AUSTRALIAN
ALUMINIUM
COUNCIL LTD

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

Climate Change Authority
https://consult.climatechangeauthority.gov.au/australias-emissions-reduction-targets

30 June 2023

Dear Chair

Re: Issues Paper - Setting, tracking and achieving Australia's emissions reduction target, May 2023

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 17,000 people, including 4,000 full time equivalent contractors. It also indirectly supports around 60,000 families predominantly in regional Australia.

The Climate Change Authority (the Authority) has released an Issues Paper - Setting, tracking and achieving Australia's emissions reduction target, May 2023 (the Paper) focussed on the four interrelated projects the Authority is undertaking this year:

1. Advice on emissions reduction targets for Australia's next Nationally Determined Contribution (NDC) under the Paris Agreement;
2. Advice for the Minister for Climate Change and Energy's Annual Climate Change Statement, i.e., the 2023 Annual Progress Report;
3. Review of the Carbon Credits (Carbon Farming Initiative) Act 2011 (CFI Review); and
4. Review of the National Greenhouse and Energy Reporting Act 2007 (NGER Review).

In responding to the issues raised in the Paper, the Council will respond to selected questions for consideration.

Response to Specific Questions

Frameworks

1. What actions and enablers beyond those identified in the Strategic Framework could help Australia progress towards a prosperous and resilient net zero future? What are your highest priorities?

Decarbonisation of electricity supply is the biggest opportunity and challenge in the next decade. 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. Energy typically accounts for 30-40% of

the industries cost base, and therefore energy efficiency is a key focus of 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. Appendix 1 highlights the decarbonisation context for the industry.

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 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
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

In addition to the framework provided, the Council believes that if Australia is to maintain a sustainable aluminium industry through the transition and deliver decarbonisation goals, the industry must be globally competitive. The fundamental pillar of global competitiveness is low-cost renewable energy, firming and transmission. 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. The Mission Possible Partnership[1] highlighted that a global investment of approximately US$1 trillion will be required for the aluminium sector transition.

[1] https://missionpossiblepartnership.org/wp-content/uploads/2022/10/Making-1.5-Aligned-Aluminium-possible.pdf

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.

2. How are you and the people around you impacted by or preparing for the net zero transition and Australia's climate future? How can governments better support you to prepare for or respond to the impacts?

Australia's existing aluminium industry is already predominantly located in regional Australia (Figure 1). The majority of the more than 17,000 employees live in the regions in which they work and there is often intergenerational employment at sites. In regions like Cape York, bauxite mining companies such as Metro Mining have a dedicated local workforce including 30% indigenous participation[2]. Across Rio Tinto's aluminium operations in Australia as a whole, the indigenous employment rate is more than 8%. In the regions in which the Council's members operate the intent is to provide financial benefits but also education, training, cultural heritage protection and employment. A key pathway to enabling new economy industries, will be to leverage the capability in the regions of existing industries.

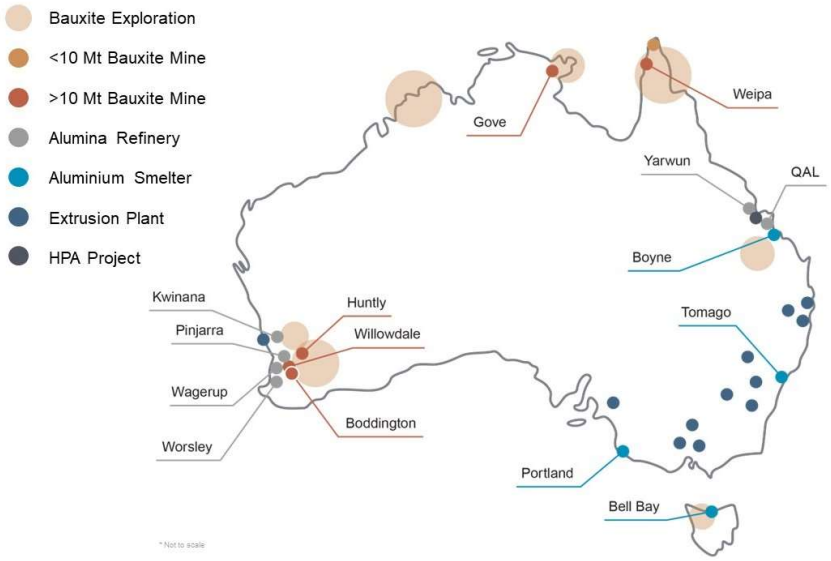

Figure 1. Aluminium Operations in Regional Australia

The Council and its Members look forward to working with the newly announced Net Zero Authority to help mitigate the potential range of impacts of the transition on the communities in which we operate.

The future effects of climate change on the sector's sustainability are set to increase in both scope and magnitude. One of the most consequential effects will be the impact of climate change on the health of aluminium sector workers and their communities. Through the International Aluminium Institute (IAI) the sector has assessed[3] the main anticipated health effects due to climate change and the associated adaptation measures to reduce impacts. The IAI is continuing to work to develop tools for adaptation, climate risk and the communities in which we operate.

3. What should the Authority measure or assess to determine progress towards a just transition and improved wellbeing?

The Council supports initiatives for Government to support a just transition. Important support includes vocational and tertiary programs to develop the skills required for a decarbonising economy. Skilled worker

[2] https://www.metromining.com.au/media/33566/metro-investor-presentation-noosa-conference-nov-2022.pdf
[3] https://international-aluminium.org/resource/health-risks-and-adaptation-in-a-changing-climate/

shortages are, in some regions, already a key bottleneck in deploying new projects as well as safely operating existing facilities.

The future effects of climate change on sustainability are set to increase in both scope and magnitude. One of the most consequential effects will be the impact of climate change on the health of workers and their communities. Climate change is already affecting human health and is likely to take a sizable health-related toll in decades to come. Notably, the human health impacts of climate change will be most severe in many of the same regions where the aluminium industry is most active. Climate change and human health risks are ubiquitous across the aluminium sector and related communities. Since a reliable labour force is essential to the operation and profitability of the industry, these risks need to be well managed. For this reason, the industry is working to reduce impacts on workers, communities, and businesses[4].

4. What more could the Government do to help you reduce your carbon footprint?

About half the industries 2021, Scope 1 and 2 emissions are covered Scope 1 emissions from Safeguard facilities (16.9 Mt CO_2-e). A further 17.6 Mt CO_2-e are Scope 2 emissions from purchased electricity. In this context, the Council believes that the emissions associated with the industry can only be reduced at scale if new large scale renewable energy, firming and transmission assets to meet the needs of a decarbonising aluminium industry are developed in a timely fashion. Current market-based delivery mechanisms for renewables, firming and transmission are delivering energy costs that are uncompetitive globally and do not support a sustainable aluminium industry.

5. What are the other challenges and opportunities the global context presents Australia with in responding to climate change?

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 $16.9B[5] a year to the economy in export value (Figure 2). More than $15B 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. 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.

Australia is the world's largest bauxite producer, producing over 100 Mt per annum or almost 30% of global production in 2021[6]. Of this, around 40 Mt is exported, with more than 98% going to China. The balance is refined to produce 21 Mt per annum of alumina (aluminium oxide) in Australia. Of this more than 85% is exported to a range of countries[6], with Australia being the world's largest exporter. Australia produces around 1.6 Mt of aluminium per annum, of which more than 90% is exported. There is some downstream manufacturing of aluminium in extrusion presses (around 150 kt capacity), metal powders (~10kt) and aluminium coatings (~10kt). However, the bauxite mined in Australia produces 40 Mt of alumina, which is nearly double Australia's current production, and around 20 Mt of primary aluminium; more than 13 times Australia's current production. So, while the existing aluminium industry in Australia is a successful example of vertical integration, it is far from being at capacity. The single biggest factor in determining the location of future refining, smelting and manufacturing locations is reliable, internationally competitive, low emissions energy.

[4] https://international-aluminium.org/wp-content/uploads/2022/02/IAI-Climate-Change-Adaptations-2022.pdf
[5] https://www.industry.gov.au/sites/default/files/minisite/static/ba3c15bd-3747-4346-a328-6b5a43672abf/resources-and-energy-quarterly-september-2022/documents/Resources-and-Energy-Quarterly-September-2022-Aluminium.pdf
[6] https://aluminium.org.au/wp-content/uploads/2022/09/221214-TRADE-AND-COMPETITIVENESS.pdf

Aluminium use is highly correlated with GDP, so as countries urbanise, per capita use of aluminium increases. Aluminium is recognised for its importance to both economic development and low emissions transition. It is expected that by 2050, global demand for aluminium is expected to nearly double. While an increasing proportion will be met through recycled aluminium, there will still be increased production of primary aluminium requiring a comparable increase in global bauxite mining and alumina refining rates.

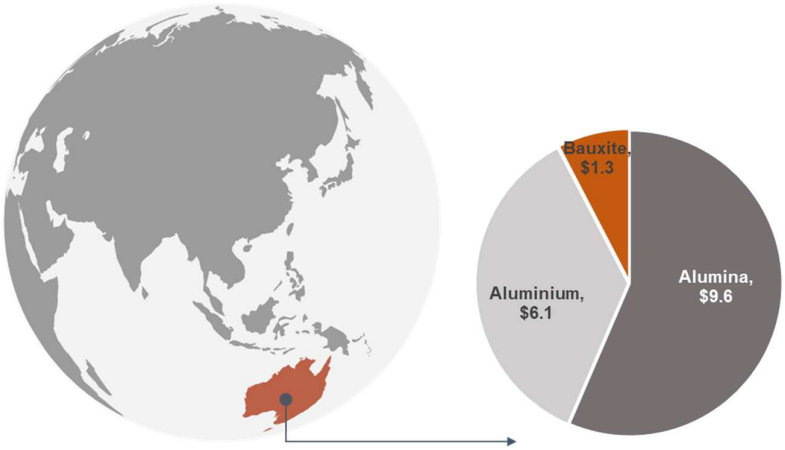

Figure 2. 2021 Industry Export Value ($B)

The Council notes the Government's commitment to consult further in the future on a potential Carbon Border Adjustment Mechanism (CBAM) in 2023. The Council also notes that a CBAM may not be well suited to export focused markets (e.g., bauxite and alumina). However, it may be applicable to the import exposed aluminium extrusion sector as well as primary aluminium billet which is also imported.

6. What role is there for corporate action to 2030 and beyond?

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 2). 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 members' 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. In the case of the Council's members, these targets include:

- Corporate targets can be set on ownership, operational control or equity share basis which is different to Safeguard / National Greenhouse and Energy Reporting (NGER) data at the controlling corporation level;
- 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. Therefore, local facility targets may differ from corporate targets, and these may not align with Australian NGER data;
- Corporate and end-market requirements can be Scope 1, Scope 1 plus Scope 2, intensity based, or may include Scope 3. While these are accepted greenhouse gas emissions accounting procedures, they may not align with NGER data;
- Can be reported on calendar or financial years (and financial years vary by corporation) which may not align with NGER data;
- Target setting relies on Government/regulator forecasts of substantial grid electricity decarbonisation by 2030; and
- Additionally, targets are generally set as long-term ambition supported by interim goals. This considers the temporal nature of targets (i.e., short, medium and long-term), and a non-annual approach to ensure businesses do not chase short-term and short-sighted annual reductions, but rather focus on long-term success.

Table 2.Summary of Corporate Ambitions[7]

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[8]	45% reduction in scope 1 and 2 emissions by 2030 (from a 2010 baseline)	Net zero by 2050
Hydro[9]	Reduction of 30% by 2030	Net zero by 2050

8 How could the Authority best strike a balance between ambition, domestic considerations and the international context in its 2023 NDC advice?

Considering Australia's emissions in the international context is critical, reducing domestic emissions by closures, especially where production will be replaced by an international production with a higher emission intensity, does not support the Paris Agreement goals. It is worth noting that the global competitors for each part of the industry vary with commodity. For bauxite, this is principally Guinea, which is the world's largest exporter, principally to China, including some captive bauxite mines; as well as Brazil, India, and Indonesia. Key competitors in alumina refining are China (>50% global production) and emerging economies such as Brazil, India, Saudi Arabia, Vietnam and Kazakhstan. Similarly, for aluminium smelting, China accounts for almost 60% of global production and the key countries for *growth* are India, United Arab Emirates, Bahrain, Saudi Arabia, and Malaysia.

The March 2023 Clean Energy Regulator (CER) Quarterly Market Report[10] predicts supply scarcity of Australian Carbon Credit Units (ACCU) before 2030. Australia's targets must have policy to support the NDCs to strengthen our global reputation for our commitment to the goals.

Cross-cutting Issues

12. What factors should the Authority consider when developing sectoral decarbonisation pathways?

a. What are the risks and opportunities for households, business, workers and communities affected by the transition?

b. Are there supply chain pressure points?

The Australian aluminium industry has been included in Australian sectoral studies, such as the Australian Industry Energy Transitions Initiative[11]; global studies such as the Mission Possible Partnership Making Net Zero Aluminium Possible: A Transition Strategy for a 1.5°C-compliant Aluminium Sector[12] and sub sector specific studies such as Australian Renewable Energy Agency's (ARENA) Roadmap for Decarbonising

[7]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/

[8] 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.

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

[10] Quarterly Carbon Market Report March Quarter 2023 (cleanenergyregulator.gov.au)

[11] https://energytransitionsinitiative.org/

[12] https://missionpossiblepartnership.org/wp-content/uploads/2022/10/Making-1.5-Aligned-Aluminium-possible.pdf

Australian Alumina[13]. Given the existing materials and complexity of sectoral decarbonisation pathways, the industry would appreciate the opportunity to consult directly with the Authority on this issue as this submission cannot provide sufficient depth of response and clarity of issue.

13. What is the role for Government in reducing these risks and assisting households, business, workers and communities to realise the opportunities?

See Response to Q3.

15. How could Australia partner with other nations to accelerate global progress towards meeting the Paris Agreement goals?

The Council welcomes the recent announcement of the Climate, Critical Minerals and Clean Energy Transformation Compact[14] and eagerly anticipates additional detail on how this can support Australian facilities access to funding under the US Inflation Reduction Act. However, this agreement highlights the need to review Australia's critical mineral list to align it with other major economies such as Canada[15], USA[16] and Europe[17] which identify bauxite (aluminium ore) and aluminium as critical.

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 CO_2-e/t), compared to the global industry average of 1.2 tCO_2-e/t.

Case Study 1: In May 2021[18] Alcoa of Australia Limited (Alcoa) announced it had received funding from the Australian Renewable Energy Agency (ARENA) to test the potential use of renewable energy technology in a process known as Mechanical Vapor Recompression (MVR). Alcoa is currently conducting technical and commercial studies to adapt MVR technology to alumina refining. Electricity sourced from renewable energy would power compressors to turn waste vapor into steam, which would then be used to provide refinery process heat. If the feasibility studies are successful, Alcoa plans to install a three-megawatt MVR module with renewable energy at its Wagerup refinery in Western Australia, to test the technology at scale.

The MVR technology powered by renewable energy could reduce an alumina refinery's carbon footprint by 70%. The technology also has the potential to significantly reduce water use in the refining process by capturing water vapor that would otherwise be lost to the atmosphere.

Case Study 2: Rio Tinto announced a partnership with ARENA in June 2021[19], 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 displacing natural gas with renewable hydrogen at its Yarwun alumina refinery in Gladstone, particularly focussed on simulating the use of hydrogen in the calcination process. 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.

[13] https://arena.gov.au/assets/2022/11/roadmap-for-decarbonising-australian-alumina-refining-report.pdf
[14] Australia-United States Climate, Critical Minerals and Clean Energy Transformation Compact | Prime Minister of Australia (pm.gov.au)
[15] https://www.canada.ca/content/dam/nrcan-rncan/site/critical-minerals/Critical-minerals-strategyDec09.pdf
[16] https://www.usgs.gov/news/national-news-release/us-geological-survey-releases-2022-list-critical-minerals
[17] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52020DC0474
[18] https://arena.gov.au/projects/mechanical-vapour-recompression-for-low-carbon-alumina-refining/
[19] https://arena.gov.au/projects/rio-tinto-pacific-operations-hydrogen-program/

Case Study 3: Electric pressure calcination[20] can produce pure, uncontaminated steam exhaust, which can be captured and reused, reducing demand for steam from natural gas boilers. Electric calcination could potentially reduce Australian alumina refining emissions by 40% when powered by 100% renewable electricity. Alcoa is undertaking a $19.7 m project in conjunction with ARENA ($8.6m) and the WA Govt ($1.7 M) to test this process. The project also aims to improve understanding of load flexibility and the provision of essential systems services to the South West Interconnected System (SWIS).

The findings of these studies have potential applications in other high temperature Australian manufacturing processes beyond the alumina and outside the mineral processing sectors. Additionally, if successful, the technical and commercial lessons from the hydrogen calcination technology could lead to its wider implementation not only in Australia, but also globally.

16. What do you see as the challenges and opportunities from a phase out of fossil fuel production? What should the Government consider when determining a plan for the phase out of fossil fuels?

When considering the gas needs of the aluminium industry it is important to consider the time scale for change. While the Australian aluminium and alumina industries are developing and commercialising new technologies, the time, cost and complexity of developing viable, large-scale alternatives to the use of gas should not be underestimated.

While the industry consumes gas in its aluminium smelters and extrusion operations, the largest use is in alumina refineries, located in both the east and west coast gas markets. The Council believes that gas will have an important and necessary bridging role in lowering carbon emissions, as it is technically and economically viable today; while zero emissions alternatives are more fully developed in the future.

The evolving gas needs of an electricity system with higher levels of renewable generation and new technologies like hydrogen, also need to be considered. This will be particularly important in ensuring all options for industry transition, including fuel switching and electrification are not only technically but also commercially viable.

17. Should the Authority consider international maritime and aviation emissions in its advice?

For the aluminium industry globally, transport emissions only represent a small percentage of cradle to gate emissions[21]. However, for the parts of the industry which use bulk freight this is still a focus and research is being done to reduce this component of Scope 3 emissions[22,23].

18. What risks and opportunities do you (including your household, business, workers and communities) face as the world decarbonises and as Australia responds to the impacts of climate change?

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 advantages, providing jobs and value to the economy.

There are already workforce and skills shortage across many industries and regions that will impact on industry growth and the further development of advanced manufacturing. The scale of the workforce and skills required for transformational abatement projects and new industries should not be underestimated, nor should the impacts of this on the pace of abatement.

Australia must be able to compete to attract the necessary capital and investment to undertake the transition. Additionally, the strong existing vertically integrated aluminium industry with a regional

[20] https://arena.gov.au/projects/alcoa-renewable-powered-electric-calcination-pilot/
[21] https://international-aluminium.org/wp-content/uploads/2021/10/1.5-Degree-Scenario-FINAL.pdf
[22] https://www.combinationcarriers.com/insights-and-news/2022/1/4/kcc-and-south32-conclude-first-sustainability-linked-contract-of-affreightment
[23] https://www.riotinto.com/en/news/stories/decarbonising-the-high-seas

manufacturing base in Australia enables existing industry to be leveraged to create new manufacturing opportunities. Strengthening our national manufacturing capabilities now will put Australia in the strongest possible position to meet these future forecasts for not only traditional commodities such as bauxite, alumina and aluminium; but also, other emerging aluminium related commodities, like high purity alumina (HPA), aluminium fluoride, aluminium alloys and aluminium salts. As the world's largest producer of bauxite and the largest exporter of alumina, Australia is strategically positioned to support this opportunity.
Recent work[24] undertaken by the Council in conjunction with Deloitte and Coreo found that significant opportunities in manufacturing and recycling can be unlocked by cross-value chain coordination, including with Government and its agencies. There are clear opportunities for value-added manufacturing enabled by the existing integrated aluminium industry.

The work identified three flagship projects which the Council believes would present a different approach to industry policy, consistent with Australia's future as a green energy superpower. By focusing on narrow value chains, these projects have the potential to unearth challenges and opportunities which could then be more broadly applied to other commodities and across industries.

1. A closed-loop mine-to-panel solar value chain - Aluminium is the second largest input by weight, and domestic extruders already have the capability to produce frame and rail for the sector. In addition, the upstream industry has a growing demand for renewables, which could further catalyse demand for manufacturing.
2. Green caustic soda production - Caustic is a critical input into alumina refining (and other industries) but is currently 100% imported in Australia. A broader review of supply chains for energy intensive products currently imported into Australia may identify opportunities, like caustic, to increase domestic manufacturing, reducing supply chain risk while increasing sovereign capability.
3. Increase recycling capacity - Global demand for recycled aluminium is growing rapidly, driven by emerging minimum content requirements from governments and corporate demand for low carbon products. A circular industry policy could lower cost and risk for domestic pre- and post-consumer scrap reprocessing.

It is also worth noting that first of a kind investments and investments in new technologies are not risk free. There is often significant early mover risk.

19. What could governments do to help?

Decarbonisation of Australia's electricity supply is the single biggest opportunity to decarbonise the vertically integrated domestic aluminium industry in the coming decade. Additionally, the single biggest factor in determining the location of future refining, smelting and manufacturing locations is reliable, internationally competitive, low emissions energy. Decarbonisation of Australia's electricity supply is the most significant opportunity and challenge in the transformation of Australia's industry, in the biggest clean industrial and economic revolution this country has seen.

The Australian Government should recognise bauxite, alumina and aluminium as a Critical Mineral to position Australia as a global supplier of choice.

20. What types of targets do you see as important and/or problematic, and why?

The Council supports alignment between Federal and State targets, where ultimately there should be a single unified set of targets and schemes. Duplication across jurisdictions should be avoided as it does not deliver the least cost outcomes for climate action. Additionally, it can result in approval processing delays which impact decarbonisation schedules and the ability for members to attract capital due to perceived 'uncertainty' related to investments within Australia. It also diverts limited resources from focusing on implementing decarbonisation plans, with them instead focusing on a large compliance and administrative burden.

[24] https://aluminium.org.au/news/aac-deloitte-and-coreo-cast-anew-project/

21. What do you see as the strengths and weaknesses of the NGER scheme? How could it be improved?

The Council believes that NGER is globally recognised as being of high standard and integrity. However, as articulated in its recent submission[25] to the Department of Climate Change, Energy, the Environment and Water the Council is concerned about the inclusion of "voluntary" options under NGER, particularly using methodologies which have not been subject to sufficient rigour.

The Council believes that there are further opportunities to improve Scope 2 reporting under NGER, including alignment with the Greenhouse Gas Protocol Corporate Accounting Standards (currently under review), where appropriate. Australia's methodologies need to ensure they are updated to international standards such as modified IPCC methodologies and global warming potential changes, in a timely manner.

23. Following the Government's acceptance of recommendations of the Chubb Review, what do you see as the strengths and weaknesses of the CFI and ERF?

The role of carbon offsets projects in supporting non-carbon benefits such as biodiversity, adaptation and sustainable development needs to be better recognised to support development of these projects. Current additionality requirements prevent a project from generating both carbon and biodiversity offsets. Allowing recognition of multiple benefits will support the development of the best quality projects.

24. How could the CFI, ERF and NGERs be improved in the context of the Paris Agreement era?

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 and its members have engaged with the CER, Department and Emissions Reduction Assurance Committee (ERAC) on the ERF. Much of this has been specific consultation around the IEFE method and the subsequent Industrial and commercial emissions reduction (ICER) method. The Council notes that due to the likely increasing demand for ACCUs for both Climate Active and the Safeguard Mechanism, consideration should be given how changes are made such as any phase out of methods, approved projects and the generated certificates, so as to avoid major market shocks. Given the scale of ACCUs which will be required just to meet emissions from the alumina and aluminium industries, an efficient process to support the timely review, approval and registration of organic projects which meet the required quality characteristics as ACCUs is also necessary to complement existing registered projects particularly given the long dated nature of these.

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

[25] https://aluminium.org.au/wp-content/uploads/2023/05/230428-Aluminium-NGER-Measurement-Update-2023.pdf

purpose of upholding the ACCUs abatement quality. Consistent with the Chubb review findings the Council supports consistency of the requirements across all methodologies and not require statements of intent or financial viability by project proponent as is currently required by the ICER method. This will also create more consistency to support projects at facilities that are not covered by the Safeguard Mechanism, for example mine fleet electrification.

29. What protections are needed to ensure the integrity of carbon trading markets and exchange platforms?

A Government carbon exchange platform is a valuable method of increasing liquidity in the carbon market by providing a platform to proponents that may not have previously traded in the secondary market.

30. What role should international carbon markets have in Australia?

The Council supports the use of international offsets, subject to future rules of international trading, and, providing they meet integrity principles - representing 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 and welcomes further consultation in 2023 on a legislative framework to support this.

Conclusion

The Council seeks a national climate and energy policy framework which is transparent, stable and predictable, while maintaining the economic health of the nation including vital import and export competing industries. The Council recognises that the Authority has an important ongoing role in the evolution of Australia's climate framework and looks forward to continuing constructive dialogue with during its development. 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

Appendix 1 - Aluminium Industry Decarbonisation Context

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 industries cost base, and therefore energy efficiency is a key focus of 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.

Transformational Pathways

The Mission Possible Partnership, in collaboration with the International Aluminium Institute, recently released Making Net Zero Aluminium Possible: A Transition Strategy for a 1.5°C-compliant Aluminium Sector[26] (the Strategy). The release of the Strategy was supported by the Council and its members. This work brought together companies across the global industry, including those operating across the value chain in Australia. The Strategy recognised that it is possible to meet rising aluminium demand, reduce emissions from the sector to net zero by 2050, and align with a 1.5°C target. The Strategy also 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. It outlined not only actions the industry needs to take, but also actions required by Governments to support this. In particular, developing policy which is predictable, stable and transparent to enable businesses to confidently plan for this substantial investment. Governments also have a vital role to play designing electricity markets to support the transition and minimising the risks of carbon leakage.

The Australian Renewable Energy Agency (ARENA) in consultation with Alcoa, Rio Tinto and South32 has published a Roadmap for Decarbonising Australian Alumina[27]. The Roadmap identifies four key themes for decarbonisation that could transform the way alumina refineries consume and use energy by enabling the uptake of renewables and removing the use of fossil fuels. It also provides a framework for future policy and investment decisions and serves as a call to action to collaboratively transition the sector into an industry at the forefront of the transition to net zero.

In addition, 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 intends to update 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.

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[28], with this increased penetration of variable renewables. Our

[26] https://missionpossiblepartnership.org/wp-content/uploads/2022/10/Making-1.5-Aligned-Aluminium-possible.pdf
[27] https://arena.gov.au/assets/2022/11/roadmap-for-decarbonising-australian-alumina-refining-report.pdf
[28] https://aemo.com.au/en/energy-systems/electricity/national-electricity-market-nem/market-operations/settlements-and-payments/settlements/carbon-dioxide-equivalent-intensity-index

industry also will 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[29].

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 3**). 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.

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.

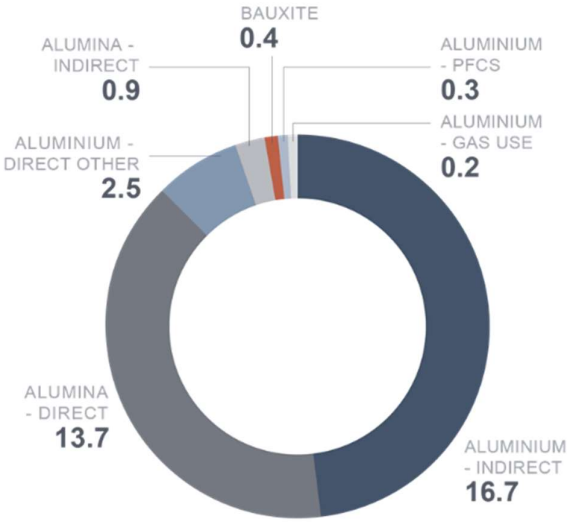

Figure 3. 2021 Industry Emissions (Mt CO_2-e)

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 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

[29] https://www.riotinto.com/-/media/Content/Documents/Invest/Presentations/2021/RT-Investor-Seminar-2021-combined.pdf?rev=2e127f507f204ecc81e2d22527949560, https://arena.gov.au/projects/spinifex-offshore-wind-farm-phase-1-development-activities/

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[30]. For example, the SWIS may not have the generation nor transmission capacity to electrify one alumina refinery, let alone four. For example, Worsley Alumina[31] 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.

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

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