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Powering the Regions Fund  
Department of Climate Change, Energy, the Environment and Water  
<https://consult.dceew.gov.au/powering-the-regions-fund>

3 February 2023

Dear Minister

***Re: Powering the Regions Fund (PRF)***

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 five large (>10 Mt per annum) bauxite mines plus several smaller 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 Council welcomes the opportunity to provide input into the establishment of the \$1.9 billion Powering the Regions Fund (PRF) Consultation Update Paper (the Paper). The Council and some of its Members also participated in the consultation on the design of the PRF in December 2022. The Council particularly notes the alignment between the Government's goal to decarbonise Australia's industrial sector while maintaining industry competitiveness, with the goals of the Council and its Members. As each aluminium smelter, alumina refinery and bauxite mine has unique circumstances, the Council will present high level comments on the Paper.

The Council recognises that the PRF is being delivered in conjunction with a range of other measures such as Rewiring the Nation, National Reconstruction Fund (NRF) and the Net Zero Economy Taskforce. While the Council welcomes the funding for the PRF, it is worth noting that the cost of transformational abatement in industry is substantial. 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<sup>1</sup> 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.

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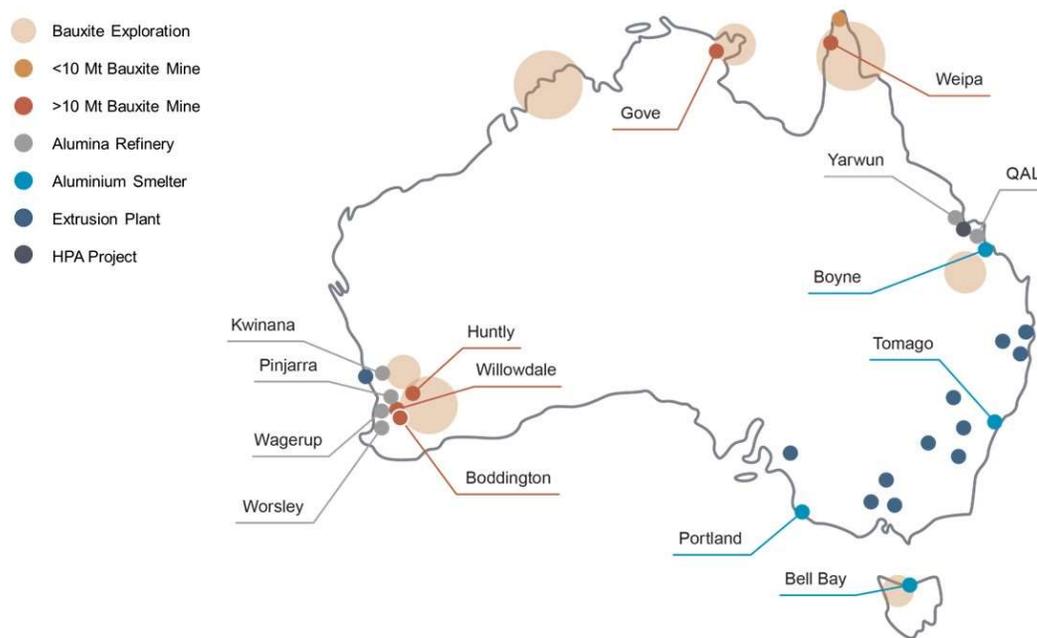
<sup>1</sup> <https://missionpossiblepartnership.org/wp-content/uploads/2022/10/Making-1.5-Aligned-Aluminium-possible.pdf>

Additionally, 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 PRF such as that of the US's Inflation Reduction Act (IRA). The scale of the investment by the Government at this stage does not match the scale of investment of Australia's competitors. It is also worth noting when considering appropriate rates of return and risk, that first of a kind investments and investments in new technologies are not risk free. A partnership approach may be required to share both risk and equity.

**Supporting Regional Australia's contribution to emissions reductions**

The core objective of the PRF is to support regional Australia's contribution to emissions reduction goals. The government must look at augmenting economic growth of regional Australia at the same time driving emissions reductions by funding production or energy efficiencies and emissions reductions improvement projects of existing industries and support new developments for renewable energy accessibility.

The vertically integrated aluminium industry has been operating in Australia since 1955; almost 70 years (Figure 1). Most of the large bauxite mines, all six alumina refineries plus all four aluminium smelters are covered facilities 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<sub>2</sub>-e, which was 7% of Australia's national emissions. About 16.9 Mt CO<sub>2</sub>-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 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.



**Figure 1. Location of Australian Aluminium Industry Facilities**

While the aluminium industry is emissions intensive, it also is one of the commodities most widely used in the global transition to a clean energy future<sup>2</sup>. It is also recognised for its importance to both economic development and low emissions transition. Aluminium use is highly correlated with GDP, so as countries urbanise, per capita use of aluminium increases. By 2050, global demand for aluminium is expected to nearly

<sup>2</sup> <https://www.worldbank.org/en/topic/extractiveindustries/brief/climate-smart-mining-minerals-for-climate-action>

double from around 100Mt per annum to around 190Mt<sup>3</sup>. 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. Therefore, despite the challenges in the decarbonisation pathway, there is an opportunity for bauxite, alumina and aluminium processing regions to thrive in a net zero world.

Therefore, when considering how the PRF should be delivered with a regional focus, the Council encourages consideration of not only regions with a high dependency on emissions intensive industries, but where those industries have the potential to in fact grow further with decarbonisation. For example, today’s aluminium industry contributes around \$16.9B<sup>4</sup> 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, making aluminium one of the few commodities in which the raw materials are mined and are processed all the way to a consumer product right here in Australia. However, there is an opportunity to leverage this existing industry further.

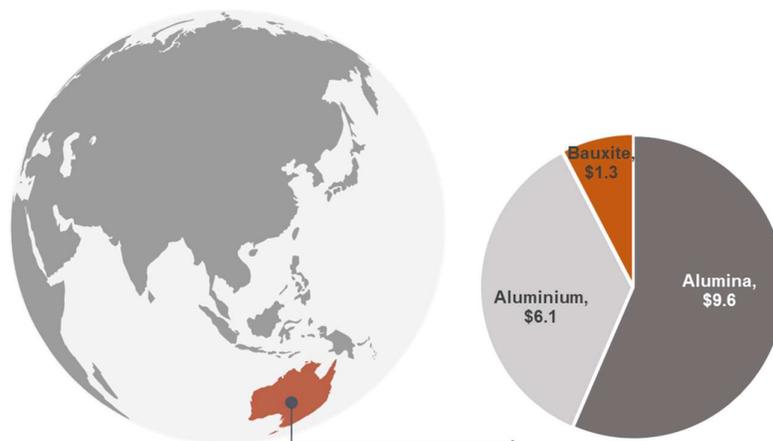


Figure 2. FY 2021-22 Industry Export Value (\$B)

Australia is the world’s largest bauxite producer, producing over 100 Mt per annum or almost 30% of global production in 2021<sup>5</sup>. 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<sup>5</sup>, 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 nearly double Australia’s current production of alumina, 40 Mt, 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.

In designing the PRF, the Council believes regions and industries which have the potential to decarbonise and grow; leveraging existing industry and Australia’s resource advantage offers the best opportunity to deliver regional transformation.

<sup>3</sup> International Aluminium Institute High Substitution Scenario

<sup>4</sup> <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>

<sup>5</sup> <https://aluminium.org.au/wp-content/uploads/2022/09/221214-TRADE-AND-COMPETITIVENESS.pdf>

### ***Objective 1: Decarbonising Existing Industries***

The PRF will support existing industries to decarbonise under two streams - the Industry Decarbonisation Stream (IDS) at any existing industrial facility and relevant common use infrastructure projects and the Safeguard Transformation Stream (STS) exclusively to trade exposed facilities covered by the Safeguard Mechanism.

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 of a similar funding model should be extended via the PRF and other initiatives as it provides support to the widest range of low emission technologies.

ARENA, in consultation with Alcoa, Rio Tinto and South32, recently published a Roadmap for Decarbonising Australian Alumina<sup>6</sup>. The Roadmap was able to leverage work within each company to provide a regional and industry view. This collaborative approach could be replicated for other industries and regions. However, even within an industry roadmap, each facility will have a different pathway, depending on the availability and applicability of relevant decarbonisation technologies and zero emissions energy, generation and infrastructure requirements.

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, within the aluminium industry Elysis is a collaboration between Rio Tinto, Alcoa, Apple and the Canadian and Quebec Governments<sup>7</sup>.

#### *Safeguard Transformation Stream*

The \$600 million STS of the PRF is allocated in recognition of the specific challenges faced by trade exposed facilities, which are often hard to abate. Australia's vertically integrated aluminium industry is strategic at a national level. Aluminium (or bauxite as ore of aluminium) is a critical mineral to provide key inputs to the clean energy supply chain and will be essential to enabling Australia to capture the benefits from a global net zero economy. The Council will also make a separate submission to the Safeguard Mechanism consultation.

The Council notes that while the STS is focused on reducing Scope 1 emissions, for many industries including alumina refining, this may be achieved through electrification or conversion of Scope 1 to Scope 2 emissions. 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 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<sup>8</sup>. For example, the South West Interconnected System (SWIS) may not have the generation nor transmission capacity to electrify one alumina refinery, let alone four. For example, Worsley Alumina<sup>9</sup> have confirmed that a substantial expansion and modification of the energy grid would be required to deliver renewable power at the necessary scale for

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<sup>6</sup> <https://arena.gov.au/assets/2022/11/roadmap-for-decarbonising-australian-alumina-refining-report.pdf>

<sup>7</sup> <https://www.elysis.com/en/what-is-elysis>

<sup>8</sup> <https://www.worley.com/~media/Files/W/Worley-V3/documents/our-thinking/from-ambition-to-reality/from-ambition-to-reality-report.pdf>

<sup>9</sup> P73, <https://www.south32.net/docs/default-source/all-financial-results/2022-annual-reporting-suite/sustainable-development-report-2022.pdf>

industrial users in the region (SWIS). In designing the STS to be technology neutral, it should therefore include electrification and support for infrastructure both inside and outside the facility gate.

The Council agrees that a focus on first of kind investments, which have higher risk, is appropriate particularly in the harder to abate sectors. Additionally, support should be prioritised to opportunities which can be shared with other sectors in Australia and also globally. For example, Alcoa, Rio Tinto and South32's Worsley 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<sub>2</sub>-e/t), compared to the global industry average of 1.2 tCO<sub>2</sub>-e/t. Findings of studies currently underway with the support of ARENA<sup>10</sup> 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 could lead to wider implementation not only in Australia, but also globally.

The Council supports twice yearly funding rounds but notes the scale of investment needs to match the substantial cost of transformational abatement in industry, and it is currently insufficient for this purpose.

#### *Industry Decarbonisation Stream*

The IDS will support decarbonisation activities at existing industrial facilities and the development of relevant common use infrastructure projects. The IDS would be designed broadly in line with the proposed approach for the STS; and designed to meet regionally specific needs and support decarbonisation by SMEs as well as larger facilities.

Decarbonisation of Australia's electricity supply is the single biggest opportunity to decarbonise the vertically integrated domestic aluminium industry in the coming decade. Providing electricity is supplied consistently, with firm power, and at internationally competitive prices, aluminium smelting can be run on renewable electricity. The carbon intensity of the Australian grid is declining rapidly<sup>11</sup>, with this increased penetration of variable renewables. The owners of Australia's four smelters have signalled their desire to recontract renewable electricity at the end of their current terms (2025-2029). 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 alumina refinery digestion may be able to be deployed prior to 2030. However, access to the required generation, storage and infrastructure outside the facility gate could be the rate limiting step in the electrification process. On this basis, the Council strongly supports funding for projects which can deliver electricity infrastructure to regions as this will enable electrification and conversion of Scope 1 to Scope 2 emissions.

Again, the Council supports twice yearly funding rounds, but notes the scale of investment needs to match the substantial cost of transformational abatement in industry.

#### ***Objective 2: Developing New Clean Energy Industries***

The second objective of the PRF is to support the development of new clean energy industries in Australia. This will help contribute to Australia's emission reduction targets while growing the industries, jobs and export markets of the future.

#### *Existing industry is already supporting the development of new clean energy industries*

The vertically integrated aluminium industry has been operating in Australia for almost 70 years. This strong regional manufacturing base in Australia enables existing industry to be leveraged to create new

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<sup>10</sup> <https://arena.gov.au/projects/mechanical-vapour-recompression-for-low-carbon-alumina-refining/>, <https://arena.gov.au/projects/rio-tinto-pacific-operations-hydrogen-program/>, <https://arena.gov.au/projects/alcoa-renewable-powered-electric-calcination-pilot/>

<sup>11</sup> <https://aemo.com.au/en/energy-systems/electricity/national-electricity-market-nem/market-operations/settlements-and-payments/settlements/carbon-dioxide-equivalent-intensity-index>

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 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.

While alumina has been produced in Australia for more than fifty years and is largely supplied to the global aluminium smelting industry as metallurgical grade alumina, usually at purities of more than 99%, alumina refineries can also produce alumina for a range of non-metallurgical uses, including water treatment; aluminium fluoride production; ceramics, refractories and abrasives. However, there has been an emergence in demand for very high purity alumina (HPA). HPA's properties such as high brightness, resistance to corrosion, good thermal conductivity, high melting point, chemical stability and high mechanical strength make it suitable for manufacturing various electronic and vehicle components, including for both electric vehicles and the aeronautical sectors. It is used to make safer, more efficient and longer lasting lithium-ion batteries, synthetic sapphire for LED lighting and high technology optics. Use of HPA in battery technologies means batteries have a higher retention capacity compared to conventional anode materials, with potential cost benefits and increased range for electric vehicles.

There are now a range of novel Australian HPA projects in the pipeline, leveraging the strong regional bauxite and alumina industry in Australia to create these new manufacturing opportunities. For example, Alpha HPA is currently constructing what would potentially be the world's largest HPA plant in Gladstone, with targeted production of 10,000 tonnes per annum. Gladstone is well known as the location of Rio Tinto's Yarwun and Queensland Alumina Ltd refineries, as well as the Boyne aluminium smelter. The Alpha HPA process uses a precursor sourced from one of the alumina refineries in its "Smart SX" (solvent extraction) low emissions refining technology. Alpha HPA also collaborates with other neighbouring manufacturers so that by-products from its extraction process can be recycled, making the project an almost zero discharge facility. The solvent extraction technology, combined with renewable energy, aims to generate a range of HPA products with a carbon footprint lowered by as much as 70% compared to the incumbent method of production.

Another well-known alumina refining location is south Western Australia. In 2021, integrated bauxite miner, alumina refiner and aluminium producer, Alcoa of Australia, announced an HPA joint development project with FYI Resources Ltd. The project will have three main stages of development before potential construction, in 2024, of a full-scale 8,000 tonnes per annum HPA plant. This project is a natural complement to Alcoa's existing business, building on the company's expertise in alumina refining technology development and production capability.

While Rio Tinto's Bell Bay Aluminium in northern Tasmania is still an operating aluminium smelter, between 1956 and 1972 the site also operated as an alumina refinery. As a result, it has a Tailings Storage Facility (TFS) housing red mud, commonly known as bauxite residue, a by-product of the Bayer process. Peloton Resources has proposed to construct an HPA pilot plant to valorise this bauxite residue to extract HPA and other critical minerals. Up to 15 tonnes per year of residue is proposed to be processed with the pilot plant to be sited immediately adjacent to the tailings storage facility, within the Bell Bay Advanced Manufacturing Zone.

There are also a range of other projects, where HPA may be produced alongside other critical minerals. Developing new projects and novel processes today, means the Australian HPA industry is setting itself up for success as a location for low carbon and low waste production facilities of the future.

HPA is not the only new industry linked to the existing aluminium value chain. ABx subsidiary ALCORE Limited (Alcore) is proposing to build a \$16.4M aluminium smelter bath recycling plant in Bell Bay, Tasmania. The plant is proposed to transform 1,600 tonnes per year of aluminium smelter bath into aluminium fluoride, an essential chemical for aluminium smelting, for which Australia currently imports 100% of its requirements. The potential to establish domestic aluminium fluoride production will help protect the aluminium industry from supply chain disruption and increase Australia's manufacturing resilience and capability. This increase in

the security of supply for Australian aluminium smelters will also create highly skilled manufacturing jobs, and the production of aluminium fluoride from aluminium smelter bath is an excellent illustration of the circular economy.

The Paper notes that smaller enterprises can find it harder to apply for funding. Both Alpha HPA and Alcore received grant funding, from the Critical Minerals and Modern Manufacturing initiatives.

#### *Further opportunities for regional transformation*

The Council believes there are further opportunities to develop regional transformation using resources which are not location based. Recent work<sup>12</sup> 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 but where these industries could be established in regions not traditionally associated with the 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.

These new industries may benefit from being developed near existing aluminium industries, but equally, under the PRF and other Government initiatives, could be developed in other regions undergoing transformation. The Council believes that there is strong alignment between these projects and the Government's priorities and would be interested in further discussion of how these plans could be further developed in 2023.

#### **Objective 3: Workforce Development**

Australia's existing aluminium industry is already predominantly located in regional Australia (**Error! Reference source not found.**). 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<sup>13</sup>. 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.

The Council agrees that there are already workforce and skills shortage across many industries and regions that will impact on industry growth. 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.

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<sup>12</sup> <https://aluminium.org.au/news/aac-deloitte-and-coreo-cast-anew-project/>

<sup>13</sup> <https://www.metromining.com.au/media/33566/metro-investor-presentation-noosa-conference-nov-2022.pdf>

## **Conclusion**

Aluminium is part of a clean energy future and Australia has a central role to play in its global supply and decarbonisation. While not being a one size fits all solution, the PRF provides the opportunity for investment to leverage Australia's natural and competitive strengths while decarbonising existing industry and creating new opportunities. The Australian industry is investing in the transition; however, the scale of the investment is substantial and decarbonising Australia's electricity supply is the biggest opportunity in the next decade. This will require Government support. Australia's industry is already leading global research into new technologies, and further investment is required. A key pathway to enabling new economy industries, will be to leverage the capability in the regions of existing industries. A circular economy and domestic focus to industry policy, will maximise the value of these new industries and the PRF is one part of the solution.

The Council would be happy to provide additional information on any issues raised in this submission.  
Kind regards,



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