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31 March 2025

To: The Australian Energy Market Operator (AEMO)

Re: Submission on AEMO Draft 2025 Inputs Assumptions and Scenarios Report (IASR) Stage 2

Thank you for the opportunity to provide input on Stage 2 of AEMO's Draft 2025 IASR.

IEEFA is an independent energy finance think tank that examines issues related to energy markets, trends and policies. The Institute's mission is to accelerate the transition to a diverse, sustainable and profitable energy economy.

The IASR assumptions play a key role in the ISP and other AEMO processes, and we acknowledge the considerable effort undertaken by AEMO to compile the IASR while implementing significant changes to the ISP methodology.

Our submission focuses on several key areas of the Draft IASR that are relevant to IEEFA's research, or where we feel additional detail would be particularly helpful.

This IASR incorporates material changes to biomethane outlooks. However, we consider that further clarifications or revisions may be required.

We have also offered initial suggestions regarding the design of IASR sensitivities, and the representation of technical carbon sequestration in the model.

Finally, we note that outputs of the multi-sectoral modelling were not available at the time of completing our submission. We would value the opportunity for further consultation on forecasts that are heavily dependent on the multi-sectoral modelling – including electrification – once the final modelling report is available.

Our detailed comments are provided in the following pages. Please do not hesitate to contact us to discuss any of the matters raised in this submission.

Kind regards,

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Hydrogen and biomethane

Low blending limits for hydrogen are appropriate

IEEFA supports AEMO's intention to limit hydrogen blending limits to no more than 10% by volume.[1] We note it would be useful to specify the implied energy blend limit, which we assume is the input used directly in the modelling.

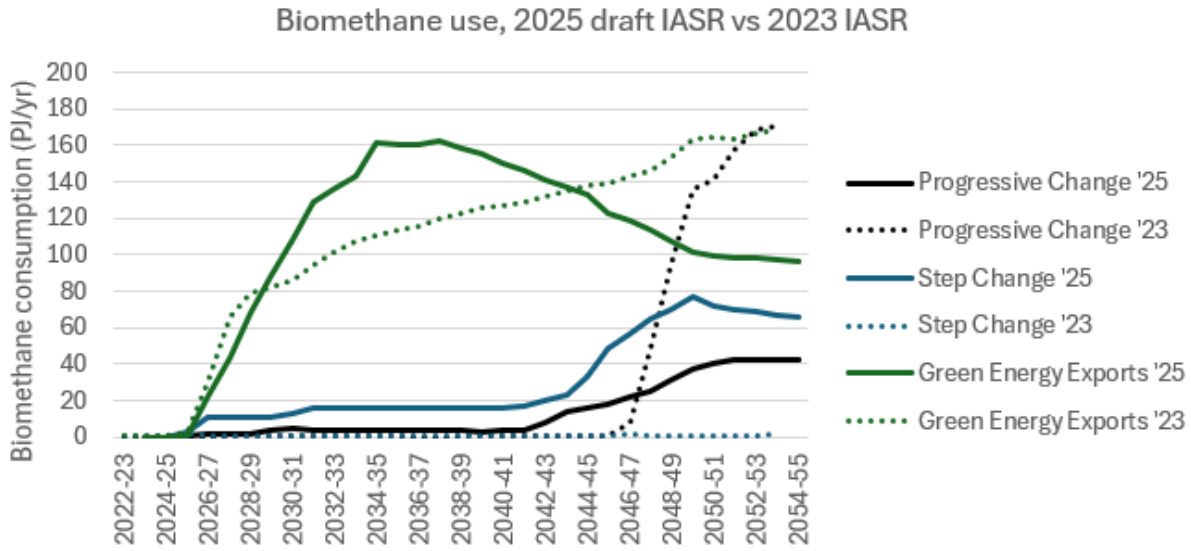
In addition to AEMO's observations regarding unclear social acceptance of high hydrogen blends, we also note that such a switchover would also require upgrades or replacements of household gas appliances. This would be extremely difficult to co-ordinate in a way that maintains uninterrupted energy supply for all users of the gas network.

AEMO's biomethane outlook has changed significantly

Biomethane forecasts have changed substantially in the draft 2025 IASR compared with the 2023-24 IASR. This is most notable in *Step Change*, where the forecast has been upgraded from negligible levels, now exceeding 60 petajoules a year (PJpa) by 2050 (Figure 1).

IEEFA recommends AEMO explain the drivers behind this change in biomethane outlook for Step Change.

Figure 1: Biomethane consumption by scenario, 2025 vs 2023 IASR



Sources: Digitised from AEMO 2025 Draft IASR (p.77) and AEMO 2023 Final IASR (p.66).

Treatment of biomethane in power generation requires clarification

AEMO's draft IASR workbook provides trajectories for gas-fired generation emissions factors due to biomethane blending. These indicate NEM-wide reduction in GHG emissions intensity due to biomethane blending of up to 27% in *Step Change*, and 54% in Green Energy

[1] AEMO. Draft 2025 Inputs, Assumptions and Scenarios Report. February 2025. Page 69.

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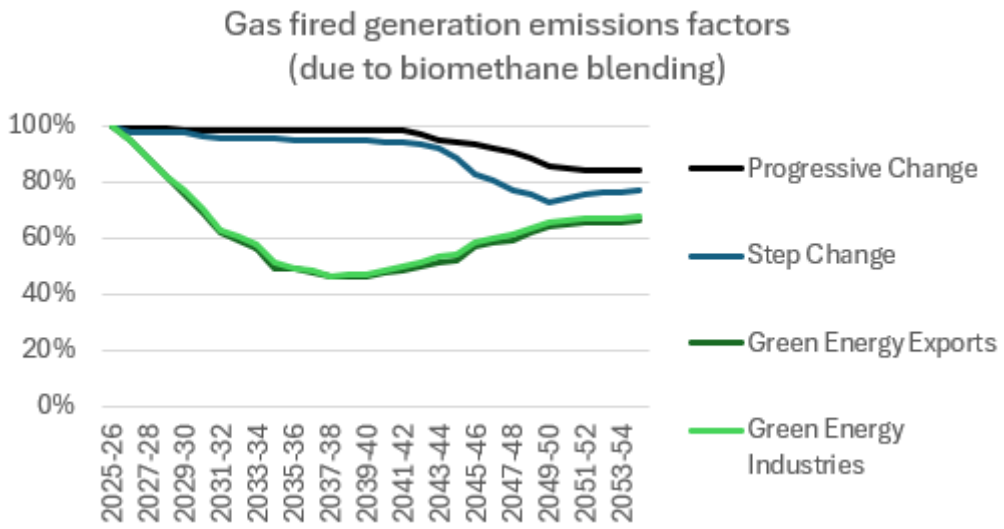
Exports/Industries (Figure 2). This implies that biomethane blends exceeding those percentages would be expected, which is highly material.

Figure 2: Gas-fired generation emissions factors due to biomethane blending in the Draft 2025 IASR



Source: AEMO Draft 2025 Stage 2 Inputs and Assumptions Workbook.

IEEFA requests clarification over whether biomethane blending in AEMO's capacity expansion model will be fixed to the outcomes of the multi-sector modelling.

If yes – we note this may lead to non-cost-optimal outcomes, as AEMO's models are better suited than the multi-sector models to model gas-fired generation requirements.

If no – it is not appropriate to apply the above emissions factors to all gas generators. If biomethane blending outcomes in AEMO's model differ from the multi-sectoral modelling, this will lead to an underestimation or overestimation of gas generation emissions. Instead, fuel-specific emissions factors for fossil gas and biomethane consumption should be applied within the capacity expansion model itself.

2025-26 biomethane cost differences do not make sense

The cost assumptions for biomethane (based on ACIL Allen modelling and provided in the IASR workbook) appear to diverge materially between scenarios as early as FY2026 (Figure 3). This is so significant that for any given feedstock, FY2026 biomethane costs in *Green Energy Exports* are lower than FY2054 costs in *Progressive Change*.

IEEFA recommends AEMO review its biomethane cost projections to reduce the short-term differences across scenarios, as it is unlikely such significant differences between scenarios could occur in as little as one year. These differences may be material enough to affect the biomethane outcomes across the suite of ISP models.

It may be useful if AEMO or ACIL Allen could provide actual and historic costs for each feedstock type, in order to anchor the forecasts.

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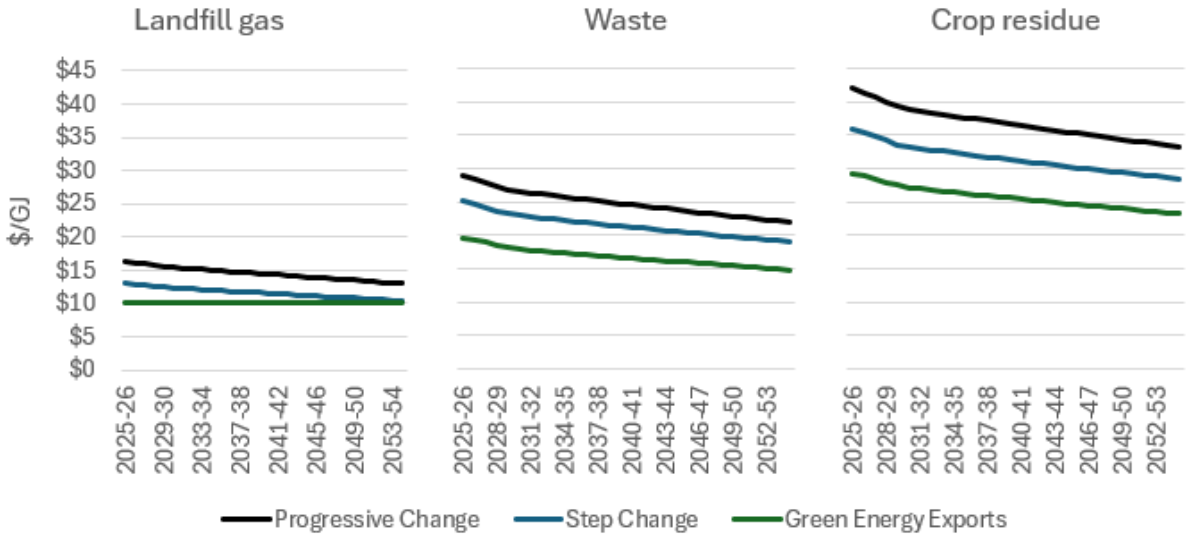
Figure 3: Draft 2025 IASR cost trajectories for biomethane by feedstock source and scenario



Source: AEMO Draft 2025 Stage 2 Inputs and Assumptions Workbook.

Regional supply dynamics of biomethane are important

IEEFA supports steps taken by AEMO to give greater consideration to infrastructure constraints of hydrogen blending in the Draft 2025 IASR, and to fossil gas infrastructure requirements under the scenarios.

However, we note that biomethane also has unique infrastructure implications that must be taken into account. Specifically, locations where biomethane is produced may not be co-located with existing gas transmission or distribution infrastructure.

In Victoria, for example, analysis by Enea consulting found that the recoverable biogas potential in the state was likely between 10.5-24.9PJpa.[2] This appears lower than the estimates used by ACIL Allen.[3] But importantly, Enea found the majority of this would need to come from agricultural feedstocks, the availability of which does not align well with Victoria's existing gas transmission network (Figure 4). This implies that new gas transmission infrastructure or alternative transport solutions would be required to access these sources, which would incur higher costs.

AEMO should review its modelled biomethane outcomes to ensure all relevant regional or infrastructure constraints are considered.

[2] Enea Consulting. Sustainability Victoria – Assessment of Victoria's Biogas Potential. December 2021. Page 2.
[3] ACIL Allen estimates 30.6-56.5PJpa supply available in Victoria (ACIL Allen. Gas, liquid fuel, coal and renewable gas projections. February 2025. pp.B-5 to B-6)

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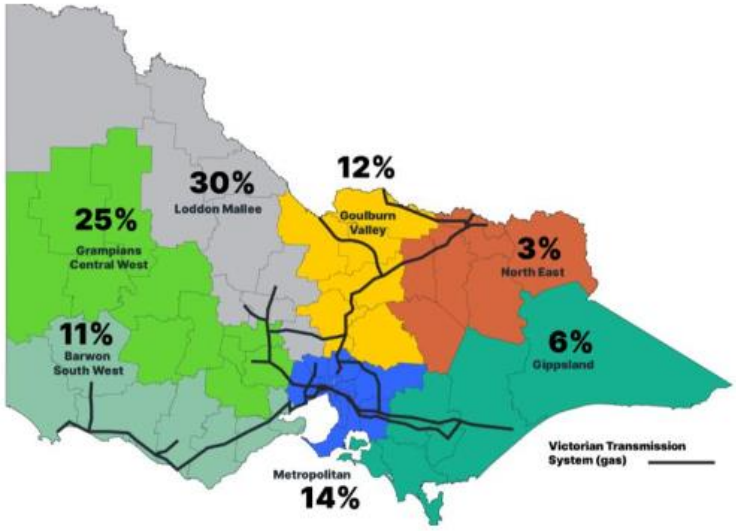
Figure 4: Proportion of recoverable biomethane feedstock in Victoria vs gas transmission network



Source: IEEFA, drawing from Enea consulting and Geoscience Australia. Percentages refer to proportion of biogas feedstock available in each region.

Design of sensitivities

Suggestions on the design of sensitivities

IEEFA thanks AEMO for providing some additional details on three proposed sensitivity areas, and we provide the following suggestions:

Alternative coal retirement schedule(s)

It would be useful if this sensitivity were designed in a way that provides insights on the renewable and storage build required to support scheduled or accelerated coal retirement dates. This would help governments plan for the timely retirement of coal.

Alternative CER uptake

It would be helpful if this sensitivity includes a high-Consumer Energy Resources (CER) variant. This could be used to provide insights on the role that CER could play to reduce large-scale system costs.[4]

Constrained supply chains

In addition to any constraints under consideration, it would be useful if this sensitivity explores the implications of supply-chain constraints on gas-peaking plants, which appear to be significant in the near term.[5]

[4] For more information, see IEEFA, Integrated System Plan needs greater ambition on DER to be a true whole-of-system plan. May 2024.
[5] Renew Economy. You want to build a gas fired power station before 2030? Good luck with that. March 2025.

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Carbon sequestration

CCS and DAC are not reliable methods of carbon sequestration

The 2025 draft IASR assumes material levels of carbon capture and storage (CCS) in *Step Change*, which is notable change from the 2023-24 scenarios.[6] This change is surprising, given the International Energy Agency's outlook for CCS has significantly decreased in recent years.[7]

IEEFA's research has found that in FY2024, Australia's flagship Gorgon CCS project "captured only 30% of the CO_2 it removed from its reservoir", and "most large CCS projects globally have failed or underperformed materially".[8]

Even analysis of Norway's Sleipner and Snøhvit CCS facilities, often cited as successful examples of CCS, has revealed risks that, "call into question the long-term technical and financial viability of the concept of reliable underground carbon storage".[9]

Direct Air Capture (DAC) is an even more speculative technology, existing only in a handful of projects globally that capture less than 0.01 Megatonnes of CO_2 a year.[10]

While we acknowledge DAC is no longer deployed in the 2025 *Step Change* scenario, it is not certain whether DAC could emerge as a cost-effective technology at the scale required by *Green Energy Industries/Exports*.

IEEFA recommends AEMO revise its CCS and DAC assumptions to ensure costs and potentials are based on real-world experiences, rather than theoretical values that may be unachievable.

Electrification

Further detail on electrification forecasts is requested

While we acknowledge the high-level comparison of electrification forecasts provided in the Draft Stage 2 IASR, it is difficult to interpret these in the absence of sectoral forecasts.

For example, AEMO notes that, *"Electrification forecasts in the multi-sectoral modelling for the residential and commercial sectors are presently lower in* Step Change *and* Progressive Change *compared to the 2023 IASR."*[11] However, the quantum of this difference or its drivers are not discussed.

It is surprising that residential and commercial electrification forecasts would have reduced compared with the previous IASR, given that policy support for residential electrification has

[6] No CCS was deployed in the 2023 *Step Change* scenario – see CSIRO and Climateworks Centre. Multi-sector energy modelling 2022: Methodology and results. December 2022. Page 52.
[7] IEEFA. CCS hype and hopes sinking fast. October 2024. Page 2.
[8] IEEFA. Gorgon CCS underperformance hits new low in 2023-24. November 2024.
[9] IEEFA. Norway's Sleipner and Snøhvit CCS: Industry models or cautionary tales? June 2023. Page 7.
[10] International Energy Agency. Direct Air Capture. Accessed 27 March 2025.
[11] AEMO. Draft 2025 Inputs, Assumptions and Scenarios Report. February 2025. Page 67.

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significantly increased in both Victoria and the ACT in the past two years, with even stronger measures under consideration in Victoria.[12]

IEEFA recommends AEMO provides further engagement opportunities on electrification forecasts once the sectoral modelling detail is available, and that they account for recent electrification policies and trends.

[12] Both Victoria (2024) and the ACT (2023) have introduced restrictions on household gas use in new dwellings. Victoria is considering regulations that would have significant impacts on electrification of existing dwellings, and has introduced strong electrification incentives under the VEU (2023 and 2024).