QEUN Queensland Electricity Users Network

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2 March 2023

Mr Daniel Westerman
Chief Executive Officer
Australian Energy Market Operator

Via email: forecasting.planning@aemc.com.au

Dear Mr Westerman

RE: Supplementary submission to the consumer advocates verbal submission on the Draft 2023 IASR

The Queensland Electricity Users Network (QEUN) would like the provide the following supplementary submission which is in addition to the QEUN comments made in the combined consumer advocates verbal submission on the Draft 2023 IASR on 9 February 2023.

The QEUN is a consumer advocate representing small business and residential consumers with a particular emphasis on regional consumers. We advocate for affordable and reliable electricity from a *resilient* National Electricity Market where the pace of the transition to a renewable energy future is not at the expense of the economy, jobs or reasonable living standards.

The inputs, assumptions and scenarios in the Draft 2023 IASR form the basis of AEMO's seminal national planning document - the Integrated System Plan (ISP).

As such it is critical all the information in the Draft 2023 IASR is transparent to all stakeholders, and in particular consumers.

The inputs, assumptions and scenarios need to be plausible, current and realistic if the process is to result in a 2024 ISP that is *deliverable*.

Put simply, if the information in the Draft IASR is outdated or missing, the 2024 ISP will not be the best national electricity plan for the energy transition, the economy, jobs and reasonable living standards.

The AEMO ISP planning process is now placing the need to meet national and state carbon targets ahead of the ability of consumers to access affordable, reliable and secure electricity from a resilient national electricity *and* gas system.

The main driver of the four Scenarios in the Draft 2023 IASR is a carbon budget, not the budgets of business and residential consumers who pay for the electricity supplied by the national electricity grid.

The failure of the four Scenarios to recognise the ability of consumers to afford the resultant 2024 ISP means the ISP does not comply with the National Electricity Objective or the National Gas Objective.

> *The **National Electricity Objective** (NEO) as stated in the National Electricity Law 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—*
>
> *(a) price, quality, safety, reliability and security of supply of electricity; and*
>
> *(b) the reliability, safety and security of the national electricity system.*

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*The **National Gas Objective** (NGO) as stated in the National Gas Law is:*

"to promote efficient investment in, and efficient operation and use of, natural gas services for the long term interests of consumers of natural gas with respect to price, quality, safety, reliability and security of supply of natural gas."

The failure is demonstrated by the absence of a key parameter in the four Scenarios that would measure affordability to business and residential consumers (Table 1).

Table 1: Key parameters by scenario

Parameter	*1.5°C Green Energy Exports*	*1.8°C Orchestrated Step Change*	*1.8°C Diverse Step Change*	*2.6°C Progressive Change*
National Decarbonisation target	At least 43% emissions reduction by 2030. Net zero by 2050	At least 43% emissions reduction by 2030. Net zero by 2050	At least 43% emissions reduction by 2030. Net zero by 2050	43% emissions reduction by 2030. Net zero by 2050
Global economic growth and policy coordination	High economic growth, stronger coordination	Moderate economic growth, stronger coordination	Moderate economic growth, moderate coordination	Slower economic growth, lesser coordination
Australian economic and demographic drivers	Higher (partly driven by green energy)	Moderate	Moderate	Lower
DER uptake (batteries, PV and EVs)	Higher	Higher	Moderate	Lower
Consumer engagement such as VPP and DSP uptake	Higher	Higher	Moderate	Lower
Energy Efficiency	Higher	Higher	Moderate	Lower
Hydrogen use	Faster cost reduction. High production for domestic and export use	Allowed	Allowed	Allowed
Hydrogen blending in gas network^	Unlimited	Up to 10%	Up to 10%	Up to 10%
Biomethane/ synthetic methane	Allowed, but no specific targets to introduce it	Allowed, but no specific targets to introduce it	7.5% blending target for reticulated gas by 2030 and 10% by 2035	Allowed, but no specific targets to introduce it
Supply Chain barriers	Less challenging	Moderate	Moderate	More challenging
Global/domestic temperature settings and outcomes	Applies RCP 1.9 where relevant (~ 1.5°C)	Applies RCP 2.6 where relevant (~ 1.8°C)	Applies RCP 2.6 where relevant (~ 1.8°C)	Applies RCP 4.5 where relevant (~ 2.6°C)
IEA 2021 World Energy Outlook scenario	NZE	SDS	APS	STEPS

^ Hydrogen blending of the gas network will need to accommodate the technical requirements of transmission and distribution pipelines, as well as the capabilities of connected gas appliances. Higher blends than ~10% may require appliance change and/or switches to dedicated hydrogen transmission pipelines.

Source: AEMO Draft 2023 Inputs, Assumptions and Scenarios Report, December 2022

To measure affordability, we recommend two new parameters be added to the four Scenarios:

- Residential energy poverty
- Business energy poverty

Energy poverty is no longer confined to the traditional area of Centrelink recipients. Over the last year the media has blamed rising interest rates and rising inflation for energy poverty. However, energy poverty has been spreading to middle Australian households for some time, in part due to mortgage/rental stress. There is no short term solution to the housing affordability crisis therefore energy poverty will not automatically decrease should power bills fall from current levels.

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In the UK one affordability measure is the number of households who are required to spend more than 10 percent of their income (after housing costs) on domestic energy. The UK are now considering social tariffs.

Energy poverty is also impacting the viability of businesses.

Some cafes are reducing operating hours or only turning on heating appliances during the main traffic times. Industrial customers are scaling back production, postponing/cancelling expansion plans or substituting Australian products with imported products. Farmers are planting to an electricity budget.

Energy consumption is an excellent barometer to the health of the Australian economy.

Small business is the largest user of NEM supplied electricity and is also the largest employer in Australia.

If small business cannot afford NEM supplied electricity then the NEM plan – the 2024 ISP - is the wrong plan for the Australian economy and Australian jobs.

If the Australian economy continues to slow, tax revenue will shrink. This will reduce the funds available for schools, roads, hospitals, police, the NDIS, Centrelink, the defence force etc.

However most importantly, a struggling Australian economy will not have sufficient funds to invest in research needed to develop technology that will decarbonise the NEM without destroying the environment of developing countries and using child labour to mine and process minerals currently used in the green energy transition such as cobalt, lithium and rare earths.

AEMO's pursuit of inputs, assumptions and scenarios that focus primarily on a carbon budget without taking into consideration evolving energy and storage technology, risks Australia being captive to yesterday's technology - which is akin to Australians still using the same mobile phone they own today in 25 years' time.

The continued lack of corporate investment in long term Power Purchase Agreements with solar farms, wind farms and battery projects is evidence that businesses are cognisant of the real risk of locking themselves into yesterday's technology and yesterday's electricity costs (which could then risk their business having higher energy costs than their Australian and international competitors).

If a fruit and vegetable shop only sold organic produce and could not attract enough customers to keep the shop open, the shop would have to choose between including some non-organic produce or closing the shop.

Like the organic fruit and vegetable shop, the inputs, assumptions and scenarios used in the 2024 ISP must take into consideration the customers' ability to pay, especially small business customers since small business is the engine room of the economy.

Over the last couple days, Queensland's wind generation has been less than 5 MW when Queensland's demand for electricity was over 6,000 MW. The solution is not more wind farms because if the wind is not blowing it doesn't matter how many wind farms there are – there is simply no wind generation.

The 2024 ISP needs to ensure the NEM can supply sufficient reliable and secure electricity to meet consumer demand. Without natural gas and hydrogen the NEM will not be able to keep the lights on as the investment in short duration (batteries) and long duration (pumped hydro) storage is still dependent on NEM supplied electricity to recharge.

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The 2024 ISP also needs to ensure the NEM is resilient to climate change (wind, solar & water droughts, severe wind events, hail storms, bush fires and floods), geopolitical tensions and supply chain issues.

Transparency & reality check on inputs and assumptions for green hydrogen prior to 2030

The biggest potential gamechanger for the NEM, and therefore the 2024 ISP, is the production of green hydrogen for both the domestic and export market.

However, there needs to be a reality check on what can be achieved with green hydrogen prior to 2030.

Green hydrogen production requires:

- ***water*** – Australia is the driest continent on Earth and El Nino may be returning this year
- ***super cheap electricity*** – the International Energy Agency (IEA) states solar PV costs have to fall to USD14/MWh by 2030 (AUD21/MWh) – all regions in the National Electricity Market currently have an average annual wholesale electricity cost over $100/MWh
- ***electrolysers*** – current global electrolyser manufacturing capacity is 8 GW/year and could exceed 60 GW/year by 2030 – installed electrolyser capacity could be 134-240 GW by 2030
- ***scarce minerals for PEM electrolysers*** – PEM electrolysers require iridium and platinum which are largely concentrated in South Africa and Russia (the IEA states a reduction of iridium by a factor of 10 seems feasible in the next decade according to some experts).

The Draft 2023 IASR is silent about the inputs and assumptions used in the modelling for green hydrogen production and puts the need to analyse the availability of water as a future exercise.

Without making its inputs and assumptions transparent the Draft 2023 IASR states:

> *Water supply*
>
> *For the 2024 ISP,* ***water availability is not considered to be a limiting factor to affect electrolyser operations****, since all sites are assumed to be coastal.* ***Water is not a costed component of electrolyser operation within the ISP modelling,*** *although some export ports may require desalination.* ***AEMO recognises that further analysis may be needed in future*** *to validate the availability of water resources.*

Water availability for green hydrogen

The location of green hydrogen production is critical to the availability of water and therefore the quantity of green hydrogen produced.

Yet AEMO does not have an electrolyser database which lists green hydrogen projects by location.

Water availability is strongly linked to the quality of water required for electrolysers.

The IASR needs to stipulate the quantity of *raw* fresh water and *desalinated* water required to produce 1 kg of green hydrogen.

There is anecdotal evidence that the 9 litres quoted in Australia's National Hydrogen Strategy may not be raw water. It could be possible the raw water requirement for 1 kg of green hydrogen could be as high as 20 litres.

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Water cost for green hydrogen

A study stated the cost of water is about 2% of the cost of green hydrogen.

It is important that AEMO quantify the cost of water used in its modelling for green hydrogen.

In February 2023, the Queensland Government announced it would build the $983 million Fitzroy to Gladstone Pipeline to supply water to green hydrogen proponents in Gladstone. The 117 km pipeline will be completed in late 2026 with the water being sourced from the $370 million Rookwood Weir – which is funded 50/50 by the Federal and Queensland Governments and expected to be completed in late 2023. The 2017 Lower Fitzroy River Infrastructure Project Detailed Business Case (Rookwood Weir) identified 30,000 ML of *high* priority industrial water for Gladstone.

Identifying the green hydrogen market is critical to Australia's water, energy & food security

AEMO needs an electrolyser database that identifies the market targeted by each green hydrogen proponent.

This is critical to Australia's water, energy and food security.

It is possible green hydrogen exporters may have to commit to long term offtake agreements to finance green hydrogen projects ie similar to the LNG plants in Queensland.

This means green hydrogen exporters could purchase high priority water to ensure sufficient stock to meet export commitments.

Farmers typically buy medium priority water which means Australian farmers will be second priority to green hydrogen exporters.

The Federal nor state governments have introduced a green hydrogen reserve.

Should the natural gas industry cease or diminish in the future, Australian businesses and households could find themselves in the same place they are in for winter 2023 – a forecast shortfall of 'gas' for domestic purposes.

Electricity cost for green hydrogen

The average annual cost of wholesale electricity traded in the NEM in FY2022 ranged from $84.89/MWh in Tasmania to $162.06/MWh in Queensland (Table 2).

According to the International Energy Agency, this is 4 to 8 times the cost of electricity from solar PV needed to economically produce green hydrogen.

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Table 2: Average annual wholesale electricity price by region by financial year (MWH)

Financial Year End	NSW	QLD	SA	TAS	VIC
2010	$44.19	$33.30	$55.31	$29.37	$36.28
2011	$36.74	$30.97	$32.58	$29.44	$27.09
2012	$29.67	$29.07	$30.28	$32.58	$27.28
2013	$55.10	$67.02	$69.75	$48.30	$57.44
2014	$52.26	$58.42	$61.71	$41.98	$51.49
2015	$35.17	$52.52	$39.29	$37.16	$30.35
2016	$51.60	$59.99	$61.67	$102.70	$46.14
2017	$81.22	$93.12	$108.66	$75.40	$66.58
2018	$82.27	$72.87	$98.10	$86.98	$92.33
2019	$88.56	$80.29	$109.80	$90.01	$109.81
2020	$71.95	$53.41	$62.04	$55.05	$73.74
2021	$64.81	$61.81	$44.83	$43.69	$45.93
2022	$132.35	$162.06	$104.60	$84.89	$91.06
2023	$151.23	$154.98	$130.14	$134.59	$109.05

Source: AEMO Data Dashboard, 2 March 2023

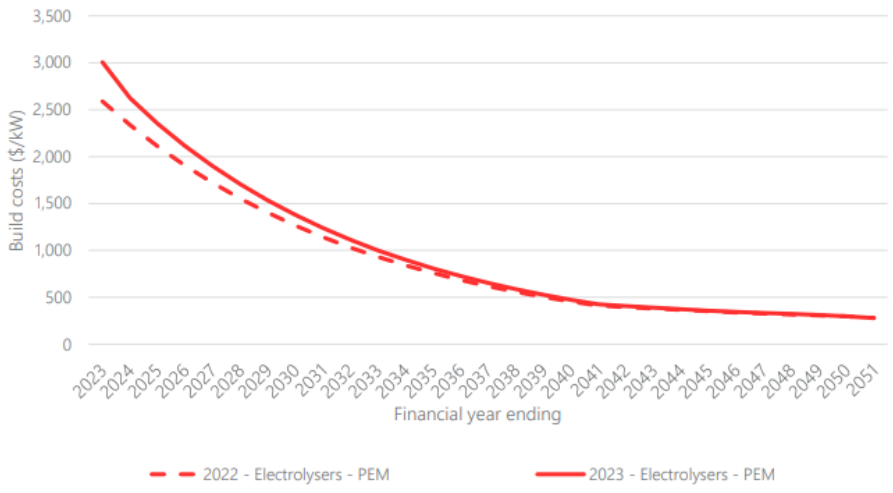
Electrolyser cost for green hydrogen

Should the global demand for electrolysers reach an installed electrolyser capacity of 134-240 GW by 2030 as stated by the International Energy Agency, it is likely the demand for iridium and platinum will not cause a reduction in the cost of a PEM electrolyser as stated in the Draft 2023 IASR (Table 3).

The only company to date to commit to manufacturing electrolysers in Australia will produce PEM electrolysers in Gladstone.

Hysata have developed an electrolyser that does not require iridium and platinum. Hysata claim the entire current global iridium supply would only support the deployment of 30-75 GW of PEM electrolysers over the next decade. Hysata have received Australian and German Government funding to develop their technology.

Table 3: 2022 vs 2023 Global NZE post 2050: build cost trajectories forecasts for PEM electrolyser



Source: AEMO Draft 2023 Inputs, Assumptions and Scenarios Report, December 2022

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AEMO's Generation Information Page

AEMO's Generation Information Page (GIP) is chronically outdated.

Yet the GIP is a source document for the 2024 ISP.

Without current information on existing and proposed generation and storage projects it is not possible for AEMO to develop a deliverable 2024 ISP.

It is unrealistic to expect AEMO to commit financial and human resources to keep the GIP current when state and federal governments are the responsible entities for the approval of energy and storage projects (or have jurisdiction over local governments to provide the information to them).

As a matter of urgency all state, territory and federal energy Ministers need to provide to AEMO on a monthly basis the applications, approvals and changes to generation and storage projects in their respective jurisdictions.

AEMO's Transmission Augmentation Information Page

AEMO's new Transmission Augmentation Page is a most welcome initiative.

However, to be an effective planning tool for the 2024 ISP it needs to include more information, in particular:

- include connection transmission to proposed, anticipated and committed generation and storage projects
- indicative cost (as published in the public domain)
- sources of committed funding
- length of transmission and connection transmission lines
- specify DC or AC
- date construction started (rather than the current comment "*construction started*")
- date construction expected to start (rather than current comment "*construction has not started*")
- include all transmission projects publicly announced (eg the Queensland Energy Plan has 5 Transmission Stages totalling over 1,550 km with an estimated cost of over $7 billion. There is also the 1,000 km privately proposed CopperString Project with an estimated cost of $1.7 billion).

Thank you for the opportunity to provide a small consumer perspective, in particular a regional consumers' perspective since the emerging green hydrogen industry will largely be located in regional Australia.

Yours faithfully

Jennifer Brownie
Coordinator
Queensland Electricity Users Network