Friday, 16 February 2024

Daniel Westerman
Chief Executive Officer
Australian Energy Market Operator

Dear Mr. Westerman,

The Clean Energy Council (CEC) is the peak body for the clean energy industry in Australia, representing over 1,000 of the leading businesses operating in renewable energy generation, transmission, distribution, and storage, plus renewable hydrogen. The CEC is committed to accelerating the decarbonisation of Australia's energy systems as rapidly as possible while maintaining a secure and reliable supply of electricity for customers.

The CEC appreciates and welcomes the opportunity to comment on the draft of the 2024 Integrated System Plan (ISP). The ISP is an integral part of the NEM transition. The CEC commends AEMO for delivering such a highly detailed and considered piece of work. This submission offers some suggestions, by way of asking questions – we hope this contribution can be used by AEMO to further strengthen its analysis.

OVERALL RESPONSE

The CEC appreciates AEMO's work to produce this draft update to the 2022 ISP with continued and expanded consideration of ongoing challenges to transforming the National Electricity Market (NEM) to be 100% renewables capable.

The CEC considers that a planning process for the NEM's transition must cover the impact of community concerns, supply chain strains and disruptions, workforce concerns, and inflationary pressures that have continued to develop since the 2022 ISP. Careful system planning to support efficient investment in generating and network assets has also grown in importance over the past two years. The CEC views the ISP as continuing to serve an important role in the transition of the NEM to a renewable-powered system and Australia's economy to net-zero.

In particular, the CEC supports the draft ISP's clarion call for "urgent investment in generation, firming and transmission that targets secure, reliable and affordable electricity," and AEMO's ongoing communication of that message. Likewise, the CEC welcomes building on the scenario updates introduced in the 2022 ISP by expressly incorporating temperature objectives, removing the Slow Change scenario, bringing the Progressive Change and Step Change scenarios closer together, and retitling the Hydrogen Superpower scenario to 'Green energy exports' as that better captures the broader range of renewable-based value-added commodity exports possible for Australia.

Including workforce projections and expressly considering the impact of social licence are also important as both have material impacts on network planning and generation investment. The CEC welcomes AEMO's request for input and advice on how the ISP can further consider them.

The remainder of this submission is organised into sections by topic or question addressed. Each section also provides input, advice, and recommendations, and a few pose some questions AEMO

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may consider that CEC considers can provide more clarity and detail, and thus more value in the final 2024 ISP report.

CONSIDERATION OF SOCIAL LICENCE

In response to the ISP team's request for advice on further considering social licence in the ISP, including potential ways to quantify its impact in the social licence sensitivity, the CEC first notes that we are pleased to see AEMO include these issues in the ISP, social licence considerations will and should have a material bearing on infrastructure build out considerations.

If social licence of new infrastructure is lost, consumers will pay more for electricity (as fossil gas and carbon capture and storage replace renewable generation and transmission lines) and the lack of replacement generation will create system security and reliability challenges as aging coal-fired power stations retire. Australia's energy sector would also continue to be highly carbon intensive relative to other nations and worsen the impacts of, and suffering from, climate change. Further, it would also result in Australia failing to meet its international obligations under the Paris Agreement.

Consequently, AEMO may consider emphasising these consequences of not meeting variable renewable energy (VRE) targets on time as part of its call for urgently building needed VRE and transmission assets, *and* the importance of ensuring every effort is made to engage, consult and share the benefits of renewable energy projects with the communities that are hosting them. Given the importance of the transition to renewable energy, the CEC views earning and maintaining social licence as every NEM stakeholder's responsibility. This includes state and federal governments that declare renewable energy zones and renewable energy targets, regional and state planning bodies that map transmission easements, local governments, project developers, TNSPs, land holders, farming groups, environment groups, planning departments, local Members of Parliament who advocate for their community, and all other NEM stakeholders.

CEC and Social Licence

Social licence for the CEC remains a constant area of focussed activity and reflection. Almost 60 of CEC's largest members have signed onto the *Best Practice Charter*. This means they have committed to adhere to 10 principles, many of them anchored in building and maintaining trust in the communities they operate.

The CEC itself has published several reports and guides related to social licence, such as:

- Benefit sharing for renewable energy projects
- Building Powerlines for Renewable Energy Developments
- Community Engagement Guidelines for the Australia Wind Industry
- Best Practice Guidelines for Implementation of Wind Energy Projects in Australia
- Enhancing Positive Social Outcomes from Wind Farm Development

We note that industry best practice continuously evolves and in some cases has evolved beyond the guidance in the above resources. Finally, the CEC will soon publish *'Leading Practice Principles: First Nations and Renewable Energy Projects*, the first comprehensive national Guide on First Nations engagement, participation and benefit-sharing, for renewable energy projects, co-designed by First Nations peoples.

The CEC supports AEMO's approach to incorporating social licence considerations in the ISP by developing a social licence sensitivity and assessing the cost benefit analysis and how the loss of social licence could impact the delivery of the Optimal Development Pathway (ODP). The CEC

acknowledges, and appreciates, the finding that the optimal development path delivers $17b of net market benefits. While not entirely attributable to social licence, the $17b benefit demonstrates in a roundabout way, the value of social licence. Quantifying the additional costs to Australia's energy transition is useful in ensuring the above-mentioned stakeholders are working together to address the challenge.

Draft ISP 2024 social licence sensitivity parameters

The CEC is broadly supportive of the social licence sensitivity parameters as published in the Draft ISP, but wishes to make a few comments. Firstly, while the appendix states *"Project costs observed to increase by **approximately 15%**."*, CEC is of the view the real cost could be much higher than this due to the parameters not including a range of additional elements that could increase the costs of a project.

For example, costs relating to additionally imposed conditions such as management plans or ongoing monitoring, the difficulty of attracting institutional capital and its accompanying increased cost through risk of delay and uncertainty, the increased cost from difficulty finding suppliers and finally, the increased costs of housing and transport for workers due to difficulty finding accommodation or vehicles.

The CEC notes that the parameters were developed with insights from the Advisory Council on Social Licence. CEC recommends that to maximise the value the advisory council can offer to AEMO, that AEMO appointment 2 additional members, firstly, an industry representative from CEC, and secondly, a representative from a renewable energy generator/developer proponent.

Recommendation 1: Appoint 2 additional members to the Advisory Council on Social Licence: an industry representative from CEC and a representative from a renewable energy generator/developer proponent.

The CEC also notes that there is an opportunity to increase parameters in the sensitivity to that reflect attitudes towards specific technology types. It would be reasonable for AEMO to develop a sensitivity that modelled the extra cost, when compared to the ODP, if onshore wind couldn't be progressed as currently modelled in the Step Change or Progressive Change scenarios. CEC is of the view that this modelling would be extremely useful for decision makers when weighing up the cost/benefit analysis of pursuing different renewable energy policies and allocating resources to ensure better social licence outcomes.

Recommendation 2: AEMO should conduct a sensitivity analysis exploring the loss of social licence of specific technologies, specifically onshore wind.

CONSIDERATION AND ANALYSIS OF WORKFORCE NEEDS

The Clean Energy Council welcomes the updated workforce projections in the 2024 Draft ISP.

These updates on the projections from the 2022 ISP highlight the continued growth in the Australian labour market's demand for a skilled workforce to build, operate and maintain increasing numbers of clean energy assets. While aggregate projections demonstrate the scale and pace of change required, a more granular level of detail is required to understand the true risks posed to the energy transition.

Most clean energy jobs will be in regional and remote Australia. The sufficiency of these communities to supply the skilled workers needed at the right times is an enduring knowledge gap affecting workforce planning and policymaking. Achieving community buy-in by utilising the local workforce where possible ensures projects deliver local benefits and minimises delays due to diminished social licence as discussed earlier. An insufficient supply of local workers results in roles being filled by temporary workers or skilled migrants. This puts downward pressure on available accommodation, and risks pricing residents out of their communities due to insufficient housing supply.

Regional Australia experiences numerous and specific training and education barriers that need to be addressed to realise the benefits of new clean energy jobs. These include thin markets, low availability of training providers, and lack of trainers and facilities. As noted by Jobs and Skills Australia in its report, The Clean Energy Generation (2023), "…the concentration of growth in trades and technical employment in regional Australia will require an even more substantial uplift in education and training to ensure that job opportunities can be accessed by local workers." If these challenges are not resolved, regional communities may be locked out of new jobs. This risk to the delivery of clean energy projects is poorly understood by governments.

Race for 2030, in collaboration with the AEMO and the Institute for Sustainable Futures, separately produced state- and some REZ-level workforce projections for the 2022 ISP. CEC recommends including workforce projections at this level of data as an appendix to the 2024 ISP. This would elevate regional workforce availability as a core issue affecting the energy transition.

Recommendation 3: AEMO should include detailed workforce projections, perhaps including spreadsheet workbooks, as it did for the 2022 ISP.

Green Energy Exports scenario workforce projections

Finally, the projected capacity of the NEM in 2049-50 for the Green Energy Exports scenario is considerably smaller than in the Hydrogen Superpower scenario from the 2022 ISP. This is due to a reduction in the assumed proportion of electrolysers that will be grid-connected from 100% to 50%, and the inclusion of export from Western Australia. As a result, the volume of NEM-connected hydrogen produced has halved.

If workforce projections for the Green Energy Exports scenario only include NEM-connected infrastructure, they will substantially understate the total number of workers required to deliver this scenario. We recognise that modelling these jobs is outside of the scope of the ISP. However, as this is the same workforce that is needed to decarbonise the NEM, understated projections will inhibit effective workforce planning and dull the urgency of the wide-reaching policy reforms needed for Australia to secure its renewable superpower ambitions.

Given the likelihood that readers of the ISP will be unaware of this gap, we recommend any workforce projections for the Green Energy Exports scenario include an explanatory note detailing this effect.

INCREASE IN GAS CAPACITY AND DECREASE IN GAS GENERATION COMPARED TO THE 2022 ISP

The draft 2024 ISP report's Optimal Development Path (ODP) scenario features a 60% increase in total MW of gas-powered generation (GPG) capacity compared to the 2022 ISP, while the model output workbooks shows that cumulative MWh gas-powered (mid-merit plus peaking+liquids/flexible) generation increases by 35% (66 TWh) over the modelled time horizon. The draft ISP narrative provides two statements that appear to be the primary explanations for these shifts.

The first is that the model forecasts an increase in wind generation capacity and consumer-owned storage that decreases the need for medium-depth storage capacity by 5GW. The second is the decision to undertake exploratory modelling of ahistoric-level renewable resource drought length of 8 days in an effort to "simulate a more volatile future climate," and then use that output to inform the needed levels of gas-peaking to backup variable renewable generation (VRE).[1]

The CEC understands the underpinning rationale for increased gas capacity in the NEM relates to predicted changes in renewable generation availability, and the need to meet demand at the potential extremes of the residual demand duration curve.[2] The CEC agrees the nature of reliability risks are changing in the NEM, and acknowledges that gas powered generation (GPG) will likely play some role in the transitioning power system.

The draft report text, however, would improve by providing more details on the rationale for the scenario parameters involved in the exploratory modelling. To provide greater confidence to NEM participants and other stakeholders, we consider the role of GPG in the transition must be subject to robust assessment. Doing so will help ensure the ISP sets out a plan that is generally consistent with the requirement to decarbonise our power system as quickly as possible. The ISP must also robustly question the likely economics of GPG comparative to other capacity and energy solutions - particularly long duration energy storage (LDES) technologies.

The Changing Costs of Gas and Storage Technologies Supports Undertaking Robust Techno-Economic Analysis of Both

The CEC acknowledges the common assumption that GPG will play a role in the future NEM, mainly when this comes to meeting the last increments of the residual demand distribution, particularly those demand periods associated with renewables droughts / high impact, low probability events. This appears to be the use case that AEMO has envisioned for GPG.

We recommend that AEMO undertake further analysis to test the extent to which GPG will play this role, given likely changes in the underlying economics of GPG, as well as its nearest substitute of LDES. These likely changes mean that GPG may play only a very minor role, and may in fact be more efficiently replaced with LDES. This is especially the case if GPG is expected to operate

[1] Draft 2024 Integrated System Plan, p. 68.
[2] In this submission we refer to the concept of the residual demand curve, being energy demand not met by VRE generation. The 'extreme' ends of this distribution refers to periods of prolonged VRE supply shortfall (or, equally, prolonged periods of residual demand unmet by VRE), such as may be experienced in seasonal shortfalls or 'renewables droughts'. We use this term in place of the more commonly understood 'load duration curve', on the basis that reliability risk periods are likely more effectively represented through a residual demand distribution, as opposed to a load duration distribution focused on peak demand.

only extremely infrequently, which markedly affects the value associated with the initial capex investment.

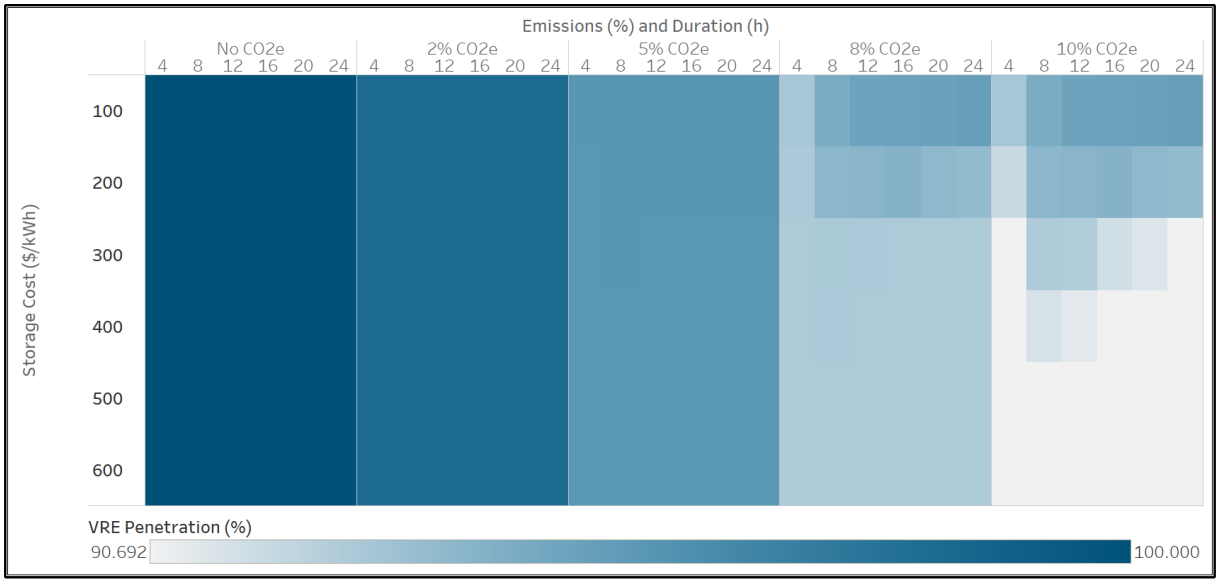
It is important that AEMO provides a clear explanation of this peripheral role of GPG, and the extent to which LDES can provide the same services as GPG at a lower cost. Policy makers are presently making the choices that can create path dependency, such as between building GPG or supporting investment in LDES. The ISP is a central guide to these policy makers - we therefore strongly recommend AEMO explore these future roles, to help set a more accurate portrayal of future power system requirements.

We recommend that AEMO do this by systematically challenging the cost assumptions that underpin the use of GPG in a carbon constrained NEM. We especially encourage AEMO to consider the extent to which the likely high cost of gas supply, and potential unavailability of gas pipeline capacity, will impact on the economic viability and competitiveness of GPG, particularly in the later years modelled in the ISP. This is particularly the case if GPG is weighed accurately against LDES technologies, including established technologies like pumped hydro as well as rapidly emerging technologies like compressed air, thermal storage technologies, and redox flow energy storage technologies.

Initial analysis of modelling commissioned by CEC suggests that the impacts of high gas prices coupled with the rapidly falling costs of long duration storage means that economic case for GPG will only make sense for meeting the absolute margins of the residual demand distribution – and even there the role of GPG can be challenged. The following indicative analysis illustrates this point.[3]

Figure 1 below presents the results of modelling to assess the interplay of GPG, long duration energy storage costs and VRE penetrations in a 2040 modelled NEM, under different carbon budgets. It shows that regardless of long duration energy storage costs, GPG will constitute some portion of the total generation mix under the 2% and 5% carbon budgets.

Figure 1: interplay of LDES energy cost, VRE penetration and GPG volumes.
SOURCE: Forthcoming CEC report.



[3] This modelling, which was completed by EndGame Economics on behalf of the CEC, is based on a greenfield LRMC approach, utilizing ISP inputs, to model the varying effects of different LDES energy ($//kWh costs) at different durations. The model base case assumes a carbon budget of 2% of 2022 NEM levels. The modelling itself will be published in the coming months by the CEC, as part of the general review and analysis of the role of LDES in the future NEM.

In these scenarios, capex effects predominate because to meet the carbon budget, actual GPG utilisation (MWh produced) must be highly limited – so opex has a minimal impact on modelled outcomes.. Meeting decarbonisation goals means the combined capex + opex costs of the GPG *must be less than* the combined capex + capex of additional storage and VRE, to meet the final increments of the load duration curve.

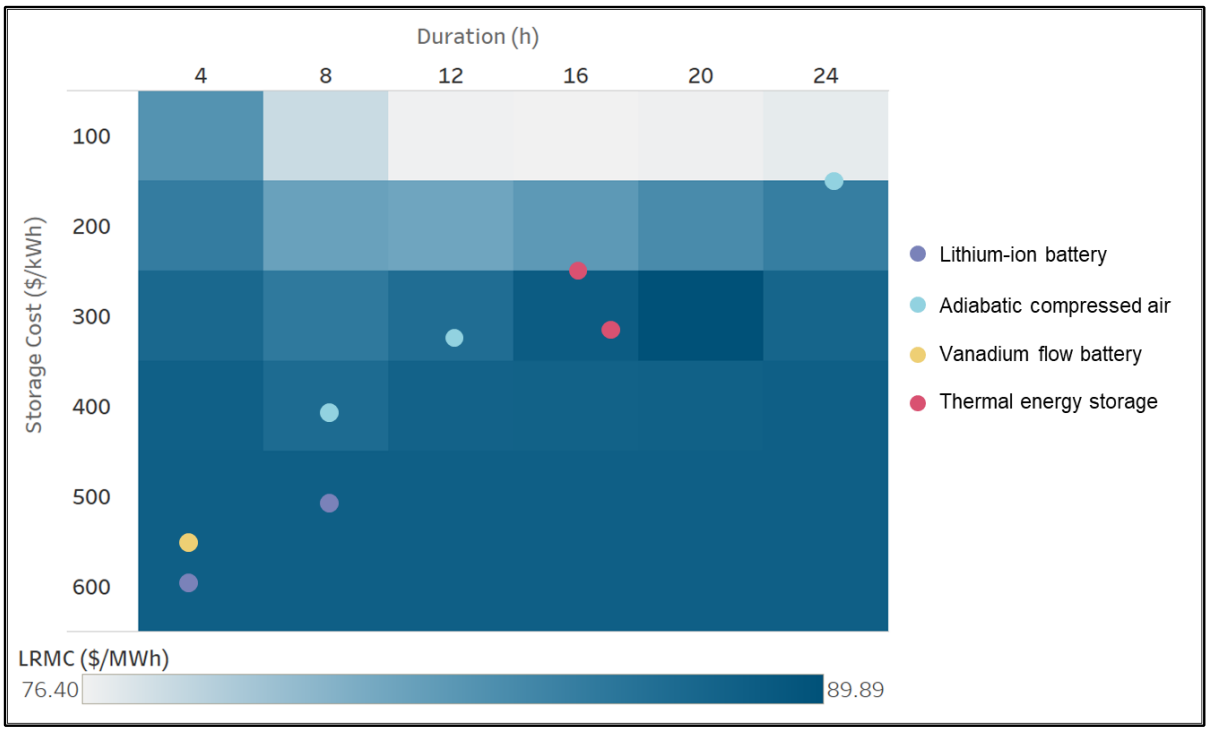
By contrast, modelling situations with a more relaxed carbon budget, and where GPG can operate more freely (i.e., produce more MWh), the opex costs of GPG start to play a greater role. This means that LDES begins to substitute for GPG, particularly at longer durations and lower $/kWh costs of stored energy. As such, we see the model deliver higher aggregate VRE penetrations, and thus deliver reduced emissions, even in a modelled world where carbon budgets are materially relaxed.

This results from the interplay between the capex and opex costs of GPG and LDES. Given that our modelling across all carbon budget cases utilised a $12/GJ cost for gas, we can expect that any marked increase in gas prices would increase gas opex, and further erode the levels of GPG that are economic in the system. At sufficiently high gas prices, this will begin to show the same substitution effects under tighter carbon budgets.

This modelling shows that under a more likely future world – as represented by the more generous carbon budget - GPG will likely be eroded by LDES, assuming that the energy cost of LDES can be reduced.

The analysis also demonstrates that the current costs of LDES are fast approaching the thresholds where economics alone materially erode the case for GPG produced energy. Figure 2 shows these storage costs plotted against system long-run marginal costs.. While these are relatively young technologies, this also means their costs can be expected to decrease through learning rates and efficiencies of scale. CEC's analysis shows once these LDES technologies reach specific cost thresholds, they can drive both decarbonisation *and* significantly lower the overall long run cost of energy.

Figure 2: Effects of LDES cost and durations on total system long-run marginal cost (LRMC) SOURCE: Forthcoming CEC report.



While not plotted in Figure 2, the well establish pumped hydro energy storage (PHES) technology also can be expected to play a significant role in the NEM's transition on account of its techno-economic performance. CEC notes that Aurecon's Technical Parameters report to AEMO assumes a technical life of 80-100 years.[4] By contrast, the draft 2024 ISP assumes a 50 year technical life,[5] and Entura's 2018 report on PHES cost modelling considers several existing systems older than 50 years (and accounts for increasing opex with age).[6] This gap in assumed life makes a significant difference in the cost competitiveness of PHES vs other firming technologies, both BESS and GPG. While the 2023 IASR report references the Aurecon and Entura reports as sources for candidate technology build costs,[7] the CEC did not see in the draft report's text other materials, however, any rationale for choosing 50 years as the assumed technical life of 50 years and strongly encourage providing more clarity on that rationale.

Both GPG and LDES are long-lived, long-lead time assets. It follows, then, that the correct investments must be made now, or in the near term, to meet expected NEM power system needs out to 2040 / 50. The CEC's analysis shows that LDES likely to offer a more cost-stable and economic long-term solution than GPG at least out to the margins of the load duration curve.

Because sending the incorrect investment signals now could well contribute to locking in development of highly inefficient, underutilised and largely unnecessary GPG capacity, we strongly recommend AEMO explore all the assumptions that underpin the increased GPG capacity in the 2024 draft ISP as compared to the 2022 ISP.

Recommendation 4: AEMO should explore all assumptions underpinning the 60% increase in GPG capacity in the ODP.

Additional Clarity and Detail Sought Regarding the Role of Different Firming Technologies in the Final 2024 ISP

Connecting the analyses above, especially the economics of different technologies and the current and anticipated future social licence standing of each, it is quite reasonably to expect that by the 2040s and 2050s heightened community concerns about climate risk will drive an expectation for any thermal generation to utilise renewable fuels such as renewable hydrogen (or derivatives) or biofuels. The CEC would expect that the deployment of renewable fuels would be required across all GPG operating without CCS in 2050.

While the ODP and other Step Chage CDPs feature no 'mid-merit gas with carbon capture and storage', we are concerned to see Step Change's counterfactual show large amounts of capacity and generation starting by 2032. We note that over the past five decades, despite significant domestic and global public subsidies plus research and development, carbon capture and storage still has not proven itself to be a credible, effective, or cost-efficient approach to emissions reduction. We suggest that AEMO should reconsider including it in any scenario, including the counterfactual in the likely event that it cannot become a cost-effective part of the technology mix by 2050.

With the above analysis and considerations in mind, the CEC recommends that AEMO consider and provide further detail in the text regarding questions such as:

- What methodology was used to consider "the worst possible VRE drought conditions" affecting the NEM over the next 20 years will be 8 days?

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[4] 2023 Costs and Technical Parameter Review, Aurecon (15 Dec. 2023), p. 139.
[5] Draft 2024 ISP Inputs and Assumptions workbook, AEMO (15 Dec. 2023), "Lead time and project life" tab.
[6] See, e.g., p. 23.
[7] 2023 IASR report at p. 104.

- What would be the results of exploring the range of drought periods from 4 to 7 days?
- Does the analysis or results provide probabilities of such an event over specific time horizons?
- How does the analysis consider:
    - Current and likely future cost curves for BESS storage and other forms of medium- and long-duration energy storage technologies?
    - Current and likely future cost curves for domestic gas prices?
    - Probability of sufficient gas pipeline capacity?
    - The likely operational profile of GPG in the out years of the ISP?
        - If GPG is assumed to be operating as 'backup' to meet demand at the far edges of the residual demand distribution, is this consistent with current understandings of financing, contracting and operational behaviour of GPG? The CEC considers that utilisation of GPG at these very low capacity factors to provide 'back up' support for seasonal shortfalls or to manage renewable droughts, does not align with the typical commercial basis and use case of GPG. This usually revolves around selling cap defending contracts at an approx. $300 strike price, with assets operating more frequently to defend these positions. Is AEMO assuming this behaviour will continue? If so, this implies that the new GPG invested under AEMO's modelling will more likely be used at higher capacity factors, in response to price volatility. This then may contradict overall carbon budget requirements. We therefore encourage AEMO to reassess the underlying assumptions made regarding the operation of GPG in its modelling.
    - Ability of the gas network to service the larger build and a backup operating role of new GPG assets?
        - This is important because of the marked increase in gas offtake volatility associated with an increasingly seasonal / 'backup' role of GPG in the later years of the ISP time horizon. Existing gas haulage contract structures, which typically operate under a 'take or pay' structure, may not allow this kind of offtake arrangement.
    - Potential social licence issues in communities asked to host the additional GPG assets?
- Has AEMO considered other scenario modifications such as where:
    - Gas prices continue to increase as supplies decrease, for example due to elevated social and policy risk for investors, as well as depletion of gas fields?
    - Gas prices become more volatile with higher swings as global markets fluctuate more?
        - The market consequences of the Ukraine invasion demonstrates how rapidly gas prices can fluctuate. We recommend that AEMO therefore test the economic efficiency of using this increased GPG capacity, under conditions of extreme high gas prices.
    - High carbon pricing, and broader application of carbon pricing come into play?
    - Costs associated with accessing pipeline capacity climb, possibly significantly higher, and thus alter the operational profiles GPG considered by AEMO, especially in the out years of the ISP?
    - Changing amounts of pumped hydro storage investment in key NEM areas/assets?
    - Continued technological innovation resulting in
        - More significant price declines for BESS systems by the mid-2030s and ensuing decade?
        - More significant efficiency gains in PV-based assets on similar time scales?
- Will the final 2024 ISP report provide more detail on the constraints for GPG when VRE droughts are likely to occur given those also tend to be when heating and industrial demands for gas also rise?

Given that the future NEM will be dominated by VRE and non-thermal storage assets, further detail and analysis in response to questions such as those above would provide investors, developers, and other NEM stakeholders with more certainty to help guide investment decisions around GPG, storage, and VRE systems. This is particularly pertinent given the long lead times, and current level of competitiveness, of some of these long duration storage solutions.

IMPLICATIONS OF THE RENEWABLE HYDROGEN OPPORTUNITY FOR THE SCENARIOS MODELLED

The CEC supports the updated view in the Inputs, Assumptions and Scenarios Report that a smaller share (50 per cent) of hydrogen projects will be connected to the NEM, noting that a large share of the current project development pipeline is based in Western Australia while some projects in NEM states may also occur in remote areas but not connect to the NEM.

The CEC also welcomes the explicit consideration of the potential use of hydrogen for green steel, noting that green metals is a leading use case for renewable hydrogen. Of note, the Grattan Institute's and others' latest analysis anticipate green iron to become a more plausible manufacturing and export market than green steel. This is important in the context of the ISP because that alter electricity demand for projects.

The CEC acknowledges that the Draft 2024 ISP now envisages a modest volume of green hydrogen exports (226,000 tonnes) in the Step Change scenario by 2050 whereas the 2022 ISP indicated no exports at all. This compares to an assumption of 9 million tonnes per annum of hydrogen exported by 2050 under the Green Energy Exports scenario.

The shift away from the binary assumptions ('no hydrogen exports' v. 'hydrogen exports') between the Step Change and former Hydrogen Superpower scenarios is a welcome adjustment. Given the current business and policy environment, the CEC considers that Australia may have several export-oriented green hydrogen derivative (particularly ammonia) projects in place by 2030. The commitment to Hydrogen Headstart and expected additional measures following the imminent refresh of the National Hydrogen Strategy will likely play a key role. However, we do not consider that the existence of these projects would automatically equate to Australia being on the turbo-charged transformational trajectory set out within the Green Energy Exports scenario.

In sum, the CEC considers that the Step Change scenario, and thus the ODP, should allow some reasonable headroom for export-oriented large-scale hydrogen project development. Not doing so would be risky given the risk asymmetries raised earlier in this submission, namely:

- the consequence of any large-scale electrolyser on system load;
- the speed of policy developments and market changes;
- the international interest and support for the development of Australia's hydrogen sector; and
- the long lead-times associated with transmission development.

DESCRIPTION OF THE ROLE GAS-POWERED GENERATION IN THE DRAFT ISP

The CEC notes that the draft 2024 ISP report's narrative describes GPG in two apparently different ways in almost equal measure: as a backup for VRE firmed by storage, and also as a firming technology. The CEO preface states that "Renewable energy connected by transmission, **firmed with storage and backed up by gas** is the lowest cost way to supply electricity to homes and

businesses through Australia's energy transition".[8] Each section under Part B subsequently commences with a nearly identical statement in a callout box. The modelling results would appear to support this as the generation profile show the shift from mid-merit gas to peaking, with the shift becoming more pronounced through the modelled timeframe.

About an equal number of times in the report, however, the text refers to GPG as firming for VRE. Notably, the glossary defines firming as including GPG but does not include a definition of "backup."

Given that some stakeholders may generally associate firming with "backing up" VRE while others may not, we consider that this level of discrepancy could lead to confusion for policy makers, other decision makers, and various NEM stakeholders. Consequently, we recommend AEMO provide more clarity on whether "backup" and "firming" are meant to be synonyms, or if AEMO has more specific definitions for each term and thus should provide further explanation about when GPG would be used as a backup and when as firming.

Recommendation 5: AEMO should clarify if the terms "backup" and "firming" used to describe gas-powered generation have synonymous or different meanings and update the final report text, including the Glossary, accordingly if needed.

CONSIDERATION OF THE ROLE OF CONSUMER ENERGY RESOURCES

The CEC notes that the draft 2024 ISP's forecast of Consumer Energy Resources (CER) models a four-fold increase in rooftop solar capacity in the step change scenario, reaching 86GW by 2050, 17GW higher than the same scenario in the 2022 ISP. This seems reasonable given Australians have the world's highest adoption rates of solar rooftop solar as they seek to smartly manage their energy usage and costs. We also note that the draft 2024 ISP points to the important role co-ordinated (or orchestrated) CER will play in the transition.

We also note the Federal government recently proposed a new Vehicle Efficiency Standard. This will be important in achieving the predicted electric vehicle (EV) penetration between 63% (Progressive Change) and 97% (Step Change) of all vehicles by 2050. We are aware that the peak body for the electric vehicle sector, the Electric Vehicle Council (EVC) considers forecast trajectory of EV penetration to be significantly higher than is credible, based on analysis that it has set out within its response to the Forecasting Assumptions Update. The CEC encourages AEMO to utilise EVC's input in developing the 2024 ISP.

Importantly, the CEC supports the Draft 2024 ISP's noted risks to achieving the CER forecasts, being:

1. Consumer-owned assets are grouped together and coordinated as virtual power plants (VPPs) to respond to market or network signals; and
2. VPPs are appropriately integrated into the NEM to help support power system reliability and security.

[8] Emphasis added for ease in reading.

Further, consumers will also need to see the benefits of both these actions and trust the energy sector to deliver them.

To this end it was pleasing to see the Energy and Climate Change Ministers Council prioritise integration of CER at the November 2023 meeting by establishing a CER Taskforce. This Taskforce will first and foremost develop a CER Roadmap and nationally consistent standards on the connection, safety, and functionality of rooftop solar and storage devices.

Importantly, the CEC is developing a CER Roadmap that will evaluate the consumer and system wide benefits from achieving the ISP optimal development step change path for CER generation, storage and orchestration. The CEC's Roadmap will also outline a set of key policy priorities crucial for effectively integrating these resources into Australia's power systems. The CEC Roadmap will specifically focus on those policy areas that will be important to remove the friction points along the consumer journey in considering, purchasing, and using these resources. We believe a consumer led consideration of policy options is the best way of ensuring consumers consistently access the benefits and build trust.

CONSIDERATION OF THE ROLE OF OFFSHORE WIND

The CEC welcomes the consideration of Victoria's offshore wind targets in the Draft (p. 31). The high quality wind resources found over the waters surrounding Australia mean that offshore wind energy has immense potential for the NEM. The technology will play a complimentary role to onshore renewable energy generation sources. It is critical, however, that planning activities early on consider the sizeable increase of generation load these projects will deliver. This forward thinking will be key to their success and avoid delays in connecting offshore wind capacity.

We note there are also projects planned which will connect into states other than Victoria that are yet to establish offshore wind targets, but should they proceed, will have significant impact on transmission planning. While we appreciate at this stage those projects are harder to calculate, it is expected that there will be greater surety over the coming 12 to 24 months as licences are awarded. We expect this means they will be included in the critical guidance of the next ISP instalment in 2026.

As always, the CEC will work with AEMO to support the rapid transformation of the NEM whilst maintaining security and reliability and welcomes further engagement on the draft and final 2024 ISP. Further queries can be directed to Paul Beaton at the CEC on pbeaton@cleanenergycouncil.org.au.

Kind regards,

Paul Beaton
Senior Policy Officer
Market, Investment, and Grid Transformation