3 February 2023

To the Department of Climate, Change, Energy, the Environment and Water,

Thank you for the opportunity to make a submission for the Critical Minerals Strategy. Beyond Zero Emissions (BZE) is an independent think tank creating solutions for a prosperous zero-emissions future and we commend the Australian Government's work on advancing a critical minerals strategy.

Australia has a wealth of renewable resources and is uniquely positioned to become a significant international player in critical minerals and green exports. In our 2021 Export Powerhouse report we identified a $333 billion green export opportunity for clean commodities and manufactured goods by 2050. Central to achieving this is:

- a rapid roll out of renewable energy generation, supported by a National Supergrid: connecting Australians to a zero-emissions future (forthcoming report release); and
- a sharp focus on repowering and decarbonising our manufacturing sector using Renewable Energy Industrial Precincts (REIPs) as a core model.

We have an opportunity to prepare Australia's economy and community to take a leading role in the global zero-emission future. To achieve this we must build the foundations required to deliver the dual objectives of economic prosperity and emission reduction. Australia's paired competitive advantage in critical minerals and renewable energy are key elements to securing this future.

Please find below our feedback on specific questions posed in your consultation document, we would welcome the opportunity to discuss this further.

Yours Sincerely,
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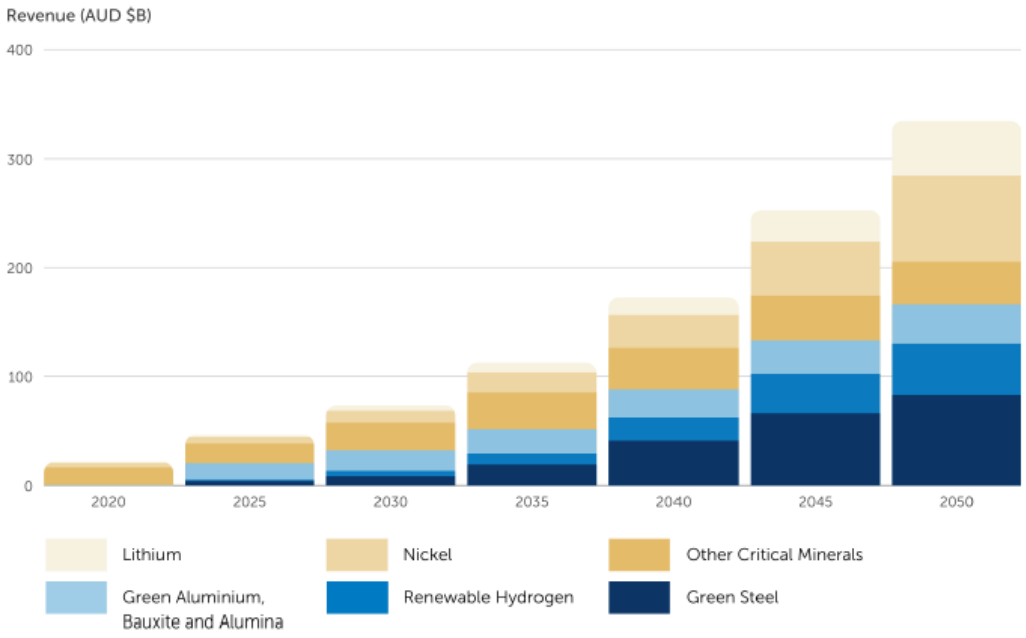
Responses to questions

Context
Australia is uniquely positioned to become a significant international player in critical minerals and green exports. In our 2021 Export Powerhouse report we identified a $333 billion green export opportunity for clean commodities and manufactured goods by 2050 (almost triple the value of 2019 fossil fuel exports - see figure 1). Of this, **critical minerals have a combined potential revenue of $168 billion by 2050.**

Figure 1: Australia's green export opportunities in the coming decades



Australia has a wealth of renewable resources and some of the largest reserves of lithium, copper, nickel and cobalt in the world, we have recently joined an international grouping to commit to sustainability and the highest environmental, social and governance (ESG) standards for the mining and processing of critical minerals, and are located close to major producers of renewable technologies in Asia.

This existing, natural advantage, means we are primed to capitalise on a green export opportunity by driving renewable-energy powered, onshore-processing of ores into critical minerals to add value in the supply chain - this is particularly true for critical minerals that are energy intensive to process. Grasping this opportunity will create additional value for our economy, increase efficiency around logistics as well as generating new jobs for local communities.

How can Australia capitalise on its existing advantages to create economic opportunity for all Australians – particularly regional communities and First Nations Peoples?
Australia's top five export markets (China, Japan, South Korea, US and the EU) have all set net zero targets and are all implementing ambitious policy settings to drive change faster. Developments such as the US IRAct and EU Green Deal Industrial Plan have already locked in demand for critical minerals around the world.

Positioning ourselves as the number one supplier of choice to export markets based on ESG best practice and zero-emission supply chains will be key to securing these markets. To achieve the scale of operations required to capitalise on export opportunities, we need:

- a sharp focus on repowering and decarbonising our economy using regionally located **Renewable Energy Industrial Precincts** (REIPs) as a core model; and
- a rapid roll out of renewable energy generation, supported by a **National Supergrid**: **connecting Australians to a zero-emissions future** (forthcoming report release).

This is likely to include, for example, support for:

- critical mineral industries and value add manufacturers to decarbonise operations;
- value adding to raw materials - by investing in manufacturing capability and Australian innovations (for example through the establishment of incentives for local battery manufacturers and advanced manufacturing); and
- support local markets for value added products to grow and scale up supply chains - including government procurement standards for Australian critical mineral content in manufactured goods.

It is imperative that free, prior and informed consent be sought from First Nations Peoples in projects. First Nations Peoples are often key stakeholders in critical minerals mining / processing and partnerships based on First Nations led engagement will help to unlock economic opportunities and ensure cultural, environmental and other concerns are appropriately considered and addressed. See also response to question relating to First Nations People. It is imperative that free, prior and informed consent be sought from First Nations Peoples in projects

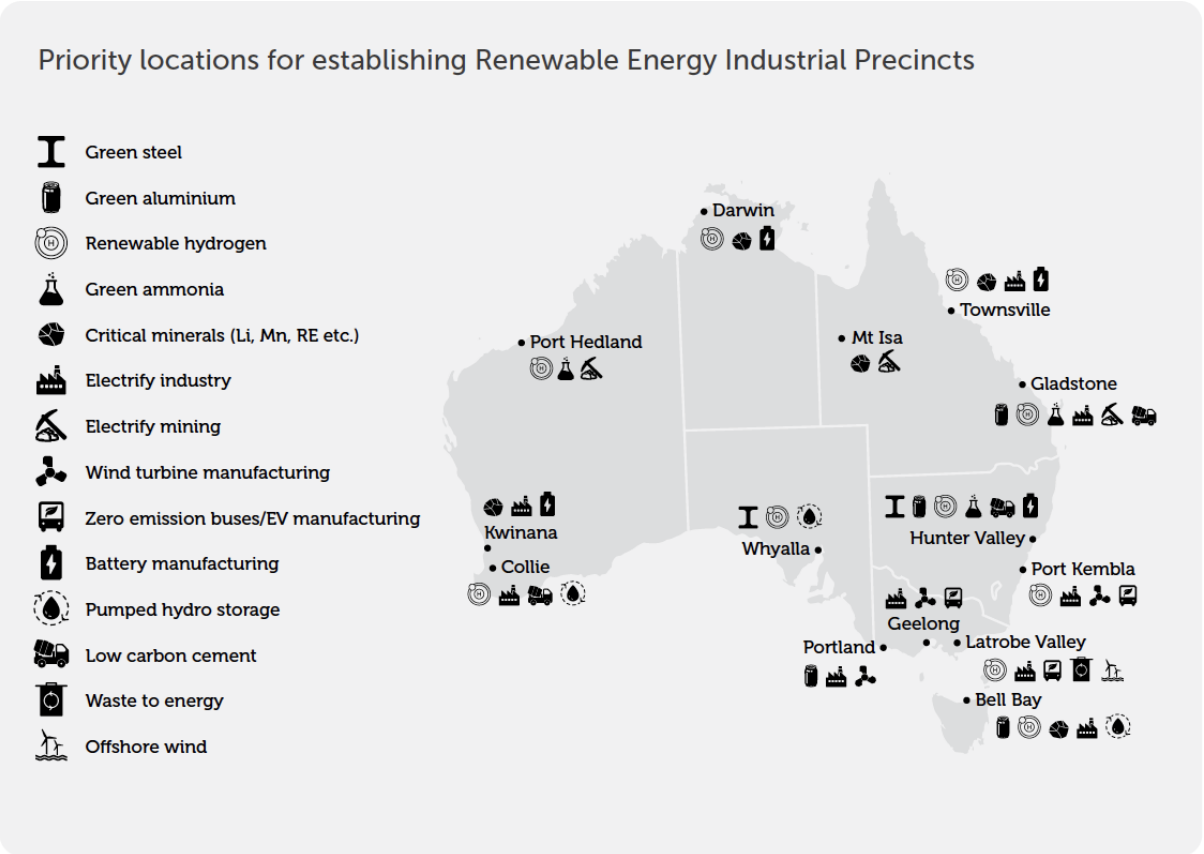
What could be done to facilitate project development and ensure benefits flow to regional communities? *And* ***What might be done to ensure maximum reasonable opportunity for local employment and local business participation in projects?***

Beyond Zero Emissions recommends Australian Government investment in a national REIP program to:

- plan and co-fund the common infrastructure required to de-risk and incentivise industry and private sector investment in renewable energy infrastructure including generation, storage and distribution upgrades; and
- provide financial support to fast-track and incentivise operational and supply chain decarbonisation.

REIPs are clusters of industry, manufacturers and service providers that have efficient access to 100% renewable energy. These precincts are either located within Renewable Energy Zones or connected to renewable energy generation through high-voltage transmission lines. They also have access to clean heat, future renewable hydrogen, skills development and coordinated training, targeted support to accelerate decarbonisation of operations and ready access to common user infrastructure including transport, grid and port infrastructure.

Fourteen potential locations for REIPs are outlined below. Five of these locations contain critical minerals - Darwin, Mt Isa, Townsville, Kwinana, and Bell Bay, while the other regions provide the materials and / or the manufacturing capability to enable the realisation of value-add opportunities. The locations are all existing industrial heartlands with supporting infrastructure , brownfield land and a tradition and skills in energy production, mining and or manufacturing.



Our work developing REIPs in the Hunter and Gladstone regions has gained tremendous local support, highlighting the keen interest in our regional manufacturing heartlands for growing zero-emissions industries. Our research shows that establishing zero-emissions industries there can create over 45,000 jobs and generate over $13 billion in revenue.

Our recent pre-budget submission proposed a 10-year REIP investment program of $6.3 billion in total, $3.2 billion of which is allocated in the current four-year budget period (2023-24 and 2026-27). This investment would be delivered in two streams as outlined in the following table.

Stream	Funding	Details
Stream 1. $1.95 billion Coordination of planning, infrastructure and skill development pathways	$140 million (first mover accelerator funding)	Accelerate planning and coordination of works in two REIP locations: • co-design roadmaps with state governments, industry and regional communities to match industry needs with renewable energy ($20m); • strategic land use and infrastructure planning to inform investment priorities for enabling infrastructure ($80m); and • identify skill gaps and fund skill development pathways ($40m).
	$210 million	Plan and coordinate works in the remaining five REIP locations. Processes established in the acceleration of the first two locations should allow remaining locations to achieve cost efficiencies.
	$1.6 billion	Upgrade infrastructure, including roads, rails, ports, water infrastructure, shared heating networks and renewable hydrogen pipelines. Note: spending on grid infrastructure for REIPs falls under Proposal 2: National Supergrid.
Stream 2. $1.3 billion Renewable manufacturing precinct implementation	$378 million	Grow and scale early movers, clean tech innovators and research and development to decarbonise existing industries.
	$417 million	Provide capital for existing heavy industry to decarbonise. Additional capital to be accessed through private sector, state government initiatives and public finance.
	$467 million	Provide incentives for new businesses to establish zero-emissions industries within REIPs.
Enabling funding included in Proposal 2: National Supergrid		
$2.6 billion Grid infrastructure for REIPs	$2 billion	Support transmission projects that deliver renewables to two industrial precincts.
	$600 million	Support distribution upgrades to industrial clusters, enabling them to electrify and adopt modern, renewable-powered manufacturing processes.

In addition to implementation of a REIP national program, further elements that can facilitate project development and ensure benefits flow to regional communities (including opportunities for local employment / business participation etc) include:

- Development of best practice guidelines for engagement of regional communities - ensuring these place high priority on early engagement such that concerns/desires can be addressed in project design.
- Employment and training strategies that incentivise hiring and / or upskilling of members of the local community, this may include projects that train/skill up local communities or provide offtake to help accelerate the expansion of local businesses. This will build trust and unlock synergies, particularly where communities have an ongoing role in projects or comprise part of the service sectors supporting the critical minerals sector.

What are the specific opportunities Australia should seek to realise while developing downstream processing and manufacturing capabilities?

As outlined previously, Australia should seek to realise REIP aligned, onshore, renewable energy powered critical mineral processing and export commodity production, with high ESG standards and strong social licence. In BZEs Export Powerhouse report we recommend specific focus on:

- Processing of lithium* from spodumene to lithium carbonates or lithium hydroxide for lithium-ion battery applications - this processing should be as far up the value chain as possible to capture larger economic opportunities.
- Processing of alumina, copper, nickel and cobalt to their respective metals for a wide range of applications from steel, to electrical wiring, to batteries - for example purity alumina production from Alpha HPA.
- Processing of vanadium for flow cell devices.
- Zinc, titanium and rare earth elements are other opportunities, for example the Sun Metals zinc refinery in Townsville.

* In our Hunter REIP briefing paper, we note that *"Australia earns only 0.5% of the ultimate value of its exported lithium ore. That means 99.5% of an estimated $213 billion of the value of Australian lithium ore occurs offshore through offshore electro-chemical processing, battery cell production and battery production."*

For key technologies and value chains, such as batteries, magnets, alloys and other clean energy technologies, what are the key obstacles to Australia moving up the value chain?
One of the key obstacles for value adding to critical minerals is access to sufficient, reliable, low cost, green electricity that will enable these goods to achieve green credentials - and in doing so, enable them to access the increasing demand for cleantech that are clean both in the services they deliver and in their production.

Australia has abundant renewable resources and is undergoing a rapid build out of renewable energy generation - BZE's Deploy report shows that a target of 100% by 2030 is an ambitious but achievable goal. In order for all Australians, including mining, mineral processors and manufacturers to benefit from this, we must also ensure we have a fit-for-purpose electricity grid. Our forthcoming report, A National Supergrid, outlines a plan for laying the foundations to decarbonise national electricity, including transmission, firming, distribution, system security and equitable access. The report offers a holistic investment plan, with key components of the plan targeted to enabling transmission and distribution upgrades (see final row in table above).

The National Supergrid investment plan also recognises storage as a key enabler for decarbonising the grid, and identifies key investments in storage and support for Australian innovation that can help deliver both current and future value chains, this includes:

- $3.6 billion: Support for 6 GW/50 GWh medium duration (8 hr) battery storage projects to unlock renewables and provide critical firming capacity.
- $400 million: Support for local innovators to scale up next-gen energy storage technologies.
- $300 million: Support the groundwork for pumped hydro assets, focusing on brownfield and off-river sites, as well as projects that support our industrial regions.

How can governments, industry, and researchers support Australia's critical minerals industry to move further downstream and develop new sovereign capabilities?
To support Australia's critical minerals industry to move further downstream and develop new sovereign capabilities Governments can:

- Take a coordinating role in relation to a national REIPs program to support essential infrastructure deployment and facilitate industry, manufacturer and service provider co-location
- Ensure REIPs are underpinned by a fit for purpose National Supergrid to deliver abundant, reliable green energy
- Use this consultation process to build a national approach towards onshore critical minerals processing including:
    - guidance on best practice around project development
    - growing public awareness on the opportunities and benefits of critical minerals mining and processing
    - planning for a circular economy, ensuring we are able to reuse the critical minerals once they reach end of life - for example building recycling facilities in parallel with processing and manufacturing facilities
- Identify green export investment as a priority for DFAT, Trade and Investment Growth and negotiate trade partnerships with key markets.

To support Australia's critical minerals industry, industry itself can commit to onshore processing of ore to maximise efficiencies and fast track future opportunities. They can also use/upgrade to 100% renewable based processes to improve market competitiveness, enter into public-private partnerships around infrastructure and facility build outs, adhere to ESG best practice to maintain and grow social licence, and train up/employ locally to build up workforce.

Researchers can support Australia's critical minerals industry by continuing to innovate on renewable based minerals processing (Australia has led on this in the past and we still have a fantastic research base from which to deploy leading research), as well as develop new chemistries for batteries/energy storage and other cleantech to reduce the reliance on critical minerals.

What can Australia do to better develop and retain IP and to attract IP investment from like minded partners?

To better develop and retain IP, and to attract future investment, Australia must build sovereign manufacturing capability with integrated supply chains that are powered by renewable energy - with the aim of making Australia one of the most appealing locations globally. Directing support to the development of new IP around renewable energy based technologies will enable us to both make the most of our natural advantage and become world-leaders in delivering clean tech for the global energy transition.

To achieve this, we should support local innovators, such as Alpha HPA and other homegrown technologies, directing investment to new startups and SMEs. Support may include direct grant funding, for example to assist production scaling, or programs to link industry partners to integrate local supply chains.

Working to highlight our innovators to investors and encouraging institutional investors such as banks, superfunds and other managed funds to invest can also help unlock successful IP development. Showcasing companies on the domestic and global stage will help build the Australian brand and grow knowledge of our national capabilities For example the Cleantech Showcase coordinated by BZE as part of the Australian Delegation at COP 27 and regional innovation festivals such as the Hunter Innovation Festival in the Hunter Valley.

How can Government and business work together to ensure private sector insights on the context and complexity of current supply chains and markets can inform policy design?
BZE's Export Powerhouse recommends greater collaboration between Government, business, industry, investors, communities and other stakeholders to capture export opportunities. Collaboration not only reduces risk for all parties, it fosters synergies and relationships that can accelerate deployment and rapid scaling. For example:

- Pairing heavy-industry users with renewable developers and transmission planners to match supply, demand and infrastructure requirements.
- Harnessing the technical know-how of fossil fuel industries to help accelerate the newer zero-emissions industries, for example, fossil gas to renewable hydrogen, coal and fossil Mining Equipment, Technology and Services (METS) to critical minerals and renewable METS solutions.
- Aligning investors, developers, governments, communities and industries towards large scale regional zero-emissions developments like REIPs.
- Accelerating investment and development with smart policy, community backing and industry support.

How can the Australian Government support the sector's integration with key clean energy supply chains, both domestic and international?
Again the co-location of manufacturing clusters within the REIP model can support the sector's integration with key clean energy supply chains - this includes minerals processing and downstream production.

What more can Australia do to ensure we are the international best practice jurisdiction for ESG?
While the development of zero-emissions export goods will help reduce global emissions, it is critical that these new industrial developments are held to high sustainability and environmental standards and benefit local communities. This is particularly important as ESG expectations from international trading partners, investors and other stakeholders continue to grow.

Australia must continue the evolution of best practice from our long history of extractive industries and aspire to set new global standards. This includes careful consideration of how we power, mine, process and importantly, rehabilitate the areas of industrial activity while ensuring community consultation and providing community benefits. Some example considerations include but are not limited to:

- Sustainable water use for the production of hydrogen, particularly for inland sites. Projects should take into account sustainable water allocations for hydrogen production and how to adapt them to a changing climate. Projects that rely on desalination of sea water will also need to consider their impacts on coastal sites.
- Impact of renewable energy development. The electrification of industry will require many gigawatts of new renewable energy along with firming and transmission. Consultation and building in community benefits will be key to any project's success, while new solutions can bring synergies, like co-locating grazing with solar farms.
- Obtaining free, prior and informed consent from First Nations Peoples and setting an example for international best-practice for land use partnerships, delivering equitable and long-term benefits to all.

- Impact of mining on the land, waterways, Indigenous history and local communities. Extensive planning and consultation should be undertaken prior to new activities. Projects should consider their impact on the local environment and communities and the rehabilitation of sites impacted by extraction.
- Increasing consideration for the circular economy as a key part of diversification. Aluminium, steel and critical minerals are primed for reuse and recycling. Designing products and systems for the circular economy will reduce emissions and create economic opportunities for Australia as a leader in recycling and reusing products such as solar panels, batteries and electronic components, as well as steel, aluminium, plastics, advanced biofuels and construction materials.

By setting these global benchmarks, we not only help protect our environments and help deliver economic outcomes to local communities, we also become more attractive to investors. As global markets increase their expectations of an equitable decarbonisation, the guarantee that our green export goods are delivered without the exploitation of labour, communities or environment is a powerful market advantage.

How can Government and industry create meaningful engagement with First Nations Peoples and ensure critical minerals projects benefit their communities?

BZE is a proponent of using strong frameworks to guide meaningful, considered engagement with First Nations communities and we recommend two sets of guidelines that have recently been released :

- First Nations Clean Energy Network guidelines, these were designed by Australian National University with community
- Aboriginal and Torres Strait Islander Best Practice Principles for Clean Energy Projects and a Clean Energy Negotiations Guide for First Nations have also been released by the Clean Energy Network.

First Nations Peoples are key stakeholders in regard to any impact on the land, waterways, Indigenous history and/or local communities and future critical minerals mining and processing must partner with these groups to unlock economic opportunities and ensure cultural, environmental and other concerns are appropriately managed and addressed. It is imperative that free, prior and informed consent be sought from First Nations Peoples in projects, setting an example for international best-practice for land use partnerships, delivering equitable and long-term benefits to all.