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Attention Ms. Summa McMahon
Assistant Director
Energy Policy WA
Level 1, 66 St Georges Tce
Perth WA 6000

Via email: epwa-info@dmirs.wa.go.au

Dear Ms McMahon,

RE: Renewable Hydrogen Target for electricity generation in the South West Interconnected System Consultation Paper October 2022

Thank you for the opportunity to provide feedback on the Renewable Hydrogen Target for electricity generation in the South West Interconnected System.

South32 is a globally diversified mining and metals company. Our strategy includes identifying opportunities to sustainably reshape our business for the future, increasing our exposure to commodities critical to the transition to a low-carbon world. Our Climate Change Action Plan describes the actions we are taking to address the risks and opportunities that climate change presents, including our approach to decarbonising our operations. South32 holds an 86 per cent interest in Worsley Alumina, an integrated bauxite mine and alumina refinery located in the south-west of Western Australia.

Like the Western Australian Government, South32 has set a goal of net zero greenhouse gas (GHG) emissions by 2050 and faces challenges in achieving this ambition. We have engaged positively with Energy Policy WA and look forward to this relationship continuing.

We oppose the proposed '*obligation on electricity retailers and potentially large users to purchase a portion of their electricity from hydrogen-fuelled generation'* and are concerned it will place a greater cost burden on energy users who are pursuing decarbonisation pathways that do not involve hydrogen fuel sources. Compared to renewable electricity, we consider hydrogen-fuelled electricity is likely to increase safety, environmental and social risks, including a comparatively higher greenhouse gas emissions profile for large and small energy users.

Outlined below are key points substantiating our position on the proposed Renewable Hydrogen Target.

1. Stimulating local demand for hydrogen

We note that: *"A key component of implementing the Strategy is to stimulate local demand for hydrogen to develop our domestic hydrogen industry".*

We believe that policy or regulation that requires purchase of hydrogen-fuelled electricity generation is an economically inefficient method to stimulate local demand for green hydrogen. The focus of our low-carbon hydrogen industry should be on converting existing fossil-derived hydrogen users to green hydrogen. Examples include urea, ammonium nitrate and ammonia which are all industries present in Western Australia.

South32 agrees that hydrogen has potential for other uses in the energy sector including long duration energy storage and peaking. Energy users should not be forced to use a particular energy source such as hydrogen which, in most scenarios, is inefficient versus the alternatives and increases the cost, environmental and social impacts of the transition to a low carbon world.

2. Long duration energy storage and peaking

We understand that a component of this policy is to find a low-carbon alternative to gas peaking plants, that are required to support demand for electricity when renewables are not available directly and electrical storage has been drawn down. Policy should be technology-agnostic and aimed at incentivising development of the best long-duration energy storage solutions over the right timeframe. This will promote the most economically efficient method for addressing climate change and ensure Western Australia is an advantaged supplier of renewable energy. We believe consideration should also be given to maintaining the incentive for loads to match renewable generation as this reduces the total overall demand for energy storage and is likely significantly cheaper.

3. Consequences of poor process efficiency compared to using renewable electricity directly

Converting renewable electricity into hydrogen to convert it again into electricity is a process with very poor efficiency compared to using renewable electricity directly.

With current technologies, the power-to-power round-trip efficiency of green electricity via hydrogen varies from 22% to 29%, with technology improvements during the next decade this could take that efficiency to 42%[1].

In the current "best-case" scenario (29%), 3.45MW of green electricity must be generated in one place to provide consumers with 1MW of electricity from hydrogen-fuelled generation where they are. We consider this is likely to introduce:

Greater cost burden to energy users – industrial and households

The necessary investment in renewable generation capacity will have to be x3.45 for the same result, inevitably leading to a cost of electricity from hydrogen-fuelled generation much higher than using renewable electricity directly and, in some cases, impacting the competitiveness of Western Australian industries. This does not allow for the capital cost associated with the hydrogen production plant, the operating costs of that plant and any necessary hydrogen transport (via pipeline or truck) or the low-capacity factor having a multiplying effect on the cost of hydrogen.

Companies are already planning to decarbonise and will require a significant amount of renewable energy. South32, like many companies has announced a net zero GHG emission goal by 2050. The pathway to achieve this for Worsley Alumina, involves electrification of our energy sources, with an expected demand [redacted]. Introducing hydrogen into the electricity mix, which is structurally inefficient compared to alternatives and significantly more expensive, has the potential to delay existing users' conversion to electricity with little environmental or GHG emissions reduction benefit.

Greater environmental and social consequences to Western Australians

Given the low efficiency of green hydrogen fuelled electricity (when compared to renewable electricity being used directly or electrical storage), greater areas of land and sea will be required to support wind turbines and solar photovoltaic to supply the same amount of green electricity to consumers. Transmission of electricity requirements will also increase to ensure the generated electricity can reach the hydrogen plant.

Western Power estimates that up to 43GW of renewable generation could be necessary before 2038 if directly supplied to consumers via the grid. If a portion (assuming 10%) of the electricity must transition by hydrogen-fuelled generation, an additional 15GW capacity will be needed. If this additional capacity is supplied by 50% wind and 50% solar, that's an additional 33,750 hectares[2] covered by solar panels and an additional 142,500 hectares[3] for wind turbines.

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[1] Energy efficiencies calculated based on current published data for electrolysers and gas turbines and gas reciprocating engines and using forecasts of energy efficiency of electrolysers

[2] *Based on the power density of the Merredin solar farm of 4.5hectares/MW.*

[3] *Based on average power density of Codrington, Dollar and McArthur wind farms in Australia at 19hectares/MW.*

4. **Greater safety risks**

Compressing, storing[4], transporting and using[5] hydrogen comes with significant safety risks that are not found in storing, transporting and using the equivalent electricity in either electrical, potential or thermal energy storage. This would most likely have a further negative impact on the cost of electricity from hydrogen-fuel generation.

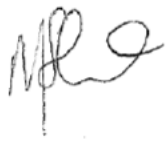
5. **Greenhouse gas emissions from hydrogen**

Hydrogen is an indirect greenhouse gas with a global warming potential (GWP) of 6-to-16 over a 100-year time horizon[6] (i.e. 6-to-16x the GWP of CO_2). As a result, producing electricity from hydrogen introduces greenhouse gas emissions, which could have been avoided by using the green electricity as electrical or thermal energy. Placing hydrogen generation close to the end use can limit the amount of fugitive hydrogen emissions and reduces the losses associated with transportation of hydrogen.

Policy or regulation that requires retailers and large energy users to purchase a portion of their electricity from hydrogen-fuelled generation, when they could source green electricity from the grid or behind-the-meter renewables, compels them to pay a premium for less clean electricity that comes with unnecessary safety risks and higher environmental impact.

Thank you for the opportunity to respond to the consultation paper and we look forward to working with EPWA and the Western Australian Government on achieving our respective climate change goals. For further information please contact Michael Brooks, Manager Carbon and Energy, Michael.brooks@south32.net.

Regards,



Michael Cutler
Group Manager Government and Public Policy

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[4] *For reference, the UK's Control of Major Accident Hazards (COMAH) sets out guidance on storage tonnages and regulated hydrogen storage at 5 tons when Natural Gas is regulated at 50 tons.*

[5] *For reference, ARUP assessment report "Hy4Heat" for the UK Dept for Business, Energy & Industrial Strategy on the risks associated with using hydrogen mix for domestic cooking estimated over 4 times more potential accidents (explosions) than with Natural Gas.*

[6] *Warwick, N., Griffiths, P., Keeble, J., Archibald, A., Pyle, J., & Shine, K. (2022). Atmospheric implications of increased hydrogen use. Department for Business, Energy and Industrial Strategy.*