GRATTAN Institute

Green energy superpower: trade and investment

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Overview

Australia can be a 21st century green energy superpower. Climate change provides the imperative; our vast renewable energy and mineral resources provide the opportunity.

Despite the current geopolitical energy challenges, global and domestic demand for Australia's coal and gas will decline over the next few decades. Now is the time when we should build export-oriented industries based on these renewable energy and mineral resources to thrive in a net-zero global economy.

Meeting global and domestic emission-reduction targets will impose transformative change on Australia's heavy manufacturing and mining sectors, change for which we are ill-prepared. Yet, we have an opportunity, based on our comparative advantage in globally competitive renewable energy, to add value to globally significant mineral resources, and support employment in the regions where carbon-intensive industries will decline.

The production of already important commodities such as steel, aluminium and ammonia will need to be transformed to low-emission alternatives. Extracting and processing of minerals critical in a low-emissions world and materially present in Australia holds the prospect of new export growth and job creation. And direct export of renewable energy as hydrogen or ammonia only adds to the opportunities.

European countries reduced their emissions by deindustrialising and outsourcing their emissions to China. Australia can follow a different path that will lead to a hugely positive outcome - economic, social and environmental. Achieving this vision will require the concurrent, coordinated mobilisation of effort: clear policy development, supporting government agencies, cooperative partnerships with industry, international linkages via revitalised trade and co-operation agreements, and consideration of how we avoid early mover disadvantage.

The new federal government has a once-in-a-century opportunity. Despite the very real challenges, the opportunity should be taken – the downside is too ugly to be contemplated and the upside too great to be missed.

1 Introduction

This submission is made by Tony Wood and Alison Reeve of the Grattan Institute. Grattan Institute is an independent think-tank focused on Australian domestic public policy. It aims to improve policy outcomes by engaging with both decision-makers and the community.

On 11 October 2022, an inquiry into Australia's transition into a green energy superpower was referred to the Joint Standing Committee on Trade and Investment Growth. This submission to that inquiry outlines the nature of Australia's opportunity to make the transition and responds to matters raised in the Terms of Reference.

Australian industries that extract resources and add value through manufacturing currently contribute more than $200 billion to GDP annually[1] and employ 1.1 million people.[2] But they also contribute about 30 per cent of our domestic greenhouse gas emissions. And the emissions from our exported coal and gas add to the climate responsibilities of other nations. A serious global commitment to net-zero emissions has profound economic, social, and environmental implications for Australia.

Activities such as coal mining that will be essentially incompatible with a net-zero economy. Then, there are activities such as steel-making that may be able to transform through economic, low-emission technologies. And there are activities such as low-emission extraction and processing of critical energy minerals which are insignificant today but where Australia could capitalise on globally significant comparative advantages.

The challenge for Australia is to navigate the phase out of the first set of activities while identifying and implementing the strategies, policies, and investments to realise the opportunities inherent in the second and third.

Trade and investment growth will be critical because the biggest opportunity lies in exports and will only be delivered if trade linkages are set up and exploited and if policy and regulatory arrangements support the necessary investment. The scale of investment required by the transformation is likely to require mobilisation of both domestic and international debt and equity providers.

Trade and investment are also critical to our domestic energy transition. In the near term, policies such as *Rewiring the nation* and state governments' renewable energy targets will increase demand for materials, equipment, capital and labour, much of which will need to come from overseas. Without the right trade and investment policies in place, Australia will not be able to meet its emissions targets and deliver on the promise of lower energy costs.

Three major Grattan reports have included detailed analysis on the challenges and opportunities for Australia as a green energy superpower. They addressed Australia's opportunity in green steel production, the broader opportunity that arises with decarbonisation of industry and the case for a 21st century industry policy to underpin Australia's transformation to a green energy superpower. These reports can be viewed in full on our website.

- The next industrial revolution : Transforming Australia to flourish in a net-zero world(2022)
- Towards net zero: practical policies to reduce industrial emissions (2021)
- Start with steel: A practical plan to support carbon workers and cut emissions (2020)

1. ABS (2019).
2. ABS (2022).

2 Key Issues

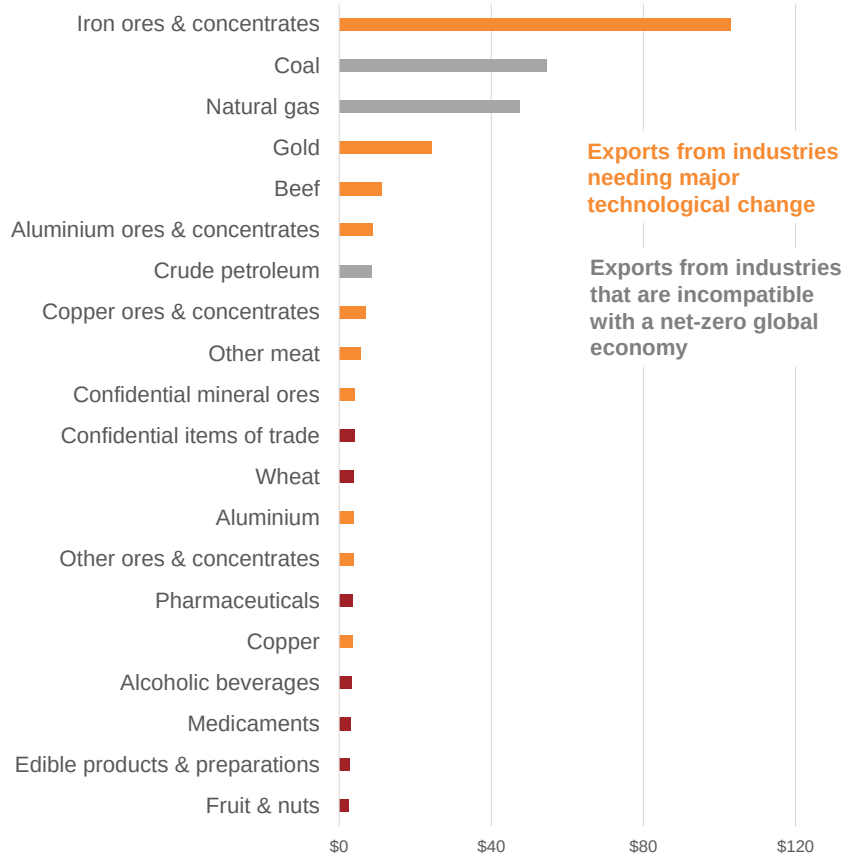
As a relatively small and open economy, Australia relies on trade for prosperity. Australia and many other countries are committed to achieving 'net zero' – reducing their emissions as much as is technically and economically feasible and offsetting any that remain – by 2050 or earlier. These commitments to net zero will profoundly change our trade.

Of $373 billion in goods exports in 2019 (Figure 2.1), $111 billion came from industries (coal, LNG and oil) that are incompatible with a net-zero global economy. A further $175 billion relate to industries where major technological change is needed to decarbonise production. This includes iron ore and grazing beef. On the upside, $14 billion in exports such as copper, cobalt and lithium are likely to experience phenomenal growth and be worth around $106 billion in 2050.

These figures underline the importance of global trade to Australia's energy transition, and how much we stand to lose if we don't get it right.

Figure 2.1: Almost all Australia's exports are vulnerable in a net-zero world

Value of export commodities (2019 $billion)



Notes: Top 20 commodities by value in 2019-20. Descriptions of confidential commodities are not available.

Source: Grattan analysis of DFAT (2021).

2.1 Emerging and future trends

Moving to net zero will profoundly change Australia's industrial sector, pushing commodities into three groups.

2.1.1 Coal and LNG

Coal mining and LNG production are essentially incompatible with a net zero economy. Demand for coal is falling in Australia and is forecast to fall across the globe (Figure 2.2). Demand for thermal coal for generating electricity will decline as it is replaced by renewable generation. The development and deployment of emerging green

steel technologies will determine the rate of decline in demand for metallurgical coal.

Global demand for LNG will also fall in a net-zero economy (Figure 2.2). Net zero will change how much LNG our trading partners want. The biggest LNG importers – China, Japan, the EU, and South Korea – all have net-zero targets. Japan, Australia's second-largest importer of LNG, plans to halve gas-fired generation by 2030.

The war in Ukraine has disrupted this picture and there is great uncertainty about the future of Russian gas. But even if Australia replaced some of Russian supply to Europe, the global trend will be the same. If anything, the war has accelerated moves away from gas, and will result in permanent demand destruction.[3]

2.1.2 Transforming industries

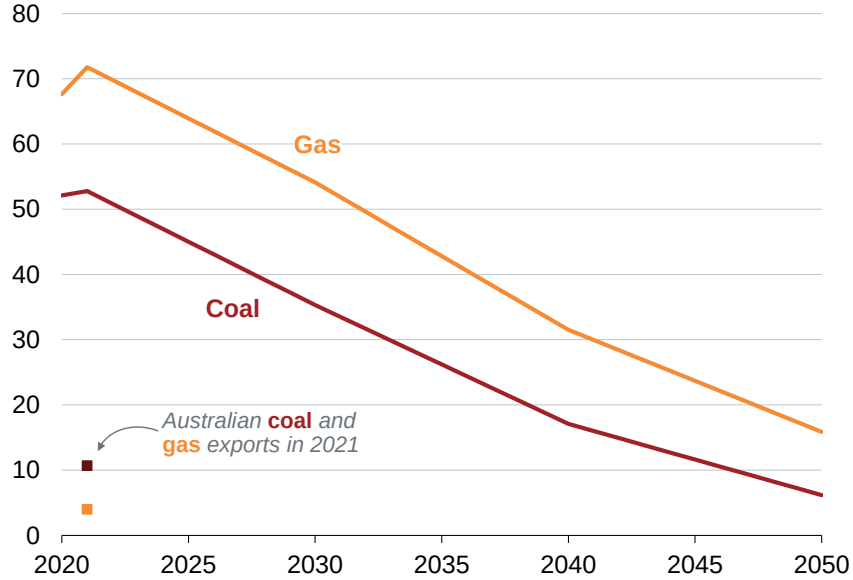
We cannot live without some industrial products such as steel, cement, aluminium, and ammonia. To be viable in a net-zero world, these products will need to be produced cleanly.

Some options already exist for decarbonising steel and cement – including using materials more efficiently, carbon capture and storage, and steel recycling. But as described in the International Energy Agency's 'net zero' scenario, 20 per cent of emissions reductions will require further technology development.[4]

Demand for aluminium is expected to continue to grow steadily, reflecting population growth and demand for aluminium in lightweight electric vehicles and solar panels. Between 2020 and 2030, aluminium demand could rise by 24 per cent.[5]

Figure 2.2: Demand for coal and gas will fall as Australia and the world move towards net zero

Global final energy consumption (EJ)



Note: EJ = exajoules. 1EJ of coal is approximately 34 million tonnes. 1 EJ of gas is approximately 19 million tonnes of LNG.

Source: Grattan analysis of IEA (2021a) and DCCEEW (2022).

3. IEA (2021a).
4. Ibid (p. 141).
5. Vass et al (2021).

Most emissions from aluminium production come from the electricity consumed by the smelter (70 per cent). Many Australian smelters have made progress on switching their facilities to renewable energy sources. But about 15 per cent of emissions are direct emissions, coming from the consumption of carbon anodes in the smelting process. As with emissions from bauxite refining, dealing with these direct emissions is more difficult. Technologies are still being developed.

Ammonia is an important feedstock for producing fertiliser and explosives. Today ammonia is made from natural gas, with carbon dioxide as a by-product. Green ammonia could, however, be made from renewable hydrogen.

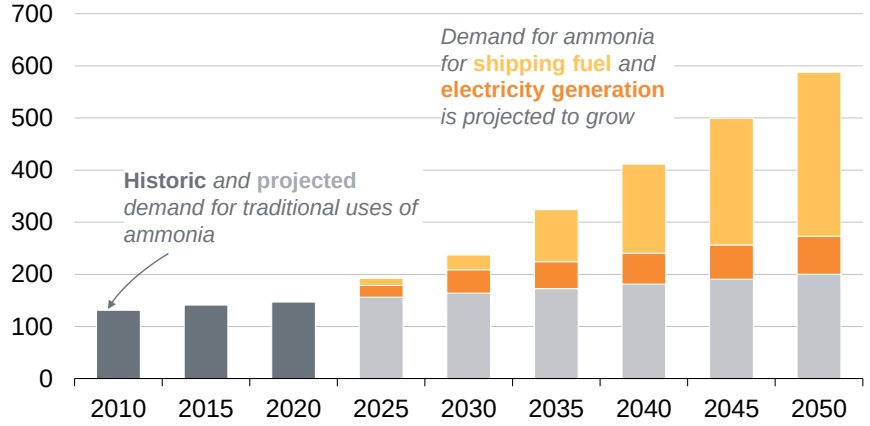
If ammonia can be commercially produced from green hydrogen, then global demand for ammonia could grow significantly through applications as a marine fuel, power generation and as a low-cost way to transport hydrogen (Figure 2.3).

2.1.3 Emerging mineral commodities

The energy transition will require large quantities of minerals and metals that have traditionally been mined only in small quantities, such as lithium, vanadium, graphite, and cobalt for batteries, silicon for solar panels, and manganese and rare earths for power electronics.

Demand for critical energy minerals is expected to grow dramatically. Global demand for lithium is expected to grow by up to 41 times by 2040. The value of both the nickel and cobalt markets is expected to be 30 times higher than now by 2040.In 2050, the cobalt market is expected to be worth US$214 billion, making it the biggest of the critical minerals.

Figure 2.3: Global demand for ammonia is projected to grow
Tonnes of ammonia (millions)



Sources: Statista (2022), IEA (2021b).

These three minerals are particularly promising for Australia with 27 per cent of the world's lithium, 22 per cent of nickel, and 21 per cent of cobalt as shown in Figure 2.4 on the following page.

Australia has the opportunity to move up the value chain to make the end-products the world will need. This could be economical where minerals processing is energy-intensive (notably nickel processing) because Australia has abundant low-cost wind and solar energy.

2.2 Australia's strategic opportunity is based on underlying strengths

Rapid reductions in the cost of wind and solar power over the past decade have turned Australia's large, sunny, and windy land mass into a globally significant resource. A decarbonising world will enable Australia to diversify beyond its existing carbon-intensive industries, by exporting renewable energy – either as electricity or hydrogen

– or low-emissions energy-intensive commodities, such as metals, chemicals, and biofuels.

The large resource base alone does not guarantee Australia's future as an energy powerhouse. Other factors contribute to the cost of renewable electricity: engineering, labour, and transport costs are each likely to be higher in Australia than many other countries. Economies of scale can bring down costs, but Australia's electricity market is small relative to the renewable resource base.

If the world acts decisively to limit carbon emissions, countries with poor renewable resources will have higher energy costs than Australia. They will look to import energy, or energy-intensive commodities, from renewable-rich countries such as Australia. In such a world, Australia's trading partners will either be implementing policies that make emissions-intensive commodities more expensive, or they will be willing to pay a 'green premium' for low-emissions commodities. In either case, Australia is likely to be highly competitive in a range of low-emissions commodity markets.

These opportunities are not certain and will emerge with international policies to reduce emissions, and/or the emerging willingness of customers to pay a 'green premium'.

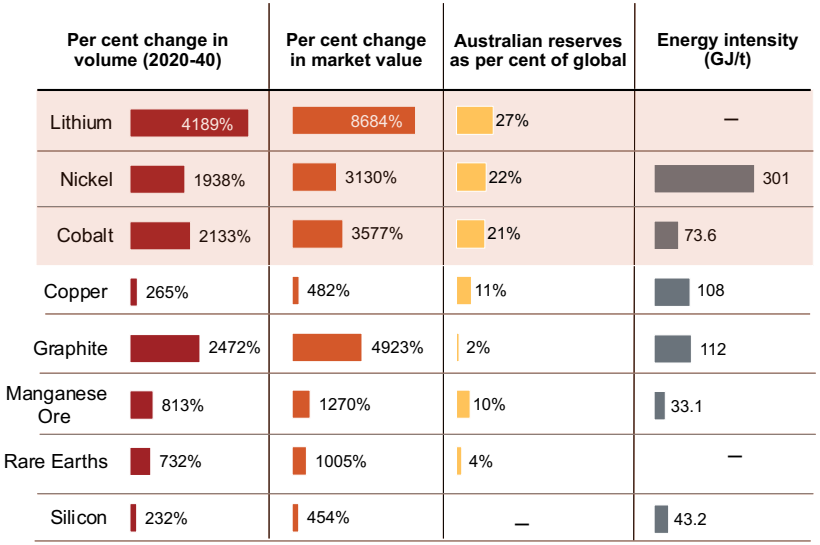
2.3 Areas of growth

Coupling Australia's renewable and mineral resources to serve an export market could make this country an energy 'superpower'.

2.3.1 Start with steel

Of Australia's clean energy opportunities, the largest and most economically viable appears to be using renewable hydrogen to produce 'green' (near zero emissions) steel. With globally cost-competitive hydrogen, it will be cheaper to produce green steel here than to ship hydrogen

Figure 2.4: Demand for critical energy minerals could fuel the next mining boom



Notes: Energy intensity is the amount of energy required to produce a tonne of refined metal. Energy intensity of rare earths production varies. Energy intensity for lithium varies and the dominant form of production in Australia is more energy-intense than the dominant form of production in competitor countries. Dashes indicate unavailable data.

Source: Grattan analysis of IEA (2021c) (volume), IEA (2021b) (value) Geoscience Australia (2020) (share of global reserves), Surovtseva et al (2022) (energy intensity of graphite), Voet et al (2018) (energy intensity of copper, manganese, and nickel), Dai et al (2018) (energy intensity of cobalt) and Maldonado (2020) (energy intensity of silicon).

and iron ore to countries such as Japan or Indonesia that have inferior renewable resources.

A market for green steel is emerging, particularly among car manufacturers, but this market is new and demand is uncertain. Low-emissions commodities are generally more expensive than their emissions-intensive equivalent. It would be risky to build a commercial-scale low-emissions plant just to satisfy the green premium market.

Australia should use the next decade to create a foothold in the emerging green steel market. The best way to do this is through direct government funding to support private investment in higher-cost, but lower-emissions, steel production – a steel 'flagship' project. This would help build the skills and capability needed in a future export-oriented expansion phase.

The government funding required to support a low-emissions steel project is not small. Government funding in the order of $500 million is likely to be necessary to underpin a multi-billion dollar modernisation of Australia's steel industry. Though the investment is large, it would also support significant emissions reductions compared to Australia's existing integrated steelworks. The cost could be $20 to $30 per tonne of carbon dioxide avoided – higher than the cost of abatement purchased through the Emissions Reduction Fund, but lower than typical recent prices for emissions permits in the EU emissions trading scheme. It is an affordable step towards decarbonising Australia's heavy industry.

Australia's rich bauxite and fossil fuel resources enable it to manufacture about 15 per cent of the world's alumina today. And Australia's share of world bauxite production (27 per cent) is comparable to, but lower than, its share of iron ore production (38 per cent).

There are also attractive opportunities for Australia in producing biofuels, renewable ammonia, and hydrogen, and by exporting electricity via undersea cables.

2.3.2 Critical minerals: the next mining boom?

Most of the minerals and metals extracted and refined in Australia are exported; and demand for minerals and metals is expected to increase sharply as the world moves towards net-zero emissions. This increase is projected to mirror the decline in demand for coal. But if Australia maintains a constant market share of the critical minerals market as it grows, this market will be worth roughly double what coal is worth today (see Figure Figure 2.5 on the next page).

2.4 The role of policy, Commonwealth agencies and special investment vehicles

Industry policy cab be used to direct resources to strategically important sectors to promote economic growth. There is a strong case for taking this approach in realising Australia's opportunity as a green energy superpower.

First, markets do not generally provide adequate incentives for research and development of new technologies, because knowledge is often intangible, risky, and difficult to appropriate. Low-emission technologies are particularly complex and uncertain.

Second, many of the technologies that might produce large emissions reductions are expensive and high-risk. Early investors face high costs, low returns, and the risk of competitors free-riding on their initiative. Investors require a reliable, long-term carbon price to underpin their investments. Yet a carbon price is inherently uncertain because it depends on the decisions of governments. For both these reasons, investment in low-emission technologies is and will remain critically inadequate.

And third, there is a time imperative. Market forces are not good at managing structural transformations at high speed when the future is deeply uncertain. Moreover, the long-lived nature of industrial assets means that industry is particularly poorly suited to fast changes.

Australia needs a 21st Century industry policy that sets a clear emissions-reduction target, pushes down emissions from existing facilities, encourages low- or zero-emissions refurbishments and new facilities, and supports export-led industries that can flourish in a net-zero world.

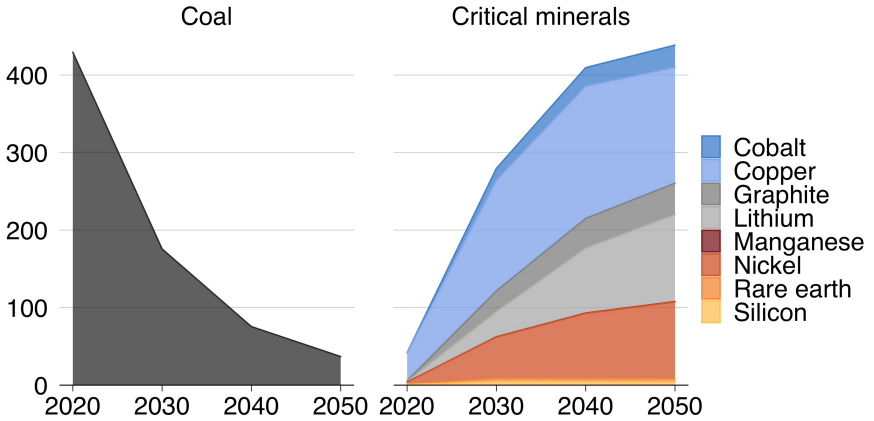
Many of the necessary policy tools already exist, and need only a few tweaks to make them more effective. These include the Safeguard Mechanism, and the major federal funding facilities such as the Northern Australia Infrastructure Facility (NAIF), the Australian Renewable Energy Agency (ARENA), Export Finance Australia (EFA), the Clean Energy Finance Corporation (CEFC) and the new National Reconstruction Fund. There are some gaps, particularly in bringing forward investment in low-carbon refurbishments of existing facilities, and supporting demand for 'green' commodities.

Much of the capital required to transform the sector will come from private investment. However, there will be a risk gap for first-of-a-kind and first-in-country transformation of industrial facilities. Making concessional finance available is one way to share this risk.The CEFC, provided it has access to enough funds and can prudently manage the risk, would be the ideal vehicle, and could aim to make between 5 and 10 'big bets' on big net-zero industrial facilities. As proposed above, a green steel flagship project would be one such opportunity. Depending on its other priorities and final design, the National Reconstruction Fund may also play this role. The NAIF could also be used.

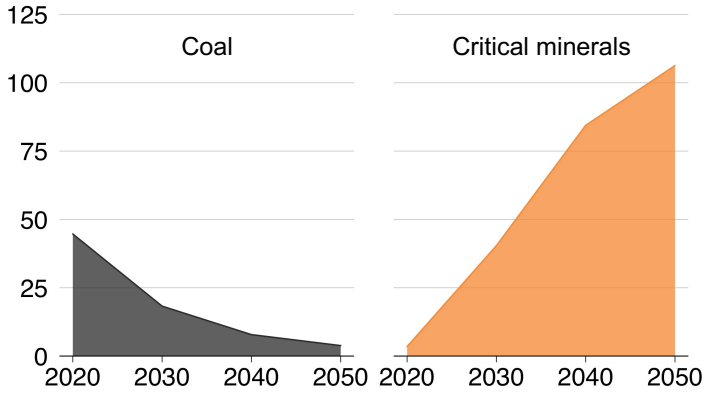
An emerging risk is competition for international capital. To ensure Australia is not at the back of the queue for capital, the Federal

Figure 2.5: Minerals critical to low-emissions technologies are expected to be in high demand over coming decades

Global market value (US$billion, inflation-adjusted to 2019)



Australian revenue assuming constant market share (A$b)



Notes: Includes total revenue for coal and for selected critical minerals used in clean energy technologies. The prices of critical minerals are based on conservative assumptions about cost increases (about a 10-to-20 per cent increase from current levels to 2050). Australia's share of the global coal market is taken from IEA (2020), and minerals from Bruce et al (2021). Exchange rate is assumed to be 0.73 USD per AUD.

Source: Grattan analysis of IEA (2021b, p. 163).

Government and regulators should bring Australian regulations and guidance into line with international best practice:

- ASIC should update regulatory guidance for listed companies in line with the Task Force on Climate-related Financial Disclosures (TCFD), to establish clear regulatory expectations on disclosure of material climate-related risk.102
- APRA should update the Climate Change Prudential Practice Guidance for regulated entities in line with International Financial Reporting Standards Foundation recommendations, to establish regulatory expectation on disclosure of material climate-related risk.
- Federal Treasury should review whether the current legislative framework on disclosure is consistent with the TCFD framework.

2.5 Trade agreements and economic frameworks

Australia's economic diplomacy focuses on promoting trade, encouraging growth, attracting investment and supporting Australian business recognise the increasing interconnectivity between Australia and the global economy.[6] Free trade agreements, and other bitaleral co-operation agreements a key parts of the this framework.

2.5.1 A revised trade and investment framework

Australia's negotiating positions for free trade agreements have tended to focus on improved market access for Australian exports and Australian services providers, as well as expansion of two-way investment flows (see for example DFAT (2022b)). While all of these will benefit Australia once it has become a renewable energy superpower, more is needed on the journey to that goal.

One critical element is access to the materials, equipment and labour required to build the renewable power plants and transmission infrastructure required to be a superpower. The construction required to replace retiring coal generators with renewables was estimated in 2021 to add 10 per cent to Australian demand for steel across the next decade.[7] This number will be higher once the government's Rewiring the Nation fund commences, and many times higher if the renewable generation required to by a superpower is built. A similar story exists for other materials as well as equipment and trades, and for manufactured goods like solar panels, wind turbines, and power electronics. And Australia is competing with rest of the world as other economies transition their energy systems to reduce their reliance on gas and coal imports and achieve their net-zero goals.

The government should make better use of its trade and investment framework to secure access to the materials, equipment and labour we will need to reach our own net-zero ambitions and become a renewable energy superpower. This could mean accelerating tariff removals in free trade agreements, or establishing separate agreements with like-minded countries to secure supply chains.

It should also revisit existing energy and resource co-operation agreements with Germany, India, Japan, Republic of Korea and Taiwan and identify pathways to move those agreements away from promoting coal and gas exports. Future agreements should focus on securing trade in areas of competitive advantage in a net-zero global economy; and securing Australia's access to the materials and technology we will need. Similarly, international partnerships on clean energy innovation should identify practical pathways to move beyond technical co-operation and towards greater trade.[8]

6. DFAT (2022a).

7. Infrastructure Australia (2021).
8. Innovation partnerships are in place with Germany, India, Japan, the Republic of Korea, Singapore, the United Kingdom, and the United States.

2.5.2 Levelling the playing field for Australian industry

As Australian industry ‘greens’ it may face higher costs compared to other producer countries that are not moving as quickly to manage emissions. This can cause ‘carbon leakage’ if Australian consumers choosing cheaper imports over greener local production.

Current policies like the Renewable Energy Target and the Safeguard Mechanism include assistance to Australian industries to prevent carbon leakage. Other countries have similar assistance for domestic industry.

But permanent assistance is not a sustainable long-term option. The European Union is moving to phase out such assistance, replacing it with a carbon border adjustment mechanism which prices carbon into imports at a level equivalent to domestic production.

The government should consider a similar mechanism for Australia in the medium term.

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