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Alcoa of Australia submission Renewable Hydrogen Target Consultation Paper

Alcoa of Australia welcomes the opportunity to provide comment on the Energy Policy WA (**EPWA**) *Renewable Hydrogen Target for electricity generation in the South West Interconnected System* consultation paper.

Alcoa of Australia understands the need for the State Government to support the development of a domestic hydrogen industry in the long term, particularly to support the management of an ever-changing electricity grid generation mix. However, a domestic hydrogen industry is dependent on robust and considered policy and investment. We hold concerns that should the State Government preference one decarbonisation technology, such as hydrogen, there is a considerable risk that the progress of decarbonisation for industry participants, who are focused on alternative technologies, such as direct electrification, will be hindered or penalised. In that context, we strongly encourage consideration of how the cost burden for the development of the local hydrogen industry will be shared under the terms of the proposed policy; particularly for the largest energy users in the state, and those whose decarbonisation strategies do not currently anticipate the use of hydrogen.

Alcoa of Australia holds the position that the most efficient and cost-effective use of green electricity is to directly consume those electrons, rather than convert to another fuel type ahead of conversion to electricity. The proposed hydrogen target, that is aimed at the wholesale consumption of electricity by large industrials and retailers, poses a significant risk of penalising those seeking to implement direct electrification pathways to decarbonise. Diverting the focus away from direct electrification opportunities has the potential to delay decarbonisation timelines, delay investment in electrification technologies, add costs and inefficiencies and threatens long term jobs.

The below submission provides further context to our concerns referenced above and outlines Alcoa of Australia's commitment to the decarbonisation pathway.

Alcoa in Australia

Alcoa of Australia Limited (**Alcoa**) is owned 60 per cent by Alcoa Corporation and 40 per cent by Alumina Limited.

The Australian operations represent one of the world's largest integrated bauxite mining, alumina refining and aluminium smelting systems and adds value to Australia's local, state and national economies at every stage.

We directly employ approximately 4,500 people Australia wide, including approximately 4,000 people in Western Australia.

Our Australian operations include:

- Two bauxite mines in Western Australia (Huntly and Willowdale)
- Three alumina refineries in Western Australia (Kwinana, Pinjarra and Wagerup)
- One aluminium smelter in Victoria (Portland, Victoria)

- Two dedicated port facilities in Western Australia (Kwinana and Bunbury)
- Two Alcoa Farmlands sites in Western Australia (Pinjarra and Wagerup)

Alcoa's decarbonisation pathway

Alcoa is committed to reduce Green House Gas (**GHG**) emission intensity (scope 1 and scope 2) by 30 percent by 2025 and 50 percent by 2030 from a 2015 baseline and to achieve net zero (Scope 1 and Scope 2) by 2050.

Probably the most effective way to avoid emissions with aluminium production is to recycle it. Aluminium is already infinitely recyclable, and Alcoa is working to recycle even more of it. Alcoa has patented technology called ASTRAEA™ that can purify low-value automotive scrap, removing impurities to make aluminium with higher purity than commercial-grade metal produced at a smelter.

In regard to our Smelting business, Alcoa is in a joint venture to commercialize ELYSIS, a process that emits pure oxygen as a by-product and eliminates all of the scope 1 greenhouse gas emissions associated with traditional smelting. This innovation involves replacing the carbon anodes used in traditional aluminium smelting with inert, proprietary materials.

Our global alumina refinery portfolio, including our Western Australian operations, already has the lowest carbon footprint among global producers. Despite this, the alumina refining processes are hard to abate emissions, owing in part to the scale of energy requirement, energy intensity and inherent complexity. Today, our existing facilities are reliant on natural gas for both process heat and internal electricity generation. Alcoa has announced a technology roadmap that includes two technologies that focus on electrifying refining processes, Mechanical Vapor Recompression and Electric Calcination. These two technologies have potential to employ significant numbers of employees and contractors to develop and reduce emissions from our Western Australian refineries by up to 98%, which could equate to 5 million tonnes of CO_2 per annum.

We also continue to evaluate decarbonisation technology and opportunities in our mining operations, including the mobile equipment we use.

Electrification needs in the South West Interconnected System (SWIS)

The volumes of electricity that underpin the electrification pathway are considerable. We expect the need for an additional 1 to 1.2 GW baseload power for Alcoa assets alone in the SWIS. When taking into consideration other industrial peers, such as South32 and Newmont, as much as between 1.5 to 3GW baseload zero carbon electricity could be required by around 2040. Considering the capacity factors of typical onshore wind and solar technologies, this would require somewhere between 6 and 12GW of new renewable generation capacity.

As previously communicated with EPWA and the Australian Energy Market Operator, we encourage the State Government to consider a scenario where the scale of electrification and decarbonisation by industry for stationary processes begins from the mid-2020s and requires an incremental baseload of 3GW by the late 2030s. This demand should be fulfilled entirely by renewable sources (with storage), with installed renewable capacity between 6 and 12 GW. This growth will be on top of the increased uptake of electric vehicles by household consumers and fleet operators. It is important to note that this consumption rate is significantly higher than the projected annual consumption considered in the consultation paper.

Storage

Alcoa expects to see significant investment in electricity storage and/or flexible load management and a completely new "duck curve". The head and tail of the "duck" will be large, but almost all will be used to time shift supply into sustained periods of low solar irradiation and wind. Long term storage will be vital for industry to maintain production rates through low renewable generation periods (e.g., sustained periods of low wind or solar irradiance). We recognise the need for hydrogen to play a part in this for the SWIS in the longer term, but this should be in addition to other storage technologies.

Importantly, in order to make these electrification and decarbonisation ambitions viable, a network that can manage the scale and complexity of the generation and storage assets that will feed into it will also be required. It is vital the ambitions of industry remain in synchronisation with network capability, otherwise it will lead to inefficient and reactive investment and delays to decarbonisation efforts.

Hydrogen

Compressing, storing, transporting and using hydrogen comes with significant technical and safety risks that are not found in storing, transporting and using the equivalent electricity in either electrical, potential or thermal energy. This would most likely have a further negative impact on the cost of electricity from hydrogen-fuel generation. Additionally, hydrogen is a very small molecule that tends to leak very easily, and hydrogen is an indirect GHG, with a global warming potential (GWP) of 6-to-16 over a 100-year time horizon (i.e., 6-to-16x the GWP of CO_2).

While Alcoa notes that hydrogen remains a viable future clean energy source, industry has recognised the efficiency penalty that comes with converting water to energy. As a result, industrial users, who typically require low-cost energy, will be driven away from hydrogen other than for unique process needs, as a feedstock to substitute diesel use or for long term storage. Likewise, encouraging the development of a renewable hydrogen industry by setting targets for electricity generation, where the efficiency is even lower than for direct use, could seriously hamper other industries' decarbonisation pathways or even overall economic viability. While this could be mitigated by excluding internal generation, as is done for the Renewable Energy Target (RET), it does not exempt other options that are being looked at by industry, such as supporting renewable energy and storage via power purchase agreements (PPAs). Additionally, without careful design considerations, stored electricity could be subject to the scheme twice, once when imported by the battery, electrolyser etc. and again when it is exported back to the grid and acquired by a retailer or large energy user.

In conclusion, Alcoa urges EPWA to ensure that policy development in relation to supporting a hydrogen industry does not inadvertently penalise those seeking to take the direct electrification pathway to decarbonise. Any target or policy should not be placed on any internally self-generated electricity or externally sourced renewable power as this would provide a disincentive to the propagation of renewable capacity build in the SWIS for the purpose of decarbonisation by direct electrification.

Alcoa understands that EPWA are seeking to implement the proposed hydrogen target in 2023, desiring rapid deployment. It is Alcoa's view that the targeted timeframe would be rushing the policy design and implementation process. As such, Alcoa urges EPWA to allocate the necessary time to allow for full consideration of all relevant and contributing factors and ensure that unintended consequences are identified, and inefficient or ineffective outcomes are mitigated.

Once again, thank you for the opportunity to provide comment. Should you wish to discuss any part of this submission further please do not hesitate to contact me directly via nick.eaton@alcoa.com.

Kind regards,

Nick Eaton
Energy Director - Australia
Alcoa of Australia Limited