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Productivity Commission
https://www.pc.gov.au/inquiries/current/productivity/make-submission#lodge

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Dear Commissioners

Re: Australian Aluminium Council Response to 5-year Productivity Inquiry: A competitive, dynamic and sustainable future, Interim Report 4

The Australian Aluminium Council (the Council) represents Australia's bauxite mining, alumina refining, aluminium smelting and downstream processing industries. The Australian aluminium industry has been operating in Australia since 1955, and over the decades has been a significant contributor to the Australian economy. Alongside many decades of economic contribution, the industry is globally comparatively young and well maintained. The industry includes six bauxite mines which collectively produce over 100 Mt per annum making Australia the world's largest producer of bauxite. The six alumina refineries produce around 20 Mt per annum of alumina and Australia is the world's largest exporter of alumina. There are four aluminium smelters; in addition to downstream processing including more than 20 extrusion presses and Australia is the seventh largest global producer of aluminium. Aluminium is Australia's largest manufacturing export. The industry directly employs more than 17,000 people, including 4,000 full time equivalent contractors. The industry also indirectly supports around 60,000 families in regional Australia.

The Council welcomes the opportunity to provide feedback to the Productivity Commission's September 2022 interim report "5-year Productivity Inquiry: A competitive, dynamic and sustainable future" (the Report). In its response to the Report, the Council focused on managing the climate transition and, in particular, the potential design options for the Safeguard Mechanism, as well as complementary measures. The Council has focused on the continued global competitiveness of the Australian aluminium industry, while recognising Australia's target of by net zero by 2050 and 43% by 2030, as well as corporate ambitions over similar periods. The Council has also considered the needs for policy settings which will provide a transition to certainty for businesses through to 2030 and beyond. Considered, equitable and effective long term climate policy will help contain the long run cost of climate change in the Australian economy.

The Council is a member of the Australian Climate Roundtable[1] which has previously published policy principles, positioning on climate impacts and how Australian's can work together for a successful transition.

[1] https://www.australianclimateroundtable.org.au/

Aluminium Industry Context

Most of the large bauxite mines, all six alumina refineries plus all four aluminium smelters are facilities covered under the safeguard mechanism. In 2021, Scope 1 and 2 emissions from Australia's integrated aluminium industry (bauxite, alumina, aluminium) were about 34 Mt CO_2-e, which was 7% of Australia's national emissions. About 16.9 Mt CO_2-e of this was Scope 1 emissions from Safeguard facilities, representing 12% of Safeguard emissions for the 2020/21 reporting year. 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 is critically important to the ongoing operation of the overall system. The Council agrees with the Report, that it is important that Australian governments (Commonwealth, State, and local) take a coordinated approach to policy development.

Transformational Pathways

In September 2022, the Council joined with its Members and other industry leaders in welcoming the Making Net Zero Aluminium Possible: A Transition Strategy for a 1.5°C-compliant Aluminium Sector[2] developed by the Mission Possible Partnership in collaboration with the International Aluminium Institute. The Strategy is an ambitious but achievable decarbonisation roadmap for the global aluminium industry

Additionally, focused on the Australian context, the Council has produced a series of five factsheets:

1. Australia's role in a global aluminium decarbonisation pathway;
2. How Australian bauxite will help meet global demand for aluminium;
3. Australia's role in developing low carbon alumina refining technologies for the world;
4. The role of Australia's aluminium smelters in providing baseload stability in a decarbonising grid; and
5. Decarbonisation of Australia's electricity supply, which the Council sees as the single biggest opportunity to decarbonise the vertically integrated domestic aluminium industry.

The Council updates these factsheets annually; reflecting not only progress in decarbonisation in the industry; but also updating the industry's views of the evolution of decarbonisation technologies, based on research undertaken in Australia and through global partnerships. The single biggest opportunity to decarbonise the energy intensive Australian vertically integrated aluminium industry is through the combination of electrification of existing processes and decarbonisation of the electricity supply (See also **Attachment 1**)

Globally, there is a focus across industry to find solutions for the technology challenges required to decarbonise. Australia's alumina industry already has some of the lowest emissions in the world, with an average Scope 1 and 2 emissions intensity for alumina of 0.7 t CO_2-e/t compared to the global industry average of 1.2 t CO_2-e/t. Alumina refineries will require technology changes to meet zero-emissions goals; either in the form of electrification or adaptation to use hydrogen for process heating. Development of this technology and its application will be stepwise as new technologies to reduce overall emissions (Scope 1 plus Scope 2) become viable. However, this relies on not only the development of commercial and technological solutions for electrification of alumina refineries but also the development of sufficient competitively priced low emissions generation, storage and transmission capacity at scale to match. It is hoped that some technologies for refinery digestion may be able to be deployed prior to 2030, however, access to the required infrastructure outside the

[2] https://missionpossiblepartnership.org/wp-content/uploads/2022/09/Making-1.5-Aligned-Aluminium-possible.pdf

facility could be the rate limiting step in the electrification process. The investment required to implement this transformational abatement will be substantial.

For smelters, more than 95% of Scope 1 emissions could be eliminated with conversion to inert anodes. This technology is currently under development and will be more easily *assessed* in 5 years, however, global deployment of this technology is not anticipated before 2030. Again, the investment required to implement this transformational abatement will be substantial.

Corporate Ambitions

The major operators and joint venture participants in Australia's aluminium industry have the common ambition of net zero by 2050, supported by interim goals (Table 1). However, when comparing these targets with performance within Australia or at a facility level, it is worth noting that corporate ambitions are set at levels that are in line with their policies and subject to their accounting and transparency rules. All of the Council's member's interim ambitions are for *both* Scope 1 and Scope 2, and the application of known technologies such as increasing renewable energy supply will be the major pathways for these to be achieved. Corporate targets are frequently set at a multinational level to ensure those facilities in their international portfolio that provide the cost-effective and low-risk emission reductions are actioned first.

Table 1.Summary of Corporate Ambitions[3]

Company	Interim Goal (s)	Net Zero Ambition
Alcoa	30% reduction in scope 1 & 2 emission intensity by 2025 50% reduction in scope 1 & 2 emissions emission intensity by 2030 from 2015 baseline	Net zero by 2050
Rio Tinto	15% reduction in scope 1 & 2 emissions by 2025 50% reduction in scope 1 & 2 emissions by 2030 From a 2018 baseline (equity basis)	Net zero by 2050
South32	50% reduction in operational carbon emissions (Scope 1 & 2) by 2035 from FY21 baseline	Net zero by 2050
Alumina Ltd[4]	45% reduction in scope 1 and 2 emissions by 2030 (from a 2010 baseline)	Net zero by 2050
Hydro[5]	Reduction of 30% by 2030	Net zero by 2050

Australia's Competitiveness

The Council believes there is an opportunity for Australia to capitalise on its own strategic advantage and maximise economic value. Today's aluminium industry contributes around $13.7B a year to the economy in export value (Figure 1). More than $12 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

[3]Sources: https://www.riotinto.com/en/sustainability/climate-change; https://www.alcoa.com/global/en/stories/releases?id=2021/10/advancing-sustainably-alcoas-2050-net-zero-ambition; https://www.south32.net/docs/default-source/exchange-releases/2021-south32-sustainability-briefing.pdf?sfvrsn=d8a76a71_2; https://www.hydro.com/en/media/news/2021/hydro-capital-markets-day-2021-sustainable-value-creation/

[4] Alumina Ltd are a JV participant in Alcoa World Alumina and Chemicals, which operate two mines and three refineries in Western Australia and has equity in the Portland Aluminium Smelter.

[5] Hydro is a JV participant in Tomago Aluminium Company.

all the way to a consumer product right here in Australia. Globally, there is a focus across industry to find solutions for the technology challenges required to decarbonise. There is an opportunity for Australia to lead the world in development and implementation of these technologies, capitalising on Australia's national advantage providing jobs and value to the economy.

Figure 1. 2021 Industry Export Value ($B)

Reform options for Australia's Safeguard Mechanism

The Council agrees with the Report, that with this context, ongoing reforms to the Safeguard Mechanism can help move Australia towards a more least cost approach to achieving its targets. The Council recognises that Safeguard Mechanism is starting from an existing scheme and the Government's[6] timeline to proposed implementation is short, with less than 9 months to the start date and yet many design features are not yet agreed. In this context, the Council believes that we must not let "the perfect be the enemy of the good" and has urged the Government to adopt a pragmatic approach to developing the final design, to enable industry to capitalise on Australia's national advantage allowing for economic growth, supporting competitiveness, and applying costs only at the margin. This can also allow for policy convergence over time and enabling technologies, particularly the development of sufficient competitively priced low emissions generation, storage and transmission to be developed.

The focus of policy design for Safeguard Mechanism should be on establishing a framework to maintain industry, jobs and competitiveness while also decarbonising, through the period to 2030 and beyond to achieve net zero by 2050. The success of this policy will not be measured in 2030 alone, but in the transformation of Australia's industry in the biggest clean industrial and economic revolution this country has seen.

In this context, and while the Council notes the interdependency between design features and has responded in detail to the Government's August consultation paper[7], the Council's preferred options for key parameters could be summarised at a high level as:

Parameter	Preference
Phase 1 & 2	Timescales do not match those of transformative abatement
Share of Abatement Task	Electricity sector to deliver more abatement pre-2030, with safeguard abatement to increase later with electrification enabled.
Baseline Type	Intensity (Production Adjusted)
Baselines for Existing Facilities	Hybrid Option which removes headroom, allows for trading, but does not penalise existing lower intensity facilities

[6] https://consult.industry.gov.au/safeguard-mechanism-reform-consultation-paper
[7] https://aluminium.org.au/wp-content/uploads/2022/09/220920-Aluminium-Response-to-Safeguard-Reforms-Consultation-Paper.pdf

Crediting and Trading	SMCs should be available from 1 July 2023, and be fully tradeable, including inter-temporal adjustments (banking, borrowing and MYMP)
International Units	Should be able to be used at a future time
EITE Definition	Maintain EITE definition (inc Scope 2) acknowledging 1 July 2023 start
Tailored Treatment	Use differentiated baselines, supported by funding opportunities which recognise scale and priority of transformational abatement
Baseline Decline Rates	Industry- or facility-specific decline rates are an appropriate mechanism to maintain the competitiveness of EITE facilities, particularly those which will have substantial step change processes.

Promoting the integrity of ACCU offsets

The Council understands that more than 97% of the abatement contracted to date under the Emissions Reduction Fund (ERF), has been through large-scale vegetation, waste and savanna fire management projects, which are outside the sectors represented by the Council. Of the more than 1000 projects listed on the Clean Energy Regulator's (CER) Register of ERF Projects, only 50 are listed under the Industrial Electricity and Fuel Efficiency (IEFE) methodology. Of these, only 11 projects have generated Australian Carbon Credit Units (ACCUs). The largest of these 11 projects is at one of the Council's members (RTA Gove Pty Limited).

The Council recognises the need to maintain the integrity of ACCUs to ensure these represent real emissions reductions, make a genuine contribution to the goals of the Paris Agreement, and provide confidence in action by Australian companies to achieve targets. The experience of Members as project proponents using the IEFE method is that the statistical tests over the baseline regression and additionality requirements present in the IEFE and the Carbon Credits (Carbon Farming Initiative) Act 2011 are rigorous. The Method carefully considers interactive effects and has limitations in the claimable abatement being relevant only for individual data points (± 5%) to ensure abatement is not able to be claimed from process or operational influences outside of the project boundary. These requirements are also included in the new ICER method. Each of the annual offset reports claiming abatement was required to have financial quality third-party assurance completed. The Project was also selected for an additional compliance audit as per the CER's compliance checks to protect the integrity of the ERF scheme, which required an independent re-audit over project eligibility, baseline and abatement. With this experience, the Council believes that the threshold for additionality and level of auditing requited under IEFE has been more than adequate to achieve the ERF's purpose of upholding the ACCUs abatement quality.

The Council supports the use of credible carbon credits including ACCUs and international offsets, subject to future rules of international trading provided they meet integrity principles - representing real emissions reductions, making genuine contribution to the goals of the Paris Agreement, and providing confidence in action by Australian companies to achieve targets and, under a Safeguard Mechanism, meeting compliance obligations. This is particularly important when abatement is not yet technologically available.

Capacity mechanism

The National Electricity Market (NEM) is going through a once-in-a-century transformation, as Australia moves towards net zero emissions by 2050 and this transition will need to be carefully managed, to ensure that all consumers are provided with competitively priced, reliable, low emissions energy. The Council supports the development of a mechanism which incentivises the right technologies and structures to ensure the grid can be maintained in a secure state during times of maximum duress, whether that be lack of supply to match demand, or lack of demand to match supply. The Council acknowledges that without the development of such a mechanism, the NEM is

currently heading towards a system which lacks the inertia and demand requirements required to address the risk of instability. The current energy only market is no longer fit for purpose.

All of Australia's major industrial facilities; including aluminium smelters and alumina refineries; also have long term base load electricity contracts. These contracts currently bundle many markets services, including capacity risk management, required to meet continuous electricity demand at an internationally competitive price. One of the key drivers for the new markets which are currently being designed, is declining and less predictable minimum demand. However, this does not recognise that industrial loads from smelters and refineries have not reduced their minimum load and therefore, the counterparty retains their ability to manage capacity and other services on these loads through existing NEM mechanisms. These existing contracts underpin dispatchable generation and system reliability, particularly when demand is low and variable renewable generation is high. However, these contracts are not immune to changes in the market as contracts may contain a range of change-in-law and other pass-through provisions, so there is a real risk that base load consumers could pay twice for additional market services introduced to provide reliable and secure supply for customers with highly variable demand. It will also be important to the capacity costs in any future market are able to be hedged. The design of any capacity or other mechanism, needs to carefully consider how consumers, including those which hold long term contracts, do not face duplicate costs as a result.

Public support for research and development

To date, the Australian Renewable Energy Agency (ARENA) has been the most successful enabling vehicle for the deployment of priority technologies in the aluminium industry, working on a partnership model of equity and risk. The Council believes support for ARENA, or a similar funding model should be extended as it provides support to the widest range of low emission technologies.

Additionally, a model of leveraging large private corporate investment including from customers, or Original Equipment Manufacturers (OEMs), together with national and regional government support for investment and collaboration has been successful internationally. For example, Elysis is a collaboration between Rio Tinto, Alcoa, Apple and the Canadian and Quebec Governments[8].

Conclusion

The Council seeks a national climate and energy policy framework which is equitable, transparent, stable and predictable, while maintaining the economic health of the nation including vital import and export competing industries. The Council wishes to continue to work to achieve optimal outcomes for Australian industry, through 2030 and beyond.

Kind regards,

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[8] https://www.elysis.com/en/what-is-elysis

Attachment 1 - Aluminium Industry and Electrification

In 2021 the industry's indirect emissions associated with the consumption of grid purchased electricity are around 17.6 Mt CO_2-e, of which 95% is from the production of primary aluminium (**Figure 2**). However, technologies which electrify the digestion process in alumina refineries could offset an additional 11 Mt CO_2-e of the 13.7 Mt alumina Scope 1 emissions.

Australia's grid-connected mines, refineries and particularly smelters perform an enabling function in grid stabilisation which helps with increased penetration of variable renewable electricity. The carbon intensity of the Australian grid is declining rapidly[9], with this increased penetration of variable renewables. Our industry will also have the opportunity, as part of contract renewal, to contract a substantial share of electricity supply from firmed renewable electricity from on grid sources or behind the meter sources and members have signalled their intentions to do so[10].

Alumina refineries will require technology changes for both digestion and calcination processes to meet zero-emissions goals; either in the form of electrification or adaptation to use hydrogen for process heating. Development of this technology and its application will be stepwise as new technologies to reduce overall emissions become viable. The required thresholds for implementation will be differentiated by refinery (and processes within a refinery); locational access to energy, including supporting transmission infrastructure; the local emissions intensity of electricity supply and bauxite type. The investment required to implement these changes will be substantial.

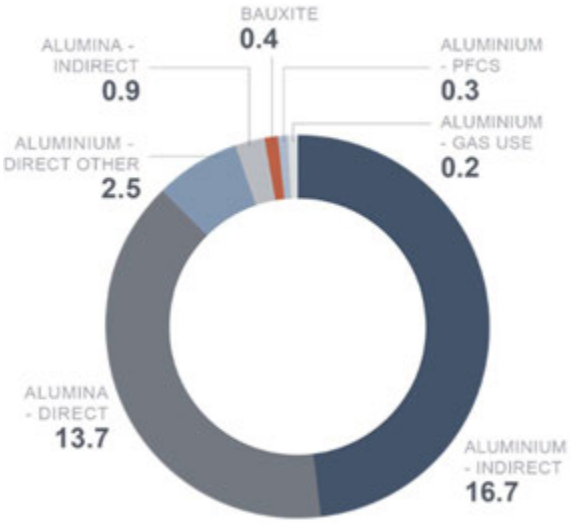

Figure 2. 2020 Industry Emissions (Mt CO_2-e)

Providing electricity is supplied consistently, with firm power, and at internationally competitive prices, aluminium smelting can be run on renewable electricity. For aluminium smelters, more than 95% of Scope 1 emissions could be eliminated with conversion to inert anodes (eliminating direct anode consumption, energy used in carbon bakes plus perfluorocarbons). The technology for inert anodes is currently under development and will be more easily *assessed* in 5 years. Deployment of this technology is not anticipated to be readily available before 2030. Additionally, this would only be

[9] https://aemo.com.au/en/energy-systems/electricity/national-electricity-market-nem/market-operations/settlements-and-payments/settlements/carbon-dioxide-equivalent-intensity-index

[10] https://www.riotinto.com/-/media/Content/Documents/Invest/Presentations/2021/RT-Investor-Seminar-2021-combined.pdf?rev=2e127f507f204ecc81e2d22527949560, https://www.tomago.com.au/tomago-aluminium-future-renewable-energy-needs/

implemented in conjunction with long-term internationally competitive electricity contracts to underpin investment and available renewable electricity supply because they are more electricity-intensive (~10-15%). And even with competitive low emissions electricity, the investment would be substantial, and implementation would vary from smelter to smelter, or even potline to potline.

Electrification

Australia's alumina industry already has some of the lowest emissions in the world, with an average emissions intensity for alumina of 0.7 t CO_2-e/t compared to the global industry average of 1.2 t CO_2-e/t. Alumina refining is an energy intensive process, using about 10.5 GJ / t produced. Digestion and calcination are the two most energy intensive steps, with digestion consuming around two thirds of this energy. Currently, this energy is largely derived from gas and coal, as well as electricity. All of Australia's alumina refineries have some combined heat and power generation (cogeneration) facilities which use coal, gas, or biomass fuels. Cogeneration is an efficient way to produce process heat from the waste steam from electricity generation, resulting in the refineries using, and in some circumstances, also exporting low emissions electricity.

Around 150 PJ of energy, derived from gas or coal, is currently used in the digestion phase in alumina refineries to generate steam and electricity. This has the potential to be replaced by internationally competitive renewable electricity, subject to the successful development and commercialisation of refinery side technology (including Mechanical Vapour Recompression, thermal storage and Electric Boilers). This has the potential to require more than 4000 MW of electricity at a national level to replace the existing energy supply, on a like for like basis. This would transform both the National Electricity Market (NEM) and South West Interconnected System (SWIS) electricity markets.

However, this relies on not only the development of commercial and technological solutions for electrification of alumina refineries but also the development of sufficient competitively priced low emissions generation and storage, and transmission capacity at scale to match. The electrification of existing industry, combined with the development of new electricity intensive industries, such as hydrogen, will require substantial volumes of electricity delivered reliably, affordably and at scale. The Council is concerned that if technology development lags, or energy infrastructure is delivered in the manner and at the pace it has historically, this will become the rate limiting step in the transition[11]. For example, the SWIS may not have the generation nor transmission capacity to electrify one alumina refinery, let alone four. For example, Worsley Alumina[12] have confirmed that a substantial expansion and modification of the energy grid would be required to deliver renewable power at the necessary scale for industrial users in the region (SWIS). Therefore, decarbonisation of Worsley Alumina may be in two stages, firstly conversion of the onsite boilers to natural gas and only in the longer term application of new technologies to support increased electrification and renewable energy for the refinery, which would require broader investment in shared energy infrastructure in the region.

It is the internationally competitive cost of zero carbon electricity at industrial scale to facilities, which will enable the greatest transformation of the sector. It is hoped that some technologies for refinery digestion may be able to be deployed prior to 2030. However, access to the required generation, storage and infrastructure outside the facility could be the rate limiting step in the electrification process.

[11] https://www.worley.com/~/media/Files/W/Worley-V3/documents/our-thinking/from-ambition-to-reality/from-ambition-to-reality-report.pdf

[12] P73, https://www.south32.net/docs/default-source/all-financial-results/2022-annual-reporting-suite/sustainable-development-report-2022.pdf