ANU Grand Challenge Submission to the AU-SG GEA

Cover Letter:

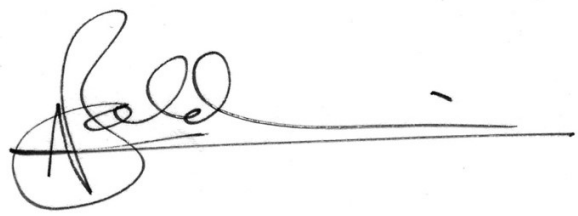
On behalf of the ANU Grand Challenge Zero-Carbon Energy for the Asia-Pacific, I am pleased to provide the following submission to help inform Australian Government negotiations with Singapore towards a Green Economy Agreement (GEA). We applaud the Government's initiative in this leading example of international green industrial policy. If best-practice policy development is followed, the agreement can help to achieve both economic and environmental objectives through cross-border trade and investment.

We hope that the submission below, prepared by an interdisciplinary team of experts in our Grand Challenge team, helps both Governments achieve these goals.

Please note that the submission draws heavily on as yet unpublished work by Grand Challenge team members and on lecture materials prepared for DFAT Australia-Awards Grid Integration of Renewable Energy short courses being delivered by the ANU. The Grand Challenge has also engaged with our collaborators in the Solar Energy Research Institute of Singapore to help promote Australia-Singapore collaboration on hydrogen and renewable electricity trade, and have proposed a joint symposium on this topic.

For more information about this research and teaching, please contact Emma Aisbett (emma.aisbett@anu.edu.au).

Yours sincerely,



Prof. Kenneth Baldwin

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on behalf of Emma Aisbett, Kenneth Baldwin, Wenting Cheng, Reza Fazeli, Frank Jotzo, Chell Lyons, Yuan Peng, Lee White

Summary

A rapid, fair and efficient transition to net zero emissions in the Indo-Pacific - given its future global importance as an energy user - is an existential need for many species and communities. International trade and investment have a crucial role to play in the net zero transition for Australia, our region and the world. Similarly, it is increasingly recognized that Green Industrial Policy (GIP) is an essential component to reaching net zero by 2050. Australia's Technology Investment Roadmap is a case in point. While traditionally industry policy and trade policy have not always aligned, they will need to interact more coherently if we are to achieve a net zero global economy by 2050. The Singapore-Australia Green Economy Agreement (GEA) is important because it provides an opportunity to achieve greater synergies between these two policy areas. It also has the potential to provide foundation stones, whether as a platform or incubator of ideas and approaches, for later regional or even multilateral initiatives. Last but not least, the GEA signals commitment by both governments to work together on greening bilateral and regional trade and investment. Signalling that upscaling of future green energy trade is a clear priority for both parties should be at the centre of the GEA.

While the potential scope for what could be included in the GEA is enormous, we recommend defining scope according to best-practice policy principles; including clear identification of the market failures[1] being addressed, and a focus on market failures that cannot be addressed by domestic measures. Following this logic, substantive priorities for the GEA should include:[2]

1. Ensuring that information failures surrounding sustainability aspects of traded products, including embedded emissions content, are addressed by collaborating on:
    - embedded emissions accounting frameworks (see page 11),
    - product certification and standards (see page 12 inter alia), and
    - carbon markets (see page 17).
2. Addressing market failures caused by the interaction of credit constraints and information failures by:
    - collaborating on green investment and finance principles, policies and activities, including definitions (see page 16-17).
    - sending information to markets and other governments by:
        - referencing relevant objectives in the parties' related key policy statements (e.g. the Australian Government Technology Investment Roadmap and related statements), and
        - emphasizing the importance of prospective renewable energy-based exports from Australia to Singapore, including electricity via HVDC submarine cable, and the likely relevance of this for prospective regional connectivity.

[1] Throughout this submission "market failures" refers to the welfare economic definition – that is – anything that causes are failure of the assumptions of the First Welfare Theorem.

[2] These recommended inclusions are based on our team's expertise on production and export of renewable electricity and clean energy embedded commodities. It is not meant to be exclusive. For example, alignment of certification and standards related to life-cycle emissions and recycling/reuse would also qualify under point 1 above where the goal is to promote energy efficiency and/or a more circular regional economy. These are both worthy goals that deserve a place along-side net zero transition in the GEA.

3. Addressing co-ordination failures and network externalities by:
    - collaborating on policy and development activities for supply chain infrastructure for trade in renewable energy as electricity or embedded in commodities such as hydrogen and ammonia (see page 11), and
    - facilitating track 1.5 and 2.0 diplomacy and information sharing via joint conferences for industry and/or academia, joint research projects, and exchange programs (see page 11.
4. Eliminate unnecessary/unintended regulatory barriers to trade and investment by:
    - developing processes for identification of green goods and services for priority removal of non-tariff barriers (see page 14).
    - seeking to maximise compatibility in definitions of "clean" and "green" across the policy domains: product certification, finance principles and trade definitions (see page 13).
5. Reforming investment agreement provisions to improve government ability to address substantive market failures inhibiting the green economy by clarifying how "damages" should be calculated under ISDS cases (see page 16).

In addition to the recommended substantive priorities above, this submission also draws on best-practice policy principles from both Trade & Investment and Green Industrial Policy domains to recommend procedural priorities. These include consistency with international obligations, clear objectives, cross-sectoral involvement, sufficient resourcing for implementation, and rigorous review and updating.

In addition to providing details on the above recommendations, the remainder of our submission provides: bilateral context of the GEA (page 6-7); best-practice Green Industrial Policy principles (pages 7 & 10); and answers to the specific questions posed on the GEA website (pages 9-18).

Introduction and context for the GEA

The Singapore-Australia Green Economy Agreement (GEA) is being negotiated at a very significant time for both countries' respective energy policies. This reflects the dramatic changes underway in global energy production and planning related to the increased awareness of the need to act quickly and decisively on climate change. The global community and individual governments are focused on deciding the metrics for how and where to allocate the resources required to mitigate and adapt to climate change, and have this mesh with important economic policy and other goals of government.

There is little doubt that a massive upscaling of clean energy production and use will be undertaken globally in response to climate change. This expansion has begun and is accelerating, with the steady downward shift of technology cost curves interacting with an increased understanding of the costs of climate change. In particular, the commercial viability of wind and solar PV generated energy has dramatically altered the decision-making landscape for future investment in domestic energy generation. Importantly, it has also demonstrated that more rapid improvements can be made in technologies than anticipated with real ramifications for the economic mainstream. This development has helped energise relevant government and business actions and planning.

Australia could potentially play a significant role in this global transition, given our abundance of renewable energy resources, large land mass, experience as a resources-based, exporting economy and proximity to the epicentre of global energy demand growth in the Asia-Pacific. Singapore's and Australia's economies have clearly complementary roles at different stages of supply chains in the emerging net-zero global economy and could enjoy great benefit from developing this trade and in making the requisite investments. International trade and investment can lower the costs of the net zero transition by allowing countries to exploit their comparative advantages and maximise economies of scale. Trade and investment also have an essential role to play in the technology transfer and diffusion that will be critical to global efforts to remain under 1.5C warming. Consequently, trade and investment policy has an important role to play in the net zero transition.

Green Industrial Policy (GIP) is another key component of government efforts to reach net zero. GIP comprises sector-targeted policies which aim to address both economic and environmental objectives in a harmonised way.[3] Australia's National Hydrogen Strategy, Technology Investment Roadmap and Low Emissions Technology Statements, the Australian Renewable Energy Agency's grants and Clean Energy Finance Corporation loans are all examples of green industrial policy. International examples include the EU Green Deal, US Green New Deal and Build Back Better (reflected in recent infrastructure and budget reconciliation legislation in Congress), Japan's and Korea's Green New Deals. These developments all respond, at least in part, to the core Paris Agreement commitment to increase abatement efforts over time. These policy developments also reflect a movement of climate policy to the economic policy mainstream and the transition to clean energy systems being viewed at least as much an opportunity as a cost for economic systems.

Traditionally, industrial policy has often been seen as antagonistic to open trade and investment regimes, so there is a need to revisit GIP to ensure that it is innovative and supportive of trade and investment and related policies. International Green Industrial Policy (IGIP), which explicitly combines the two policy regimes, is a useful development in this regard. The GEA is a leading example of IGIP. Australia's Low and Zero Emissions Technology Partnerships with countries such as South Korea are other important examples, as are initiatives such as the German-Australian HySupply project. Australia is far from alone in recognizing the importance of IGIP. Major industrial economies are actively pursuing these policies. The 2021 Japan-EU Green Alliance and the recent EU-US set of arrangements on steel and aluminium trade are high profile examples. Hydrogen supply chains have been particularly intense areas of such cooperation, with numerous bilateral projects similar to HySupply around the world.

It will be essential for Australia to engage effectively in the IGIP policy space given our huge potential renewable resources and the value to us of obtaining a 'first mover' advantage, or risk being seriously disadvantaged in emerging global markets. In this light, the Australia-Singapore Green Economy Agreement (GEA) is an important initiative.

Purpose, potential pitfalls and principles

[3] Emma Aisbett. "Green Industrial Policy" in Haddad B. & Salomon B.D. (eds) Dictionary of Ecological Economics, (2022). Edward Elgar Press.

The Australia-Singapore GEA can be understood as both a potential instrument embodying and reflecting IGIP, and as a deep sectoral bilateral economic cooperation agreement. Both of these ways of understanding suggest purposes, principles and potential pitfalls for the agreement. By understanding purpose and effectively integrating with best-practice principles and practical elements, potential pitfalls can be avoided. Such an approach can also help maximise the effectiveness of the GEA in the bilateral context and also form a platform for possible expansion with regional partners. It could also form a template for other international instruments aimed at developing cross-border, low emissions trade and related IGIP.

Purposes

There are two major purposes of GIP. Economists frame its purpose as addressing market failures that inhibit the development and growth of environmentally preferred industries. These market failures include information failures, knowledge/R&D spillovers, dynamic economies of scale, coordination failures such as chicken and egg problems, and credit constraints. The second major purpose of GIP is as a process to support learning and discovery for both government and private sectors.

There is a large body of knowledge on the purpose of economic partnership agreements. Broadly speaking, they have two purposes. The economic view, mirroring that for GIP, is that these agreements should seek to address market failures that are inhibiting economic cooperation (especially trade and investment) between partners. Key market failures include policy-induced market barriers such as tariff and non-tariff measures limiting efficient trade, and restrictions and hold-up problems limiting efficient cross-border investment. Political science views the purpose of economic treaties to include signalling, both domestically and geo-politically, and to reflect political perspectives. For the signal entailed in an agreement to be meaningful it is imperative that it involve commitment to cost-incurring actions for the parties which can be demonstrated as having clear benefits to both sides.

Potential Pitfalls

The potential pitfalls of industry policy are well known. For decades industry policy was generally out of favour because it was believed that "government failure" was worse than the market failures industry policy ostensibly addressed. Governments were believed to be bad at 'picking winners', either because they lacked sufficient information, capacity or because they were captured by vested interests. Recent research suggests that this has helped create a 'pessimism bias' creating a chilling effect on government policy action on clean energy and a consistent under-estimation of forecast rates of improvement in key clean energy costs[4].

Adherence to the principles described below will help to ensure that these pitfalls are avoided and the Australia-Singapore GEA provides welfare benefits broadly across the Australian and Singaporean communities.

Principles

Good policy principles are well-known and documented (see for example the OECD Recommendation of the Council on Regulatory Policy & Governance, 2012). In the context of IGIP, the essence of good

[4] The Economics of Energy Innovation and System Transition (EEIST) Consortium, The New Economics of Innovation and Transition: Evaluating Opportunities and Risks, 2021 (p36).

policymaking is clarity about the market failures being addressed and the targeting of policy towards those failures.

Looking beyond the welfare-economics framework, Rodrik (2014) identifies three key institutional design features for successful GIP[5]: embeddedness, discipline, and accountability. Embeddedness helps governments overcome informational asymmetries that can plague GIP, as such, it involves a significant amount of interaction and communication between the public and private sectors. Discipline requires support policies to be reduced or removed if they are not (or no longer) achieving goals. This, in turn, requires "clear objectives, measurable targets, close monitoring, proper evaluation, well-designed rules, and professionalism"[6]. Finally, public accountability helps to ensure agency-business relationships are being pursued in ways that further relevant goals and thereby help legitimise GIP.

Importantly, Rodrik's approach emphasizes industry policy as an evolutionary process for government, highlighting the importance of updating, revising, or removing policies as new information is gained. Rodrik's recommendation is elaborated by Hallegatte et al.[7] who recommend iterative policy design. Systematic policy learning is also one of three central requirements for successful GIP.[8]

In the context of IGIP, an additional important principle is subsidiarity. That is, regulation and governance should be conducted at the lowest jurisdiction possible to address the issue (market failure) concerned. A consequence of this principle in the context of IGIP is that it should not be used to address things that can be addressed through national or sub-national GIP. Therefore, having the GEA recognise and outline possible roles for sub-national government or administration could be useful.

Singapore-Australia Bilateral Relations Context

The GEA will be negotiated within the context of Singapore and Australia's broader bilateral relationship as well as within the regional setting.

The Singapore-Australia bilateral relationship has strengthened over time. The Comprehensive Strategic Partnership (CSP) agreed in 2015 is the keystone of the relationship and clearly signals the interest of both countries in elevating the bilateral relationship in respect to a range of issues - trade, defence, science and innovation, education, the arts and the digital economy. Australia and Singapore governments meet regularly at the highest level, including at head of government and key ministerial level.

Renewable energy and related issues have featured in a number of recent high-level exchanges between both governments – with the proposed Sun Cable Australia-Asia Powerlink from the Northern Territory

[5] Since International Green Industrial Policy (IGIP) is a subset of all Green Industrial Policy (GIP), these principles also apply to the GEA.
[6] Dani Rodrik, "Green Industrial Policy," *Oxford Review of Economic Policy* 30, no. 3 (2014): 469–91, at 487 https://doi.org/10.1093/oxrep/gru025.
[7] Stéphane Hallegatte, Marianne Fay, and Adrien Vogt-Schilb, "Green Industrial Policies - When and How," *World Bank Policy Research Working Papers*, Policy Research Working Papers, no. October (October 2013): 26, https://doi.org/10.1596/1813-9450-6677.
[8] Anna Pegels et al., "Politics of Green Energy Policy," *The Journal of Environment & Development* 27, no. 1 (March 15, 2018): 26–45, https://doi.org/10.1177/1070496517747660.

to Singapore headlining the prospects for such engagement. Renewable and low emissions energy have been central to several important recent bilateral developments: agreement of an MOU for Cooperation on Low-Emissions Solutions in October 2020 (including developing hydrogen and hydrogen-based supply chains and standards, examining collaboration on climate policies, various aspects of CCUS and renewable electricity trade); in June 2021, both Prime Ministers committed their governments to a public-private partnership on Commercialisation of Low-Emissions Fuels and Technologies in Maritime Shipping and Port Operations under the MOU; and the launch of negotiations for the Singapore-Australia Green Economy Agreement on 22 September.

Singapore is Australia's most important economic and trading partner in ASEAN, and our sixth largest trading relationship, with two-way trade in 2020 of AUD26.5 billion (USD 18.3 billion). Singapore is also the sixth-largest source of foreign investment in Australia (valued at AUD 116.5 billion in 2020, representing 2.9% of total foreign investment).

Singapore and Australia also take similar pro-trade liberalisation positions in important groupings such as the WTO and APEC. This approach is also evident in our mutual support for and participation in prominent regional FTAs: the ASEAN-Australia-New Zealand Free Trade Area (AANZFTA); the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP) and the Regional Comprehensive Economic Partnership Agreement (RCEP), which will come into force on 1 January 2022.

Our shared commitment to trade liberalisation and the recognition of strong complementarities between our economies underpinned the agreement of the Singapore-Australia Free Trade Agreement (SAFTA) in 2003. This was a decade ahead of other FTAs being reached by Australia with major trading partners in North Asia. The prominence of SAFTA to both countries was underlined by the substantive upgrading of SAFTA in 2017, and the renegotiation of the SAFTA E-commerce chapter through the Australia-Singapore Digital Economy Agreement (DEA) that came into force in December 2020.

Singapore and Australian Customs' administrations signed a new Mutual Recognition Agreement (MRA) with Australia in 2018 to facilitate customs administration cooperation.

Australia and Singapore have also taken supportive positions on work in the WTO and APEC to liberalise trade in environmental goods and services to – inter alia - foster diverse and resilient low emissions technology and facilitate climate change emissions abatement at a global level.

The very close bilateral relationship between Australia and Singapore has as a central driver the strong complementarity between the economies of the two countries. Notable in two-way trade and investment is the importance of energy commodities. LNG and crude petroleum top Australia's exports to Singapore, while refined petroleum and a range of higher value-added products (non-petroleum based) are imported from Singapore into Australia.

However, asymmetry in future renewable energy trade is likely to be even more marked as Singapore's small land area will only allow the generation of sufficient renewable energy to cover a fraction of its likely future needs. Singapore's Green Plan aims to address climate change and to promote the adoption of clean energy use and related technological development that is scalable and commercially competitive. Increasing trade in these technologies and commodities is a key channel through which the Plan will be realised. This policy push on trade to complement Australia's Technology Investment

Roadmap, and the prospects for export of Australia's significant renewable energy resources either as electricity, hydrogen and/or hydrogen-derived fuels, and high emissions intensity of production goods.

However, this combination of close existing bilateral relations and relevant prospective complementarities should not make Australia complacent, as other nations may be well-placed to help meet Singapore's clean energy needs. Already there are plans for Singapore to import renewable electricity from several floating solar projects in Indonesia,[9] and there is the potential to import hydrogen and hydrogen derivatives from countries such as Chile, Norway, Russia, and those in the Middle East that are positioning themselves in the international market.

The opportunities provided by our close bilateral relations and economic complementarities should be reflected in the Singapore-Australia Green Economy Agreement. The GEA provides the Australian and Singapore governments with the opportunity to jump ahead and place their economies on the leading edge of the global energy transformation, providing an exemplar for the region and for countries beyond. It can also influence regulatory and financial mechanisms for the energy transition, and support Australia's direct economic, political and strategic interests by integrating our two economies through expanded and technologically advanced trade, and the development of industrial capacity and infrastructure.

It also provides both governments with an opportunity to signal to their own relevant institutions and firms that they are committed to concrete action on renewable energy technology, policies and internationalisation of that sector of the economy.

Key Stated Objectives of the GEA

The statement by Leaders that initiated the GEA, and subsequent Ministerial[10] and official statements describing the content and objectives of the future agreement, emphasise the following:

- Accelerate the transition to a sustainable and low emissions future
    - through a "…smooth and inclusive transition into a green economy that creates good jobs."
- The promotion and facilitation of trade and investment, removal of non-tariff barriers and reduction of regulatory burden, to boost trade in environmental goods and services and accelerate the adoption of low-carbon and green technologies, low-carbon and renewable energy, and decarbonised production processes. Including through:
    - systems compatibility, including on customs requirements, and relevant regulations and standards; exploring new opportunities in green growth sectors; and adopting environmental measures that facilitate trade and investment in a manner consistent with existing international trade and investment obligations.

[9] Jules Scully, "Sunseap Planning 7GWp of Solar in Indonesia, Eyes Link to Singapore via Subsea Cable," PV Tech, 2021, https://www.pv-tech.org/sunseap-planning-7gwp-of-solar-in-indonesia-eyes-link-to-singapore-via-subsea-cable/.

[10] The Hon Dan Tehan MP Minister for Trade Tourism and Investment, Australia and Gan Kim Yong, Minister for Trade and Industry, Singapore "Singapore-Australia Green Economy Agreement," 2021, https://www.trademinister.gov.au/minister/dan-tehan/media-release/singapore-australia-green-economy-agreement.

- The role that the agreement and government cooperation can have in facilitating and leveraging private sector economic activity.
- That the approach to be taken will be practical, ambitious, and innovative:
    - with both parties "embarking on a world-first agreement that combines trade, economic and environmental objectives."
- Importantly, both governments envisage the GEA becoming an exemplar for, and catalyser of more effective international action:
    - "…GEA to serve as a pathfinder that contributes to multilateral and regional policy development by establishing policies, standards and initiatives that will not only create good jobs in green growth sectors, but also strengthen environmental governance and global capacity to address environmental issues, in particular climate change.[11]"

We strongly endorse this vision for the GEA. These are vital activities and objectives to help put Australia on the required path to continue to develop its clean energy-based industries at an expanding scale, with trade in renewable energy and related goods at the forefront. These important objectives relevant not just in relation to Singapore, but to the wider region and beyond.

DFAT-provided questions for submissions

1. How a GEA could boost Australian two-way trade and investment in clean energy, and environmental goods and services exports.

Broadly, the GEA could boost Australian two-way trade and investment in clean energy, and environmental goods and services exports by:

1.1. Providing a clear signal on the strong commitment – to be backed up with serious resourcing - of both governments to re-design trade and investment for a low emissions future in line with both countries' Paris Agreement commitments

1.1.1. this would aim, inter alia, to build confidence, particularly in the commercial sector as to the intention of both governments to work to develop clean energy demand and supply potential so that current scale and cost disadvantages are effectively addressed.

1.1.2. as an essential element of this parties would put a particular focus on ensuring strengthened trade and investment bilaterally, consistent with relevant international obligations.

1.2. Promoting Australia's comparative advantage in clean energy resources, extensive experience in developing renewable energy generation, and our experience as a competitive and reliable supplier of commodities to global markets, noting that these factors place us in a very strong position to supply Singapore with renewable/clean energy:

1.2.1. place this potential Australian contribution in the context of the very significant scale-up in renewable energy trade that will be required in the GEA partners, regionally and globally to allow parties to the Paris Agreement to meet their goals.

[11] DFAT. Singapore-Australia Green Economy Agreement: Propelling Our Sustainable Future Joint Vision Statement. https://www.dfat.gov.au/geo/singapore/singapore-australia-green-economy-agreement/singapore-australia-green-economy-agreement-propelling-our-sustainable-future

1.3. Identifying areas where the governments will cooperate and clearly identify a range of approaches to achieving the green economy and a zero emissions future:
    1.3.1. the focus of government action should be on areas where market failures are most pronounced, that is, where markets may either not be sufficiently established, mature or unlikely to respond quickly enough[12] to cement the first mover advantage that GEA parties are seeking in their respective areas of interest and comparative advantage.

As an important expression of international Green Industrial Policy, the GEA will be more successful in achieving the goal of boosting Australian two-way trade and investment in clean energy, and environmental goods and services exports if it follows best-practice principles. Best-practice suggests the following procedural recommendations:

1.4. Include scheduled follow up/review to support implementation and evolution, including meetings of identified government bodies with relevant responsibilities and other government and non-government bodies.
    1.4.1. the GEA should be a living agreement that can evolve over time in response to changes in circumstances and the likely rapid change in technological, political, economic and policy contexts. As many of the key elements covered by the GEA are complex and prospective the agreements should not be overly prescriptive or definitive, rather it should create processes and reference points that will be developed over time.
    1.4.2. this approach would further indicate that both parties will follow through on implementation to ensure that the needed resourcing and effort is provided to maximise the value of agreement outcomes.
    1.4.3. robust assessment review processes are also essential to follow best practice Green Industrial Policy as discussed on page 5. For example, clean energy investors in the EU have indicated that when clean energy support policies frequently change, this introduces an element of investment risk; clear and credible policy stances with associated assessment tools can alleviate this element of risk.[13] The element of policy risk is particularly impactful during the time when clean energy technologies are still working towards reaching market parity.
1.5. Outline clear objectives:
    1.5.1. clear objectives are another component of best-practice GIP discussed on page 5.
    1.5.2. consistency with the 'stretch goals' mentioned in the Australian Government Technology Investment Roadmap will be important, but the Roadmap goals should not be the only objectives. In particular, the Roadmap stretch goals fail the Government's own stated objective of technology neutrality in GIP because they only refer to economic elements.[14]
    1.5.3. clear objectives act as objective reference points against which to judge progress, including to act as a 'reminder' if more effort or rebasing of effort is needed over time.

[12] International Energy Agency. World Energy Outlook 2021, www.iea.org/weo, p.20.
[13] Florian Egli, "Renewable Energy Investment Risk: An Investigation of Changes over Time and the Underlying Drivers," *Energy Policy* 140 (May 1, 2020): 111428, https://doi.org/10.1016/j.enpol.2020.111428.
[14] Emma Aisbett, Wenting Cheng, and Fiona Beck, "Green Industrial Policy and Technology Neutrality : Odd Couple or Unholy Marriage ?," 2021. (ZCWP01-21), https://www.anu.edu.au/research/research-initiatives/zero-carbon-energy-for-the-asia-pacific/research-outputs/grand

1.5.4. these reference points should align with the scale-up of economic and technological activity and development that will be needed.

1.5.5. identification of these goals would signal on the need for alignment of relevant green industrial policy objectives and activities of the two governments.

1.5.6. clear objectives need to be accompanied by monitoring and evaluation mechanisms that allow progress towards GEA targets to be assessed; this to guide implementation and provide concrete information to support any necessary future updates to the GEA to maintain relevance and effectiveness.

1.6. Embed the private sector (see page 6) by including provisions recognising the key role of the private sector as producer/trader/investor and innovator of clean/renewable energy, and placing government-private sector interaction as a core process to ensure close and continuous cooperation and communication:

1.6.1. GEA provisions should detail how this cooperation could go forward and ensure that this interaction is on a broad front to include a range of relevant groups and bodies that have commercial, technical/scientific and policy capabilities, as well as other stakeholders representing civil society, including those with particular interest in environmental issues and the social and economic aspects of the relevant issues.

1.7. Facilitate policy learning and diffusion:

1.7.1. the GEA can be a springboard and/or template for other IGIP initiatives in the region and beyond. Its development can also be informed by other leading examples of IGIP including the EU-Japan Towards a Green Alliance (May 2021) or the German and Japanese Government policies promoting international cooperation on the development of renewable energy trade and investment.

1.7.2. Singapore is a city nation and global front runner in environmental sustainability in multiple areas. We would suggest an intercity component for the GEA that aims to facilitate communication and cooperation between Singapore and Australian cities in multiple ways, such as experiencing learning and sharing, and duplicating and contextualizing successful practices for both sides. In this way, collaborative relationships might be built. In recognition of the leading role that cities are playing in innovating and adopting green technologies, we would suggest state-level or city-level governments in Australia should be brought into the GEA to mobilise their resources, expertise and connections to build relevant links with Singapore and have the GEA leverage the potential role of local government in the green transition process

1.7.3. ZCEAP research on hydrogen indicates that policy guidance from central government can play an enabling role in initiating and enhancing city-level communication and collaboration.

1.8. Target clearly identified market failures that are limiting growth in two-way trade and investment in clean energy, and environmental goods and services exports.

The best-practice approach of targeting market failures suggests substantive areas for inclusion in the GEA should:

1.9. Address coordination failures inhibiting the development of clean supply chains between Australia and Singapore by:

1.9.1. providing information to markets and other governments by referencing relevant objectives in the parties' related key policy statements (e.g. the Australian Government Technology Investment Roadmap and related statements), and emphasizing the importance of prospective renewable energy-based exports from Australia to Singapore, including electricity via HVDC submarine cable, and the likely relevance of this for prospective regional connectivity

1.9.2. facilitating track 1.5 and 2.0 diplomacy and information sharing via joint conferences for industry and/or academia, joint research projects, and exchange programs

1.9.3. referring to Australian and Singaporean joint development and advocacy of trade and investment policies, initiatives and actions with climate change positive impacts with other governments and in relevant international organisations such as the WTO, APEC, OECD, UNEP, UNCTAD, IEA and the UNFCCC. More focused bodies such as the International Partnership for Hydrogen and Fuel Cells in the Economy are likely to be important in the transition in energy trade and the GEA should look at referencing them, perhaps as illustrative examples in more focused references on future work.

1.10. Address market failures arising from imperfect or asymmetric information about tradeable product and service-related emissions. Singapore and Australia should use the GEA to facilitate alignment of relevant embedded emissions accounting systems for emissions-intensive, tradable products and to reach out internationally to maximise the level of alignment, especially with key economic partners. Specifically, the GEA could:

1.10.1. include detailed references to work being conducted and outcomes reached over time on the alignment/interoperability of systems to measure and verify/certify embedded greenhouse emissions. For example, ANU ZCEAPGC has partnered with DFAT, the Climate Change Authority and the Clean Energy Regulator to submit a proposal to the Australian Research Council (ARC) Linkage Scheme to develop an integrated embedded emissions accounting framework for Australia. Notably, the project also includes agricultural and land-use products, including negative emissions (carbon sequestration) services. Extending this work towards collaboration with Singaporean institutions would be a constructive step towards enhancing our ability to achieve compatibility with trading partners in the region, and ultimately globally. Other Australian and international projects should also be considered and referenced, including the development by DISER of a Certificate of Origin scheme for Hydrogen Production.

Progress in this area would have a number of benefits:

1.10.2. increased alignment would reduce the regulatory burden for exporters. For example, it would allow green ammonia produced in Australia and bunkered in Singapore to easily demonstrate its low-emissions value chain credentials and therefore be exempt from border carbon adjustments imposed in destination markets

1.10.3. many competing certification schemes for hydrogen and derivatives such as ammonia are being developed currently around the world, including in Australia. Similar schemes are emerging for green metals such as steel and aluminium. Australian producers will be disadvantaged if they have to meet different reporting/certification requirements for different markets . Given that green hydrogen and ammonia are inputs to other products (such as steel, fertilizer and ultimately aluminium) it is important that a system is developed that works for all products.

1.10.4. Credible and meaningful measurement of embedded emissions associated with Singapore-Australia clean hydrogen/ammonia supply chains will be important for business and government, including for selecting appropriate policy options addressing the risk of 'off-shoring' potentially considerable carbon emissions on the production side in Australia[15].

1.10.5. Accounting and trading frameworks for emissions from agriculture and other land-based sources (particularly methane and nitrous oxide), as well as considering the potential of land- and ocean-based sinks for CO2 is important for both Australia and Singapore given its relevance to collective climate change emissions effort but also as a possible source of tradeable offsets, including with third countries if a GEA expanded its membership over time. Such references would also reflect the important place in Australia's Long Term Emissions Reduction Plan of land-based solutions.

1.11. Address market failures caused by the interaction of credit constraints and information failures in finance and investment markets by collaborating on green investment and finance principles, policies and activities, including definitions (see page 17).

1.12. Address network externalities and external economies of scale by:

1.12.1. collaborating on policy and development activities for supply chain infrastructure for trade in clean energy as electricity or embedded in commodities such as hydrogen and ammonia. The GEA needs to indicate convincingly that parties will lead on this and make decisions that properly account for the relevant public, longer term interest as well as commercial needs.

1.13. Address unnecessary/unintended regulatory barriers to trade and investment by:

1.13.1. Developing processes for identification of green goods and services for priority removal of non-tariff barriers

1.13.2. Seeking to maximise compatibility in definitions of "clean" and "green" across the policy domains: product certification, finance principles and trade definitions .

1.14. Address market failures caused by the interaction of knowledge spillovers, economies of scale and credit constraints in tradable products by:

1.14.1. credibly signalling that both governments will consistently provide necessary financial support, and/or create other government mechanisms or policies that provide incentives to drive innovation and scale in tradeable green products given the significant gap in commercial viability that exits between tradeable fossil fuel and tradeable clean fuels, derivatives and technologies.

2. Any trade and investment barriers (especially Non-Tariff Barriers) that are impacting the ability to undertake trade of environmental goods and services with Singapore.

Identifying and addressing non-tariff barriers is a highly resource-intensive task. For this reason, it is important for such efforts to be targeted at genuinely environmental goods and services. To this end the GEA should explore mutually agreed approaches to identifying environmental goods and services, consistent with other relevant approaches.

[15] Stocks M, Fazeli R, Hughes L, Beck F (2020), Global emissions implications from co-burning ammonia in coal fired power stations: an analysis of the Japan-Australia supply chain, Nov 2020, The Australian National University.

2.1. As Australia and Singapore are both participating in APEC consideration of an expansion of the of the list of Environmental goods for tariff reduction/elimination,[16] it is advisable that the bilateral approach to clarifying environmental goods be consistent with potential/likely APEC approaches, and act as a positive influence on the APEC work:
   2.1.1. identifying these goods could also act as a point of focus for government action promoting and facilitating trade in the GEA context, and
   2.1.2. such a list could form the basis for a liberalisation of trade in those more generic services closely associated with the provision of green goods that have been elusive to capture through the green services trade liberalisation agenda given the difficulties of differentiating – for example – engineering services as applied to large fossil fuel powered steam turbines or smaller turbines fuelled by waste methane.
2.2. Other relevant work includes the OECD's research on developing methodologies for analysis of common definition and classification of the environment industry;[17] the EU's sustainable investment taxonomy;[18] and WTO proposals for liberalisation of environmental goods under the Doha mandate[19] and the Environmental Goods Agreement negotiations.

The ANU Grand Challenge team was commissioned by DFAT to participate in the APEC Environmental Goods List APEC Scoping Study on New and Emerging Environmental Goods. The Scoping Study should be applied to ensure consistency between an APEC outcome and the GEA. Based on the work conducted for the Scoping Study, we recommend approaches to identifying environmental goods and services consider both inclusion criteria and exclusion criteria when examining green/environmental goods.

Inclusion Criteria.

2.3. A useful starting point for inclusion criteria would be to have green/environmental goods show an identifiable environmental end use and/or benefit aimed at, for example:
   2.3.1. supporting the transition to a low-emissions, climate resilient and circular economy,
   2.3.2. reducing water, soil, marine and ocean, and air pollution, or
   2.3.3. improving waste and wastewater management or protecting and conserving biodiversity.
2.4. This "environmental end use or benefit" concept overlaps with the **OECD's Goods for Environmental Management (GEM) and "Environmentally Preferable Products" (EPPs)** concepts:
   2.4.1. the OECD defines GEM as "products [and services] that reduce environmental risk and minimise pollution and resource use"
      2.4.1.1. water purifying machinery is an example of such a product on the current APEC list

[16] Expanding the APEC List of Environmental Goods List to Fight Climate Change: Analysis the APEC Policy Support Unit, https://www.apec.org/press/news-releases/2021/expanding-the-apec-list-of-environmental-goods-list-to-fight-climate-change-analysis.
[17] Sinclair-Desgagné, Bernard. 1999. "The Environmental Goods and Services Industry: Manual for Data Collection and Analysis." *OECD*. https://doi.org/10.1561/101.00000012.
[18] In particular the Technical annex to the TEG final report on the EU taxonomy, see https://ec.europa.eu/info/files/200309-sustainable-finance-teg-final-report-taxonomy-annexes_en.
[19] Balineau, G., & De Melo, J. (2011). Stalemate at the Negotiations on Environmental Goods and Services at the Doha Round. FERDI, Working Paper; WP 28.2011.

2.4.2. the OECD's "Environmentally Preferable Products" (EPPs) identifies goods where there exists a close, less environmentally friendly substitute with a similar use or purpose. Solar water heaters are an example of an EPP on the current APEC list

2.4.3. **challenges can arise in defining EPP**s when a product is less environmentally harmful than some technologies, but more harmful than others. An example from the current APEC list is natural gas turbines (841182) over 5MW which are deemed as environmental goods[20]

2.4.4. this challenge is amplified over time as newer categories of less environmentally impactful substitute technologies emerge and may or may not align with the APEC list definitions.

Exclusion criteria.

2.5. While an environmental end use or benefit is a useful starting point for inclusion criteria, it is open to judgement whether *all* goods that satisfy this criterion should be preferentially liberalised. There are two main issues that may prevent certain goods from being appropriate for preferential liberalisation, despite having an identifiable environmental end use and/or benefit.

2.5.1. the first potential exclusion criterion relates to categories of goods which have multiple end uses – only some of which are environmentally beneficial. For example, certain turbine (e.g. 841182 see APEC list above) classifications cover turbines that can be used to burn either conventional fossil fuels or new low-emissions fuels

2.5.1.1. this dual use problem may be reduced through specifying 8-digit (country-specific) rather than 6-digit HS code (in agreements covering limited parties) or by using an "ex-out" that can specify environmentally beneficial end-use(s) associated with product characteristics/descriptions

2.6. the second concern relates to individual goods having both harmful and beneficial impacts. The EU's sustainable investment taxonomy established a negative inclusion criterion of 'doing no significant harm'[21]. This criterion means that environmental goods must not only directly contribute to achievement of one goal, but also do no significant harm to the achievement of other goals.

2.6.1. however, excluding goods based on harmful side-effects could prove controversial and difficult, as the production processes of all goods have some negative environmental impacts. An approach may be to require substantial measures to minimise or eliminate any harmful impacts from production processes. For example, in the case of wind turbines, the innovation of bird collision avoidance technology turbines could limit harm.

The role of Process and Production Methods in identifying environmental goods

2.7. **C**onsideration of the environmental sustainability of process and production methods (PPMs) when identifying green/environmental goods is often of great importance. While some products may be deemed green because of their low environmental impacts when in use, for others the extent of the environmental impacts from the PPM will be as important, or even more so in determining 'greenness':

[20] Although the coverage of this line as defined by 'ex-outs' in the Vladivostok 2012 Leader's Declaration Annex C on the APEC List of Environmental Goods was not entirely clear and was further clarified by APEC member officials.
[21] For instance, see the JRC report: Technical assessment of nuclear energy with respect to the 'do no significant harm' criteria of Regulation (EU) 2020.

2.7.1. for example, bamboo flooring panels on the current APEC list of 54 Environmental Goods are an example of a product whose environmental claim stems from the relatively low environmental impact from one aspect of its PPM – it being sourced from readily renewable bamboo (itself a potentially problematic assessment given varying PPM contexts – i.e. what if the bamboo was grown in a recently cleared forest?).

2.7.2. **notably, PPMs in the form of low greenhouse emissions during production are very important for the definition of potential EPPs such as green hydrogen, green ammonia, green steel, and green aluminium**.

2.8. Currently, many EPPs and their less environmentally friendly counterparts share the same World Customs Organisation Harmonised System Tariff Classification (HS) 6-digit code. Over time (consensus could be elusive in the interim period) it may be appropriate to create new HS codes which differentiate EPPs based on PPMs. In the meantime, "ex-outs" allow for differentiation by reflecting or approximating environmental impacts across a product's life-cycle.

2.9. PPMs are also relevant as exclusion criteria. However, this could be problematic if a 'do no harm' approach is used, as all production has some negative environmental impacts. Indeed, many key technologies for the energy transition have significant environmental costs associated with their current production:

2.9.1. Lithium is essential for electric vehicles and energy storage technologies, but its production process is water intensive and prone to high pollution rates.

2.9.2. many first-generation biofuels have also proven controversial due to their questionable life-cycle emissions benefits and negative impacts on soil and biodiversity.

3. Any suggested changes to, or opportunities for, policy or regulatory settings that could encourage improved collaboration in the clean energy, and green economy sectors.

We strongly recommend that the GEA negotiations also consider possible amendment of the investment provisions in the Singapore-Australia FTA (SAFTA) in line with the alternative damages rule proposed by Aisbett & Bonnitcha.[22]

3.1. Current provisions in investment agreements like that included in the SAFTA are fundamentally inconsistent with the systematic learning and updating required for successful Green Industrial Policy as they allow investors to make compensation claims for damages arising from even legitimate changes to policy, for example changes in subsidies or feed-in-tariffs.

3.2. The alternative damages rule uses a law and economics derived approach to design a liability and compensation mechanism that is able to protect investors from both direct and indirect forms of expropriation, while still allowing space for policy learning and evolution.

[22] Emma Aisbett and Jonathan Bonnitcha, "A Pareto-Improving Compensation Rule for Investment Treaties," *Journal of International Economic Law* 24, no. 1 (June 30, 2021): 181–202, https://doi.org/10.1093/jiel/jgab006; Jonathan Bonnitcha and Emma Aisbett, "Against Balancing: Revisiting the Use/Regulation Distinction To Reform Liability and Compensation Under Investment Treaties," *Michigan Journal of International Law* 42, no. 2 (2021): 231–90, https://repository.law.umich.edu/mjil/vol42/iss2/2/.

3.3. The proposal has been recommended as a key element of investment treaty reform by multiple recent publications, including a paper presented to the UN General Assembly.[23]

4. How a GEA with Singapore could assist Australia's low emissions technology pathway including priority technologies (clean hydrogen, low emissions steel and aluminium, energy storage, carbon capture and storage and soil carbon measurement), and in enabling technologies and associated services.

4.1. As noted above, having both GEA governments commit themselves to supporting and developing clean energy production, investment and trade, and indicating their strong support for related green industrial policy in relation to priority sectors/technologies will be critical in providing relevant firms, institutions and agencies with the confidence to allocate resources and effort to scale up the sector and the role of both countries.

4.2. By emphasizing the importance of the low emissions technology priority sectors for the two governments should amplify the value of GEA signalling, commitments and anticipated action raised under question one above for those sectors.

5. Opportunities and challenges to access, or improve access, to green or sustainable finance, or to identify and advance finance options and investor partnerships with Singapore.

Globally, green finance is increasingly recognized as a central driving force for sustainability [24]. Central banks have also taken an increasingly important role in deepening the understanding of climate risk as financial risk, as well as effectively safeguarding financial systems, phasing out funding for older, less energy efficient and highly emissions intensive industries and phasing in the funding for new green economy [25].

5.1. However, as pointed out by an OECD report, definitions related to "green" investments are also variously referred to as "clean", "sustainable", and "climate change" investments, and can be explicit or implicit, broad and generic, or technical and specific. Moreover, "the devil is in [the] detail on what exactly is included and what is not. Nor is there clarity around the appropriate metric for greenness".[26]

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[23] OHCHR. "Report of the UN Working Group on the issue of human rights and transnational corporations and other business enterprises on Human rights-compatible international investment agreements" https://undocs.org/A/76/238. Anthea Roberts and Taylor St John, "Complex Designers and Emergent Design: Reforming the Investment Treaty System," American Journal of International Law, 2021, https://doi.org/10.1017/ajil.2021.57.

[24] Aaron Maltais and Björn Nykvist, "Understanding the Role of Green Bonds in Advancing Sustainability," *Journal of Sustainable Finance and Investment* 11, no. 3 (2021): 233–52, https://doi.org/10.1080/20430795.2020.1724864.

[25] Andreas Breitenfellner, Wolfgang Pointner, and Helene Schuberth, "The Potential Contribution of Central Banks to Green Finance," *Vierteljahrshefte Zur Wirtschaftsforschung* 88, no. 2 (2019): 55–71, https://doi.org/10.3790/vjh.88.2.55.Ulrich Volz, "On the Role of Central Banks in Enhancing Green Finance," *United Nations Environment Programme*, no. February (2017): 1–48.

[26] Georg Inderst, Fiona Stewart, and Christopher Kaminker, "Defining and Measuring Green Investments: Implications for Institutional Investors' Asset Allocations," *OECD Publishing*, no. 24 (2012) at 6, https://doi.org/10.1787/5k9312twnn44-en.

5.2. The EU sustainable finance taxonomy has been developed based on rigorous technical screening criteria. In the Asia-Pacific region many jurisdictions have also developed their own sustainable finance taxonomy or are preparing taxonomies. We understand that in Singapore, the Green Finance Industry Taskforce (GFIT) consultation paper titled "Identifying a Green Taxonomy and Relevant Standards for Singapore and ASEAN" ("GFIT Taxonomy Consultation Paper") was released for consultation in early 2021[27]. This paper signalling a strong interest in this area within the Singaporean government. An Australian sustainable finance taxonomy is also under consideration[28]

5.3. Given the interest on both sides, the GEA should include provisions that recognise the need for both parties to work together to seek common ground when developing and applying their taxonomies to enhance their access to bi-directional sustainable investment. This would include close consultation on the approaches of the Singaporean and Australian taxonomy in the development stage, so that the two parties could to a certain extent refer to each other. In the longer term, the two parties need to engage with each other to compare and identify commonalities and differences between certain features of the two taxonomies. For private stakeholders, it is essential to develop a user-friendly analytical tool for them to understand the types of activities that could be covered under the respective taxonomies.

6. Opportunities and challenges in advancing cooperation on voluntary carbon markets with Singapore and for the Southeast Asian region.

6.1. The Singapore and Australian governments have shared interests in developing carbon markets in the region. These markets have potential benefits in addressing climate change and meeting respective NDC targets under the Paris Agreement in as economically efficient a manner as possible. They also represent a business opportunity for those service providers acting as agents in this process. This latter potential is apparent in the Singapore government's announced plans to become a regional hub for carbon market trading.

6.2. In light of these interests, and important developments on carbon trading at the recent COP26, the GEA should do the following:

6.2.1. develop a framework for collaboration and cooperation bilaterally to increase the capacity of both economies to participate in carbon offset trading, including through possible mutual recognition of standards and alignment of relevant policies

6.2.2. develop a plan to cooperate to jointly influence regional standard setting and institution building to promote markets and have their operations operate effectively and efficiently, and importantly, to ensure their environmental effectiveness and integrity, and consistency with UNFCCC/Paris Agreement framework (under Article 6)

6.2.2.1. this building on work already underway in each jurisdiction including under the Indo-Pacific Carbon Offsets Scheme.

[27] Monetary authority of Singapore. *Industry taskforce proposes taxonomy and launches environmental risk management handbook to support green finance* (2021) https://www.mas.gov.sg/news/media-releases/2021/industry-taskforce-proposes-taxonomy-and-launches-environmental-risk-management-handbook

[28] Australian Council of Financial Regulators. *Council of Financial Regulators Climate Change Activity Stocktake 2021* (2021) https://www.cfr.gov.au/publications/policy-statements-and-other-reports/2021/council-of-financial-regulators-climate-change-activity-stocktake-2021/