Climate Council of Australia

Submission to: Australian Energy Market Operator's Draft Integrated System Plan 2022

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About the Climate Council

The Climate Council is an independent non-profit organisation funded by donations by the public. Our mission is to provide authoritative, expert advice to the Australian public on climate change and solutions based on the most up-to-date science available.

To find out more about the Climate Council's work, visit www.climatecouncil.org.au.

1. Introduction and overview

The Climate Council thanks the Australian Energy Market Operator for this opportunity to contribute to the development of the 2022 Integrated System Plan. We would also like to commend the team for the work performed so far through development of the Inputs Assumptions and Scenarios Report as well as other satellite processes to the ISP. We are pleased to watch as the ISP process continually improves with each iteration.

Similarly, while we have some reservations with the implementation, we are pleased to note the presence of the Hydrogen Superpower scenario, which is by far the most ambitious decarbonisation pathway ever discussed by the operator, or indeed any other public institution that we are aware of here or overseas. The climate crisis requires urgent action and the high ambition pathways such as this are essential to realising the deep, immediate and permanent emissions reductions necessary to avoid the worst outcomes for Australian lives, livelihoods and the places we cherish.

With that in mind, we have just one core recommendation for the ISP.

Recommendations

Promote the Strong Electrification sensitivity to give this scenario status

The Climate Council praises the inclusion of a scenario that considers deep decarbonisation of Australia's largest grid. However, the Hydrogen Superpower scenario as enumerated does not represent a central vision of what deep decarbonisation is most likely to look like for Australia's largest grid. We request that the ISP team consider promoting the Strong Electrification sensitivity to give it scenario status as a more reasonable basis for discussion of the grid's future needs.

2. Promote the Strong Electrification sensitivity to give this scenario status

The Hydrogen Superpower scenario should be praised as the first deep decarbonisation scenario to be featured in an Integrated System Plan. However, hydrogen's role in the future of the global economy is

contested and this scenario's very heavy emphasis on hydrogen – especially for domestic use in Australia – means that it cannot be said to be a central vision of deep decarbonisation. This means that while it does represent a possible future for the future of Australia's largest grid in the strict sense – speaking generously, this is a very remote possibility.

There is a deep and growing body of energy system expertise that is critical of expansionist visions of the role of hydrogen in a zero emissions future.[1] This criticism very often targets those potential uses of hydrogen that would occur in sectors that can readily be decarbonised in other ways, such as electrification. Household energy use is such a sector. Here modern electric alternatives to gas are cheap, available and frequently judged to be superior to fossil-fuelled alternatives by those who use them. There are few rational justifications that could support the idea that pure hydrogen will out-compete electrification for households. This is doubly so when one considers the potential need for significant upgrades to the gas transmission and distribution network to enable it to run on anything other than very low levels of hydrogen. This is a significant additional cost burden that someone must pay for – most likely consumers. Further, piping pure hydrogen through the gas network does not mitigate the need to replace end users' appliances in most instances. Virtually every domestic appliance would need to be significantly upgraded or replaced to handle pure hydrogen.

On top of this, there is growing awareness of the impact of household gas use on human health.[2] Hydrogen may theoretically assist with the problem of decarbonisation of household energy use – if it is 100% renewably derived.[3] It cannot solve the human health impact of household gas use. Nitrogen oxides from gas appliances are produced by the existence of a combustion reaction in air. Burning hydrogen in place of gas is no solution to this indoor air pollution problem that is harming children and vulnerable people today. Up to 12% of the burden of childhood asthma in Australia is attributable to the presence of a gas cooktop in the home – a figure comparable to the impact of parental smoking.[4] Piping hydrogen in place of gas would ensure that this significant source of disability continues in perpetuity.

Finally, with rooftop solar and household batteries likely to continue their impressive uptake, it is difficult to imagine why consumers would do anything other than electrify in order to take advantage of their own power generation where possible. There are few convincing arguments for why consumers would continue to pay gas companies to provide a product that delivers a worse service at greater expense and a higher disease burden than to take advantage of clean, cheap, reliable and efficient electric alternatives. The assumption that electrification will

dominate the decarbonisation of households is, in our opinion, the most sound one available.

Hydrogen presents a significant opportunity for Australia. There is no doubt that renewable hydrogen will play a large role in decarbonising certain sectors of the Australian economy. Australian renewable hydrogen will also play a significant role in decarbonising the global economy, particularly through the onshoring of high-emitting processes. Even the most ardent critic of the role of renewable hydrogen would agree that the existing grey hydrogen industry – responsible for around 800 million tonnes of carbon dioxide per year,[5] or 2% of the global annual total – will need to be decarbonised in order to reach the necessary global goal of net zero emissions. Renewable hydrogen is certainly the simplest way to do to decarbonise fossil derived hydrogen. This alone presents a large opportunity for the development of Australian renewable hydrogen.

That said, there is a substantial credibility gap between the idea of renewable hydrogen decarbonising the extant, highly-polluting hydrogen industry and the pipe dream of pure hydrogen being distributed through the existing network into households around the country. This core assumption undermines the integrity of the Hydrogen Superpower scenario.

With that in mind, we feel that the Strong Electrification sensitivity contained in the draft ISP represents a much more central view of the way in which Australia's largest grid would decarbonise under elevated climate ambition. While we recognise that this produces a similar ordering of various transmission and interconnection projects around the country – albeit further accelerated – to our mind it is far more realistic than the Hydrogen Superpower scenario as it stands.

We would recommend that the Strong Electrification sensitivity be given scenario status alongside, rather than in the place of, the Hydrogen Superpower scenario. This is because, while Hydrogen Superpower is a relatively unlikely future for the grid, it is nonetheless a possible one that is worth planning for.

Finally, we would note that where bulk hydrogen creation occurs, it is unlikely to be done in a way that fully integrates with the grid. While there are real incentives to maintaining a grid connection for hydrogen production facilities, there is a similarly large incentive for these facilities to minimise their reliance on it as much as possible, including to avoid TUOS and other network charges. This further entrenches the need to look at hydrogen creation as something additional to the core scenarios used in the ISP, rather than something essential to the decarbonisation of Australia's largest grid.

Endnotes

[1] Falko Ueckerdt et al, 'Potential and Risks of Hydrogen-Based e-Fuels in Climate Change Mitigation' (2021) 11(5) *Nature Climate Change* 384; Michael Liebreich, 'Liebreich: Separating Hype from Hydrogen – Part Two: The Demand Side', *BloombergNEF* (16 October 2020) <https://about.bnef.com/blog/liebreich-separating-hype-from-hydrogen-part-two-the-demand-side/>; 'Hydrogen Science Coalition', *Hydrogen Science Coalition* (2022) <https://h2sciencecoalition.com/>.

[2] Climate Council, *Kicking the Gas Habit: How Gas Is Harming Our Health* (5 May 2021) <https://www.climatecouncil.org.au/resources/gas-habit-how-gas-harming-health/>.

[3] Robert W Howarth and Mark Z Jacobson, 'How Green Is Blue Hydrogen?' [2021] *Energy Science & Engineering* ese3.956; Thomas Longden et al, '"Clean" Hydrogen? – Comparing the Emissions and Costs of Fossil Fuel versus Renewable Electricity Based Hydrogen' (2022) 306 *Applied Energy* 118145.

[4] Climate Council (n 2).

[5] International Energy Agency, 'Hydrogen - Fuels & Technologies', *IEA* (2022) <https://www.iea.org/fuels-and-technologies/hydrogen>.