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AEMO Forecasting and Planning Group
Via: forecasting.planning@aemo.com.au

AEMO consultation on the 2025 Inputs, Assumptions and Scenarios Report (IASR) scenarios

Thank you for the opportunity to participate in the consultation process for the development of the 2025 Inputs, Assumptions and Scenarios Report (IASR) scenarios. We support the broad premise which AEMO has outlined within the scenarios, and furthermore we see opportunity to refine some underlying aspects. We have outlined these as follows:

- The technology suite required for renewable hydrogen underground storage (deployed for electricity storage purposes in the NEM) is developing and will likely be commercially available within the time horizons considered in the current ISP scenarios. Suitable geology exists in Australia in locations with access to the HV transmission network.
- Renewable hydrogen may offer medium/long-duration and interseasonal electricity storage opportunities far beyond what BESS and many pumped hydro facilities can offer, the latter of which may be subject to geographical and ecological constraints, let alone high uncertainties around build cost.
- Under the ISP 2024, up to 20% spill of renewable generation is forecast (2050), hence whilst renewable hydrogen batteries may have a lower round-trip efficiency (RTE) than lithium-ion batteries or pumped hydro, the abundance of otherwise available spill may outweigh RTE disadvantages (this would be for the modelling to resolve, rather than the technology struck out at an earlier stage), while still considering stability and thermal constraints. Moreover, long-duration underground hydrogen storage connected to electrolysers and hydrogen-ready turbines may also be competitive compared to pumped hydro, predicated on favourable market arbitrage opportunities in a future with high price volatility.
- The 2024 ISP has highlighted a need for greater quantities of firming generation in the form of GPG (compared to the 2022 ISP). Renewable hydrogen, through hydrogen-ready turbines, can participate in meeting this need.
- Renewable hydrogen (as an electricity storage vector) can be a locally produced, which represents greater levels of national energy security over the long term, whilst not competing for the feedstock sought for many other renewable fuels.
- The University of Melbourne is aware of the computational tractability limitations of the optimisation tools used by the ISP (Plexos or otherwise). Nonetheless, we believe there are ways around these challenges. We see merit in including renewable hydrogen underground storage in the development of the 2025 IASR and not being excluded as an electricity storage technology due

to computational tractability constraints. Including it in modelling can resolve preferences and balances in delivering the least cost technology mix for electricity storage. Under many conditions, such as duration of renewable energy droughts, high market price volatility and geographical constraints, we envisage that facilities comprising combined PEM electrolysers and hydrogen-ready gas turbines can be competitive with and in cases preferential to, for example, said pumped hydro projects.

With regards to specific questions raised in the consultation, we provide the following:

- *Since the 2023 IASR publication, what changes (such as environment, social, policy) do you consider most impact scenario development for the 2025 IASR scenarios?*
    - A relevant change in policy is the introduction of the $2/kg hydrogen tax incentive which can have a material effect on economics of renewable hydrogen batteries between 2030 and 2040.

- *Is AEMO's proposal as described above a suitable evolution of each scenario's parameters that will effectively support AEMO's functions in planning the transition? What additional changes should be considered?*
    - The 'Hydrogen use and availability' row in Table 3 includes "domestic uses and exports", however it would be ideal to explicitly include renewable hydrogen as an electricity storage medium. If electricity storage is considered to be included in the blanket term 'domestic use', later stages of ISP development may only see this as feedstock and transport fuel, etc. and renewable hydrogen batteries may be lost from the analysis.

With also note the following with regards to specific references in the consultation paper:

- *"AEMO does not consider that the scenarios should be defined by technology outcomes."*
    - We support this point and seek that hydrogen underground storage as a medium/long-duration and interseasonal electricity storage technology should not be excluded from the scenarios, nor further stages of development of the 2025 IASR and 2026 ISP.

To discuss any of the above feedback further, please contact me on +61 410 788 902 or sleiman.mhanna@unimelb.edu.au.

Sincerely,

Dr. Sleiman Mhanna

Senior Research Fellow

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