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**Submission to Australia-Japan Research Centre (AJRC)
Reimagining the Japan Relationship**

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Please find below a submission to the Australia-Japan Research Centre (AJRC) Reimagining the Japan Relationship project.

In it I propose the development of a bilateral body to map out the energy transition, modelled on the German-Japanese Energy Transition Council, drawing on government, industry and academic expertise.

The creation of such a body would help to map out a process for developing joint strategies across a broad range of shared issues related to energy transition, such as renewables integration, digitalization, energy efficiency in buildings, sector coupling in transportation, and long-term scenario and review mechanisms.

Sincerely,

A handwritten signature in black ink, consisting of several overlapping loops and a long horizontal stroke at the end.

Llewelyn Hughes

Australia – A Shared Agenda in the Low Carbon Energy Transition

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Introduction

For decades Australia and Japan have been partners in trade and investment in the energy sector.

The partnership has met the economic needs of both countries. Japan benefits from Australia's abundant resources of coal and natural gas to fuel its economy. For Japan, Australia is a strategic partner in a geopolitically stable part of the world that provides geographic and fuel diversification for its energy-related imports, and helps the country manage its energy security concerns.

Japanese companies are also deeply invested in the Australian energy sector, and together the two countries help to pioneer liquefied natural gas in the Asia-Pacific region, a market that has grown to the value of hundreds of billions of dollars over time. Significant investments since 2010 include the 2012 investment by INPEX in the Ichthys LNG project, the investment in the same year in the Wheatstone LNG project in Western Australia by a consortium that includes Kyushu Electric, Mitsubishi, Nippon Yusen, JOGMEC, and JERA, and the 2014 Clermont coal mine investment that includes Sumitomo, Mitsubishi Development, and J-Power Australia (Australian Government 20).

The value of Australian exports to Japan is high. In 2020, Australia exported AUD 6.9 billion dollars of thermal coal to Japan, representing 13 per cent of exports by value. Japan was the largest importer of Australia's Liquefied Natural Gas (LNG) by value, importing 21 percent of Australian LNG exports by value for AUD 15 billion. Japanese customers also bought 17 per cent of Australia's metallurgical coal exports, valued at AUD 4.6 billion.

The decades long economic partnership in energy trade and investment between Japan and Australia is a key platform in the relationship between the two countries. But together Japan and Australia now share a new challenge: how to meet the challenge of a rapidly decarbonise world, and benefit economically from the low

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carbon energy transition that must occur if we are to keep the risk of catastrophic climate change to reasonable levels.

The Low Carbon Energy Transition

The low carbon energy transition raises important questions about the future shape of energy production and consumption in each country. For Japan, this need to chart a new path has taken on a new urgency due to recent announcements by the national government. In October 2020 the administration of Yoshihide Suga announced that Japan would aim to achieve that zero greenhouse gas emissions by the middle of the century, increasing its ambition substantially.

Equally importantly, in April 2021 the Suga Administration announced that by 2030 Japan would reduce economy wide emissions by 46 percent relative to 2013. Japan's previous commitment to near term decarbonisation was 26 percent by 2030 relative to 2013, so the new level of ambition in a short period of time will have important near term implications for Japan's energy mix, and the basket of resources it imports. Ambitious near-term decarbonisation implies rapid electrification of many parts of Japan's economy, along with the decarbonisation of Japan's electricity sector. Japan is also committed to deploying increasing amounts of hydrogen and associated vectors.

A key opportunity to lay out this new and ambitious agenda is Japan's 2021 Basic Energy Strategy. The Japanese cabinet is required to review Japan's basic policy settings in the energy sector every three years. The last review came in 2018, and the government has already begun the internal deliberations required to assess its medium term policy settings. As part of this assessment the government is modelling different pathways to net zero emissions by mid-century, in order to understand what the least cost options are to decarbonisation, and what might be required.

Japan has already had significant success in deploying increasing capacity and renewable energy. Electricity generated from renewable energy - centred on solar photovoltaics - has grown substantially since the introduction of a feed-in-tariff in 2012. Japan is now committed to developing 1000 MW of offshore wind power each year between now and 2030 leading to 10 GW under development by 2030, and 30 to 45 GW under development by 2040. It is likely that the pace of offshore wind power development will increase, in order to help Japan meet its new ambitious decarbonisation targets.

Crucially, Japan is also implementing a series of changes to the electricity market to enable the higher penetration of renewable electricity at scale. Central to the initiatives is the development of a national grid plan, which develops scenarios for renewable electricity deployment around the country, and then considers what near investments are needed. Like Australia, the structure of the existing electricity

network is a significant impediment to increase volumes of renewable electricity deployment. In the case of Japan, this is because the electricity market was divided into nine vertically integrated regional monopoly utilities prior to liberalisation of the sector. Investments are already being made in order to strengthen the connections between regions of the former monopoly electricity utilities, but additional planning has been done to enable renewable electricity capacity to be deployed and attractive areas, with the power generated supplied two major population centres in the Kanto and Kansai regions. The government and auto companies are also increasing its ambition around decarbonisation of the transport sector.

Bilateral Trade and Investment

In the medium to long-run, the low carbon energy transition will have a transformative effect on the bilateral trade and investment relationship between the two countries. But even in the short run, the commitment of the Japanese government to rapid decarbonisation means that the markets for fuels that are used and the Japanese economy are becoming increasingly policy driven.

To take one example, the Japanese government is developing a new efficiency target for its thermal power generation, to assist with the phase out of less efficient power plants. It is also incorporating an important new initiative that enables companies to benefit in meeting the new efficiency target from the co-combustion of ammonia in Japan's existing thermal coal fleet.

Australia and Japan, as long-standing partners in the energy sector, are uniquely positioned to be able to support one another through trade, investment, and policy expertise. There is already increased engagement with Japan at the levels of both the Commonwealth and State governments, as shown in Table 1.

Given these myriad changes, and the increasing importance of policy in affecting the demand for traditional fuels exported by Australia, as well as opportunities and new technologies associated with the energy transition, there is a strong argument for increasing dialogue between the two countries about shared challenges and opportunities.

Table 1: Recent Governmental Agreements on Energy-related Subjects

Year	Title	Details
9 Sep. 2007	Joint Statement by Japan and Australia on the Enhancement of Cooperation on Climate Change and Energy Security	Joint leaders' statement, including specific measures on uranium and nuclear cooperation.
12 April 2018	Hydrogen Energy Supply Chain (HESC) announcement	Announcement of HESC project, supported by the Japanese government, and the Commonwealth and Victorian governments.
19 Nov. 2018	Memorandum of Understanding between the Commonwealth Science Industrial Research Organisation (CSIRO), and the Japan Oil, Gas and Metals National Corporation (JOGMEC)	Encouraging joint research activities in areas related to carbon capture, utilisation and storage (CCUS) that support the hydrogen value chain, and in unconventional gas resources.
19 Jun. 2019	Memorandum of Cooperation on Energy and Minerals Cooperation between Ministry of Economy, Trade and Industry of Japan and Department of the Environment and Energy of Australia	Supersedes the 2003 Enhanced Framework for Energy and Minerals Cooperation between Japan and Australia, with annual meetings focused on developing traditional fuels, but also hydrogen, equipment, cross-border trade and investment, energy transition, energy efficiency, and other areas.
25 Sep. 2019	Memorandum of Cooperation on Carbon Recycling between the Ministry of Economy, Trade and Industry of Japan and the Department of Industry, Innovation and Science of Australia	Aims to accelerate cooperation for the development of CCUS technologies in Japan and Australia, and support efforts in multilateral fora to accelerate cooperation in CCUS technologies.
10 Jan. 2020	Joint Statement on Cooperation On Hydrogen and Fuel Cells Between the Ministry of Economy, Trade and Industry Of Japan and the Department Of Industry, Innovation and Science of Australia	Recognises Japan-Australia Energy and Resources Dialogue as vehicle to support the resources and energy bilateral relationship, and commit to encourage and facilitate the advancement of cooperation on hydrogen and fuel cells between the two ministries.
17 Feb. 2020	Memorandum of Understanding for a Comprehensive and Strategic Partnership with the Government of Western Australia	JOGMEC and Government of Western Australia signed an MOU, enabling information sharing on metal mineral resources.
13 Jun. 2021	Japan-Australia Partnership on Decarbonisation Through Technology	Japan and Australia "commit to jointly support initiatives that will help drive the transitions to net zero emissions. We take on to increase our joint focus on lower emissions LNG production, transport and use; clean fuel ammonia, clean hydrogen and derivatives produced from renewable energy or from fossil fuels with substantial carbon capture, utilisation and storage; carbon capture utilisation and storage; carbon recycling; and low emissions steel and iron ore."

There are at least eight areas in which increasing dialogue between government, business, and the research sector, can play a role in helping both countries understand how policy driven market for energy are changing, and how both countries might mutually benefit from the low carbon energy transition. Some of these are addressed in recent intergovernmental engagements, whilst others have yet to be addressed.

1. *Hydrogen and Ammonia*

Japan and Australia have identified hydrogen and ammonia as a potentially large opportunity for decarbonising their energy production and use. Japan released a national hydrogen strategy in 2017, and has led debate on the development of a global market for hydrogen and related vectors, such as ammonia. The agenda the Japanese government has laid out for hydrogen and use is broad sectorally. The 2017 strategy, for example, includes examination of the use of hydrogen within the electricity sector, within mobility through fuel cell vehicles, buses, forklifts and trucks, as well as in shipping. It also includes the possible deployment of hydrogen and industrial processes and for the generation of heat.

International partnerships are central to the vision outlined in the strategy, with the near term goal of the government developing hydrogen supply chains with international partners, including Australia. However there is uncertainty about the pace of industry growth, the competitiveness of hydrogen and ammonia relative to competitors, how quickly deployment is likely to occur within Japan, and what the likely increase in market share for hydrogen will mean for imports. Research shows, for example, that hydrogen may not be competitive compared to direct electrification for many end uses (Ueckerdt *et al.*, 2021). And the pace of change is directly dependent on the speed of the turnover of capital, which is highly dependent on specific sectoral dynamics.

Beyond this uncertainty in sectoral demand, a key question is how to properly account for the embedded emissions associated with different hydrogen and ammonia production technologies, and how to ensure that any standards and certification schemes that are developed enable differentiation between these different production technologies. Japan identifies international standards as a key strategic area in which it should lead, and the green ammonia consortium has begun the work of identifying how different levels of embedded emissions in ammonia should be accounted for internationally.

2. *Critical Minerals*

Australia already plays a role in the market for critical minerals. Rare earth elements (REEs) are used in the production of alloys that have attractive magnetic properties and can withstand high temperatures, make them useful for the creation of magnets used in technologies associated with the low carbon energy transition, such as direct drive wind turbines and motors used in electric vehicles (Serpell, Paren and Chu, 2021). REEs are mined in Western Australia, helping with the production of materials that are key to the energy transition. In 2020, JOGMEC signed a *Memorandum of Understanding for a*

Comprehensive and Strategic Partnership with the Government of Western Australia that incorporates continued cooperation over the Mount Weld mine that produces rare earths. There remain opportunities to identify how Japan and Australia might collaborate further in developing supply chains for critical materials, including the potential for Australia to play a role in downstream processing, where it meets important environmental safeguards, that will be central to the energy transition. Australia is a key producer of lithium, which is required in the current generation of batteries that are a key technology in the low carbon energy transition.

3. *Renewables Integration in Competitive Electricity Markets*

Australia has seen renewable electricity deployment soar. In 2020 renewable electricity represented 24 percent of total electricity generated, up from 21 percent the previous year. The 2020 Integrated System Plan released by Australia's energy market operator identifies an opportunity for an additional 26 GB of variable renewable energy resources to 2040, in order to replace 63 percent of Australia's coal fired electricity generation that is planned for retirement. The ISP also notes that between six and 19 GB of additional disposable resources will be needed, including technology such as battery storage, and demand response (Australian Energy Market Operator, 2020). Australia is managing this transition to decarbonised electricity sources within a national electricity market.

In the case of Japan, on the other hand, the government has made tremendous progress in developing a competitive electricity market by transforming its regulated utility model for electric power. However it is still in the process of building key components of electricity market, including the rules around curtailment of electricity, and how to structure markets that provide balancing and other services. Both countries also have regionalised grids that leads to capacity constraints between them.

4. *Electrification of Transport*

Japanese automotive companies have been pioneers in the low carbon of the personal vehicle market, and the government is developing more ambitious plans for further decarbonisation of the transport sector, in support of its net zero mid-century emissions commitment. The electrification of transport in Australia, in contrast, remains nascent, although Australia potentially has an important role to play as a supplier critical minerals that support battery development.

5. *Energy Efficiency*

Japan is a world leader in the innovation and production of energy efficiency technologies, and is committed to further improving the efficiency of energy use as a key platform within its decarbonisation strategy. Australia has much to benefit from the knowledge which has accrued in Japan in order to help decarbonise its own economy as efficiently as possible.

6. *Carbon Capture Use and Storage (CCUS)*

Japan and Australia are committed to managing existing emissions of carbon dioxide through the use of CCUS technologies. In 2019 the Australian Federal government and the Japanese government signed an agreement to examine opportunities to explore what Japan calls carbon recycling, with the Japan-Australia Energy and Resources Dialogue playing a role and moving cooperation forward. This remains a highly innovative but nascent area of potential growth that can contribute to the shared agenda in energy transition.

7. *Modelling Decarbonisation Pathways*

A key capability to assist policymakers in charting a pathway forward for low carbon energy transition, including understanding the implications for trade and investment by laterally, and regional, is the use of modelling capabilities. Japan and Australia have an opportunity to develop deeper sectoral and economy wide capabilities in the modelling of least cost decarbonisation pathways, as a way of helping to understand appropriate policy settings in both countries that might support a rapid decarbonisation of energy systems in both countries.

8. *Regional Infrastructure Development*

Japan is a crucial technology and finance provider to the Asia Pacific region. Australia is an important partner to Japan in the field of infrastructure. In 2018, for example, the Australian, Japanese, and United States governments, recorded the importance of their trilateral partnership for infrastructure investment in the Indo-Pacific region, including a shared commitment to operationalise the partnership in order to support further investment in infrastructure projects in the region.

Implementing a Shared Agenda in the Economic Opportunities from the Low Carbon Energy Transition

This list of eight areas of potential dialogue and collaboration identified above is not exhaustive. Within each area there are myriad sub-issues to be explored.

The 2019 Japan-Australia Energy and Resources Dialogue (JAERD) provides a useful building block through which to further engage. At the working level, however, an option is for the two governments to put in place a bilateral body to map out the energy transition, modelled on the German-Japanese Energy Transition Council. The bilateral council began its work in 2016, drawing on government, industry and academic expertise. Since then, it has mapped out a process for developing joint strategies across a broad range of shared issues such as renewables integration, digitalization, energy efficiency in buildings, sector coupling in transportation, and long-term scenario and review mechanisms for energy transition.

The benefits of such an initiative are threefold.

First, there is a broad agenda that already exists between Australia and Japan in terms of the low carbon energy transition. In addition, there is already joint work occurring in some of these areas. A transition council would enable a stocktake to occur to understand the areas, and the organisations, across both the public and private sectors, that are engaged in working together to support the low carbon energy transition.

Second, the creation of a transition council would help to nurture and sustain new relationships between stakeholders in Australia and Japan, that is fully reflective of the opportunities that exist in the shift to a low carbon energy economy. Helping to develop these key human-to-human relationships will help drive further economic opportunities between the two countries. In doing so, it will also help to identify further potential areas of future mutual benefit to be explored.

Third, a transition council provide the opportunity for joint learning. Australia for example, has longer experience with the deployment of renewable electricity within competitive electricity markets, while Japan, conversely, has deep expertise in the development and deployment of electric vehicles, including in vehicle-to-grid technologies. Both countries are also confronting a common set of issues, such as the deployment of demand response, digitalisation in the energy sector, and the use of large-scale battery systems and helping manage variable energy resource deployment.

Given Australia's and Japan's common economic and strategic interests in the Asia Pacific region, and the ample opportunities for learning from one another, a similar model could develop and build on the two countries' shared agenda in the low-carbon energy transition.