Australian National University

A/Prof Emma Aisbett
Associate Director (Research)
Zero-Carbon Energy for the Asia-Pacific Grand Challenge
The Australian National University
emma.aisbett@anu.edu.au
zerocarbon@anu.edu.au

To
Committee Secretary
Joint Standing Committee on Trade and Investment Growth
Australian Parliament

Subject: ANU Zero-Carbon Energy for the Asia-Pacific Submission to Australia's Transition to a Green Energy Superpower Inquiry

On behalf of the ANU Grand Challenge Zero-Carbon Energy (ZCEAP) for the Asia-Pacific, we are pleased to provide the following submission to help inform the Joint Standing Committee on Trade and Investment Growth inquire into how trade and investment can support Australia's transition to a green energy superpower.

This submission was prepared by an interdisciplinary team of experts in our ZCEAP team. We hope it is useful to the Joint Standing Committee through research-based insights.

The submission draws on published research by ZCEAP, all available at anu.edu.au/zerocarbon, and on various policy briefings by ZCEAP.

We will be happy to provide further information to the Committee, including if desired by giving evidence at Committee hearings.

Yours sincerely,

A/Prof Emma Aisbett,

Associate Director (Research), ANU Grand Challenge Zero-Carbon Energy for the Asia-Pacific

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Australian National University

Submission to Australia's transition to a green energy superpower inquiry

ANU Zero Carbon Energy for the Asia-Pacific initiative

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Contributors: Emma Aisbett, Fiona Beck, Paul Burke, Frank Jotzo, Bin Lu, John Pye, Brad Riley, Ken Baldwin & Dharani Sabba

1. Summary and Recommendations

This submission to the Joint Standing Committee on Trade and Investment Growth addresses aspects of how trade and investment can support Australia's transition to a 'green energy superpower'. It provides both specific recommendations on the issues flagged by the inquiry, and research-based insights on future renewable energy based exports from Australia.

The submission is based on the body of work undertaken by the ANU Zero Carbon Energy for the Asia-Pacific (ZCEAP initiative. All cited works are outputs from the initiative and can be found at www.anu.edu.au/zerocarbon.

We would be pleased to provide further information to the Committee including by giving evidence at a hearing if desired.

Recommendations:

A. In accordance with OECD Recommendations, Australian Government (Aus. Gov) initiatives, including Green Industrial Policy, should target clearly identified market failures inhibiting the growth of green export industries. These include:
   i. Directly addressing greenhouse gas externalities through emissions pricing or binding, tradable quotas (e.g. Safeguard Mechanism).
   ii. Investing in electricity transmission, energy storage and other infrastructure to underpin new generation investment and address network externalities.
   iii. Addressing information failures by providing trusted information to domestic and international investors and consumers. For example, through developing and expanding the Guarantee of Origin scheme beyond hydrogen production and through clearly road mapping the trajectory to net zero.
   iv. Investing in public Australian research and development to provide public goods and knowledge spill-overs.
   v. Ensuring that the ARENA and CEFC are sufficiently funded so that they can address credit constraints and provide returns on Government investment in new industries.
B. Aus. Gov. should continue to collaborate with current and potential trading partners through technology partnerships and Green Economy Agreements to:
   i. Minimise unnecessary barriers to trade and investment arising from poor co-ordination of domestic initiatives and regulation.
   ii. Address market failures such as chicken-and-egg problems that inhibit the growth of cross-border green supply chains.
C. Aus. Gov. should reform domestic policies and international agreements that cause market distortions which are inhibiting the net zero transition. This includes:
   i. Reforming and reducing explicit and implicit subsidies to polluting industries such as fossil fuels.
   ii. Reforming or disengaging from investment treaties that allow foreign investors to bring financial claims against Government for losses arising from legitimate net-zero policy initiatives.
D. Aus. Gov. should ensure renewable energy trade and investment provides benefits:
   i. For all Australians,

ii. Especially for Indigenous Australians,
iii. Without compromising domestic environmental objectives.

2. Emerging and possible future trends

Australia has already played a leading role in meeting the Asia-Pacific region's energy and resource needs, becoming the world's largest exporter of coal, liquefied natural gas, iron ore, and alumina. However, these exports are tied to sizeable consequential emissions at the point of use or processing, accounting for about 8.6% of the total greenhouse gas emissions of the Asia-Pacific (Burke et al, 2022). Furthermore, a combination of geopolitical shifts and decarbonisation policies is placing our traditional Asian fossil fuel export markets in question. Our work (Gosens, Turnbull & Jotzo, 2022) has shown that China's decarbonisation and energy security plans will reduce seaborne coal imports. We have also shown that several countries in the region have potential to be near self-sufficient with 100% renewable energy (e.g. Cheng et al, 2022 for Japan; Burke et al, 2019 and Silalahi et al, 2022 for Indonesia, Lu et al., 2021a for Southeast Asia).

Despite many countries having the potential for near 100% self-sufficiency in renewable energy, **Australia has the potential to be a renewable energy powerhouse in the coming decades.** Realising this potential rests on our ability to scale very low-cost renewable energy production and utilisation faster than other potential importers or exporters. The sources of Australia's potential to achieve scale and low cost derive from factors including its open trade and investment regime, access and co-location of world-leading mineral and renewable energy resources, and high-skilled workforce. These factors have already seen Australia achieve world-leading rates of investment and installation of solar and wind power projects (Stocks, Blakers and Baldwin, 2019). Our work has highlighted emerging and possible future pathways via which Australia could become an exporter of zero-carbon energy (direct or embodied), including:

A. Direct exports of renewable electricity via sub-sea cables (Lu et al., 2021b).

B. Exports of zero-carbon fuels such as green hydrogen and hydrogen derivatives like ammonia that are produced using electrolysis powered by renewable electricity (Jotzo, 2022; Longden et al, 2022; Stocks et al., 2022).

C. Export of "green" metals processed from Australian ores using renewable energy and renewable hydrogen (Venkataraman et al., 2022), in particular hot briquetted iron to supply the green steel value chain.

We have shown (Burke et al, Energy, 2022) that the land requirements for major export industries based on renewable energy are about one third the area of improved pasture in Australia today (see Figure 1).

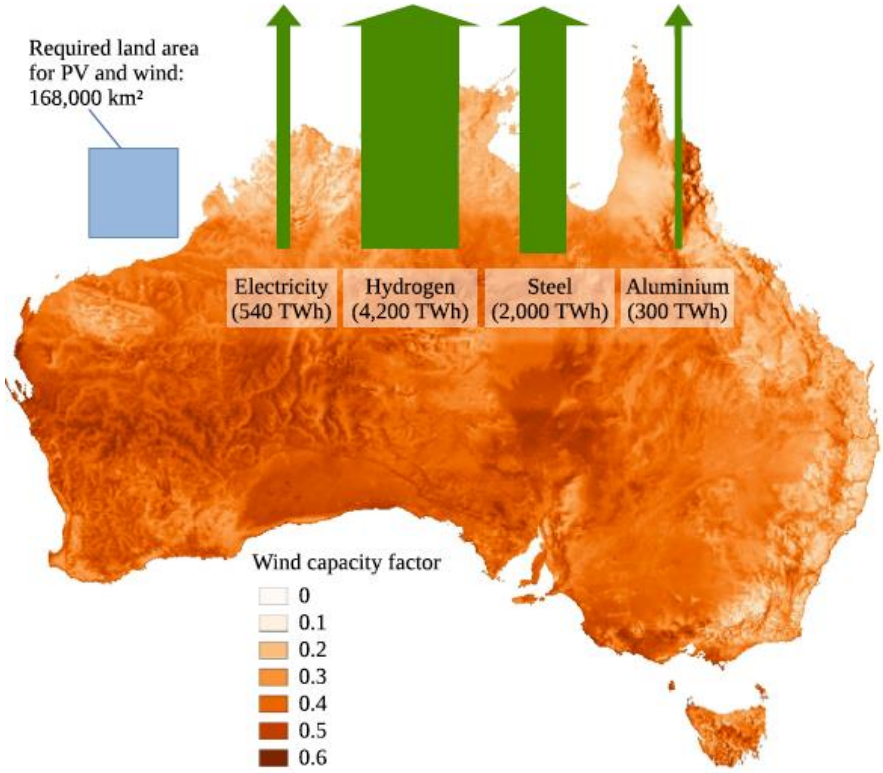

FIG. 1: Land and renewable electricity (TWh/year) requirements for a hypothetical scenario in which: (1) Australia exports the same amount of energy as it does now, but as renewable electricity (20% - or 540 TWh/year) and renewable hydrogen (80% - or 65 Mt/year); and (2) in which Australia processes current exports of iron and aluminium ores to export as green steel (510 Mt/year) and green aluminium (18 Mt/year) (Burke et al, Energy, 2022).

In order for Australia to realise its potential as a renewable energy-based powerhouse, we will need good government policies to address the market failures and policy-induced distortions that will otherwise limit the development and expansion of new, green industries. Good policy will also be essential to ensure that the benefits from these new industries are shared fairly, particularly with Indigenous Australians. Specific policy recommendations to achieve these goals are explained on the following pages.

3. Addressing market failures limiting green exports

Recommendation A.i: Addressing greenhouse gas externalities through pricing or binding, tradable quotas.

Ideally, Australia would have an economy-wide carbon pricing mechanism to help guide investment and consumption choices towards the net zero by 2050 emissions target. Our research found that carbon pricing is highly effective in achieving emissions reductions (Best et al., 2020). Countries in our region with either a carbon tax or an emissions trading scheme (ETS) include New Zealand, Singapore, China, Japan, and South Korea (Burke

and Do, 2021). The reform of the safeguard mechanism offers an opportunity to re-introduce a form of carbon pricing in part of Australia's economy.

Recommendation A.ii: Investing in electricity transmission, energy storage and other infrastructure to underpin new generation investment and address network externalities.

Very low-cost renewable energy supply is the fundamental requirement for Australia's renewable energy-based export success. Electricity transmission networks and energy storage facilities are key to enabling low-cost renewable energy. They are necessary to allow connection of renewable energy generation to the grid, geographical averaging (which reduces storage requirements and hence system costs), and connection of export-oriented loads such as hydrogen generation facilities. Network externalities and "club good" nature of electricity transmission mean that private investment alone will not provide the optimal transmission infrastructure, and not necessarily provide required storage investments. There is a need for government to help coordinate, harness and direct private investment. Direct government investment will further help reduce credit constraints and ensure shared benefits to Australians.

Recommendation A.iii: Addressing information failures by providing trusted information to domestic and international investors and consumers.

In order to access emerging markets exports, Australian producers will need to be able to prove their low emissions and renewable energy credentials (Reeve & Aisbett, 2022). Certification (including in the form of a Guarantee of Origin, GoO) is likely to often be essential for this task (White et al, 2021). Many private initiatives are seeking to provide certification for products including hydrogen, ammonia, steel and aluminium (Aisbett et al, 2022). However, there remains an important role for government certification/GoO. A high-quality, government-led scheme has the advantages of:

- Reducing customer and investor confusion about which scheme to trust,
- Reducing regulatory burden for participating producers and suppliers, and
- Increasing the ability to negotiate mutual recognition agreements and interoperability with relevant schemes and regulations in the destination markets.

Recommendation A.iv: Investing in public Australian research and development to provide public goods and knowledge spill-overs.

Without research and development investments by government, Australia's renewable-based industries will not develop at the speed required to successfully compete. While Australia's relatively small population means it cannot match the dollar amounts of R&D funding of majors such as the EU and US, our track record has shown that R&D funding targeted at industries in which we have potential comparative advantage can be hugely successful. Australia is a world-leader in mining technology and Australian developed solar panels dominate global markets.

Nonetheless, targeted investments in technology research and development will be essential to:

- Identify and develop as required technologies best suited to Australia and its potential exports, for example, those technologies best suited to our specific mineral ores., technology for large scale hydrogen production,

In the green steel space, in particular, it is critical that international technologies designed primarily with highly beneficiated magnetite ores in mind are adapted and proven applicable with local lower-grade high-volume Pilbara ores in particular – and this likely requires a series of prototypes of increasing scale to be developed and deployed over the coming 5-8 years in order to be relevant to the global green steel trajectory.

Furthermore, with appropriate research investments, Australia has the potential to be a policy and regulation leader. Without them we risk being rendered a rule-taker and having to comply with regulatory frameworks developed by and tuned for jurisdictions such as the European Union. An example of Australian Government support for this sort of research is our Australian Research Council Linkage project on the design of an economy-wide public embedded emissions accounting system (see Minister's schedule of ARC Linkage Grants).

Recommendation A.v: Funding to overcome credit constraints and provide returns on Government investment in new industries.

The growth rate of new industries is typically limited by the availability of low-cost credit due to higher perceived risk of novel industries. Robust funding of the Australian Renewable Energy Agency and the Clean Energy Finance Corporation (CEFC) can provide Australian renewables-based industries with a speed-to-scale advantage over their competitors elsewhere. Compared with subsidies and tax-breaks, the CEFC model has the added advantage of providing returns to Government from successful investments.

Australian technology has often struggled to bridge the gap between research and development, and deployment in the past. More emphasis should be placed on funding and supporting targeted schemes for prototyping and first-of-a-kind scale-up of new technologies. While many of the technologies required for green hydrogen scale up are relatively mature, they are not yet widely deployed. Much of the required learnings in this area will be in integration of technologies and scaling up capacity. Funding to de-risk deployment, such as those that have been run through ARENA and the CEFC, should be increased and extended to support first movers in this space.

4. Collaboration with trading partners

Aus. Gov. has been proactive in International Green-Economy Collaborations (Aisbett, Raynal and Jones, 2022) with trading partners through low-emissions technology partnerships and the Singapore-Australia Green Economy Agreement. These collaborations should be continued and built upon, including through the Green Economy Pillar of the Indo-Pacific Economic Framework Agreement currently under negotiation. Our work (Aisbett, Raynal and Jones, 2022) has argued that key objectives of should be to:

Recommendation B.i: Use International Green-Economy Collaborations to minimise unnecessary barriers to trade and investment arising from poor co-ordination of domestic initiatives and regulation.

The net-zero transition requires the development and implementation of many policies and regulations that have the potential to negatively impact trade and investment. Meanwhile, trade and investment are essential underpinnings for a rapid and efficient net zero transition. It is imperative to work collaboratively with our economic partners to reduce unnecessary barriers to trade and investment that can arise from poor alignment of trade-related climate polices including carbon border adjustments, embedded emissions accounting systems, and preferential environmental good liberalisation.

Recommendation B.ii: Use International Green-Economy Collaborations to address market failures such as chicken-and-egg problems that inhibit the growth of cross-border green supply chains.

A key example of these chicken and egg problems is the reticence of potential downstream hydrogen users in key markets to invest in the transition to hydrogen because of uncertainty about the price and availability of green hydrogen. Meanwhile, Australian project developers face challenges in obtaining investment and credit because of concerns about the extent of the downstream markets. Collaborations between governments in exporting and importing countries can provide clear signals to supply chain participants and de-risk these co-dependent investments.

5. Reforming existing policies and treaties

After decades of policy instability and lack of clear direction towards net zero emissions, Australia has a legacy of both domestic policies and international agreements that inhibit the growth of renewable energy-based export industries. Removing these policy and regulatory inhibitions is one of the easiest ways to support Australia's transformation to a renewable energy export powerhouse.

Recommendation C.i: Reduce and remove explicit and implicit subsidies to polluting industries such as fossil fuels.

The existence of these subsidies inhibits the development of renewable based industries both by making them relatively less competitive, and by sending the wrong signals to potential buyers and investors. Federal government subsidies for gas exploration are one example of the type of support that would ideally be fully avoided.

Recommendation C.ii: Reform or disengage from investment treaties that allow foreign investors to bring financial claims against Government for losses arising from legitimate net-zero policy initiatives.

Current investment treaties pose a serious threat to Australia's transition to a renewable energy powerhouse (Aisbett et al, 2020). It has been estimated that governments around the world could face up to $340bn in claims from investors under investment treaties if they implement policies towards Paris Agreement commitments. This figure does not include the potential claims brought in response to Green Industrial Policies such as those described in this submission. Thankfully, there are alternatives. These alternatives include not signing any further agreements that involve investor-state dispute

settlement, and revoking our ratification of existing agreements (Aisbett et al, 2020). Another alternative is to implement reforms to the way compensation award "damages" are calculated under investment treaties according to the award-winning proposal of Aisbett and Bonnitcha (Aisbett & Bonnitcha, 2021; Bonnitcha & Aisbett, 2021). This option has the advantage of supporting investment in renewables-based industries in Australia and providing Australian investors overseas with protection from predatory host-state actions, without exposing Australian Governments to compensation claims arising from their net-zero transition policies (Aisbett, 2020) Aisbett (2022) has explained that this option is even compatible with proactive Green Industrial Policies.

6. Sustainable development

Recommendation D.i: Ensure that emergence of renewable energy-based export industries is an example of sustainable development for all Australians.

Sustainable development principles require free prior informed consent and often compensation or other benefit sharing mechanisms to ensure that local populations affected by developments are not only not left worse off, but also share the net benefits (O'Neill et al, 2021). This is true not only of landowners on whose property solar, wind, or transmission infrastructure is built, but also of nearby communities whose visual amenity or cultural heritage is affected (Blakers, 2022).

Similarly, export industries need to be based on renewable energy capacity that is additional to that which has been installed to support Australia's domestic decarbonisation. In many cases the decarbonisation potential of the renewable energy is higher in domestic uses (particularly when offsetting coal fired electricity generation). Furthermore, it is important that energy-based exports do not raise the cost of the net-zero transition for Australian households.

Recommendation D.ii: Ensure that sustainable development opportunities for Indigenous Australians from renewable energy-based trade and investment are maximised.

Aboriginal and Torres Strait Islander people hold varying strengths of rights and interests to lands and waters. This places an impetus on governments to 'level the playing field' to ensure zero carbon industries are progressed with the full and engaged participation of First Nations people and communities, based on processes of Free, Prior and Informed Consent (FPIC) (O'Neill et al., 2022).

To date, many Indigenous communities have not received commensurate benefits from Australia's mining boom, despite bearing many of the economic, social, cultural and environmental costs. Yet there is a very real opportunity for a more inclusive model to be adopted in the case of utility-scale renewable energy generation and attendant downstream industries. In this context, resourcing and creating opportunities for First Nations participation, ownership and benefit is critical - to Australia's commitments to both the Sustainable Development Goals (SDG's) and United Nations Declaration of the Rights of Indigenous Peoples (UNDRIP 2007) as well as to the stated aims of the National Agreement on Closing the Gap in partnership.

Recommendation D.iii: Policy and regulation should be put in place to ensure that other environmental issues are not exacerbated in the quest to become a renewable energy powerhouse.

Potential environmental costs of renewable energy development include large-scale land-clearing to make room for solar and wind, damming of rivers to provide pumped hydro storage, and large-scale extraction of fresh water as a feedstock for hydrogen electrolysers. Appropriate regulation can minimise or even eliminate these problems. For example, our work has shown that off-river pumped hydro is a low-cost and low-impact alternative to on-river schemes like Snowy 2.0 (Blakers, Lu & Stocks, 2022; Blakers, Stocks, Lu & Cheng, 2021). Similarly, desalination of seawater using renewable energy can provide the required feedstock for hydrogen electrolysis at scale.

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