power system as we make the complex transition to the power system of the future.

To achieve our aim, we intend to undertake a range of activities including:

- participate in AEMO's ISP Stakeholder engagement activities and make other submissions to the ISP process;
- encourage and facilitate the engagement of consumers in the process;
- be a "critical friend" to AEMO on the approaches to consumer engagement;
- analyse and critique the details of some of the key decisions made in developing the ISP that are most likely to have a material impact on consumer outcomes.

We know that consumers and their advocates have found it difficult to engage in the ISP processes to date. We will be reaching out to consumers and their advocates to understand the level of interest and potential barriers to participating in the ISP process and what actions AEMO and the Consumer Panel could take to help them engage more effectively.

We are also conscious that the ISP is highly complex, and engagement competes for time with many other issues in the NEM and other issues for consumers more generally. For these reasons we will continually seek to 'bake in' the consumer interest into the Inputs and Assumptions and treatments of scenarios.

The ISP must promote the National Electricity Objective (NEO). The NEO 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". As with our colleagues on the AER's 2020 Consumer Reference Group[8], we intend to adopt ECA's operationalised view of the long-term interests of consumers, that "current and future consumers pay no more than they need to for the quality of service they require."

[8] For more information about the CRG visit: www.aer.gov.au/about-us/stakeholder-engagement/consumer-reference-group

In the context of the ISP, our approach is to ensure the ISP adequately accounts for the risks to consumers of over or under investment when the future doesn't turn out the way it was modelled. 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 blackouts due to reduced reliability or security of supply.

We have a particular focus on risk allocation. Best practice risk management allocates risk to those best placed to manage it. In the context of regulated monopoly networks, the obvious mis-allocation of risk is when all risk of over or under investment in networks is borne by consumers. The ISP Rules provide an actionable framework for investment in the Power System and that the 2020 ISP puts this level of investment at around $10bn. Our view is that the Consumer Interest lies in having confidence that the ISP process does identify an 'optimal development path' that genuinely offers the best value for consumers in the long run.

Other things we look out for:

Theatre vs substance – the proportions vary but all engagements between regulators, energy businesses and consumers inevitably involve these two aspects. We acknowledge both to allow us to focus on the substance.

Process vs content – 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 one critical way of promoting the NEO.

Self interest vs the Consumer interest – we are alert to the possibility that stakeholders have a range of views on what represents the Consumer Interest and that these views might in fact be more aligned with their self-interest.

Consumers vs Taxpayers - we assume there is a distinction to be made between a household or business being seen as an energy consumer or as a group of taxpayers. The ISP contains numerous elements that are being driven by Government Policies without a transparent analysis of the costs and benefits to consumers rather than the regulatory and market frameworks of the NEM. If these are funded (fully or partially) from Government revenue rather than electricity bills, it is our view that this is a more efficient allocation of risk.

Big vs Small – decentralisations is one of the electricity industry's megatrends and that, historically, the NEM was built as a series of very large capacity investments. We are conscious that adapting past frameworks might bias the 'optimal development path' towards larger investments.

Transmission vs Distribution – we are alert to the fact that one easy way for consumers to "pay twice" is if there is no co-optimising of distribution expenditure on increasing hosting capacity for consumers' solar and batteries and transmission expenditure for grid scale solar and storage.

Timescales - From 6-second Frequency Control markets to 5-minute wholesale market settlement to monthly billing to annual price changes, to 5-year regulatory determinations for networks, to the 20+ year ISP, to assets that last more than 50 years, we are very conscious of temporal issues in the NEM.

Now vs then – The ISP is looking ahead 20 years. 20 years ago, the NEM was having its second birthday and we were beginning the new millennium without retail competition for households and small business electricity and gas, smart phones or iPads and compact fluorescent light bulbs were rare. 10 years ago, rooftop solar was only being taken up by a few households and few could forecast its growth. We will keep reminding ourselves to think about the consumers of 10 and 20 years into the future.

Behavioural vs Rational Economics – over the last 20 years we have witnessed numerous examples of a market designed on assumptions of rational economics only to be confounded by the realities of the behaviour of individuals and businesses. We are alert to the possibility of this occurring again during the development of the ISP.

3 Overall Comments on the IASR Engagement Process so far

3.1 Introduction

In preparing the 2022 ISP, AEMO is required to follow a suite of AER 'Guidelines to make the integrated system plan actionable'[9] that were published in August 2020. This section:

- outlines the main components of the guidelines with particular focus on transparency and stakeholder engagement
- discusses AEMO's approach to stakeholder engagement and their previous commitments regarding consumer engagement for the 2022 ISP
- comments on our experience so far.

The Panel recognises the importance of stakeholder collaboration and engagement to ensure essential views and input is sought that will improve the outcomes in each edition of the ISP. Consumers and their representatives (consumer stakeholders) are a vitally important *subset* of AEMO's *set* of stakeholders and a generic approach to engaging stakeholders is not likely to be effective in engaging consumer stakeholders. Further, given the complexity of the issues and quantity of information, consumer engagement for the ISP warrants a strategic, bespoke approach.

We provide more specific comments in other sections where particular assumptions are discussed eg our impressions of engagement on that particular issue and our recommendations for future engagement.

3.2 AER ISP Guidelines

A key principle used by the AER in developing the Guidelines, is "Transparency and stakeholder engagement"[10]. The AER supports the principle of AEMO having flexibility in selecting the optimal development path, but:

> "…the flexibility for AEMO … is only appropriate where AEMO is fully transparent about how it has exercised that flexibility and judgment, and appropriately engages with stakeholders throughout the process.

[9] These are a number of Guidelines – we focus here on the cost benefit analysis and forecasting best practice guidelines. See https://www.aer.gov.au/networks-pipelines/guidelines-schemes-models-reviews/guidelines-to-make-the-integrated-system-plan-actionable

[10] See p.11 https://www.aer.gov.au/system/files/AER%20-%20Final%20decision%20-%20Guidelines%20to%20make%20the%20ISP%20actionable%20-%2025%20August%202020.pdf

> Transparency is important because it allows stakeholders to understand and test how AEMO has come to its conclusions in the ISP. Key drivers of ISP decisions, including inputs and assumptions, and AEMO's approach to risk, need to be set out clearly in public documents. Consumers should be able to understand how costs and benefits might vary between development paths, and how AEMO has traded off mitigating risk versus minimising costs.
>
> Effective consultation improves the forecasting and decision making process. Given the high fixed costs of transmission investment and uncertainty of the planning environment, promoting transparency and sharing accountability through effective consultation is valuable…To prepare an ISP that is in the long term interests of consumers (who ultimately fund transmission investment), AEMO also needs to understand the preferences of consumers, particularly around reliability and affordability."

and later[11]:

> "Our approach to the guidelines provides AEMO with substantial flexibility in preparing an ISP, particularly in terms of how it considers risk. AEMO has the flexibility to assess the costs and benefits of its development paths under a range of different scenarios of the future, and these scenarios can contain any risks AEMO seeks to mitigate in the ISP. Further, once it assesses the costs and benefits of each development path, AEMO has full flexibility to use any decision making approach to select an optimal development path. This means AEMO can choose which risks to prioritise, and how strongly to mitigate them.
>
> …
>
> To balance this flexibility, our approach to the guidelines focus on transparency and engagement. For the ISP, the guidelines require AEMO to explain and justify its decisions, and be informed by stakeholder input when it develops scenarios and considers how to approach and prioritise risks."

More detail is provided in the Forecasting Best Practice Guideline where AEMO "*must have regard to*" best practice principles[12] such as:

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[11] Op cit p.14

[12] See pp 11-12 www.aer.gov.au/system/files/AER%20-%20Forecasting%20best%20practice%20guidelines%20-%2025%20August%202020.pdf

- facilitate effective discussion at workshops, public forums and to 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;
- account for the time and resource constraints that consumer groups and other stakeholders face when developing a consultation strategy or program. For example, it might be valuable to facilitate consumer engagement by dedicating specialist internal resources to this task or by resourcing a consumer panel/consultative committee. 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;
- 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, by applying the IAP2 spectrum explicitly by stating when consultations aim to inform, involve or collaborate).
- 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;"

3.3 Engagement challenges

AEMO is generally perceived by consumer advocates to have considerable room for improvement when compared with best practice engagement in electricity and gas networks. AEMO recognises this in its current review of its overall stakeholder management approach:

> "The review confirmed that many stakeholders find AEMO consultative forums and working groups to be at times inconsistent, fragmented, uncoordinated, and one-way in their communication."

In our view, this is consistent with our own experiences with the ISP process to date and experiences shared with us by others[13]. While AEMO has committed to a Five-point action plan and staged capability uplift[14]:

> "AEMO is committed to an uplift and shift of our engagement model to enable increased participation, collaboration, and co-operation. We are determined to ensure that stakeholders can engage with AEMO's many workshops and forums in a way that is transparent (so stakeholders can understand what is happening across AEMO) and efficient (so their time is used effectively)."

and we encourage AEMO to implement this for the ISP development process as a priority[15],the experience so far with the ISP Consumer Panel is not encouraging.

We intend to undertake a survey of stakeholders to provide feedback on their view on consumer engagement in the 2020 ISP and improvements for 2022 ISP engagement. We will circulate the results to participants.

In its review of submissions on the Draft 2020 ISP, AEMO concluded[16]:

> "Consumers as a sector emphasised the need for AEMO to focus on consumer organisations even further, providing more facilitated engagements and supporting them to obtain their feedback, noting their current lack of resources and depth of technical expertise. The ISP Consumer Panel that AEMO is establishing, in accordance with the actionable ISP rules that came into effect on 1 July, will provide a primary means to address these needs."

And went on to say[17]:

> "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

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[13] See https://aemo.com.au/en/consultations/current-and-closed-consultations/renewing-aemos-engagement-model

[14] https://aemo.com.au/en/consultations/current-and-closed-consultations/renewing-aemos-engagement-model

[15] *Renewing AEMO's Engagement Model – Response Paper*, November 2020. Exec Summary and Table 1

[16] See p.4 https://aemo.com.au/-/media/files/major-publications/isp/2020/2020-isp-consultation-summary-report.pdf?la=en

[17] Op cit p. 45

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

We understand such a Plan is being developed, but we have not seen it and the ISP consultation has been underway since September 2020. It should have been available for review by the Panel prior to the start of the scenarios workshops – had the Panel been appointed to enable that review to take place We look forward to co-designing the consumer engagement aspects of this as soon as it is available.

AEMO has used two main forms of engagement in preparing the Draft IASR:

(i) The existing, regular Forecasting Reference Group (FRG), and

(ii) Focused engagement activities on particular issues eg to develop the scenarios or consider particular assumptions eg transmission capex

The FRG is a monthly webinar that also covers issues other the IASR in its regular meetings. Discussion is directed at subject matter experts and this is reflected in attendance. Only a very small proportion of regular attendees are consumer advocates.

As outlined in the draft report, AEMO have attempted to engage more widely in the development of the proposed scenarios. To do so, AEMO have held five webinars and workshops to date with stakeholders across the energy industry using interactive online approaches to engage and garner stakeholder views.

AEMO has also sought feedback on the effectiveness of these engagement approaches which highlighted the challenges and experience. This presents an opportunity for AEMO to seriously consider and further improve the stakeholder engagement process ongoing.

We recognise that consumer engagement is often difficult. Consumers and their representatives are faced with a number of challenges that directly or indirectly impact their ability to engage with AEMO on the ISP. Factors that AEMO should consider in designing consumer engagement specifically for the ISP include but are not limited to:

- Lack of familiarity or "interest" in the ISP framework and development - ISP engagement tends to be very technical and be geared towards subject matter experts which can alienate some consumer participants. The diversity in expertise, views and experiences however can provide significant, beneficial contributions to the ISP. AEMO will need to actively solicit these insights, not expect them to emerge in industry-dominated forums.

- The COVID pandemic - consumers and others are having to deal with short term and financial challenges which can limit the engagement and prioritisation of involvement. Taking into consideration these challenges in the methods and timing of the various consultations could result in more involvement.
- Limited time and resources lead to conflicting priorities - there are always multiple reviews and consultations underway that consumer stakeholders will prioritise in different ways. Many consumer organisations are responding to consultations and undertaking research on issues as diverse as the contents of electricity bills or access to energy concessions while finding time to consider "big picture" issues such as the ISP.
- Timing of consultations so people have the opportunity to participate – AEMO consulting on the Draft IASR and the Stakeholder Engagement Response Paper concurrently, over the Christmas / New Year break, is just one example of a consistent pattern across the energy industry.

3.4 Engagement principles for consideration

As we reflect on the challenges and the stakeholder feedback to date, we have considered a key set of principles we believe will assist AEMO in cultivating a deeper engagement experience with consumer stakeholders and meet their obligations under the AER Guidelines.

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.

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

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 issues and solutions.
- Measure what's working and what is not and continue to adapt and improve the consultation to suit the situation.

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.

Reflecting on these principles, we have identified key opportunities:

- Accessibility of information could be improved;
- Process to garner information could be enhanced;
- AEMO work with stakeholders, to co-design a process that will be more fit- for- purpose to facilitate meaningful engagement and participation.
- Understandable and simple examples to facilitate understanding and conversation
- Timing of workshops and other consultation forums to suit participants
- Independent facilitation to ensure that all voices are heard
- Opportunities for one on one or deep dives for particular interests or groups should be offered
- Using existing consultation channels to reach different stakeholders and consumer groups to garner responses for example most retailers and Distribution networks have established well-functioning customer councils that can be leveraged.
- A common theme with all consumer engagement is allowing significant time and multiple platforms for feedback be provided including facilitating verbal feedback which often is summarised and written up by the organisation seeking the feedback and then endorsed by the stakeholder/s. While this might be outside of the current process for AEMO, other market bodies have adopted this approach for more complex matters and has proven to be somewhat successful.
- Other institutions such as AEMC and AER use general public forums as ways to gather broad input from consumer interest groups and local communities. This could be useful as a means to develop greater understanding of issues as they pertain to particular parts of the ISP.

- With regards to consultation, it's also critical that thoughts and views of participants are recognised and acknowledged in developing the report that the consultation was called for. This is not to say that the feedback from participants need to be accepted but rather how views and inputs were considered by AEMO and addressed in the consultation and documentation. This ensures that participants know that the consultation process is transparent and they were being listened to.
- Having consumer preferences explored with investments that are not only directly funded by consumers but also impact value that consumers derive from these investments is essential in ensuring the projects are optimised and have explored ways to minimise risk during projects implementation, including economic, political and other risk.

3.5 Summary

AEMO is required to follow AER Guidelines to make the ISP actionable. These guidelines have a particular focus on transparency and stakeholder engagement. Our focus is on consumer engagement, where we argued above that consumers are a vitally important *subset* of stakeholders, that warrant a strategic, bespoke approach to engagement.

AEMO's approach so far is some distance form best practice and because of this we do not believe their development so far of the 2022 ISP has meet the AER Guidelines. We have yet to see the promised 2022 ISP Consumer Engagement Plan and we are four months into the process. We provide specific comments elsewhere in this submission on specific aspects of the Draft IASR to support this conclusion.

We make a number of suggestions to assist AEMO in improving its consumer engagement for the remainder of the 2022 ISP timetable. We look forward to working with AEMO to realise these improvements.

4 Scenarios

AEMO have stated that the scenarios proposed in the Draft 2021 IASR have been developed taking into consideration the major sectoral uncertainties affecting the costs, benefits and need for investment in the NEM. These uncertainties relate to:

- the rate of decarbonisation of the NEM,
- the speed and scale of DER penetration,
- economic and population growth,
- relative costs of various generation and storage technologies, and
- the extent of electrification of other sectors in pursuit of decarbonisation.

Depending on how these five uncertain dimensions are combined, the assumed pace of the energy transition in the NEM, and therefore the need for investment, can vary considerably.

Under the AER ISP Guidelines[18] AEMO has considerable flexibility in developing the scenarios. The only *requirement* is to identify a 'most likely' scenario and some *must consider* provisions such as the approach to key inputs like discount rate and VCR, and a balanced approach to risk of under or over investment. The rest is left up to AEMO's *discretion* and in exercising that discretion they should:

- explore the impact of major uncertainties affecting all aspects in an optimal development path through stakeholder consultation;
- represent a reasonable range of plausible future market environments;
- consist of inputs that are exogenous to the development path ie not influenced by the development path.

Using the AER scenario development guidance, AEMO applied the following considerations in developing its scenarios:

- Breadth – across the scenarios there is a representative spread of input for key drivers;
- Fit for purpose – the set of scenarios as a whole need to consider the risks of over and under investment which requires exploring combinations of setting which provide a reasonable bound on outcomes which influence the need for investment;
- Utility – scenarios are internally consistent and plausible but sufficiently different so they achieve a particular purpose.

[18] See Cost Benefit Analysis Guidelines pp11-13 https://www.aer.gov.au/system/files/AER%20-%20Cost%20benefit%20analysis%20guidelines%20-%2025%20August%202020.pdf

4.1 The critical role of scenarios in testing risks to consumers from an uncertain future

In the draft IASR, AEMO explains that

> "Exploring scenarios helps assess the risks, opportunities and development needs through the energy transition, in the long-term interests of consumers. To do so, the selected scenarios must cover a broad range of plausible operating environments for the energy sector, and the potential changes in those environments, in an internally consistent way".

We agree with this summary and consider that the scenarios play a critical role in illuminating and testing the key risks to customers from the ISP process and resulting transmission investment decisions.

AEMO has a very challenging task in developing the ISP as it needs to forecast how the energy sector is likely to develop over the next 20-30 years or more and assess what investments are most likely to maximise the value to consumers over that timeframe. Such a task is extremely difficult as the energy system of 2050 is almost certain to look very different to any forecasts that are prepared in 2021-2022. The IASR's scenarios are a key tool in managing the risks of this uncertainty. In particular, they test the potential risks to consumers if the future turns out to be very different to the central scenario and results in large amounts of either:

- over-investment that is paid for by consumers, but which does not deliver the expected benefits for customers; or
- under-investment that results in consumers paying too much as well as suffer reliability or system security impacts.

Given the current pace of technological and policy change in the energy sector, there is value in including as many scenarios as is possible to test all of the key variables that could materially affect the optimal development path. However, there are also limitations on the number of scenarios that can be included, primarily due to the constraints of the modelling process.

AEMO proposes to use 4 scenarios, in addition to the central scenario:

- **A sustainable growth scenario**, which tests the impacts of higher decarbonisation ambitions, higher DER uptake, higher levels of electrification of other sectors and stronger population and economic growth.
- **A slow growth scenario**, which tests a possible future with lower economic growth and industrial load closures, but also has a short-term boost to DER uptake due to government stimulus policies.

- **A diversified technology scenario**, which reflects a possible future with lower gas prices and increased use of carbon capture and storage (CCS).
- **An export superpower scenario** to test the impacts of very high levels of hydrogen use and export, accompanied by high levels of electrification, strong economic growth and strong decarbonisation.

AEMO has also proposed 5 potential 'risk scenarios' that seek to "*test the materiality of uncertainty associated with individual input parameters*".

Table 5 Possible risk scenarios

Risk scenario	Purpose
Central with early Victorian coal closure	To assess the potential for over-investment or premature investment in inter-regional transmission if local dispatchable capacity replacement is the only option available in time to respond to this early closure.
Central with early northern NSW coal closures	To assess the risk of under-investment or overdue intra-regional investment to support load centres in Sydney and surrounding areas.
Central with Marinus Link funding arrangements not resolved	To assess the risk of under-investment or overdue investment in other alternatives to this transmission option.
Sustainable Growth scenario with Central DER uptake	To assess the impact of more rapid development of VRE and under-investment or overdue investment in REZ transmission.
Central with CopperString* included.	To assess over-investment or premature investment in other REZ alternatives and under-investment or overdue intra-regional transmission investment in Queensland.

* CopperString refers to a proposed high-voltage transmission line that will connect the people and communities of Mount Isa and the North West Minerals Province in western Queensland to the NEM. It is a privately proposed transmission development; more information is available at http://www.copperstring2.com.au/.

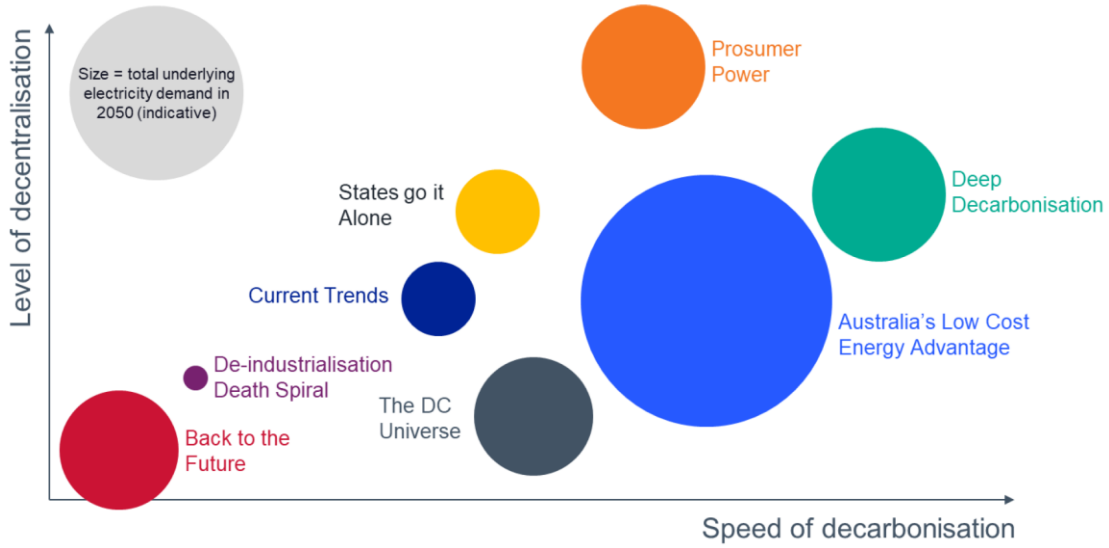
Overall, we consider that AEMO appears to have taken a reasonable approach to the number of scenarios that it proposes to include to balance the benefits of more scenarios and the limitations of the modelling process. We also support AEMO's approach of aiming to test the sensitivity of changes in key inputs through scenarios (including risk scenarios) to the extent possible to complement other forms of sensitivity analysis. Using scenarios allows the impact of these changes to more effectively flow through to the RIT-T processes that will assess the benefits of resulting transmission investment in more detail.

However, we also note that some TNSPs, such as TransGrid and ElectraNet are developing their own 'Network Visions' with different approaches to scenarios[19][20]. TransGrid has mapped their

[19] Available from: www.transgrid.com.au/news-views/publications/PublishingImages/Lists/Publications/AllItems/TransGrid_%20Network_Vision_2056.pdf

scenarios against differing levels of decentralisation and decarbonisation in order to provide a relatively accessible, graphical illustration of their scenario collection. It is unclear how these scenarios would be used by TransGrid in the network planning process and how they would be reconciled against AEMO's draft scenarios.

Figure 1 – eight divergent scenarios for the future of Australia's energy system



We recommend that the scenarios should not be based solely on stakeholder polling as to which are the most likely set of future outcomes for the energy sector. Such an attempt to predict the future is risky as views on what is likely will differ, and it may undervalue key scenarios that are less likely but would have a major impact on consumer outcomes if they did occur. We recommend that AEMO aim to include scenarios that test the widest plausible bounds of the key variables that could have material risks of poor customer outcomes due to high levels of under or over investment if the future turns out to be materially different to the central scenario. Even if some of these less likely scenarios are given low weightings, they can help demonstrate the potential risks to customers and inform AEMO's decisions, particularly if AEMO continues to adopt a "least regrets" approach to determining the optimal development path.

We note that AEMO's previous engagement on the scenarios and a survey it published alongside the draft IASR allowed stakeholders to vote on the likelihood of the scenarios. However, there is very limited transparency of the representativeness of those who voted. We do not consider that significant weight should be placed on the results of such voting unless more effort is made to ensure the voting is representative and well-informed.

Based on this approach, our preliminary views are that:

- As explained in section 4.3 below, some additional scenarios or risk scenarios may be needed to test key risks to consumers that are not adequately covered by the current scenarios.
- We support the inclusion of the Diversified Technology scenario as a way to test the impacts of lower gas prices. Gas prices are a key input that will materially affect the optimal development path and future transmission investment decisions based on the ISP. If future gas prices are materially lower than forecast then there is a risk of major over-investment that is funded by consumers. AEMO notes that many stakeholders considered that this scenario was unlikely to occur and we share these views that aspects of this scenario seem very unlikely and overly politicised. We are also not convinced that this scenario is internally consistent: for example, it has similar levels of economic and population growth to the Central scenario but lower levels of distributed PV uptake and energy efficiency. However, it remains useful as a gas price sensitivity.
- We support the inclusion of the export superpower scenario to test the risk of under-investment in a possible future world with high levels of use and export of hydrogen. This scenario may have limited impact on the optimal development path and transmission investments in the short term, but there is value in including it to test a more extreme scenario and start to better understand the potential longer term impacts of hydrogen for investment needs and system security.

4.2 Limitations on our ability to provide feedback on the draft scenarios

Several key factors have limited our ability to engage in the scenario development process to date and the extent of the comments we are able to provide in this submission. In particular:

- AEMO undertook a series of workshops and webinars on the development of the scenarios during the second half of 2020, but all of those workshops and webinars occurred prior to the Consumer Panel being appointed in late November 2020. Accordingly, only one Panel member was able to attend the scenario workshops, though in a different capacity. Several Panel members attended the IASR workshop on 20 November shortly prior to their official appointment, but AEMO made it clear in that workshop that the choice of the draft scenarios was not open for discussion and the purpose of the workshop was only to discuss the inputs for each scenario. For future ISPs, we recommend that AEMO appoints the Consumer Panel earlier in the ISP process so that it can be meaningfully engaged in the scenario development process from the outset.
- The draft IASR does not specify the methodology for how the scenarios will be used in the ISP to determine the optimal development path. We understand that this will be

addressed in the ISP Methodology, which AEMO will start consultation on with an Issues Paper in February 2021. Without clarity on how the scenarios will be used, it is difficult to provide effective comments on what scenarios should be included.

4.3 Key risks to consumers AEMO should consider exploring through new scenarios

We suggest that AEMO consider two new risk scenarios – one to account for the rapid pace of change in Government policy and one to account for the rapid move to decentralisation in electricity production and consumption that may negate the need for Transmission Network investment.

4.3.1 A new scenario to manage uncertainty from changes in public policies

Government energy and environmental policies are one of the most critical inputs to the ISP. Changes in those policies can have major effects on the ISP's decisions around the amount, type and location of investment that will maximise consumer benefits.

During 2020, several state governments announced new or amended public policies that will have a huge impact on investment in the energy sector and the ISP's inputs and assumptions. For example, the recently legislated NSW Electricity Infrastructure Roadmap will result in renewable generation, storage and REZ investment in NSW by 2030 that far exceeds even the most ambitious 'step change' scenario in the 2020 ISP.

As AEMO correctly explains in the draft IASR, the ISP scenarios, inputs and assumptions should include Federal, state and territory energy and environmental policies that meet the requirements of clause 5.22.3(b) of the NER. That clause covers public policies that are of a certain type (eg included in an international agreement or enacted in legislation) and that have "been sufficiently developed to enable AEMO to identify the impacts of it on the power system".

If a scenario meets this test, then it is to be included in all scenarios. In addition, specific scenarios may test the impact of hypothetical future new or amended public policies, for example as the draft IASR proposes to do through the sustainable growth and diversified technology scenarios.

In the draft IASR, AEMO does a good job of explaining all of the relevant public policies that currently meet this test but notes that these policies are changing regularly and that some major new policies were only announced a few weeks prior to publication of the draft IASR.

Trying to constantly update the IASR to reflect changes in public policies up until the publication of the 2022 ISP is an impossible task. The modelling process means that the IASR's

inputs and assumptions need to be locked down well before the ISP is finalised, with limited scope to change material inputs if there is a late change to public policies.

The extent of the problem caused by the risk of changes to public policies is highlighted by AEMO's comment in the draft IASR that the central scenario will only address public policies that exist as at May 2021 and have been sufficiently developed to enable AEMO to identify the impacts of it on the power system as at that date (see page 22 of the draft IASR). All other scenarios adopt the same approach, except for specific new or amended policy settings that are considered in individual scenarios, eg government policies that reduce gas prices under the diversified technology scenario or more ambitious decarbonisation targets under others.

We do not consider that this approach is likely to best promote the long term interests of consumers. It results in major risks to customers by largely ignoring the impacts of any major changes to public policies between May 2021 and the publication of the final ISP in June 2022. Recent state government policy announcements have illustrated that it is extremely likely that major new or amended policies that meet the test in clause 5.22.3(b) of the NER will be announced during this period. AEMO's proposed approach could result in the ISP being based on public policies that are more than a year out of date. That would seriously compromise the ISP's ability deliver the optimal level and type of investment to maximise consumer benefits and mean that it is already out-of-date before it is even published.

Updating the inputs and assumptions to reflect all material changes in public policies during this period is not likely to be possible. There may be scope to make some updates for new policies that are introduced in mid to late 2021, but we expect that it will be impossible for the ISP modelling to reflect major policy changes that occur in 2022.

We recommend that AEMO considers addressing the risk of material changes to public policies through a new scenario. Adding a new scenario limits or avoids the need for AEMO to try to constantly update its modelling inputs and assumptions. Although it is not possible to predict exactly what new public policies may be introduced over the next 18 months, AEMO should be able to develop a scenario that illustrates the key changes that could arise from new policies.

These risks could be tested by a new scenario that is the same as the central scenario except that it involves a hypothetical set of new Federal, state and/or territory government policies that results in a much higher level of investment in renewable generation, storage, DER and REZs. So that this scenario tests the outer limits of plausible scenarios and is sufficiently different to the sustainable growth scenario, the levels of investment in these technologies under this scenario need to be even higher than under the sustainable growth scenario. This scenario

would also differ from the sustainable growth scenario by not involving increased economic and population growth.

4.3.2 A new scenario with higher levels of decentralisation?

All of the scenarios appear to envisage a future with high levels of investment in large-scale generation and interconnection. Although some of the scenarios also have high levels of DER penetration, this appears to be in addition to centralised large-scale generation, storage and transmission investment rather than as an alternative to it. In the export superpower scenario, AEMO assumes that hydrogen production is all grid-connected rather than connected directly to dedicated renewable generation, even for hydrogen that is exported.

There could be merit in adding a new scenario that tests the impacts of a more decentralised future driven by reduced DER technology costs and new government policies that promote DER and other decentralised solutions. Adding such a scenario would help test the risks to consumers of over-investment in new interconnectors or other large transmission projects that could become stranded in a more decentralised future.

This scenario could involve:

- less investment in large-scale generation and transmission; and
- more investment in DER, stand-alone power systems and non-grid connected hydrogen production.

4.3.3 A new risk scenario to manage uncertainty in transmission costs?

A key risk to consumers that will not be tested by AEMO's proposed scenarios is the risk that the costs of transmission exceeds the forecast costs used by AEMO. AEMO plans to use the same estimates of transmission costs as inputs for each scenario. As discussed in section 6.6 below, data from the 2020 ISP and recent AER processes indicates that there is a significant risk that the actual costs of new transmission investments will significantly exceed the cost estimates used by AEMO in its inputs and assumptions.

We encourage AEMO to consider and clearly explain what tools it will use to manage this risk and assess the potential impact of large variances in transmission costs. The RIT-T process, AER contingent project approval process and ISP feedback loop will provide some protections for consumers if transmission costs exceed AEMO's forecasts, but it would undermine the value of the ISP and lead to considerable uncertainty and delay if the feedback loop had to be used frequently because transmission investments cost materially more than AEMO expected and that changes the ISP's optimal development path.

We recommend that AEMO considers whether it is possible to add a risk scenario or some other method of assessing the sensitivity of the ISP analysis to changes in transmission cost estimates.

Any such sensitivity analysis should consider the impacts of major differences between estimated and actual transmission costs, not just minor differences, and should reflect the level of certainty used in the transmission cost estimates. For example, in the materials for its 20 January 2021 webinar on the transmission cost database, we see current practice is for transmission cost estimates are based on AACE class 4 or 5 estimates, which have an accuracy of just -30% to +50% for class 4 or -50% to +100% for class 5. As discussed in section 5.6, we have concerns about using forecasts with such a low level of accuracy. If those classes of forecasts are used, then they should be supplemented by sensitivity testing that reflects that level of accuracy, for example by adding a risk scenario that tests the impacts of transmission costs being 50% or 100% higher than estimated.

If AEMO determines that risk scenarios are not an appropriate tool for managing this risk and assessing these sensitivities, AEMO should explain in the final IASR what other tools it will use instead, including through the selection of an appropriate discount rate that reflects the risk that expected future benefits may not arise.

4.4 Additional comments on the draft scenarios

We also make the following comments on issues related to specific scenarios.

Central Scenario

As discussed in Section 5.1, the treatment of decarbonisation under this scenario warrants stronger and deeper engagement.

Sustainable growth scenario:

The sustainable growth scenario combines two quite different sets of changes from the central scenario: (1) higher decarbonisation ambitions, higher DER uptake and higher levels of electrification of other sectors, and (2) stronger population and economic growth. It is not clear that these two changes should be linked and that the likelihood of both sets of changes is the same. Recent state government policies indicate that the first set of changes may be quite likely, but the impacts of COIVD may mean that the second set of changes are less likely, especially in the short to medium term.

Considering both changes in one scenario may mean the scenario is considered to be less likely and is given a low weighting. There could be merit in separating out these two sets of changes.

Our suggested new scenario to address changes in public policies discussed in section 4.3.1 would be one way of doing so, or there could be other options.

We are also of the view that the Sustainable Growth scenario may not reflect sufficiently ambitious decarbonisation and decentralisation trends both domestically and internationally.

Diversified technology scenario:

The draft IASR indicates that this scenario had the lowest level of support from stakeholders, with a number of stakeholders considering that it was unlikely and 32% considering it was not useful.

As noted above, we support the inclusion of this scenario as a way to test the impacts of lower gas prices. This scenario also provides a means of testing the impacts of different CSIRO generation and storage build costs, with this scenario being the only one to use the "CSIRO GenCost Diverse Technology" inputs.

However, we agree with the concerns of some stakeholders that the way that aspects of this scenario is described in the draft IASR do not seem plausible. This appears to be partly due to the language used in the draft IASR, which seems overly political and describes outcomes around gas prices and CCS technology improvements and uptake that sound unrealistic without more detail provided. For example, the summary of this scenario in the draft IASR states:

> "This scenario reflects the Federal Government's commitment to encourage investment to unlock Australia's gas resource potential and enable affordably priced and secure gas supplies".

There may be less stakeholder concern about this scenario if AEMO used a more factual and neutral description such as "*This scenario tests the potential impacts of policy changes that result in gas prices being around 15% lower than under the central scenario by 2040.*"

We also note that it is hard to comment on the plausibility of this scenario as the description of this scenario in the draft IASR does not clearly explain the difference in gas prices or CCS-related assumptions. Some additional information on those issues is contained in the IASR workbook and consultants report, but it is very hard to understand and identify the impacts of the differences between scenarios in this area. We recommend that AEMO clarify the description of these impacts prior to the final IASR.

Export superpower scenario

This scenario received perhaps the most enthusiastic response from those participating in the various engagement activities – a hydrogen specific workshop in September 2020 and then the subsequent scenario workshops. We reiterate that there were very few consumer advocates at these sessions.

The future role of hydrogen is a hot political topic with a National Hydrogen Strategy[21] complimented by several State and Territory Strategies. There are numerous Government announcements of funding for early-stage work eg small scale electrolysers and blending trials. Private sector investors are also talking up the promise of hydrogen – some grid connected, some not eg proposals for exports from the Pilbara. Research reports are extolling the potential economics of green steel[22]. The ISP's focus is NEM connected hydrogen.

To understand the merits of this scenario, we have considered what is known about the cost effectiveness of hydrogen. This is presented in Section 5.8 and concludes that the AEMO analysis is very high level as indicated by the scope of the matters for consultation[23]. Much more information - and debate on that information - is required before any confidence can be placed in this Scenario. What we can conclude so far is that:

- hydrogen is very unlikely to be 'economic' (ie does not require Government subsidies) prior to 2030
- given an expanding domestic industry is required to underpin the 'export superpower' scenario, we do not currently see a pathway to the demand forecasts presented
- this Scenario is useful to begin to explore the potential for a hydrogen economy in the future, but should have a very low probability in the ISP analysis

Reliance on this scenario has the potential to result in considerable stranded asset risk for consumers – moving water, electricity and hydrogen around is expensive. All these transport assets have long lives – 50-60 years. Overinvestment is costly, particularly if hydrogen does not live up to the current hype and proves to be uncompetitive with electricity.

The Draft IASR concludes[24]:

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[21] See https://www.industry.gov.au/sites/default/files/2019-11/australias-national-hydrogen-strategy.pdf

[22] Grattan Institute "Start with Steel" May 2020 https://grattan.edu.au/report/start-with-steel/

[23] Draft IASR p.181

[24] Draft IASR p.30

> "AEMO considers this scenario is critical for investors and policy-makers to consider, and to understand potential power system implications, but it may not be a significant influence on the near-term actionable investments that may be signalled by the 2022 ISP."

We agree. The state of knowledge today leads the Panel to conclude that it will not be a significant influence in the near term actionable investments in the 2022 ISP. This may change in future ISPs.

4.5 Consumer Engagement in developing the scenarios

AEMO put considerable effort into designing the engagement process for scenario development in a COVID constrained context:

- A stakeholder survey to get view on three possible scenario narratives other than the central case
- Workshop on scenario development using the survey results to build scenario narratives
- Two webinars to further develop the scenario narratives
- Final workshop to consider the assumptions in more detail

Concurrently with the period of consultation on the Draft IASR, AEMO is running a survey on its website seeking views on the likelihood of possible futures encompassed in the proposed scenarios.

In presenting the scenarios, comments are made on the level of stakeholder support. For example:

> "When polled on the usefulness of this scenario during the second webinar, over 80% of stakeholders considered this scenario useful, with no stakeholder expressing a negative view." (Sustainable growth)
>
> "This scenario featured frequently in pre-workshop stakeholder submissions and has been refined in line with stakeholder feedback across the collection of workshops.
>
> …
>
> Stakeholder support for this scenario is relatively high, with over 55% of stakeholder participants in our second webinar considering it a useful scenario to explore power system needs and understand the risk of over- and under-investment; 14% of participants rated it not useful. (Slow growth)

> "This scenario has received less support from stakeholders than the other scenarios, with 38% of surveyed stakeholders at our second webinar considering it useful in exploring power system needs and the risk of over/under-investment, and 32% not useful." (Diversified technology)

Soon after the Panel's appointment last November, we sought detailed data from AEMO on the spread of organisations represented in this engagement eg who responded to the initial survey, who attended each workshop. AEMO is yet to provide the data.

Our impression from the one Panel member who attended the workshops was that consumer advocates were a very small proportion of participants. This has been confirmed in subsequent discussions with a range of participants. Given this, we caution about the usefulness of feedback from the workshops/webinars to indicate the level of cross stakeholder support. Selection of scenarios, narratives and assumptions should not be based on simple voting of an unrepresentative sample of attendees. As we note elsewhere in this submission, it is difficult for consumer advocates to engage in the very complex ISP process.

Further, in many of the engagement sessions, materials were distributed without sufficient time for participants to consider eg materials for the 11th November webinar that sought to consolidate the scenario narratives were distributed the day before. The complexity of the mural software used in the engagement took some getting used to, the time allowed did not permit much back and forth discission (assuming you had time to read the pre-read and understand the software) and a request for AEMO to publish the results eg dot points and sticky notes in a readable form to enable further comment, was declined.

In another case a consumer advocate was prevented from attending a virtual Technical Forecasting Workshop in November because AEMO there were limited places to allow discussion and the advocate was not considered a forecasting expert.

So overall we do not consider the engagement met the standard set out in the AER Guidelines.

4.6 Scenario alignment to domestic and international climate outcomes:

The scenarios use different assumptions around Australia's future climate change targets, which we support as a way of testing the impact of different targets on investment needs and consumer outcomes. What we do know is that we have a key data point from the current policy position

of every NEM jurisdiction and their commitments to Net-Zero emissions by 2050[25]. Any scenario that does not achieve net zero by 2050 is likely to be inconsistent with our obligations under the Paris Agreement. However, the draft IASR notes that

> "*the methodology currently assumes the emissions budget for the electricity sector is based on its current share of emissions, when it is often noted that electricity may need to decarbonise more rapidly and do "more of the heavy lifting" given its advantages in this regard over other sectors. This would therefore result in a tighter emissions budget for the sector, which would offset any increase through cross-sector allocation*" (page 52-53).

We question the plausibility of this approach in relation to the scenarios with more ambitious decarbonisation targets. The sustainable growth and export superpower scenarios use emissions reduction targets for the overall economy that involve much greater reductions to emissions than under current policies, including net zero by 2050 targets. But those scenarios still assume those targets will be met with the electricity sector only delivering its proportionate share of the target. We recommend that AEMO considers whether it would be more realistic to assume that in these two scenarios an increased share of the emissions reduction budget is allocated to the electricity sector.

The draft IASR also notes that even the scenarios that assume Australia has adopted a net zero emissions by 2050 target do not enforce net zero electricity emissions by 2050. Instead, the draft IASR "implicitly assumes that the land use, land use change and forestry (LULUCF) sector (or another sector) will balance leftover emissions from energy by acting as a carbon sink", although the draft IASR " does not investigate the scale or economic appropriateness of this assumption" (page 53). We question whether this approach is appropriate. As a minimum, if AEMO adopts this approach then it should include an estimate of cost for offsets from other parts of the economy to test the efficiency of this approach.

Further there are a number of independent research studies in this area. According to Climate Works recent study[26], progress in the past five years has closed the technology gap- making achieving zero emissions possible in many sectors.

The report states:

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[25] For example, see a summary here: https://www.nortonrosefulbright.com/en-au/knowledge/publications/5e138af1/australias-climate-policy

[26] Available from www.climateworksaustralia.org

> "Globally and in Australia, major corporations, investors and governments are already moving to align their strategies with the goal of net zero emissions. For example, in September 2019, an international group of institutional investors – representing some US$4 trillion in assets under management – came together as the Net-Zero Asset Owner Alliance. Collectively, these investors declared that they would transition their portfolios by 2050. Some of Australia's largest businesses are committing to achieve net zero emissions by or before 2050, including software company Atlassian, property companies Dexus and Mirvac, resources company Rio Tinto and Qantas airlines. "

This is a complex but fundamental input into the ISP that requires more rigor and analysis to ensure that key data inputs and the right assumptions that underpin the modelling are captured. We strongly recommend more stakeholder and consumer engagement on this critical topic. We also recommend AEMO takes a deeper dive into the various research studies and data sets available and seek peer review from an independent expert to validate the facts and trends that is used to inform these assumptions.

5 Inputs and Assumptions

5.1 NEM Decarbonisation

5.1.1 Why have we chosen this issue?

The Panel is very aware of the politicisation of climate change and greenhouse emission reduction in Australia and the potential for this to also influence the treatment of these issues in the ISP. Our aim is to ensure that the interests of electricity consumers is the lens through which the ISP treats these distinct but interrelated issues.

Further, we are aware that these issues are very important to a large number of consumer stakeholders and we recommend AEMO engage specifically on these issues during the ISP development process.

5.1.2 Consumer Panel Comments

AEMO have stated that the scenarios proposed in the Draft 2021 IASR have been developed taking into consideration the major sectoral uncertainties affecting the costs, benefits and need for investment in the NEM. These uncertainties relate to:

- the rate of decarbonisation of the NEM,
- the speed and scale of DER penetration,
- economic and population growth,
- relative costs of various generation and storage technologies, and
- the extent of electrification of other sectors in pursuit of decarbonisation.

Depending on how these five uncertain dimensions are combined, the assumed pace of the energy transition in the NEM, and therefore the need for investment, can vary considerably.

Decarbonisation is clearly a critical issue in scenario development and this is also reflected in specific Inputs and Assumptions. Chapter 4.3 *Domestic emission targets and reduction*, states that:

> In the Export Superpower and Sustainable Growth scenarios AEMO proposes applying carbon budgets that target a specific decarbonisation objective, with the electricity sector expected to provide a significant contribution

Another reason why this is important for consumers is the impact of fuel switching from natural gas to electricity being driven by decarbonisation and, increasingly, cost reduction ambitions. For example, the ACT and Victorian government have made significant announcements that will impact the reticulated gas network, with potential implications for the electricity system.

For example, the ACT government has a policy to phase out the use of gas by 2040[27]. Similar to Victorian government, through its Draft 30-year Infrastructure strategy is seeking to replace gas and low efficiency electric heaters with high efficiency reverse cycle air conditioners in 250,000 households. In addition, it also recommends that new developments can proceed without mandatory gas connection and the government state they will be reviewing all gas policies to consider future mitigation and transition strategies[28].

It is not clear to the Panel that the issue of decarbonisation is appropriately dealt with in the Central Scenario. We recommend further engagement on this issue.

5.2 The Impacts of Climate Change on the NEM

5.2.1 Why have we chosen this issue?

The Panel is very aware of the politicisation of climate change and greenhouse emission reduction in Australia and the potential for this to also influence the treatment of these issues in the ISP. Our aim is to ensure that the interests of electricity consumers is the lens through which the ISP treats these distinct but interrelated issues.

5.2.2 What is in the Draft IASR?

Chapter 4.2 *Scenario alignment to international climate outcomes* proposes how the ISP modelling would reflect global climate change in the 'possible future world' of each scenario.

Chapter 4.10 *Climate Change Factors*, correctly identifies that the changing climate has an impact on a number of aspects of the power system, from consumer demand response to changing temperature conditions, to generation and network availability impacts. The subsequent sections describe the various impacts across the spectrum of inputs.

5.2.3 Consumer Panel Comments

This is a complex but a fundamental input into the ISP that requires more rigor and analysis. We strongly recommend more stakeholder and consumer engagement on this critical topic. We also recommend AEMO takes a deeper dive into the various research studies and data sets available and seek peer review from an independent expert to validate the facts and trends that is used to inform these assumptions.

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[27] https://reneweconomy.com.au/act-to-phase-out-gas-as-it-launches-next-stage-to-zero-carbon-strategy-92906/

[28] Page 16 https://www.infrastructurevictoria.com.au/wp-content/uploads/2020/12/Victorias-Draft-30-Year-Infrastructure-Strategy-Volume-1-1.pdf

5.3 Gas Price Forecasts

IASR Section 4.7.1 – Fuel assumptions - Gas prices

5.3.1 Why have we chosen this issue?

Forecast gas prices are one of the most significant assumptions in the ISP. Benefits under the Regulatory Investment Test for Transmission (RIT-T) are dominated by assumptions around the level of savings from reduced gas fired generation. Hence the need for a close focus on the gas price forecasts.

The 2020 ISP least-cost development path for the Central Scenario, for example, relies on Fuel cost reductions to provide over 80% of the Gross Market Benefits as shown below (from the 2020 ISP Appendix 2):

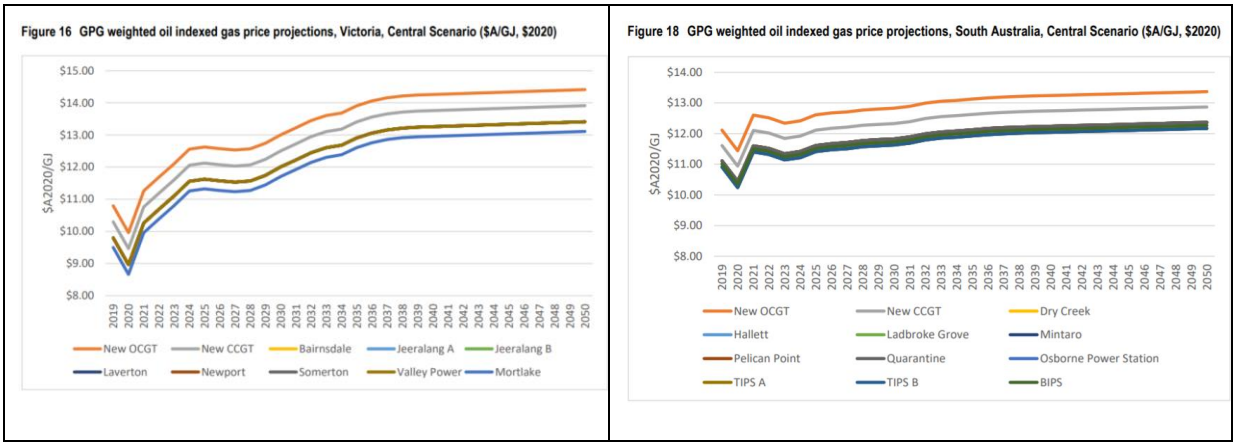
Table 8 Net market benefits of least-cost development path by category, Central scenario

Benefit category	Net Benefit ($M)
Capex	$570
FOM	$692
Fuel	$10,045
VOM	$511
USE+DSP	$124
Rehab	-$10
Gross Market Benefits	**$11,932**
Network (actionable and future ISP projects)	-$3,530
Network (generic REZ network costs)	-$714
Total Net Benefits	**$7,688**

5.3.2 What in is the Draft IASR?

The forecasts are based on a report from Lewis Grey Advisory (LGA), a different consultant than that used for the 2020 ISP. They cover four scenarios – Central, Slow Change, Step Change and Gas Led. Forecasts are provided for both industrial and gas fired generation prices with the latter the relevant forecast for the ISP. Here are the forecasts for Victorian and SA gas fired power stations in the Central Scenario[29]. The report only provides forecasts for oil linked prices unlike the forecasts for industrial prices that include both oil and non-oil linked options.

[29] See LGA pp. 27-28



AEMO has mapped these price forecasts to accord with the proposed scenarios:

Table 28 Mapping of the gas prices trajectories to the proposed scenarios

	Gas price scenario to apply	Relative price comparison
Central	Central	Mid price
Export Superpower	Step Change	Low price
Sustainable Growth	Step Change	Low price
Slow Growth	Slow Change	High price
Diversified Technology	Gas Led	Lowest price

The methodology is based on a game theory model that simulates competitive pricing outcomes suitable to understand contract pricing. Gas production costs, reserves, infrastructure and pipelines are fundamental inputs into this model that also considers international liquid natural gas prices, oil prices, and measures of the domestic economy.

5.3.3 Consumer Panel Comments

These comments cover stakeholder engagement, methodology and further issues that should be considered. In summary we have serious concerns about the robustness of the forecasts due to the lack of information provided by LGA in its report. We note that a number of questions were provided to AEMO on 13-14th January to help clarify our understanding of various parts on the LGA report. No response was received prior to finalising this submission but we hope to continue to engage with AEMO on these issues.

We begin by comparing the LGA forecasts with those prepared by Core Energy for the 2020 ISP.

The LGA price forecasts are significantly higher than the forecasts in the 2020 ISP

To illustrate the changes from the 2020 ISP to the 2022 ISP, we have extracted the forecasts for gas fired generation in South Australia. Over the 11-year period to 2021-32, LGA forecasts are 14-40% higher than Core Energy's forecasts for the 2020 ISP. When stakeholders questioned the

SA gas price assumptions as part of reviewing Project Energy Connect, ElectraNet commissioned a separate Energy Quest Report[30]. Published in May 2020, it confirmed the Core forecasts.

2020 ISP Assumptions – Core Energy

Fuel Cost Scenario	Modelling scenarios using these costs										
Neutral	Central, High DER, Fast Change										
		2020-21	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31
Osborne	Neutral	$ 8.14	$ 8.48	$ 8.66	$ 8.90	$ 9.27	$ 9.53	$ 9.82	$ 10.05	$ 10.23	$ 10.36	$ 10.48
Pelican Point	Neutral	$ 8.34	$ 8.68	$ 8.86	$ 9.10	$ 9.47	$ 9.73	$ 10.02	$ 10.25	$ 10.43	$ 10.56	$ 10.68
Quarantine	Neutral	$ 8.34	$ 8.68	$ 8.86	$ 9.10	$ 9.47	$ 9.73	$ 10.02	$ 10.25	$ 10.43	$ 10.56	$ 10.68
Torrens Island A	Neutral	$ 8.14	$ 8.48	$ 8.66	$ 8.90	$ 9.27	$ 9.53	$ 9.82	$ 10.05	$ 10.23	$ 10.36	$ 10.48
Torrens Island B	Neutral	$ 8.14	$ 8.48	$ 8.66	$ 8.90	$ 9.27	$ 9.53	$ 9.82	$ 10.05	$ 10.23	$ 10.36	$ 10.48

Proposed 2022 Assumptions - LGA

Fuel Price ($/GJ)			Export Superpower	Sustainable Growth	Central	Diversified Technology
Fuel prices for existing, committed, anticipated and new entrant		Gas price scenario	Step Change	Step Change	Central	Gas-led
		Coal price scenario	Step Change	Step Change	Central	Central
Scenario	Central					
Gas price scenario	Central					
Coal price scenario	Central					
		Toggle input through the drop down menu				
Existing generators						

Generator	Region	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32
Mintaro GT	SA	$ 11.56	$ 11.43	$ 11.38	$ 11.51	$ 11.64	$ 11.69	$ 11.74	$ 11.79	$ 11.81	$ 11.86	$ 11.94
Osborne	SA	$ 11.36	$ 11.23	$ 11.18	$ 11.31	$ 11.44	$ 11.49	$ 11.54	$ 11.59	$ 11.61	$ 11.66	$ 11.74
Pelican Point	SA	$ 11.56	$ 11.43	$ 11.38	$ 11.51	$ 11.64	$ 11.69	$ 11.74	$ 11.79	$ 11.81	$ 11.86	$ 11.94
Quarantine	SA	$ 11.56	$ 11.43	$ 11.38	$ 11.51	$ 11.64	$ 11.69	$ 11.74	$ 11.79	$ 11.81	$ 11.86	$ 11.94
Torrens Island A	SA	$ 11.36	$ 11.23	$ 11.18	$ 11.31	$ 11.44	$ 11.49	$ 11.54	$ 11.59	$ 11.61	$ 11.66	$ 11.74
Torrens Island B	SA	$ 11.36	$ 11.23	$ 11.18	$ 11.31	$ 11.44	$ 11.49	$ 11.54	$ 11.59	$ 11.61	$ 11.66	$ 11.74

The LGA report provides no analysis of what has changed between May 2020 and December 2020 that has led to such a significant increase in forecast prices (aside from any inflation impact).

Stakeholder engagement has been very limited so far and should be considerably expanded

AEMO notes that the LGA:

> "…methodology was consulted on at FRG meeting 35 in September 2020." (p.101)

The FRG discussion was a scheduled 40 minute agenda item (25 mins presentation, 15 min discussion) of a 10 slide pack. There was one slide on methodology, one slide on EIA oil price forecasts, two slides showing graphs of forecasts of industrial (not GFG) gas prices under different scenarios and then two appendix slides with short notes on outcomes (whether oil-linked or not) and modelling assumptions. The discussion at the FRG was very high level,

30 See https://www.electranet.com.au/wp-content/uploads/projects/2016/11/200608-Summary-EnergyQuest-ElectraNet-Report.pdf

constrained by the level of detail provided in the slides and verbal presentation and focussed on the price forecasts presented eg it was not possible to discuss the reasons for the difference between industrial and GFG price forecasts because only the former were provided.

Of the 104 attendees listed in the minutes, 30 were from AEMO and 5 represented consumer interests.

We do not agree that the methodology was 'consulted on' at the FRG if AEMO is using the IAP2 definition of 'consult', i.e. - "To obtain public feedback on analysis, alternatives and/or decisions." This is only possible with access to the full report, which came in late December. So to say that[31]:

> "Where AEMO defines the engagement as "for consultation", stakeholders have a two-week window following the meeting to provide formal written feedback on the issue raised for consultation, and AEMO's consideration of this feedback will be documented and published."

is meaningless in this case. Stakeholders are unable to properly review the assumptions until the full report is available and if these assumptions are clearly presented and argued.

The draft IASR indicates that the "Update process… will be dependent on feedback received on this draft IASR". We would propose that for such a key assumption that best practice engagement would include at least:

- Preparation and publication of a revised version of the LGA report addressing comments in submissions on the Draft IASR
- A series of further engagement opportunities on this revised report including webinar and written submissions

A useful model for analysis of key assumptions like gas prices, was used by AEMO for the DER assumptions in the 2020 ISP. This DER consultation involved[32]:

- Two separate consultants' reports – CSIRO and Energia,
  "… to develop forecasts, from the top down and bottom up, and deliver key insights into the future…supplying the scenario settings that would apply to each of the scenarios

[31] Draft 2021 IASR p.35

[32] See p.26 https://aemo.com.au/-/media/files/electricity/nem/planning_and_forecasting/inputs-assumptions-methodologies/2019/2019-planning-and-forecasting-consultation-responses.pdf?la=en

(including the appropriate appetite for DER in each scenario, the emissions reduction ambition, the qualitative degree of tariff reform, and guidance on cost structures for DER technologies, consumer retail energy prices, and policy settings appropriate to each scenario).

The consultants developed their forecasts of each DER component, considering the capabilities of the distribution network to integrate and allow export from the distribution networks."

Perhaps the remaining timetable does not permit a second consultant's forecast, but a separate consultant's review of the LGA report should be possible.

- Two separate workshops with the transport and energy industry
  "… to consult on appropriate considerations to improve the quality of the forecasts of EVs by the consultants. Engagement in that workshop supported the consultants' consideration of some of the technical aspects of the datasets they produced."
- Presentation of the consultants' draft forecasts to a number of stakeholder meetings
  "… to stakeholders at the 12 April 2019 workshop hosted by BCG,…to AEMO's Forecasting Reference Group at several different sessions through the consultation period, and stakeholders had an opportunity to question the outcomes and inputs of the consultants' models in those sessions. This was a useful process, as it identified points of clarification that were added to the consultants' final reports and datasets. These reports and datasets contain much of the information requested in stakeholder submissions."

Methodology

The LGA report describes the methodology as:

> "LGA bases its gas price forecasts on a demand-supply balancing methodology which captures all the features related to the above. It offers a combination of:
>
> - cost plus pricing - market prices must be at or above the delivered cost of gas sources forming part of the supply
> - export impact – the LNG export market is modelled explicitly and domestic suppliers compete in it with other LNG producers, which can also enter the Australian market as importers.
> - contract based – prices are set in the market for new contracts where the price of gas entering the market is set. Existing contracts, particularly for exports, can lock up much of the existing gas resource base. Gas producers compete to supply new contracts, to meet demand not met by existing contracts.
>
> The contribution of each of these factors to domestic gas prices is variable and in part depends upon the level of competition between suppliers."

LGA notes that[33]:

> "This report, together with the excel workbook 'Price Projections for the 2021 GSOO', fulfill the reporting requirements outlined in the Terms of Reference…"

The level of detail provided is scant. There are few footnotes and references to the data sources. The author refers to an excel model – RMMEAU – that the author has built up over a number of years from what seems to be the author's more basic Resources Market Model (RMM):

> "… which is applicable to any resource based market in which reserves and term-contracts are important features."

This RMM model has been used to build a model of the LNG market and the east coast gas market that was used to provide forecasts that LGA prepared for the 2017 GSOO. The excel workbook is simply a series of gas price forecasts (no formulae) for the Gas Led scenario only, plus a few cryptic notes on how the prices were calculated.

Unlike other key models used in the development of ISP eg the ISP model itself where there is detailed consultation on methodology[34] and the CSIRO GenCost model where the methodology is presented in detail[35], the level of detail provided by LGA is quite high level. Section 2.3.1 briefly outlines the model logic. LGA say for example:

> "The RMMEAU model used in this study was benchmarked against new contract prices reported by the Australian Competition and Consumer Commission (ACCC). (p.8)

But no data is provided to assess, for example, how it might have performed in forecasting actual prices over recent years. It is essentially a black box that consumers are asked to take on face value. In the absence of much more information, we do not.

The basis for key assumptions is opaque

We will highlight a few:

(i) Global LNG demand

> "Total demand is based on GSOO domestic demand forecasts and Global LNG forecasts are sourced by LGA."

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[33] LGA p.4

[34] See https://aemo.com.au/energy-systems/major-publications/integrated-system-plan-isp/2022-integrated-system-plan-isp/isp-methodology

[35] See https://publications.csiro.au/publications/publication/PIcsiro:EP208181 and the various supporting documents prepared over many years.

"Global LNG demand is derived by LGA from third party projections." (p.8)

But there is no reference to the source of these LNG forecasts.

(ii) The level of LNG exports

LGA say:

"The Scenarios for export contracts are:

- Central, Step Change and Gas Led Scenarios - approximately equal to contracted LNG export volumes[7] plus gas used in liquefaction" (p.12)

The footnote 7 for 'contracted LNG export volumes' is the ACCC Interim Gas Report from July 2020 but no page number is provided. The ACCC report discusses LNG contract demand for 2021[36], but no further. LGA forecasts go out to 2050. There is no reference to AEMO's own LNG export forecasts[37] so we do not know if there is internal consistency between LGA and the AEMO export forecasts that will be published as part of the 2021 GSOO.

(iii) Level of oil price linkage in contracts

LGA makes key assumptions about the % of oil linked contracts depending on the scenario. They note:

"The ACCC reports that the proportions of gas contracts for supply in 2021 that are oil price indexed are 55% in Queensland and 85% in southern states." (p.15)

and then forecast the following proportion of oil linked prices over the forecast period for different scenarios:

- "Central scenario: Queensland remains at 55% until 2026 and then declines to 38%. South declines to 20% indexation by 2031 and remains at that level
- Slow Change Scenario: Queensland is almost the same as for Central Scenario. South declines more slowly than in Central Scenario, reaching a level of 16% by 2038
- Step change scenario: Both regions move to 25% by 2021 and remain at that level
- Gas Led Scenario: Both regions start at 85% and decline steadily to 27% by 2050." (p.15)

[36] See the discussion in Section 1 on the supply/demand outlook https://www.accc.gov.au/system/files/Gas%20inquiry%20July%202020%20interim%20report.pdf

[37] See www.aemo.com.au/-/media/files/gas/national_planning_and_forecasting/gsoo/2020/gas-demand-forecasting-methodology.pdf?la=en Chapter 2

The footnote for the ACCC data is again their July 2020 Interim Gas Report, but no page number was provided. We found no such reference in a review of the ACCC report. The ACCC report only covers contracts for 2021 supply entered into between 1 January 2019 and 20 February 2020 (p. 64) so there was still some time to go to capture all contracts for 2021 supply which will be done in the next report due sometime in H1, 2021. The ACCC does not give the number of contracts it has reviewed for a particular period. What the ACCC did say about contract to supply gas in 2021 is worth quoting at length[38]:

> "Average prices under GSAs for 2021 supply in Queensland are marginally higher than average prices under GSAs for supply in 2020 executed between 23 August 2019 and 20 February 2020, whilst the average price in the southern states is significantly lower at $7.81/GJ.
>
> The decrease in the average price in the southern states is due to a small number of parties recontracting a large quantity of supply for 2021 under contracts linked to international oil prices. None of the producer GSAs for 2020 supply in the southern states executed between 1 January 2018 and 20 February 2020 were oil-linked. In sharp contrast, almost 90 per cent of 2021 supply under GSAs entered into between 1 January 2019 and 20 February 2020 is to be supplied to both retailers and C&I users under oil-linked GSAs which, under current pricing assumptions, are priced significantly lower than fixed-price GSAs.
>
> This is evident in table 2.6, which shows that the substantial decrease in oil price expectations caused the price of oil-linked GSAs to fall well below prices under fixed-price GSAs. Given that a relatively small quantity of gas in Queensland is oil-linked, average 2021 prices in Queensland are expected to be higher than in the southern states. However, if only fixed-price GSAs are considered, weighted-average gas prices in both regions are similar, at around $9.35/GJ.
>
> Further, the majority of oil-linked GSAs executed between 1 January 2019 and 20 February 2020 across the East Coast are between producers and retailers. Whether these relatively low GSA prices lead to lower prices for C&I users will likely depend on the level of competition between retailers."

[38] Ibid pp 65-6

So while 90% of the 2021 contracts in southern States were oil linked, it was close to zero for 2020 supply. The level of oil linkage in Queensland is "relatively small". There was obviously an incentive in 2020 to have oil-linked contracts given oil prices. Then the oil linked contracts were primarily done with retailers, not C&I customers as implied by LGA. There may be a logic on why the southern States rate my fall to 20% by 2031, but it is not provided by LGA. The forecast decline in Queensland to 38% sometime after 2026 (no year or rate of decline is provided) but we do not know if, indeed, this is a decline.

We would note that the ACCC data is only for GSAs that[39]:

- "have an annual contract quantity of 0.5 PJ and a contract term of 12 months or more
- are executed at arm's length
- are between retailers and C&I users for the analysis of retailer GSA pricing."

The data therefore does not include GPG contracts.

(iv) Oil price forecasts

LGA's approach is:

> "LGA's longer term oil price projections are based on confidence interval projections of historical oil prices from 1968 to 2019. During this period the price averaged $US55/bbl in $2021 terms, while alternating between 5-10-year highs and longer-term lows and trended upwards at 55c/bbl/year. The short-term projections are trended into the confidence interval projections over 2021-2025 (Figure 4) (p.14)

The table below compares the oil prices forecasts presented as part of LGA at the September FRG meeting (which seem to be based on US EIA forecasts, but no reference is provided) with Figure 4 in the final report.

[39] Ibid p.64

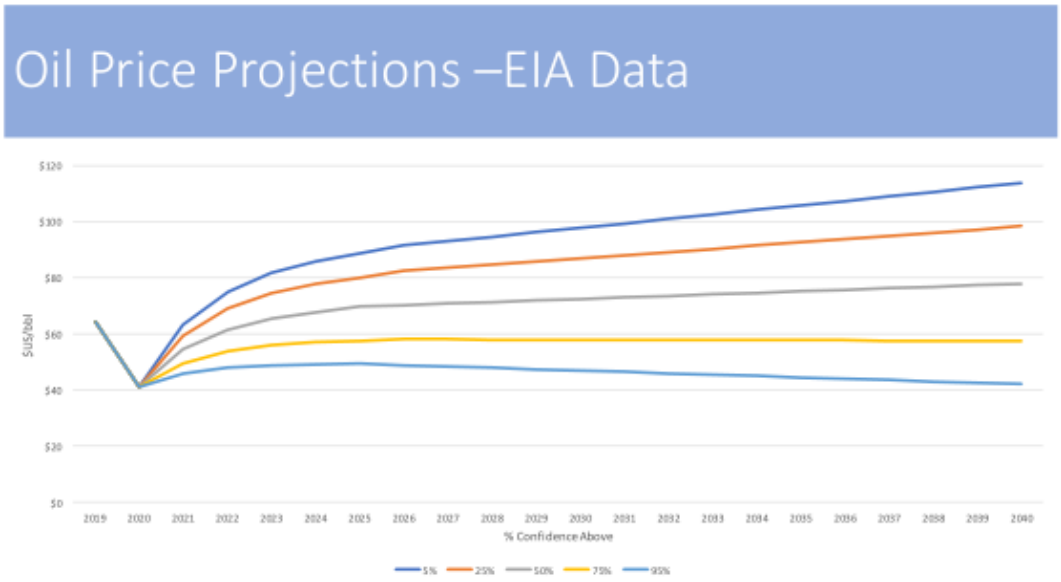
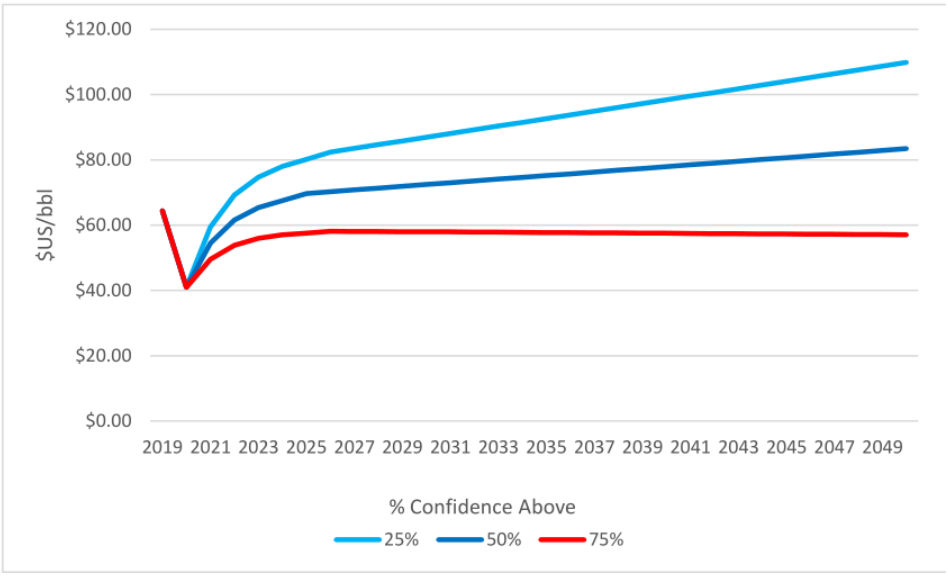


Figure 4 Confidence Interval Projections of Oil Prices ($US/bbl)



It seems that LGA has moved away from using US EIA forecast to developing its own methodology. However, no external reference or detail is provided to support the methodology behind Table 4. It is also not clear if these assumptions are consistent with the oil price assumptions used elsewhere in the calculation of liquid fuel prices[40].

(v) Exchange rate forecasts

[40] See https://aemo.com.au/-/media/files/electricity/nem/planning_and_forecasting/ntndp/2014/data-sources/fuel_and_technology_cost_review_report_acil_allen.pdf

LGA says (p.13) that "The exchange rate forecasts used were provided to AEMO by BIS Oxford Economics". However there seems to be a difference between the rate LGA provides and those provided by BIS Oxford Economics in their report to AEMO in October 2020[41].

Fig 14. Exchange Rate Forecast

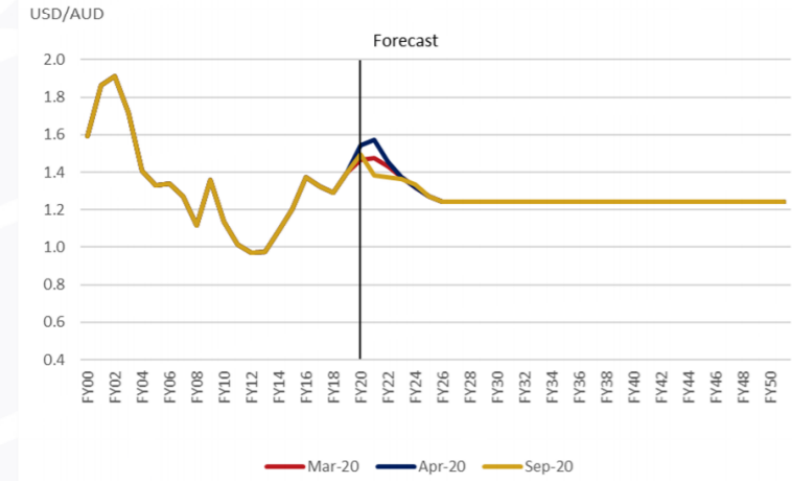
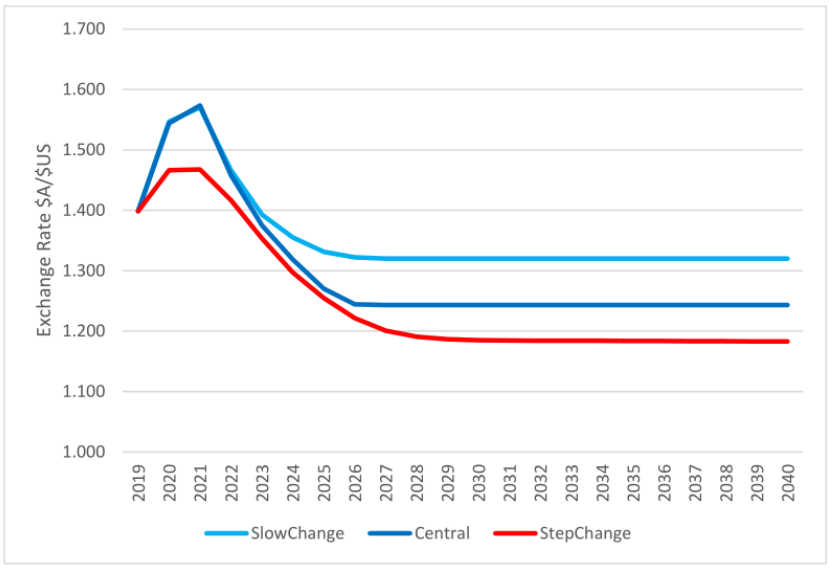


Figure 3 Exchange Rate Forecasts



(vi) The difference between C&I and GFG gas prices

LGA's basic forecast logic is[42]:

[41] See https://aemo.com.au/-/media/files/electricity/nem/planning_and_forecasting/inputs-assumptions-methodologies/2021/bis-oxford-economics--macroeconomic-forecasts-update-october-2020.pdf?la=en

[42] LGA p.27

> "To approximate the range of usage patterns, the prices paid by most gas-fired generators are set equal to their R&C [residential and commercial] zonal centre price plus a small transmission adjustment based on their locations relative to the base forecast centre."

No detail is provided for this linkage to R&C prices. We are aware that gas prices paid by GFG can, broadly speaking, be in two categories:

- Firm supply contracts for both commodity and transport with a premium paid over C&I customers to ensure availability of delivered volume capacity to quickly ramp-up a generator for short periods, and
- Non-firm supply for both gas and transport which would be at a discount to C&I prices as a generator may wish to take advantage of particular market conditions in gas and/or electricity markets

It would have been helpful to provide more analysis around the assumptions on the mix of these two categories.

All the LGA GPG forecasts are for oil linked prices. As we have seen, LGA draws on data from the most recent ACCC Interim Gas Report in July 2020. The ACCC reports are all about C&I gas contracts[43], not GFG gas contracts. No data is provided to justify the absence of non-oil linked gas prices for GPG. LGA notes[44]:

> "Full details of GPG price projections for all scenarios are provided in the accompanying Excel workbook: "Price Projections for the 2021 GSOO".

Yet, as noted above, the (published) workbook is simply a series of gas price forecasts (no formulae) for the Gas Led scenario only, plus a few notes on how the prices were calculated.

The potential impacts of key Government initiatives to bring more competition to the gas market have not been explained

The Diversified Technology scenario[45]:

> "…reflects a world in which affordably priced and secure gas supplies are achieved as part of the Federal Government's plan to lead Australia out of the COVID-19 recession"

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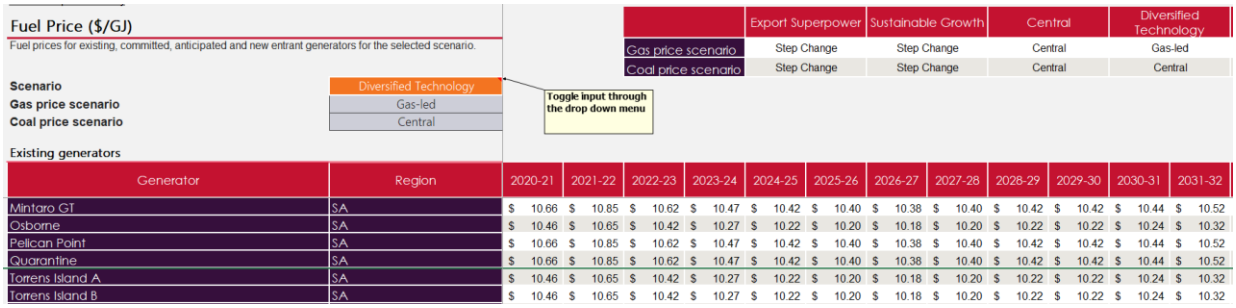
[43] See p.64 www.accc.gov.au/system/files/Gas%20inquiry%20July%202020%20interim%20report.pdf

[44] LGA p. 26

[45] IASR p.27

The LGA price forecasts for a 'Gas Led' gas price scenario (which are used in the Diversified Technology scenario) are ~ 8-12% lower that the central case forecasts in the table above with the higher difference in later years.



Fuel Price ($/GJ)

Fuel prices for existing, committed, anticipated and new entrant generators for the selected scenario.

Scenario: Diversified Technology
Gas price scenario: Gas-led
Coal price scenario: Central

Toggle input through the drop down menu

	Export Superpower	Sustainable Growth	Central	Diversified Technology
Gas price scenario	Step Change	Step Change	Central	Gas-led
Coal price scenario	Step Change	Step Change	Central	Central

Existing generators

Generator	Region	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32
Mintaro GT	SA	$ 10.66	$ 10.85	$ 10.62	$ 10.47	$ 10.42	$ 10.40	$ 10.38	$ 10.40	$ 10.42	$ 10.42	$ 10.44	$ 10.52
Osborne	SA	$ 10.46	$ 10.65	$ 10.42	$ 10.27	$ 10.22	$ 10.20	$ 10.18	$ 10.20	$ 10.22	$ 10.22	$ 10.24	$ 10.32
Pelican Point	SA	$ 10.66	$ 10.85	$ 10.62	$ 10.47	$ 10.42	$ 10.40	$ 10.38	$ 10.40	$ 10.42	$ 10.42	$ 10.44	$ 10.52
Quarantine	SA	$ 10.66	$ 10.85	$ 10.62	$ 10.47	$ 10.42	$ 10.40	$ 10.38	$ 10.40	$ 10.42	$ 10.42	$ 10.44	$ 10.52
Torrens Island A	SA	$ 10.46	$ 10.65	$ 10.42	$ 10.27	$ 10.22	$ 10.20	$ 10.18	$ 10.20	$ 10.22	$ 10.22	$ 10.24	$ 10.32
Torrens Island B	SA	$ 10.46	$ 10.65	$ 10.42	$ 10.27	$ 10.22	$ 10.20	$ 10.18	$ 10.20	$ 10.22	$ 10.22	$ 10.24	$ 10.32

The report does not discuss these Government reforms nor the Prime Minister's Gas Statement of 15th September 2020[46] to explain how the "Gas Led" price forecast was developed. This is surprising given that the Minutes of the September 2020 FRG meeting note[47]:

> "AEMO: Recent government announcements around gas generation and pipelines investment should be considered for at least some of the modelling."

The former includes two RISs through COAG Energy Ministers – pipeline[48] and upstream[49] - that are designed to give much greater information disclosure to consumers. Ministers consider that these initiatives will reduce information asymmetry and assist in competitive market development. The latter is focussed on a gas fired recovery including the negotiation of a Code of Conduct between gas consumers and producers.

Is there time for considering our comments on the forecasting methodology given the 2021 GSOO timing?

We sought to understand the role of the forecasts in the GSOO given our comments above and that the GSOO is due to be published next month (March 2021). If our comments in this submission led to a review of the forecasts, how would that impact on the GSOO? The role of these price forecasts in the GSOO demand forecasts was discussed at the January 2021 FRG. If

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[46] See https://www.pm.gov.au/media/gas-fired-recovery

[47] See https://aemo.com.au/en/consultations/industry-forums-and-working-groups/list-of-industry-forums-and-working-groups/forecasting-reference-group-frg; the Minutes are contained in the October 2020 FRG meeting pack with the quote at p.4.

[48] See http://www.coagenergycouncil.gov.au/publications/council-releases-gas-pipeline-regulation-impact-statement-consultation

[49] See http://www.coagenergycouncil.gov.au/publications/consultation-draft-regulatory-amendments-increase-transparency-gas-market-0

we understood the discussion correctly and AEMO's modelling approach[50], these price forecasts are an 'input' to the residential/small commercial (the LGA wholesale price forecast are converted to delivered retail prices in an AEMO model) and large commercial/industrial consumption models. Forecast prices are not provided as part of the Large Industrial Load (LIL) questionnaire (these would have to be Core Energy forecasts given the LGA forecasts were not finalised until after the questionnaire was sent). Respondents to the LIL questionnaire are asked for 'the upper and lower limit gas price ranges that would impact operations' with the 'data used as one input to inform an increase or decrease in consumption for relevant scenarios'[51].

In the absence of further information, we came away unsure about how any changes in the gas price forecasts could be considered in the 2021 GSOO.

5.3.4 Summary

Forecast gas prices are one of the most significant assumptions in the ISP. Benefits of the optimal development path in the 2020 were dominated by savings from reduced gas fired generation. Hence the need for a robust analysis to justify the forecasts and then close focus from the Panel on these forecasts.

We see the LGA report falling short of the level of analysis required to forecast gas prices:

- the model, being proprietary to the author, is basically a 'black box' to stakeholders; unlike other key models in the ISP, consumers are asked to accept this model on the basis of very limited explanation
- the lack of model transparency means that it is impossible for consumers to assess why its forecast prices are 15-40% higher than the 2020 ISP forecasts that were confirmed only a few months previously by Energy Quest for Electranet's updating of the Project Energy Connect CBA; but the Energy Quest model was also a 'black box' as Electranet claimed the full report could not be published for confidentiality reasons
- the lack of consideration of the impact of gas market reforms and the Prime Minister's Gas Statement

We do not consider that the actual and proposed engagement meets the AER Guidelines. We would recommend significant additional engagement on this issue before we can have confidence in the proposed forecasts.

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[50] For a general discussion of AEMO's modelling approach see

[51] Slido discussion in the FRG

5.4 Discount Rate

5.4.1 Why have we chosen this issue?

The choice of discount rate in the ISP analysis reflects how consumers value the promise of future savings on their electricity costs by spending on infrastructure compared to other ways of spending their money. The choice of discount rate is a very important reflection of consumer preferences and that is why we have chosen to engage on this issue.

The ISP Rules require the optimal development path to be identified via a 'net present value analysis' of alternatives[52]. Net Present Value (NPV) is an economic concept used to compare the value today of different future options. It does this by estimating the annual costs and benefits of these options over a common time period and then discounting the net benefits in each year to a value in today's dollars (referred to as discounted cash flow analysis).

It is a foundational part of the cost benefit analysis in the ISP. It is also commonly used by businesses to evaluate energy options, for example, investing in solar and batteries compared to buying electricity from the grid and so is appropriate for evaluating options in the ISP from a consumer perspective. However, this approach relies on setting what is known as a discount rate (in % per annum) – the mathematical parameter that reflects the "time value of money" and the risk involved in estimates of future costs and benefits.

To illustrate the sensitivity of decisions to this parameter, Figure 2 compares the impact on Net Present Value of different discount rates in an example where energy consumers are asked to spend $100 now, get no savings for a while (5 years), then expect to save $10 each year for 5 years, and then save $20 per year for 5 years after that.

Year	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Cashflow	($100)	0	0	0	0	0	$10	$10	$10	$10	$10	$20	$20	$20	$20	$20

[52] NER Chapter 5 Rule 5.22

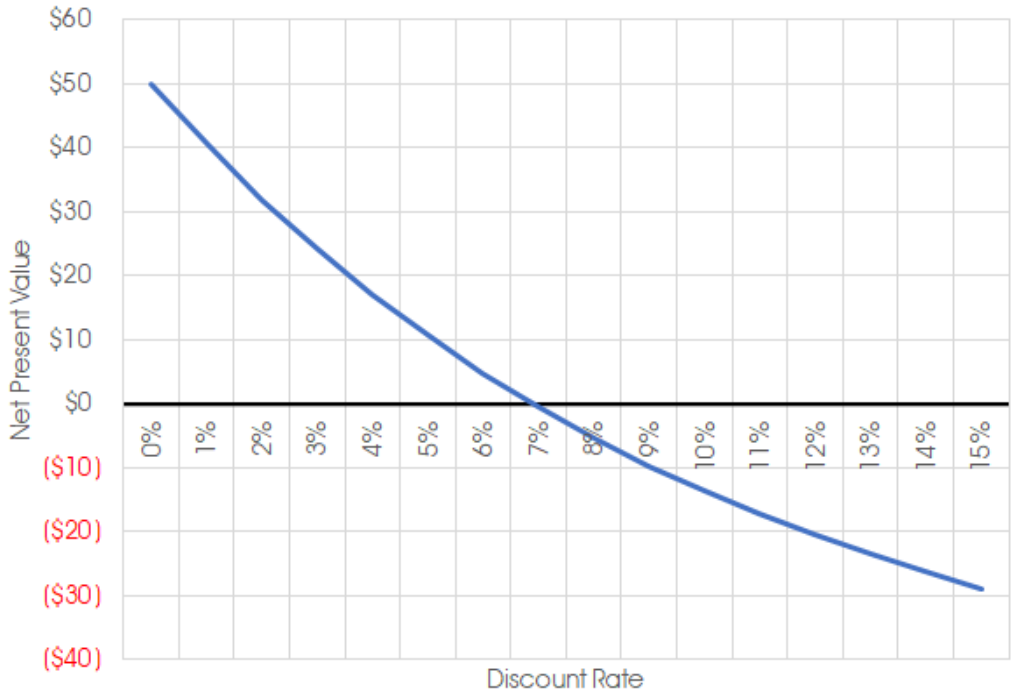


Figure 2: illustrative example of the impact of discount rate on future cashflows

If we assume no discount rate, then consumers are $50 better off after 15 years. However, if we consider that the savings might not appear and consumers could instead have used the original $100 on growing their business, paying off a loan or, for households, paying off the credit card or mortgage, using a discount rate to "discount" these promised future savings allows for a more "apples for apples" comparison of options.

In this example, a discount rate of 5% per year means that this is still a good deal and consumers are likely to be better off spending the $100 now. However, at 10% consumers would be better off considering another option.

5.4.2 What in is the Draft IASR?

The Draft IASR proposes a discount rate of 4.8% (in real terms, that is on top of inflation) for all scenarios except the Slow Growth scenario where the subdued economy is reflected in a lower real rate of 3.8%. The 4.8% is based on the AER's December 2020 annual update of the WACC calculation. [53].

The Draft IASR workbook shows the value selected for each scenario:

[53] See www.aer.gov.au/system/files/AER%20-%20Rate%20of%20return%20annual%20update%20-%202%20December%202020%20FINAL%2811739206.2%29.pdf

Discount rate

Discount rate is used to determine the present value of future cash flows during the cost benefit analysis process
Weighted Average Cost of Capital (WACC) expresses the costs incurred to obtain finance for capital expenditure
Discount rate presented is pre-tax, real.

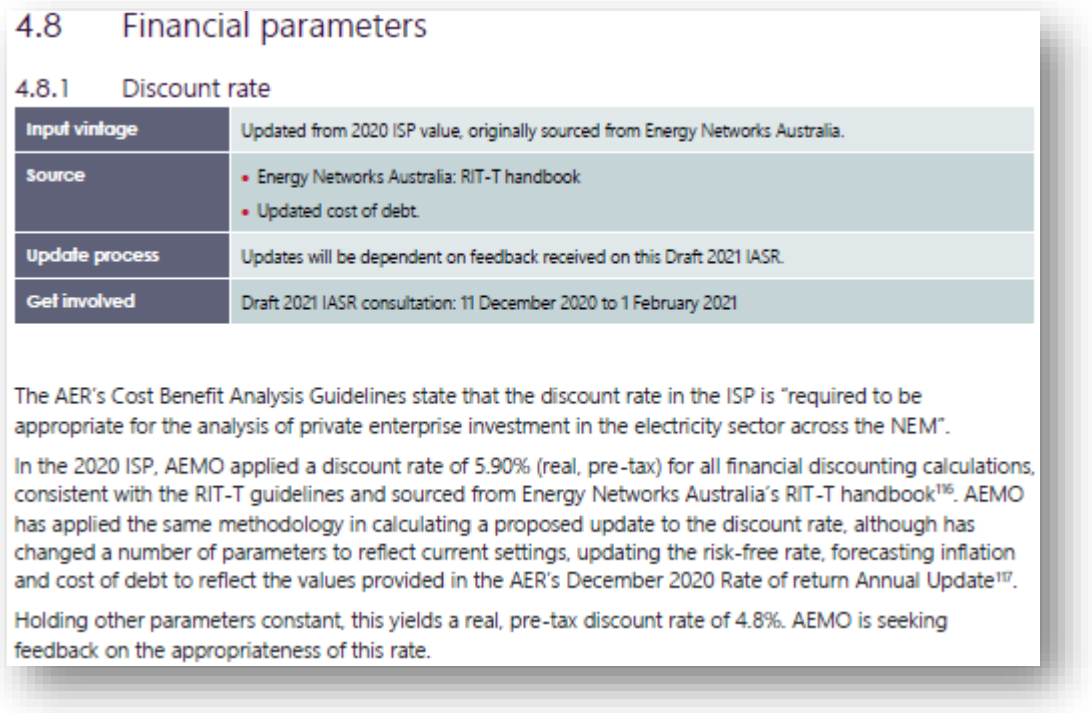
	Export Superpower	Sustainable Growth	Central	Diversified Technology	Slow Growth
Discount rate (%)	4.8	4.8	4.8	4.8	3.8
WACC, all new generation and transmission (%)	4.8	4.8	4.8	4.8	3.8

The Slow Growth scenario's settings are associated with lesser economic stimulation, lesser returns on equities, and therefore greater tolerance for lower margins on investments. AEMO proposes to use a lower discount rate of 3.8% as a simple way to account for these issues in the decision-making process.

A 2% reduction is proposed to be applied for generation developed through the NSW Electricity Infrastructure policy.

The footnote also indicates a "2% reduction is proposed to be applied for generation developed through the NSW Electricity Infrastructure policy".

The DRAFT IASR Report also summarises the parameter:



4.8 Financial parameters

4.8.1 Discount rate

Input vintage	Updated from 2020 ISP value, originally sourced from Energy Networks Australia.
Source	• Energy Networks Australia: RIT-T handbook • Updated cost of debt.
Update process	Updates will be dependent on feedback received on this Draft 2021 IASR.
Get involved	Draft 2021 IASR consultation: 11 December 2020 to 1 February 2021

The AER's Cost Benefit Analysis Guidelines state that the discount rate in the ISP is "required to be appropriate for the analysis of private enterprise investment in the electricity sector across the NEM".

In the 2020 ISP, AEMO applied a discount rate of 5.90% (real, pre-tax) for all financial discounting calculations, consistent with the RIT-T guidelines and sourced from Energy Networks Australia's RIT-T handbook[116]. AEMO has applied the same methodology in calculating a proposed update to the discount rate, although has changed a number of parameters to reflect current settings, updating the risk-free rate, forecasting inflation and cost of debt to reflect the values provided in the AER's December 2020 Rate of return Annual Update[117].

Holding other parameters constant, this yields a real, pre-tax discount rate of 4.8%. AEMO is seeking feedback on the appropriateness of this rate.

This 2022 value is an update from the 2020 ISP value of 5.9% (real), that was[54]:

> "…consistent with the RIT-T guidelines and sourced from Energy Networks Australia RIT-T handbook".

The IASR makes reference to the AER's CBA Guideline that the discount rate is[55]:

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[54] Draft IASP p. 105

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

"…required to be appropriate for the analysis of private enterprise investment in the electricity sector across the NEM"

5.4.3 Consumer Panel Comments

What does the AER CBA Guideline say?

Following the AER's framework[56] of 'required' (a binding element of the Guidelines that AEMO must achieve), and 'discretionary' (not binding with AEMO to provide further explanation or recommend best practice suggestions and provide information to increase transparency and help stakeholders understand a concept or process), the AER Cost Benefit Analysis Guidelines offers this guidance[57]:

> "The discount rate(s) in the ISP *is required* to be appropriate for the analysis of private enterprise investment in the electricity sector across the National Electricity Market (NEM), and *is required* to be consistent with the cash flows that the ISP is discounting. For example, if real cash flows are applied, a real discount rate must be applied.
>
> Outside of this requirement, AEMO has flexibility in selecting the discount rate(s) for ISP development paths. We recommend AEMO consider the following discretionary guidance:
>
> To meet the above requirement, AEMO should select a discount rate(s) that reflects the systematic risk associated with the expected cost and market benefit cash flow streams over the life of the projects in a development path.
>
> The lower boundary should be the regulated cost of capital, based on the AER's most recent regulatory determination at the time of the final ISP.
>
> …
>
> Since the discount rate is an important parameter for estimating the present value of long term projects, AEMO's choice of discount rate should be informed by expert guidance.

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

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

…

The choice of discount rate(s) should promote competitive neutrality between network and non-network options in a development path."

Does the AEMO approach accord with the AER Guidance?

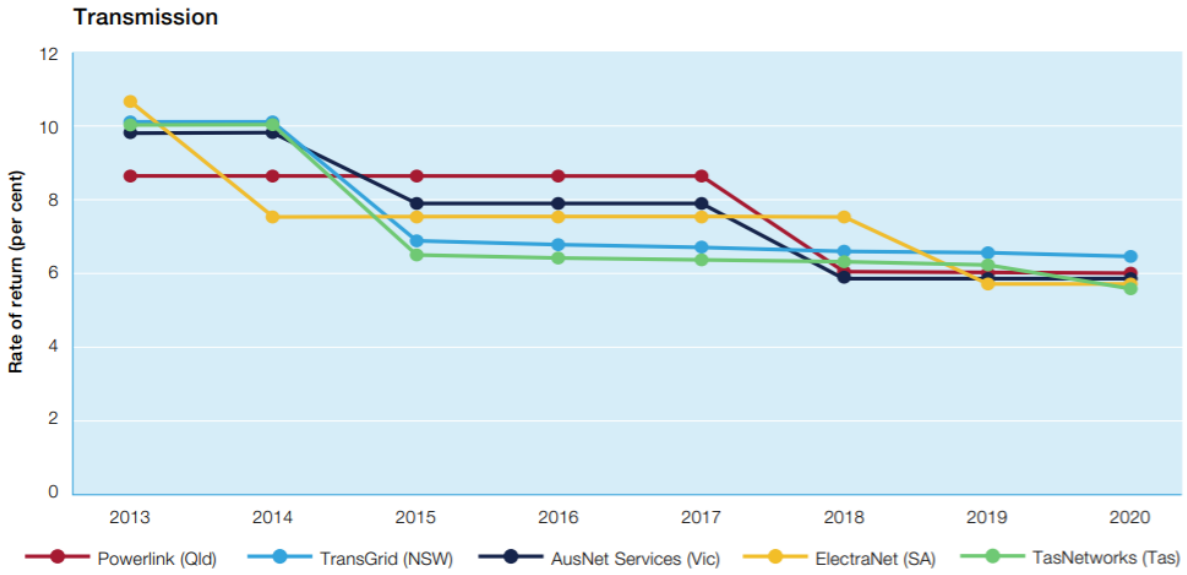
We do not think it does. The proposed discount rates should be an appropriate commercial discount rate for private sector investment in the NEM that would be influenced by the life of the asset being evaluated. For example, the return on investment that would be required by a new entrant private sector generator without any government subsidy or underwriting.

However, the Draft IASR proposes using recent determinations from the AER on the appropriate "weighted average cost of capital (WACC)"of a regulated electricity or gas network monopoly as not the lower bound but as the central estimate for all scenarios. Such an approach is not acceptable for consumers as it:

- does not reflect the systematic risk associated with commercial project evaluation; rather, it reflects an AER decision based on the relative risk faced by regulated networks where consumers take demand risk that is substantially different to the risk allocation of a private sector investment
- does not take account of the life of the asset – even non-network options have an asset life considerably longer than 5 years; network asset life can be 50-60 years; biased results can happen when a discount rate for 5 year period are used rather than the rate that would apply over, say, a 60 year life of a network asset;
- assumes the current low interest rate cycle will continue for the life of the 30 year term of the cost benefit analysis; yet the variability of regulated WACCs has been quite large over the last 7 years where data is available[58]; selecting other 5 year regulatory WACCs shown in the table would have a large impact on the lower bound of the ISP CBA:

[58] See AER "State of the Energy Market 2020" p.151 https://www.aer.gov.au/system/files/State%20of%20the%20energy%20market%202020%20-%20Full%20report%20A4.pdf

Figure 3.19
Rates of return for energy networks



- will bias investment towards network solutions that, given their asset life, will increase consumers' stranded asset risk
- has not been informed by the appropriate expert guidance
- would not achieve the competitive neutrality objective

We would expect the discount rate that would meet the AER Guideline to be considerably above the proposed 4.8% rate. Given the level of technological change reasonably expected over the modelling period (2040 and beyond), it is likely to be significantly higher.

However, even in the calculation of the lower bound, it is not appropriate to source values from the peak body of the regulated monopolies that are guaranteed to receive this low-risk return.

Why reduce the WACC for NSW Roadmap projects by 2%?

As part of its consideration of the Roadmap the NSW Government commissioned NAB to prepare a report[59] on the WACC that should be applied. NAB undertook a survey of debt and equity investors in renewable generation to obtain their views on required returns. Given the expected role of the NSW Government in offtake agreements, NAB provided estimates of the likely impact of a renewable developer having a 'sovereign or near sovereign' counterparty (in

[59] NAB "NSW Electricity Infrastructure Roadmap – Weighted Average Cost of Capital Report" November 2020 https://energy.nsw.gov.au/sites/default/files/2020-11/NSW%20Electricity%20Infrastructure%20Roadmap%20-%20WACC%20Report.pdf

fact a 'Scheme Financial Vehicle' – SFV - with an AAA rating supported by a Government legislated levy) compared to the offtaker being an 'Investment Grade Retailer'.

The survey concluded that having a SFV lowered the real vanilla WACC by ~0.48% for wind and 0.57% for solar PV. AEMO does not provide any explanation for their proposal to reduce the WACC by 2% for generation developed through the Roadmap.

Why apply a lower discount rate to the Slow Growth scenario?

We understand the logic of a lower WACC in the Slow Growth Scenario, lower long term growth results in a lower risk free rate and investors are willing to accept lower returns. However, for the above reasons, this is not relevant to an assessment of the appropriate discount rate for a private sector investment in the energy market. This should reflect the uncertainty in predicting future market conditions and the relevance to the Slow Growth scenario should be reflected in the weighting applied to that scenario. However, to underline a point about the arbitrariness of the values chosen, there is no explanation of why 3.8% is chosen as the WACC in this scenario apart from[60]:

> "AEMO proposes to use a lower discount rate of 3.8% as a simple way to account for these issues in the decision-making process."

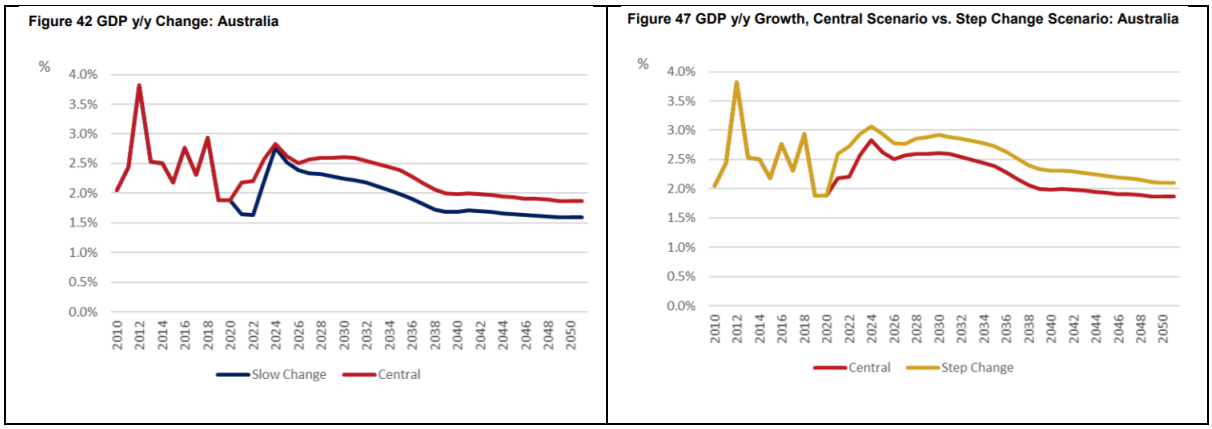
Given this logic then we wonder why AEMO did not argue for a higher discount rate for the higher growth Export Superpower and Sustainable Growth scenarios. Why does forecast GDP growth below the central case result in a lower discount rate but growth above the central case does not? The table shows the relative GDP forecasts:

GDP Growth – Central vs Slow Change[61]	GDP Growth – Central vs Step Change[62]

[60] Draft IASR p. 105

[61] BIS Oxford Economics "2020 Macroeconomic Projections Report" p. 40 https://aemo.com.au/-/media/files/electricity/nem/planning_and_forecasting/inputs-assumptions-methodologies/2020/bis-oxford-economics-macroeconomic-projections.pdf?la=en

[62] Ibid p. 45



Why is AEMO getting a WACC value from an ENA publication?

Our initial reaction is that this seems an unusual source. The logic flow seems to be:

- AEMO's choice of 5.9% in the 2020 ISP was 'sourced' from the 15th March 2019 ENA RIT-T Handbook, but this is not available on line to check[63]
- AEMO then 'applied the same methodology' to calculate the 2022 ISP discount rate applying the data provided by the AER in its recent update of WACC parameters[64]

The current (October 2020) version of the ENA Handbook says[65]:

> "TNSPs are required to adopt the discount rate assumptions form the most recent IASR published by AEMO, unless there is a demonstrable reasons why a variation of the discount rate assumption is necessary for a particular RIT-T.
>
> - At the time of updating this handbook, the discount rate adopted in the IASR is 5.9% for most scenarios
>
> Sensitivity testing…should be undertaken on the discount rate used by AEMO in its ISP and included in its IASR. In addition to the central discount rate of 5.9% noted above, the most recent IASR…provides an upper bound discount rate of 7.9% for more challenging economic environments."

The Handbook even notes that the 5.9%

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[63] The link given in the IASR https://www.energynetworks.com.au/assets/uploads/ena_rit-t_handbook_15_march_2019.pdf no longer works and a search of the ENA website found a reference to it but no link to see the document https://www.energynetworks.com.au/resources/fact-sheets/rit-t-economic-assessment-handbook/

[64] See www.aer.gov.au/system/files/AER%20-%20Rate%20of%20return%20annual%20update%20-%202%20December%202020%20FINAL%2811739206.2%29.pdf

[65] See p.44 https://www.energynetworks.com.au/resources/fact-sheets/ena-rit-t-handbook-2020/ Note it is a RIT-T Handbook for 'non-ISP RIT-Ts'

'…was based on the rate included in the March 2019 version of the ENA RIT-T Handbook."

This is a very confusing, circular story. Is an ENA rate based on an AEMO rate that is based on an ENA rate? What was the original source?

Summary

We do not believe the proposed approach meets the AER Guidelines. 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
    - undertake stakeholder engagement on both the independent report and the transparent analyses.

5.5 Transmission vs Distribution

5.5.1 The risk to consumers of paying twice

In the context of the IASR, we would like to see greater discussion around the trade-offs between which investments consumers are expected to fund. In particular the optimising of investment at both the distribution level and transmission level so consumers have confidence they are not paying more than necessary for either distribution or transmission assets, or to be paying "twice" for the same energy outcome. This is a critical issue for AEMO given the significant cost consumers are exposed to.

For example, there is significant push by state governments and AEMO to build out a number of renewable energy zones across the various jurisdictions linked by new transmission infrastructure. At the same time, we are also seeing significant investments at the distribution level for provision of services that allow the distribution companies to respond to the increasing number of distribution distributed energy resources at the local level. As such we recommend AEMO clearly explain how the impact of these investments on consumers has been considered and how the ISP arrives at the least cost / best value outcome.

5.5.2 Social and environmental impacts of new transmission corridors

As the power system transforms around variable renewable energy resources, significant investment in new transmission assets in Renewable Energy Zones and interconnectors.

The social, economic and cultural impact of this new infrastructure cannot be understated, and we believe there must be some analysis within the IASR of the potential additional costs and risks.

In the context of a changing climate, and the significant detrimental outcomes this is having on our flora and fauna, concerns have been raised with the Panel that some proposed transmission corridors would exacerbate the risks. Greater understanding of where these vulnerabilities lie would give greater confidence that the ISP is live to consumer expectations

Furthermore, as the ISP and associated renewable energy zones are building into land and geography that is often not built up there may be significant heritage and other cultural land of significant value to the local / indigenous community. Understanding where these are and the impact this may have would not only avoid future issues but also give key stakeholder groups confidence that the development of the integrated system plan is cognisant of their particular concerns

Lifting up and exploring these issues would give both confidence to consumers and communities that AEMO and governments are aware of the challenges that many face. This would also increase understanding of the various potential land use trade-offs and other concerns that. As illustrated by Project Energy Connect (the proposed new SA-NSW Interconnector), once land-use impacts and detailed line routes are finalised, costs can increase dramatically. It is in the interests of all stakeholders for these costs to be revealed as early and as accurately as possible.

The issue of cost forecasts is discussed in greater detail below.

5.6 Transmission cost estimates

5.6.1 Why have we chosen this issue?

There are two considerations here - the underestimation of capital costs was a key consumer criticism of the 2020 ISP, and the acknowledged level of inaccuracy in the cost estimates used in the ISP for Future ISP projects.

On the former, the level of information provided by AEMO in the 2020 ISP to justify is capex estimates was scant. At the Draft 2020 ISP stage there was a simple excel spreadsheet on cost

ranges without any indication of where in the range the actual capex input $ number was and no supporting information.

Prior to the publication of the final 2020 ISP, AEMO announced that it was increasing all capex numbers by 30%. Consumers were told that further information would be provided in the Final 2020 ISP. Yet all the final ISP had was another excel spreadsheet and no explanation for how the cost was derived or point estimate to use in the modelling, selected.

The 2020 ISP Actionable ISP Projects were based on AACE Class 4 and 5 cost estimates (with potential variations of -50% to +100%)[66]. AEMO's launch of the 2020 ISP however implied these should all be built, some as soon as possible, given the claimed consumer benefits[67].

> "…the ISP undertakes a comprehensive review of the changes that are occurring in the electricity system and identifies the series of supply and network investments that can best meet consumer expectations of affordable and reliable electricity.
>
> …the ISP identifies strategic investments in transmission infrastructure and renewable energy zones (REZs), which when coupled with low-cost firming resources, will be the most cost-effective way to add generation capacity and balance variable resources across the NEM."

Noting that:

> "In progressing these projects, it is critical that the cost of building transmission lines is tightly managed to ensure consumers derive these benefits,"

TNSPs' capex estimation for RIT-T projects has not been any better. The issue is perhaps best illustrated by the example of Project Energy Connect.

Stage	Capex $b
Draft ISP[68]	$1.53b

[66] American Association of Consulting Engineers (AACE) publish the industry standard cost estimate classification system used by AEMO and Network Service Providers.

[67] Press Release of AEMO Managing Director and CEO "AEMO's 20 year development for the National Electricity Market" 30 July 2020 https://aemo.com.au/newsroom/media-release/isp-2020

[68] See https://aemo.com.au/energy-systems/major-publications/integrated-system-plan-isp/2020-integrated-system-plan-isp/draft-2020-isp-archive

Final ISP[69]	$1.99b
Transgrid/Electranet contingent project application[70]	$2.36b
AER Draft decision on the CPA[71]	$2.15b

AEMO's estimation of Future ISP projects in the 2020 ISP was based on the mid-point of a Class 5 estimate with no explanation of why the mid-point was chosen. Yet the ISP's optimal development path announced that such projects should be built in the recommended timetable because of the level of net benefits from the overall package of projects.

Given a total potential cost for actionable projects in the 2020 ISP of around $10bn, robust capital costs estimates are central to consumers having confidence in the 2022 ISP optimal development path.

5.6.2 What is in the Draft IASR?

AEMO will develop a new Transmission Cost Database to estimate the costs of network augmentation options in the ISP. Updated annually, it will draw on data from TNSPs as well as other sources. The report by MMB on development of the data base was recently published[72]. GHD now has the task of preparing the database.

The role of the database can be described using the following table presented at the 20th January 2021 webinar and is based on a more comprehensive table in the MMB report[73].

Capex costs in the 2022 ISP will be a combination of:

- AEMO Database for future ISP projects, and

[69] See https://aemo.com.au/en/energy-systems/major-publications/integrated-system-plan-isp/2020-integrated-system-plan-isp

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

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

[72] See https://aemo.com.au/-/media/files/electricity/nem/planning_and_forecasting/inputs-assumptions-methodologies/2021/Transmission-Cost-Database-Phase-1-Report.pdf

[73] Ibid Figure 1, p.4

- TNSP estimates for existing actionable projects (PADR/PACR/CPA) and Future ISP Projects with Preparatory Activities; these will be cross checked against the Database and AEMO proposes to add 'offsets' if it considers they are required.

The 'Price certainty' ie which AACE estimate Class[74], is based on current AEMO/TNSP practice.

Intended usage of the database

Stage	Future ISP Projects	Future ISP Projects with Preparatory Activities	Project Assessment Draft Report (PADR) in development or completed	Project Assessment Conclusions Report (PACR) completed	Contingent Project Application (CPA) and ISP Feedback Loop
Example Projects	Network expansion options and candidate REZs in early stages	QNI Medium and Large, CQSQ, New England REZ etc	HumeLink, Marinus Link, Central-West Orana, VNI West		PEC, VNI Minor (NSW works)
Price certainty *(Draft)*	Class 5/4	Class 4/3	Class 4/3	Class 4/3	Class 3/2
Source of ISP Estimate	Database	TNSP	TNSP	TNSP	Not required for ISP

The proposed consumer engagement on the capex allowance and the data base development is in three parts:

- A submission on the Draft IASR
- A webinar in January 2021 on the database
- Draft Transmission Cost Report with consultation May-June 2021 consisting of a webinar and then a 4 week consultation period for submissions.

5.6.3 Consumer Panel Comments

We support the development of a centralised database

This is a welcome initiative. We look forward to confidentiality claims not being used as an excuse to prevent the required level of transparency for effective engagement. TNSPs should be required to provide a high level of detail that can be 'anonymised'.

As noted above with PEC, and other recent projects like ElectraNet's Eyre Peninsula Upgrade[75], TNSPs have a poor record in estimating capex.

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[74] See https://web.aacei.org/docs/default-source/toc/toc_18r-97.pdf?sfvrsn=4 for more discussion of the AACE cost classes.

[75] The capex in the AER's 5.16.6 review in April 2019 of $240m https://www.aer.gov.au/system/files/AER%20-%20Eyre%20Peninsula%20Electricity%20Supply%20Options%20RIT-T%20Determination.pdf increased to a contingent project application for $290m in May 2020 and an AER approval of $280m (all $2017/18) in September 2020 https://www.aer.gov.au/system/files/AER%20-%20Final%20decision%20-%20ElectraNet%20-%20Eyre%20Peninsula%20Reinforcement%20contingent%20project%20-%20September%202020.pdf

It is not clear what level of scrutiny these costs will have once inserted into the database. Transparency is only useful if it enables challenge, response and change where required. We would like to understand what audit process AEMO will use to ensure integrity of the database.

What is the scope of the AEMO engagement?

The 20th January 2021 webinar presentation noted that:

> "The draft class levels shown here reflect AEMO's current understanding of levels typically used at each stage."

with no indication of whether AEMO agrees with these levels. The webinar table shown above reflects what TNSPs told MMB. The consultant's report clearly implies that what is currently the case would be their recommendation for the future[76].

> "This engagement is intended to set out a framework for AEMO to develop a new Transmission Cost Database and provide clarity on the work required and level of accuracy expected at each stage of the regulatory approvals process. It will also set out a recommended process that AEMO will follow in order to produce the initial database and update it yearly."

MMB notes in Chapter 3 that:

> "Under the National Electricity Rules, AEMO and TNSPs must follow a set process for identifying, evaluating and proposing transmission investments that are identified in the ISP. Figure 2 (a more detailed version of the table above) shows a high-level overview of this process, along with a description of the proposed scope of work for estimating costs and the target accuracy of cost forecasts at each stage.

However, the RIT-T rules do not specify a particular AACE estimate class for any project stage shown in the table above. The impression given in MMB's report is that it is proposing that the AACE classes that are currently used by TNSPs are the ones that are going to applied in building the database. The AER is currently undertaking a major engagement on how to efficiently deliver ISP projects, with particular focus on the CPA stage. Its Draft Guidance Note does not propose specifying a particular AACE Class for the CPA/Feedback Loop[77].

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[76] Op cit p.6

[77] https://www.aer.gov.au/system/files/AER%20-%20Draft%20guidance%20note%20-%20Regulation%20of%20actionable%20ISP%20projects%20-%20December%202020%2811787928.1%29.pdf

It is unclear if the appropriate Class level for each stage will be part of the Draft Transmission Cost consultation. It would be very helpful for AEMO to clarify what parts of the above table are AEMO proposing to undertake engagement on.

Why engagement on the AACE classes should occur

Given the AER's RiT-T role, the discussion here is around:

- Which AACE Class should AEMO seek to achieve for each stage in the ISP capex estimation
- Once a class is set, where should the 'central' estimate sit within that class range, and
- How will AEMO set and apply its 'offsets'

Which AACE Class at each stage?

We begin with Future ISP Projects. The consultant's report says that current AEMO practice in estimating the costs of candidate ISP projects is to do a Class 4 (-30% to +50%)/5 (-50%-+100%) estimate with larger projects the latter. We are not told whether the consultants believe that the estimates in the 2020 ISP meet the Class 4/5 criteria. Certainty the proposed Database will help to achieve that if it is not already the case.

What should be highlighted is that the ISP is designed to deliver a series of 'actionable projects' and the publicity around that announcement has the impression that their economic case has been made and they should be built. Yet this large variation in cost estimates (see table on following page for examples) makes it difficult for consumers to accept the need for multi-billion dollar investments.

Now turning to Future ISP Projects with Preparatory Activities and PADR/PACR/CPA. The RIT-T process is designed to allow consumers to engage with the TNSP of what the best option might be. Yet the final stage where consumers have the ability to engage with the network – PADR – they are faced with Class 4 capex estimates for large projects. This is not a firm basis to encourage consumer engagement.

Take the example of Project Energy Connect (PEC) cited above. The estimated capital costs of the subsequent preferred Option 3C was $1.44b at the time of the PADR. This was increased to $1.53b in the PACR. The AER concluded in its 5.16.6 review[78]:

[78] See pp. 79-80 https://www.aer.gov.au/system/files/AER%20-%20Determination%20-%20SAET%20RIT-T%20-%2024%20January%202020.pdf

> "Given the preliminary nature of the estimated costs, ElectraNet has identified the investment as being in line with a Class 4 estimate under the AACE International Recommended Practice and Estimate Classification. This implies that only 1 to 15 per cent of the scope of the project has been defined. ElectraNet stated that the accuracy range for this estimate is -15 to -30 per cent on the low side and +20 to +50 per cent on the high side.157 This would mean that the investment cost could reasonably be in the range of $1.07 billion and $2.23 billion."

With the ending of 5.16.6 AER reviews for actionable ISP projects, consumer now have no opportunity to question capex estimates beyond the PADR. And that is where current practice is to have a Class 4 (-30% to + 50%) capex estimate.

Using Class 3 estimates at the CPA stage seems a recipe for shifting risk to consumers. Networks seek fixed price contracts on an incomplete scope and bidders respond by pricing that risk into their bids. In the 20th January 2021 webinar, the response from GHD to a question suggesting this would occur was that competitive tension in the bidding process would handle this. Assuming there is competitive bidding for this part of the total package, all contractors will still price in this scope risk that would probably not be there in a Class 1 or 2 estimate.

The AER's Preliminary Decision on the Project Energy Connect CPA confirmed that this problem actually exists when it reduced TransGrid's request by 10%[79]:

> "We note that TransGrid's forecast capex for transmission lines is higher than comparable benchmarks. This may be explained by the specific line route, line deviations, market conditions, and project specific topographical, geotechnical and other factors. However, we consider it is also likely to be influenced by TransGrid's project delivery model and its proposal to enter into a fixed-price contract with a single supplier to design, procure and construct all of the required works. While not unreasonable, this is a conservative approach to contracting as it transfers the majority of project risk to the contractor. "

A consequence of having such a high estimate class (and large ± cost range) is that the TNSP seeks to transfer risk to rather than its equity owners taking on that risk.

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[79] See p.3 https://www.aer.gov.au/system/files/AER%20-%20Preliminary%20Position%20-%20TransGrid%20-%20Project%20EnergyConnect%20Contingent%20Project%20-%20December%202020_0.pdf

Where should the 'central' estimate sit within the Class range?

The table shows 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

This issue was raised in the 20th January webinar. AEMO noted that they are leaning towards the mid point of the range eg for a Class 4 estimate that can vary -30% to + 50%, the capex used in the ISP would be the midpoint of that range. This was the approach taken in the 2020 ISP.

AEMO also indicated that it was seeking to 'flatten the curve' in the AACE 'zone of uncertainty'. It would be good to get additional clarification on what this actually means together with a robust justification of using the mid-point, or whatever other point they propose.

It was surprising to hear AEMO apparently comment on the 20th January engagement session that it would not test the reasonableness of the cost estimates in the database. If that was a correct interpretation then further consultation is required to understand why. How can consumers have confidence in the 2022 ISP output if that is the case?

What is meant by 'offsets'?

At the 20th January webinar, AEMO indicated that they would review the TNSP estimate and potentially apply 'offsets' to change the capex. There was no indication on whether these offsets would result in an increase or decrease in capex. There was also no indication of how they would be calculated, apart from referencing the data

It is unclear how AEMO will compare risk in network capex with risk in non-network capex to ensure an 'apples and apples' comparison

Given that part of the RIT-T process is designed to compare network with non-network options, it is unclear how AEMO proposes to recognise the different levels of risk around capex estimates of the two option categories.

It is reasonable to assume that the risk associated with building a large battery is generally significantly less that the risk of building a new transmission line. Chapter 2 of the MMB report outlines the reasons for recent underestimation of network costs. These would apply much less to non-network alternatives eg much easier to define scope, strong incentive to get costs right as early as possible, costs of getting a more accurate cost estimate are much lower, much less community engagement required, fewer issues around project schedule, small footprint reduces land acquisition and biodiversity risks. Overall a much lower risk profile. Non-network alternatives are provided by the private sector that is taking on cost risk that cannot be managed through the regulatory framework available to TNSPs. We believe this provides a greater incentive on the bidders of non-network option to provide a more accurate cost forecast.

In particular how does AEMO propose, at any given stage of the ISP/RIT-T timeline, that it compare a network option that might be a Class 4 estimate with a non-network option that might be a class 2 estimate?

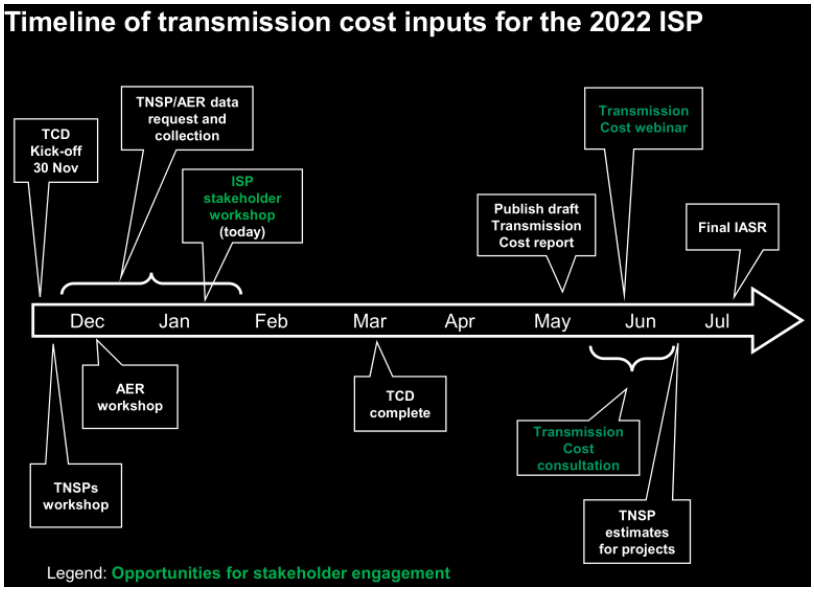
Consumer Engagement is too limited and, so far, far from best practice

Members of the Consumer Panel participated in the joint GHD/AEMO webinar on 20th January 2021 that focussed on the cost database. This hour-long session covered a slide presentation and then a Q&A using slido software. Our view, supported by a range of discussions with other participants, is that this was far from best practice engagement:

- It was very much on the 'inform' point of the IAP2 spectrum
- The time allowed for discussion was far too short for such an important topic, particularly given the next opportunity for engagement will be in May-June
- Using slido as the only form of Q&A with all participants muted, severely restricts effective engagement eg the word limit on questions, follow-up questions are not possible, (one questioner unmuted themselves seeking to ask a follow-up question and the GHD presenter shut them down)
- Questioners had no opportunity to engage on issues – on occasions the responses given did not answer the question directly but there was no opportunity for clarifying/follow-up questions
- Many answers were vague and questions meant to be answered by AEMO were answered by GHD which responded that the issue was outside their scope

- Saying that slido will be open for ideas for the rest of the day and promising to provide follow-up answers to questions and ideas put on slido is a poor substitute for effective engagement during the webinar

The only proposed further consultation will be in May-June on the Draft Transmission Cost report.



This is far from best practice consumer engagement on such an important topic. We would expect considerably more engagement on the range of issues highlighted above prior to publication of the Transmission Cost report.

5.6.4 Summary

The inability of Transmission Networks and AEMO to accurately estimate capital costs for major transmission projects to date is a major issue for consumers. While the additional work proposed for the 2022 ISP is welcome, consumers remain very unclear about the scope of engagement.

Again, we consider that the actual and proposed engagement does not meet the AER Guidelines. We consider that consumers should have the opportunity to engage further on major issues discussed above, including:

- Establishing what is the scope of AEMO's engagement on this topic
- The respective roles of AEMO and the AER
- The appropriate cost estimate uncertainty class that would apply to the ISP and then each subsequent stage
- Where AEMO proposes to set the point estimate used in modelling
- How 'offsets' would be determined

- How sensitivities are tested

ahead of the planned engagement on the draft Transmission Cost Report in May.

5.7 DER and the changing role of consumers

5.7.1 Why have we chosen this issue?

A core feature of the energy transition is that there has been, and will continue to be, significant investment in distributed energy resources. This investment will occur through consumers investing their own money and resources in technology and appliances that serve their energy and other needs. Similarly state and local government are providing subsidies for distributed energy resources so these institutions can achieve policy objectives such as decarbonisation.

It is critical that AEMO consider a range of potential future scenarios for DER. This is critical as consumers and governments are not only investing in DER it also creates a significant possibility that consumers will end up either overinvesting or underinvesting in the ISP if these developments are not adequately taken into account.

We believe that there are further elements that should be considered this includes the activities being undertaken by the distribution networks that are improving hosting capacity and other technological solutions that are supporting the uptake and greater optimisation of distributed energy resources.

5.7.2 What is in the Draft IASR

The draft IASR are makes mention of distributed energy resources this can be seen on table 14 on page 61 of the draft IASR. This table summarises the various distributed energy resources settings and assumptions to the proposed scenarios. While many may argue the specifics of the settings, we strongly encourage AEMO to continue to refine this.

5.7.3 Consumer Panel Comments

Technological progress and changing customer preferences are both fundamentally changing the nature of the electricity industry. Australia has become a world leader in household PV, which has brought benefits to households with lower bills, more control over their energy costs and reduced emissions. Large, centralised generators are now competing with decentralised, embedded generation and other demand-side resources including batteries.

The future network and other benefits of DER could be very significant. According to Energy Networks Australia, if DER is used to provide network services, that would obviate the need

for $16.2 billion in network investment by 2050.[80] This translates into a reduction in the network component of consumer bills by around 30% compared to today.

As a result, we believe this is a key area that needs to be explored further and considered by AEMO in the IASR and the ISP scenario development. We acknowledge that AEMO has identified that the 2020 forecasts of distributed PV to have underestimated uptake across most regions. As outlined in its 2020 Forecast Accuracy Report, AEMO has identified the distributed PV forecast as a key continuous improvement area, with a particular focus on enhancing the starting point and short-term trend[81]. This includes supplementing the use of CER installation data with data from the new DER Register. We also note that AEMO will be commissioning updates to the distributed PV forecast, which will be consulted on through the February, March and April Forecasting Reference Group meetings in 2021.

In reviewing the IASR, the Panel has formed a view that there is a risk that the inputs, assumptions and scenarios underestimate the future uptake and nature of distributed energy resources and the impact this would have on the overall development of the Integrated System Plan.

In addition to significant increases in rooftop solar PV, a proliferation of additional and more advanced DER infrastructure (digital metering, smart inverters, energy storage, energy management systems, household appliance with smart controls, electric vehicles etc) are now entering the customer market. These technologies offer not only new opportunities for customers to more actively manage their energy use and to share in value beyond the home - whether that be sharing energy with peers or participating in programs like Virtual Power Plants which support the operation of the distribution network and further up the supply chain impacting the transmission system and the wholesale market. The ISP is the ideal planning instrument to be considering the role of DER in a 'whole of system' way.

Distribution networks are also changing their practices and shifting investments [82]to ensure the network has increased capacity to host and optimise distributed energy resources. This can be seen through examples like recent Queensland, South Australian and Victorian distribution

[80] CSIRO & Energy Networks Australia (2017) *Electricity Network Transformation Roadmap, Final Report*, p.43.

[81] https://aemo.com.au/-/media/files/electricity/nem/planning_and_forecasting/accuracy-report/forecast-accuracy-report-2020.pdf?la=en Table 1, Page 3

[82] Examples: https://www.essentialenergy.com.au/our-network/network-projects/network-innovation and https://www.ausnetservices.com.au/-/media/Files/AusNet/About-Us/Electricity-distribution-network/Week-4/AusNet-Services---DER---Deep-Dive---presentation-F.ashx?la=en

proposals submitted to the AER. We recommend that AEMO cross reference the distribution companies' strategies and developments within the various scenarios and in the IASR.[83]

With the movement toward various mechanisms for integrating DER into distribution networks we expect to see the rise of coordinated and orchestrated distributed energy resources in the energy system. This significant change will reshape how electricity and other services are dispatched across than NEM through new technology and approaches such as dynamic operating envelopes and virtual power plants, potentially resulting in reduced need for transmission investments.

There are significant changes within the energy market with demand side participation becoming an increasing feature, including for This includes commercial and industrial customers through the Wholesale Demand Response mechanism (WDR) to be implemented 24th October 2021.

There is also proposed rule changes directly related to transforming the distribution network including new pricing and other service arrangements for distributed energy resources[84].

These developments and investments that are underway coupled with the introduction of the consumer data right (CDR) in the Energy, Banking and Telecommunications sector, suggests a sea-change in the deployment, use and therefore availability of increased Demand side energy assets including demand response, energy production and distribution and the provision of other systems services across the NEM.

Similarly, state governments are supporting consumers make these investments with significant subsidies and other targeted programs announced in recent state budgets and we strongly encourage AEMO to consider these in the development of the IASR. We note the recent draft 30 year infrastructure strategy[85] released by Infrastructure Victoria as a key reference that should be considered.

In relation to consideration of Large Industrial Loads (LIL), Non-Network Options and Energy Efficiency forecasts, we encourage AEMO to continue to directly engage with organisations such as the Energy Users Association of Australia, Major Energy Users and Energy Efficiency Council to build understanding of the appetite and opportunities for Australian businesses to

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[83] https://arena.gov.au/assets/2020/03/network-hosting-capacity-projects-progress-report-year-one.pdf

[84] https://www.aemc.gov.au/rule-changes/network-planning-and-access-distributed-energy-resources

[85] www.infrastructurevictoria.com.au/wp-content/uploads/2020/12/Victorias-Draft-30-Year-Infrastructure-Strategy-Volume-1.pdf#page=35

build the overall flexibility of demand in the NEM. This should also consider the ongoing post-2025 Market Design process being lead by the Energy Security Board.

We therefore believe that further development needs to be undertaken by AEMO to ensure these technological advancements including the significant public policy commitments and support from state governments and allowances provided by the regulators are carefully considered in the ISP development. Consideration of how these investments by consumers and other parties interact with and support the transmission investments proposed within the IASR and the ISP needs to be defined.

In our view therefore, it would be prudent of AEMO to have direct conversations with the various distribution networks and new service providers to get a greater understanding of the current and future investments in this area and the projected changes in network utilisation and energy flows and how these impacts both the IASR and ultimately the ISP.

Further insights into changing consumer preferences could be gathered though Energy Consumers Australia consumer sentiment survey. This survey details consumers' willingness to reduce demand and the propensity to invest in solar and/or battery technology. We note the last survey was undertaken in 2020, during the COVID pandemic lockdowns, saw only a small fall in consumers' willingness to reduce their consumption and invest in solar and or battery technologies. We believe there is likely to be a significant rebound consistent with a V-shaped recovery in consumers' willingness to participate in distributed energy options hence influencing the distributed energy input into the ISP.

In addition to the grass roots step change in the DER developments, the various COVID recovery plans [86]announced by State and Territory Governments demonstrate that there is likely a significant change in the distributed energy resource in the foreseeable future.

In regard to this we recommend that AEMO should develop a summary and log of the most recent state budget announcements from the various jurisdictions and ensure these are incorporated in the IASR, scenario developments and ultimately the ISP.

In short, the IASR modelling should not be limited to estimates of uptakes of distributed energy resources such as PVs, battery operated electrical vehicles, load control etc, but the optimisation and enhanced utilisation of these resources through increased orchestration. We believe that the

[86] VIC example: https://www.premier.vic.gov.au/victorians-embracing-solar-record-levels

IASR has failed to take into account the impact that this can have on various future integrated system plan developments.

5.7.4 Electrification of transport

There has been a significant shift in the electrification of transport over the last 12 months both globally and in Australia which the scenarios do not seem to contemplate. Consumer awareness and sentiment has also improved significantly, according to a recent survey [87]carried out by the motoring clubs NRMA, RACV and RAA on behalf of the EV Council, highlighting 56% of surveyed consumers would now consider purchasing an electric vehicle as their next car.

According to the EVC State of EVs 2020 report, in 2019, Electric vehicle (EV) sales increased by 200% with 6,718 EVs sold, petrol/diesel vehicle sales fell by 7.8%. 3,226 EVs were sold in the first half of 2020 in Australia despite the global pandemic that contributed to a 20% decline in overall new vehicle sales. A global scale, according to the BloombergNEF, investment in electric vehicles and associated infrastructure grew by a massive 28 per cent, setting a new annual record with $US139 billion of investment.

Over the last few months as the state and federal government announce their budgets, there has been significant funding made towards electrification of transport. The federal government announcement of the Future Fuels Fund of $74.5m through ARENA. South Australia's EV roadmap announcing 13.4m for public charging and a further 4.9m for Vehicle to Grid Smart Charging Trials. The NSW Net Zero emissions program with a dedicated $25m towards fleet transition and EV public charging infrastructure and the recent Victorian budget announcement of $25m towards EV fast public charging and ultra-Fast charging. In total Government grants announced to date are estimated over ~$186m to accelerate the EV transition.

Further, a recent research study by McKinsey and Morgan Stanley [88]suggests a significant step change in people's willingness to embrace new technology and mobility trends.

We recommend AEMO to consider these as inputs into the scenarios and IASR modelling to reflect the significant trends towards Electric vehicles.

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[87] EVC-State-of-EVs-2020-report.pdf (electricvehiclecouncil.com.au) page 15

[88] https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/from-no-mobility-to-future-mobility-where-covid-19-has-accelerated-change#

To assist in the development of these scenarios we also recommend AEMO directly engage with the Electric Vehicle Council of Australia, its members and associated businesses and other stakeholders and consider State Government commitments to EV uptake.

5.8 Treatment of Hydrogen

5.8.1 Why have we chosen this issue?

The future role of hydrogen is a hot political topic with a National Hydrogen Strategy[89] complimented by several State and Territory Strategies. The Export Superpower scenario is the only scenario to consider a role for Hydrogen. To understand the merits of this scenario and what hydrogen's treatment in the ISP might mean for energy consumers, we have considered what is known about cost effectiveness of hydrogen.

5.8.2 Consumer Panel comments

We know that hydrogen production is now at or near the top of the technology readiness index but near the bottom of the commercial readiness index with small scale trials just started or about to start[90].

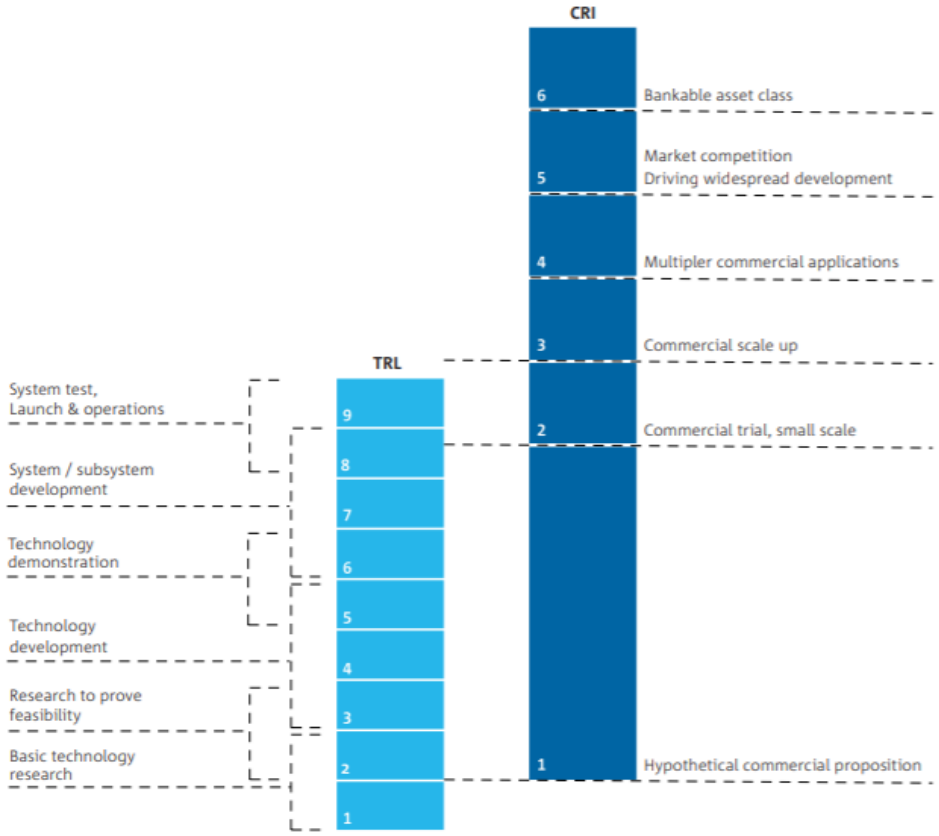


Figure 5. Technological and commercial readiness index[10]

[89] See https://www.industry.gov.au/sites/default/files/2019-11/australias-national-hydrogen-strategy.pdf

[90] See CSIRO National Hydrogen Roadmap November 2019 p.5 https://www.csiro.au/en/Do-business/Futures/Reports/Energy-and-Resources/Hydrogen-Roadmap

Under the National Hydrogen Strategy, the "measures of success" for 2025 and 2030 are[91]:

2025

Clean hydrogen advances quickly	Clean hydrogen advances slowly
Hydrogen technology breakthroughs are occurring and uptake is driving cost reductions. Hydrogen scale is driving supply chain costs down rapidly	No or few hydrogen technology breakthroughs and there are minimal trials underway, meaning costs are not falling

2030

Clean hydrogen continues to advance	Clean hydrogen is falling behind
Hydrogen is cost-competitive compared to alternative fuel sources for some, if not most, hydrogen applications	Hydrogen is not cost-competitive and other technologies are the preferred low-emissions option in most, if not all, sectors

In early 2020 the Commonwealth Energy Minister set up an advisory group led by Dr Finkel to advise on ways of getting to the very ambitious target of hydrogen under $2/kg[92]. The figure below[93] shows that this price will make it competitive with some uses eg ammonia. In the case of trucks and cars, it will need to compete with rapidly dropping costs of electric vehicles. AEMO's consultation pointed to "mixed views on the uptake of EVs"[94] and the evidence to suggest that hydrogen powered motor vehicles will be competitive with battery powered vehicles in the next 20 years is not there[95].

A cost of $2/kg is a long way from making it competitive with natural gas: with an energy density of approximately 120 MJ/kg[96], a fuel price of $2/kg equates to over $15/GJ. The ACIL Allen study done for ARENA in 2018 calculated that given electricity is ~75% of production

[91] National Hydrogen Strategy op cit pp. 68-9

[92] See https://www.minister.industry.gov.au/ministers/taylor/speeches/keynote-address-ceda-future-direction-energy-technologies-event-sydney

[93] See National Hydrogen Strategy p.6 https://www.industry.gov.au/sites/default/files/2019-11/australias-national-hydrogen-strategy.pdf

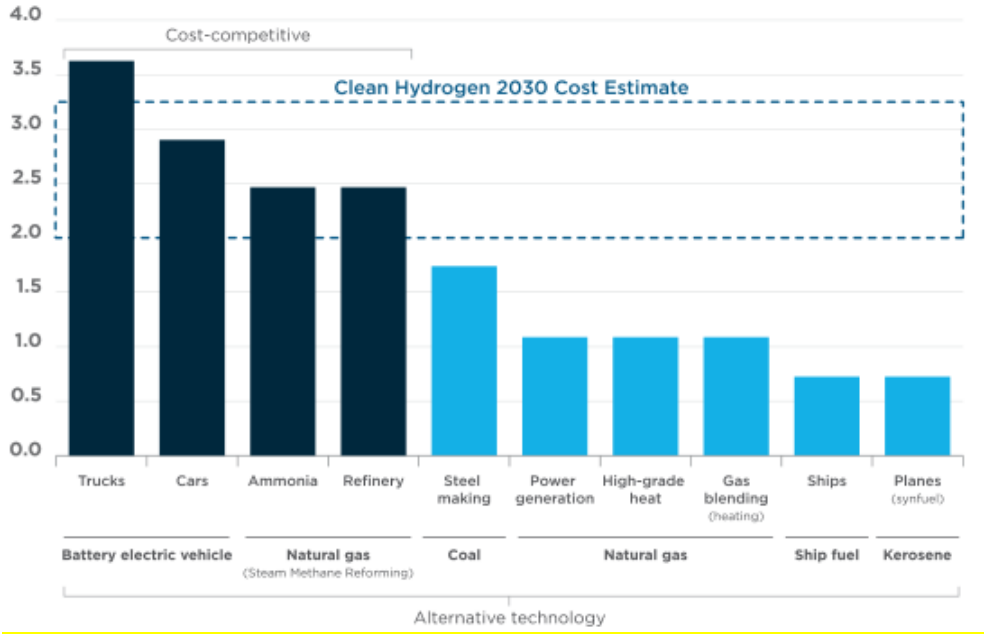
[94] Draft IASR p.30

[95] In 2020 Daimler Benz announced it is stopping development of hydrogen vehicles after 20 years of research because they were too expensive - electric vehicles were more promising; they will continue research on hydrogen for heavy vehicles; see https://electrek.co/2020/04/22/daimler-ends-hydrogen-car-development-because-its-too-costly/

[96] National Hydrogen Strategy page xiv: lower heating value of 120 MJ/kg (equivalent to 33 kWh/kg)

costs, their then forecasts of capex in 2025 would require a delivered power price of $30/MWh to get $2/kg hydrogen[97].

Figure 1.3 Breakeven cost of hydrogen against alternative technology for major applications, in 2030.



We are not yet convinced there is sufficient evidence to support the assumption in this scenario that there will be[98]:

> "…a strong emerging export economy assumed to start from 2030… (given the) National Hydrogen Strategy recognises that a strong domestic sector will be required to successfully compete internationally."

There is a long way from proving a 10% blend can work to achieving large scale replacement of natural gas with hydrogen for the domestic economy. The demand forecasts have been based on 'stakeholder collaboration'[99] with no details provided[100]. We gained some insight at the January 2021 FRG when we were told:

- The 10% blend for residential and commercial gas distribution is assumed to remain constant for the forecast period

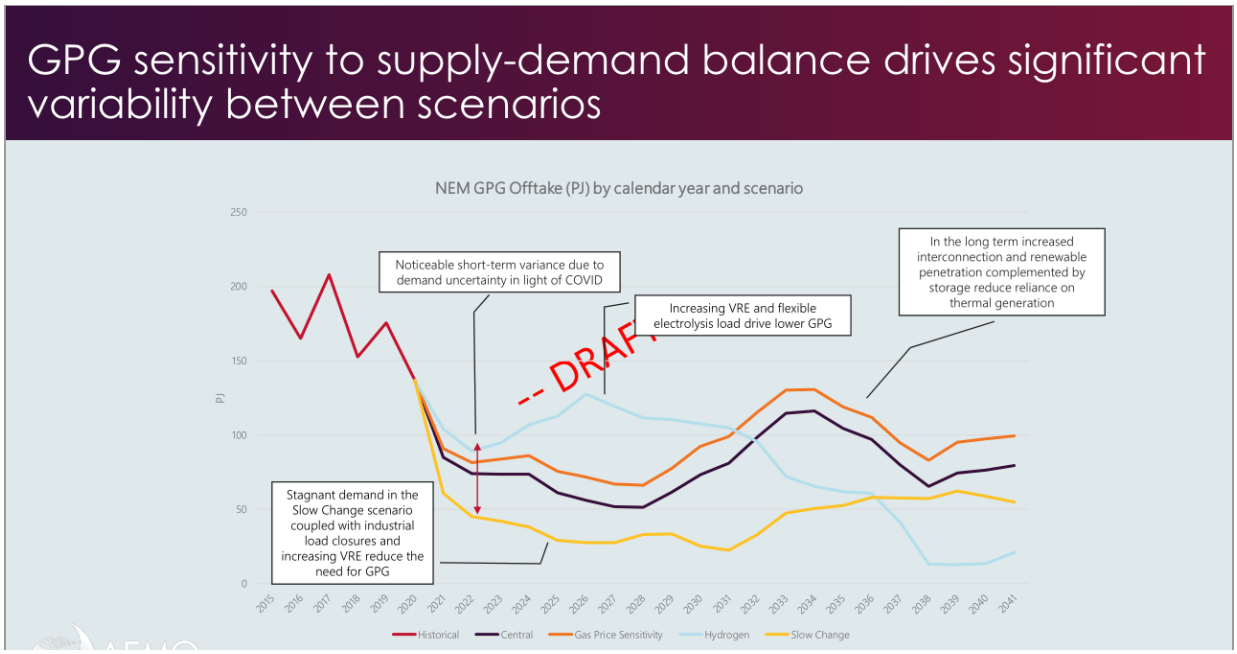
[97] ACIL Allen "Opportunities for Australian for Hydrogen Exports" August 2018 p. 35 https://arena.gov.au/assets/2018/08/opportunities-for-australia-from-hydrogen-exports.pdf

[98] Draft IASR p. 173

[99] Draft IASR p.173

[100] Unlike the analysis provided in ACIL Allen op cit

- On the basis of feedback from the hydrogen forum participants and other internal discussions, assumptions were made that particular industries – steel, oil refining and ammonia - would substantially move to hydrogen over the forecast period; the price assumption used to justify that move was not provided,
- When AEMO was asked what discussions they had undertaken with these industries to justify that demand forecast the response was 'the GSOO survey for LIC had a general, high level question about the respondent's view on the potential for hydrogen"
- AEMO acknowledged that the participants in the hydrogen workshop may not have been fully representative of those stakeholders with a view on the future of hydrogen
- On the comment in this graph presented to the FRG, where "Increasing VRE and flexible electrolysis load drive lower GPG"; the argument here is that flexible electrolysers will shut down at peak electricity demand times and hence reduce the need for peak gas generation; yet we expect a large volume of the electrolyser's capacity would be required to make a material difference to peak electricity demand and there are no electrolyser capex estimates for the mid 2020s that suggest that will be the case simply because the expected hydrogen price in the mid 2020s is far too high to support substitution.



Overall we have little informed insight into the basis for the demand forecasts in Figures 47 and 48 in the IASR.

No analysis of the international market supply/demand competitor analysis is provided[101]. The scenario recognises that strong growth in exporting hydrogen requires 'significant government investment'[102] in early years, though no estimate of 'significant' is provided.

On electrolyser location, the IASR provides only very high level analysis of its assumptions.

> "The export-focused electrolysers are proposed to be associated with nearby REZs. The selection of combined port/REZ candidates will be optimised to minimise the cost to produce the hydrogen. This will be constrained by the available resources (such as VRE and water), considering the deliverability of VRE in REZs to hydrogen hubs at regional ports (accounting for transmission augmentations as described in Section 4.9.3).

The REZ costs will be increased to account for upgrades to deliver power to port based electrolysers. There are only very high level 'screening' assessments of the water availability at selected export ports[103]. Storage will not be a problem under 'pathway 2' because hydrogen is generated close to the port[104]. 'Pathway 3' assumes linepack in 'new hydrogen transmission lines' providing storage. AEMO concludes[105]:

> "Given the simplified modelling approach, the cost of hydrogen storage is implicit in the assumed price of hydrogen; it is assumed that hydrogen will be readily available in this scenario."

By contrast the location of electrolysers for domestic consumption is different[106].

> "The demand for each region's domestic load is assumed to be delivered from centralised electrolysis plants located near the regional load centre. Where possible, each state's domestic hydrogen will be produced in that state with electrolysers placed at the edge of the industrial zones near to the regional reference node."

No details are provided to support this assumption. No information is provided on water availability (and how hydrogen production will compete with other water demand in the region), what level of electricity grid augmentation will be provided to move the power, or pipeline investment to move the hydrogen. The embrittlement issue with existing steel high

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[101] Again unlike the analysis provided in ACIL Allen op cit

[102] Draft IASR p. 29

[103] Draft IASR p.180

[104] Draft IASR p.179

[105] Draft IASR p.179

[106] Draft IASR p.178

pressure transmission pipeline means that we will not be able to use the existing transmission network. Much more information is needed on how water, electricity and hydrogen are going to be moved around in this scenario.

5.8.3 Summary

The AEMO analysis is very high level as indicated by the scope of the matters for consultation[107]. Much more information - and engagement on that information - is required before any confidence can be placed in this Scenario, though we support its' inclusion. What we can conclude so far is that:

- hydrogen is very unlikely to be 'economic' (ie does not require Government subsidies) prior to 2030
- given an expanding domestic industry is required to underpin the 'export superpower' scenario, we do not currently see a pathway to the demand forecasts presented
- this Scenario is useful to begin to explore the potential for a hydrogen economy in the future, but should have a very low probability in the ISP analysis.

Reliance on this scenario has the potential to result in considerable stranded asset risk for consumers – moving water, electricity and hydrogen around is expensive. All these transport assets have long lives – 50-60 years. Overinvestment is costly, particularly where hydrogen does not live up to the current hype and proves to be uncompetitive with electricity.

AEMO concludes[108]:

> "AEMO considers this scenario is critical for investors and policy-makers to consider, and to understand potential power system implications, but it may not be a significant influence on the near-term actionable investments that may be signalled by the 2022 ISP."

We agree. The state of knowledge today leads the Panel to conclude that it will not be a significant influence in the near term actionable investments in the 2022 ISP. This may change in future ISPs.

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[107] Draft IASR p.181

[108] Draft IASR p.30