



AUSTRALIAN
ALUMINIUM
COUNCIL LTD

Level 1,
18 National Circuit
Barton ACT 2600
Ph: 02 6267 1800
info@aluminium.org.au

Department of Climate Change, Energy, the Environment and Water (DCCEEW)
<https://consult.dcceew.gov.au/review-of-the-national-hydrogen-strategy>

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Dear Minister

Re: Review of the National Hydrogen Strategy

The Australian Aluminium Council (the Council) represents Australia's bauxite mining, alumina refining, aluminium smelting and downstream processing industries. The aluminium industry has been operating in Australia since 1955, and over the decades has been a significant contributor to the nation's economy. It includes six mines which collectively produce over 100 Mt per annum making Australia the world's largest producer of bauxite. Australia is the world's largest exporter of alumina with six alumina refineries producing around 20 Mt per annum of alumina. Australia is the seventh largest producer of aluminium, with four aluminium smelters and additional downstream processing industries including more than 20 extrusion presses. Aluminium is Australia's highest earning manufacturing export. The industry directly employs more than 19,000 people, including 4,000 full time equivalent contractors. It also indirectly supports around 60,000 families predominantly in regional Australia.

The Energy and Climate Change Ministerial Council (ECMC) agreed to a Review of the National Hydrogen Strategy to ensure it positions Australia on a path to be a global hydrogen leader by 2030 on both an export basis and for the decarbonisation of Australian industries. While hydrogen has the potential to be an important contributor to the transition to net zero through use in areas such as industry, transport, grid firming, chemicals and metals production, Australia's development of projects currently lags.

The Council welcomes the opportunity to provide feedback to DCCEEW's National Hydrogen Strategy Review Consultation Paper (the Paper). In responding to the issues raised in the Paper, the Council will respond to selected questions for consideration.

Aluminium Industry - Hydrogen Context

In 2022, Scope 1 and 2 emissions from Australia's integrated aluminium industry (bauxite, alumina, aluminium) were about 33.7 Mt CO₂-e, which was 7% of Australia's national emissions. Energy typically accounts for 30-40% of the industry's cost base, and therefore energy efficiency is a key focus for these processes. The integrated nature of bauxite mining, alumina refining, aluminium smelting and extrusion processes in Australia means that efficient and effective regulatory processes for each step are critically important to the ongoing operation of the overall system. Decarbonisation of electricity supply is the biggest opportunity and challenge in the next decade and without access to competitive, firm renewable energy, including green hydrogen, it will be difficult for the industry to achieve meaningful emissions reductions.

Globally, there is a focus across industry to find solutions for the technology challenges required to decarbonise, including hydrogen technologies. There is an opportunity for Australia to lead the world in development and implementation of these technologies, capitalising on Australia’s national advantages, providing jobs and value to the economy. A summary of key Australian Aluminium industry initiatives is provided in Table 1.

Table 1 Key Australian Aluminium Industry Initiatives

Activity	Link
Electric Calcination Study	https://arena.gov.au/projects/alcoa-renewable-powered-electric-calcination-pilot/
Gladstone Renewable Request for Proposals	https://www.riotinto.com/news/releases/2022/Rio-Tinto-calls-for-proposals-for-large-scale-wind-and-solar-power-in-Queensland
Hydrogen Calcination Study	https://arena.gov.au/projects/rio-tinto-pacific-operations-hydrogen-program/
Hydrogen Pilot Plant	https://www.riotinto.com/news/releases/2021/Rio-Tinto-and-Sumitomo-to-assess-hydrogen-pilot-plant-at-Gladstones-Yarwun-alumina-refinery
Yarwun Hydrogen Calcination Pilot Demonstration Program	https://www.riotinto.com/en/news/releases/2023/rio-tinto-and-sumitomo-to-build-gladstone-hydrogen-pilot-plant-to-trial-lower-carbon-alumina-refining https://arena.gov.au/projects/yarwun-hydrogen-calcination-pilot-demonstration-program/
Mechanical Vapour Recompression Study	https://arena.gov.au/projects/mechanical-vapour-recompression-for-low-carbon-alumina-refining/
Memorandum of Understanding between Tasmania and Rio Tinto	https://www.stategrowth.tas.gov.au/data/assets/pdf_file/0010/334558/TAS-RIO_TINTO_MOU_Feb_2022.pdf
Refinery of the Future	https://www.alcoa.com/global/en/stories/releases?id=2021/11/alcoa-to-design-an-alumina-refinery-of-the-future
Rio Tinto and GMG	https://graphenemg.com/gmg-riotinto-energysavings-battery/
Spinifex Wind Farm (Portland)	https://arena.gov.au/news/offshore-wind-could-power-portland-aluminium-smelter/ https://www.spinifexoffshore.com.au/#/
Tomago Aluminium Renewable Future	https://www.tomago.com.au/tomago-aluminium-future-renewable-energy-needs/
Weipa Solar and Battery Capacity	https://www.riotinto.com/news/releases/2021/Rio-Tinto-to-triple-Weipa-solar-capacity-and-add-battery-storage-to-help-power-operations
Mission Possible Partnership	https://missionpossiblepartnership.org/wp-content/uploads/2022/10/Making-1.5-Aligned-Aluminium-possible.pdf
ARENA Roadmap for Alumina	https://arena.gov.au/knowledge-bank/a-roadmap-for-decarbonising-australian-alumina-refining/
HILT CRC	Heavy Industry Low-carbon Transition Cooperative Research Centre https://hiltcrc.com.au/
Affreightment Carbon Reduction	https://www.combinationcarriers.com/insights-and-news/2022/1/4/kcc-and-south32-conclude-first-sustainability-linked-contract-of-affreightment

Australia has more than 50 years of technical experience in bauxite mining and alumina refining technologies. This experience helps not only us, but our bauxite, alumina and aluminium customers, to reach their sustainability goals. Alcoa, Rio Tinto and South32’s Alumina operations all have their global bauxite and alumina research headquarters in Australia, helping develop new technologies for the world. Australia’s alumina already has some of the lowest emissions in the world, with an average emissions intensity of 0.7 tonnes of carbon dioxide per tonne of alumina (t CO₂-e/t), compared to the global industry average of 1.2 tCO₂-e/t.

Rio Tinto announced a partnership with ARENA in June 2021 to conduct a feasibility study investigating the potential to partially decarbonise its alumina refining operations using renewable hydrogen. Rio Tinto will investigate the technical implications of replacing natural gas with renewable hydrogen at its Yarwun alumina refinery in Gladstone, particularly focussed on simulating the use of hydrogen in the calcination process¹. In August 2021, Rio Tinto announced a further partnership with Sumitomo Corporation to study the construction of a hydrogen pilot plant and explore the potential use of hydrogen at the Yarwun alumina refinery.

Following the successful completion of these projects, in July 2023, Rio Tinto and Sumitomo Corporation announced² they will build a first-of-a-kind hydrogen plant in Gladstone as part of a A\$111.1 million program aimed at lowering carbon emissions from the alumina refining process. The Yarwun Hydrogen Calcination Pilot Demonstration Program received a A\$32.1 million co-funding boost from ARENA³. This program involves construction of a hydrogen plant at the refinery and the retrofit of refinery processing equipment. If successful, the program could pave the way for adoption of the technology at scale globally and mean that the Gladstone refineries have potential to be large-scale domestic customers supporting development of a green hydrogen industry. Construction will start in 2024. The hydrogen plant and calciner are expected to be in operation by 2025.

As noted in the Paper, by the end of 2022, only a single Australian project with a capacity of at least 10 MW had reached a Final Investment Decision (FID). Even in the case of Rio Tinto's Yarwun Hydrogen Calcination Pilot Demonstration Program, this is a 2.5 MW on-site electrolyser. The scale of investment in Australia's hydrogen industry does not yet match those of our peers.

Response to Specific Questions

2 What other actions in the other sectors, will have the greatest decarbonisation impacts?

3 What sectors are best placed to be early adopters of hydrogen?

As noted in the Paper, and in the recent announcement by Rio Tinto, green hydrogen may be able to replace natural gas for industrial process such as alumina digestion and calcination. The industry is conducting projects which aim to demonstrate the viability of using hydrogen in the calcination process, where hydrated alumina is heated to temperatures of around 1,000° C.

Green hydrogen has the potential to play a key role to support the decarbonisation and transformation of electricity grids through creating schedulable load, storing energy when generation is in surplus and making it available to help meet peak electricity demand. However, at this stage, it is hard to see hydrogen playing a substantial role in the grid before 2030.

Additionally, the Paper notes the potential use of hydrogen in mining communities. To date⁴, the sector has focussed on renewable energy and batteries as more immediate solutions to replace diesel generation.

4 Are there specific barriers that may limit hydrogen uptake in each of these sectors?

Producing hydrogen will require substantial increases in generation capacity, as referenced in Figure 7 of the Paper. Already the single biggest opportunity and challenge to decarbonise Australia's industry, such as alumina and aluminium, is the ability to supply firm, internationally competitive renewable energy at industrial scale to facilities. Access to the required generation, storage and infrastructure is already likely to be the rate limiting step in aspects of industrial decarbonisation.

¹ <https://arena.gov.au/projects/rio-tinto-pacific-operations-hydrogen-program/>

² <https://www.riotinto.com/en/news/releases/2023/rio-tinto-and-sumitomo-to-build-gladstone-hydrogen-pilot-plant-to-trial-lower-carbon-alumina-refining>

³ <https://arena.gov.au/projects/yarwun-hydrogen-calcination-pilot-demonstration-program/>

⁴ <https://www.riotinto.com/news/releases/2021/Rio-Tinto-to-triple-Weipa-solar-capacity-and-add-battery-storage-to-help-power-operations>

Given the industry's experience in both the East and West Coast gas markets, the Council would support the implementation of both some form of domestic reservation policy and competitive price mechanism for green hydrogen.

6 Should Australian governments adopt a more sector driven approach to hydrogen industry development?

As shown in Figure 4 of the Paper, there are some natural industry driven hubs in regional Australia. These also strongly align with locations of potential high impact sectors; such as alumina and support the most efficient production of green hydrogen, i.e., close to industrial customers. The Council believes a combination hub / sector approach will maximise the opportunity and leverage of Government investment.

7 Should Australian governments adopt national hydrogen production and/or use targets for hydrogen?

8 If targets are adopted, what type of activities and/or sectors should this target be tailored towards? For example, production targets, demand targets for sectors such as transport, renewable gas target. Please describe how such targets would attract investment

9 Should Australian governments use regulatory mandates to drive demand for hydrogen? If mandates were adopted, what type of activities and/or sectors could mandates be directed towards? Please describe how such mandates would attract investment.

The Council does not support targets for hydrogen production or use. For many industries there may be multiple pathways to decarbonise⁵ and the least cost technology in any particular industry and jurisdiction should be adopted. There may also be variations from plant to plant, so the application of hydrogen in one plant may not be directly applicable to the next.

Similarly, the mandatory construction of hydrogen fuelling stations, may result in redundant infrastructure depending on the long term cost competitiveness of hydrogen versus electric vehicles.

The Council supports use of project funding, such as the current grants process, to accelerate technology development and reduce costs, however the scale of these needs to be commensurate with the cost of the transition.

15 What in addition to the commercial cost gap is preventing Australian hydrogen projects progressing beyond a financial investment decision?

16 What signals are effective overseas and can apply to unlock greater investment?

17 Are there any other measures needed to unlock investment in the development of the Australian hydrogen industry including from international and Australian institutional investors?

18 When would it be appropriate to take a 'tech neutral' approach to developing hydrogen, and when would a more directed approach be warranted?

Given the industry's experience in both the East and West Coast gas markets, the Council would support the implementation of both some form of domestic reservation policy and optional price mechanism.

The Paper articulates that Australia has a substantial pipeline of announced hydrogen projects, in the order of \$230-\$300 billion. However, Australia lags behind other nations in converting announcements into final investment decisions. This is an example of where Australia is competing internationally to attract the necessary capital and investment to undertake the transition but also to attract the type of priority areas which are the focus of the Government. Australia's response to date has been the recently announced \$2 billion Hydrogen Headstart program and \$5.6 million to support further analysis on the best ways to leverage Australia's competitive strengths to become a renewable energy superpower, including through the production of hydrogen.

The scale of the investment by the Government at this stage does not match the scale of investment of Australia's competitors, such as in the US. For example, under the US Inflation Reduction Act there are

⁵ For example, hydrogen versus electric calcination of alumina refining. Both technologies are currently being trialled in Australia.

US\$370 billion in Energy and Climate Tax Credits and Incentives, including specific initiatives for hydrogen but also industries such as aluminium. Currently the funding offered by the Government does not match international schemes or the investment required to achieve net zero..

This is true for not only hydrogen, but for other industries such as aluminium. The Mission Possible Partnership recently released Making Net Zero Aluminium Possible: A Transition Strategy for a 1.5°C-compliant Aluminium Sector⁶ which highlighted that a global investment of approximately US\$1 trillion will be required for the aluminium sector transition, including significant investment to supply the required zero-emissions electricity. Considering the size of the Australian aluminium industry (~3% of the global industry), an investment of US\$30bn would be necessary to deliver the same outcome.

The Council supports a technology neutral approach to developing green hydrogen, but also other industries, and notes that either the scale of investment needs to increase or other measures to enable Australia to more competitively attract this investment needs to change substantially.

25 What market conditions would indicate the need for a hydrogen reserve, price cap or other fuel security measures?

Given the industry's experience in both the East and West Coast gas markets, the Council would support the implementation of both some form of domestic reservation policy and optional price mechanism.

The risk of a market price cap is that it may be difficult to apply as technology is still being developed and prices are evolving rapidly and there is there a real risk that instead of a cap any nominated price becomes a floor with an expectation industry will pay. Price monitoring, however, is certainly required to ensure Australian industry is paying Australian production costs.

Consideration to the methodology through which the gap between commercial pricing and production cost be measured at the level of individual offtake or customers. The methodology should seek to identify and define the competitiveness threshold at the industry level and priority industries for allocation of the subsidy and prevent excessive subsidisation of low value consumption of hydrogen or subsidy in excess of the differential between the cost of hydrogen production and the next best alternative fuel (inclusive of carbon costs) for any particular customer.

With regard to domestic reservation, the Council believes that domestic use should be prioritised. While Australia should seek to grow suitable export markets for hydrogen globally, the Council believes that the before opportunities to export hydrogen are investigated, Australia should maximise the domestic application to capitalise on its own strategic advantage and maximise economic value. Today's aluminium industry contributes around \$15B⁷ a year to the economy in export value. Around \$13 B of this comes from the alumina and aluminium industries, as value adding mineral processing sectors. Australia is one of the very few countries which has bauxite mining, alumina refining, aluminium smelting and aluminium extrusion industries. Importantly - aluminium is one of the few commodities which Australia mines, which is then processed all the way to a consumer product right here in Australia. Aluminium is one of the commodities most widely used in the global transition to a clean energy future⁸. It is also recognised for its importance to both economic development and low emissions transition. Australia should be a supplier of choice to our partners, allies and emerging markets like the United States, the United Kingdom, Japan, Korea, India and the European Union. Recognising bauxite, alumina and aluminium as critical minerals is one of the keys to the long term success of Australia and our allies clean energy manufacturing industries The Council believes Australia should seek to maximise its own value adding domestic sectors, providing them with internationally competitive, firmed, renewable energy, including green hydrogen, prioritised over exports. This would

⁶ <https://missionpossiblepartnership.org/wp-content/uploads/2022/10/Making-1.5-Aligned-Aluminium-possible.pdf>

⁷ <https://www.industry.gov.au/sites/default/files/2023-07/resources-and-energy-quarterly-june-2023.pdf>

⁸ <https://www.worldbank.org/en/topic/extractiveindustries/brief/climate-smart-mining-minerals-for-climate-action>

capitalise on Australia's national advantage providing jobs and value to the economy, before supplying energy to others.

32 How can agreements with other nations best support Australia's hydrogen industry?

33 How should Australia ensure that the necessary foreign investment in hydrogen industry, and export projects leads to lasting benefits for all Australians?

The Council believes Australia should seek to maximise its own value adding domestic sectors, providing them with internationally competitive zero emissions hydrogen, prioritised over exports. This would capitalise on Australia's national advantage providing jobs and value to the economy, before supplying energy to others.

Conclusion

Decarbonisation of electricity supply is the biggest opportunity and challenge in the next decade and without access to competitive, firm renewable energy, including green hydrogen, it will be difficult for the industry to achieve meaningful emissions reductions. Globally, there is a focus across industry to find solutions for the technology challenges required to decarbonise, including hydrogen technologies.

The Council supports a technology neutral approach to developing green hydrogen and notes that either the scale of investment needs to increase or other measures to enable Australia to more competitively attract this investment needs to change substantially.

Australia should seek to maximise its own value adding domestic sectors, providing them with internationally competitive zero emissions hydrogen, prioritised over exports. This would capitalise on Australia's national advantage providing jobs and value to the economy, before supplying energy to others.

The Council is happy to provide further information on any of the issues raised in this submission.

Kind regards,



Marghanita Johnson
Chief Executive Officer
Australian Aluminium Council
M +61 (0)466 224 636
marghanita.johnson@aluminium.org.au