



Joint Standing Committee on Trade and Investment Growth
Committee Secretariat
PO Box 6021
Parliament House
CANBERRA ACT 2600

28 November 2022

Dear Sir/Madam,

How trade and investment can support Australia's transition to a green energy superpower

Low Emission Technology Australia (LETA) welcomes the opportunity to make a submission to the Joint Standing Committee on Trade and Investment Growth Inquiry into Australia's transition to a green energy superpower.

With global commitments to net-zero embedded in many jurisdictions and industries, global experts agree that to meet these commitments, all available and prospective technologies for lowering emissions will be required. Both green and clean energy technologies are sustainable energy options that will be vital to reaching net zero by 2050.

Australia's abundant, cost competitive and high-quality energy resources have long underpinned our economic strength and high standard of living. What will be fundamental to the future of Australia's energy needs and potential status as a future green energy superpower will be an approach that deploys low emission technology (LET) or clean energy technology that are already cost competitive and available now to support the establishment of clean energy markets.

LETA seeks to draw attention to the following elements of the Terms of Reference as being critical to Australia's transition:

- emerging and possible future trends
- the role for Commonwealth agencies
- areas for growth, particularly by leveraging our existing trade relationships.

LETA believes Australia is well positioned to be an energy superpower provided it transitions towards green in an orderly manner and equips existing energy resources with LET's. This submission looks specifically at Carbon Capture, Utilization and Storage (CCUS) deployed in conjunction with the manufacture of hydrogen and ammonia and a new innovative power cycle that uses coal and gas while producing emission free power.

LETA welcomes further discussions on this topic, if you have any questions, please contact me.

Yours sincerely,

Mark McCallum
Chief Executive Officer



Low Emission Technology Australia

Submission to the Joint Standing Committee on Trade and Investment Growth

LETA is a A\$600 million fund established in 2006 by the Australian black coal industry to invest in technologies that significantly reduce emissions and support the transition to a low emission global economy, in line with the Paris Agreement. LETA partners with government, research institutions, universities and industry locally and internationally to develop projects that reduce and remove carbon emissions from large scale industrial processes such as power generation, steel and cement manufacturing, mining, and future energy sources such as hydrogen.

1. Emerging and possible future trends

LETs are advanced technologies that can create clean, secure, reliable, affordable energy and flexible power while also reducing carbon emissions from hard-to-abate industries. They have been recognised by experts across the globe as a key factor to transitioning to renewable sources and achieving our climate commitments ¹.

There are a number of LETs available and in development that have the potential to significantly reduce greenhouse gas emissions, from CCUS, clean hydrogen production and advancements in new clean energy systems, such as the Allam-Fetvedt Cycle. The United Nations Framework Convention on Climate Change (UNFCCC) has stated that LETs will be a critical accelerator and enhancer of the efforts to implement national climate action and achieve global emission objectives, but there is no 'one size fits all' approach' ².

LETs also have the potential to create new energy opportunities for Australia and position Australia as a clean energy superpower as we move towards greener energy production. Specifically, the energy market is also transitioning with global demand for clean and green products increasing. Examples discussed later in this submission focus on the drive for clean energy security by Japan and the market and supply chain opportunities being pursued by the United Arab Emirates.

Commercial ready LETs, such as those that produce hydrogen from fossil fuels with CCUS, will be the precursor to greener alternatives, and will establish supply chains and embed a new cleaner energy market globally. To move towards being a green energy super power, Australia must harness this energy momentum whilst utilising our existing resources to stake a market position in the race to net zero.

1.1 CCUS

CCUS must play a vital role in Australia's energy transition. It can support the energy sector through retrofitting existing infrastructure, such as coal and gas-fired power plants and achieve up to 95 per

¹ <https://www.oecd.org/sd-roundtable/papersandpublications/Accelerating%20the%20development%20and%20diffusion%20of%20low-emissions%20innovations.pdf> Accessed: 9 Nov 2022

² https://unfccc.int/ttclear/misc_/StaticFiles/gnwoerk_static/brief10/8c3ce94c20144fd5a8b0c06fefff6633/57440a5fa1244fd8b8cd13eb4413b4f6.pdf

cent CO₂ capture with further improvements to near zero anticipated ³. By safely and permanently storing carbon dioxide (CO₂) kilometers under the earth's surface CCUS can enable new industries and open up profitable trade relationships by repurposing CO₂ for use in manufacturing processes, such as cement and other building materials, as well as by using Australia's coal resources to make clean hydrogen by sequestering the CO₂.

1.2 Hydrogen

Australia has the opportunity to become a world-leading clean hydrogen producer and exporter as well as a zero-emission energy solution for many other nations in the Asia Pacific region. LETA believes that the current international interest in hydrogen must be leveraged through pragmatic technological and economic considerations.

The most cost competitive sources of clean hydrogen are from hydrocarbons including coal, gas and biomass coupled with CCUS. For example, the CSIRO has identified black coal-based hydrogen with CCUS as one of the most affordable methods of producing clean hydrogen at AU\$2.02-\$2.47/kg of hydrogen ⁴. Fossil fuel-based hydrogen with CCS can also be scaled up to meet the likely commercial demands in the near future, providing a platform for export markets to develop as costs come down for renewable energy-based hydrogen.

The 2019 National Hydrogen Strategy identified that Queensland's Surat Basin has high potential as a hydrogen production site due to the known CO₂ storage resource and the significant deposits of non-export quality black coal ⁵. Australia should be capitalizing on this asset, using our existing workforce and building their capacity to support hydrogen production, identify CO₂ storage and be part of new export and import industries of the future.

1.3 Allam-Fetvedt Cycle plants

The Allam cycle is an emerging high efficiency power cycle that can generate flexible, high-capacity power and hydrogen with negative carbon emissions while producing feedstocks for other critical industries.

Invented by 8 Rivers Capital LLC, the Allam cycle uses CO₂ instead of steam to drive a turbine, while inherently eliminating air pollution by capturing the CO₂ for use in other processes or for sequestration.

The technology can quickly ramp up and down at a similar rate to natural gas power stations, enabling firming and strengthening of the grid to manage higher levels of power from intermittent renewable sources. It can also co-locate with renewable hydrogen electrolyser projects, sharing hydrogen export infrastructure, and consuming the oxygen produced from splitting the water molecule (H₂O), and boosting revenue for the renewable electrolyser.

³ IEA Greenhouse Gas R&D Programme, *Towards zero emissions CCS in power plants using higher capture rates or biomass*, 2019/02, March, 2019

⁴ CSIRO, *National Hydrogen Roadmap*, CSIRO, Canberra, 2018, p. 82.

⁵ COAG Energy Council, *Australia's National Hydrogen Strategy*, Australian Government, Canberra, 2019, p. 13

In 2020, LETA commissioned a feasibility study of an Allam cycle project in Queensland. The study shows that this technology could produce clean hydrogen at the plant gate for approximately AU\$2/kilogram, with additional peaking electricity support. It also found that ammonia could be produced for sub-AU\$1.50/kilogram at larger scale once the ammonia market matures.

The first commercial scale 300MW Allam cycle project based off natural gas was announced in Odessa, Texas earlier this year and a final investment decision is expected in 2024.

We encourage the government to look at the Allam cycle solution as it provides an avenue for new resource derived energy commodities such as clean hydrogen and ammonia, while complementing the increasing role of variable renewable energy with on demand clean emission free electricity.

1.4 International opportunities

Many of Australia's largest trading partners have announced target dates to achieve net zero emissions, such as Japan, South Korea and Vietnam in 2050, China in 2060 and India in 2070. This ambition needs to be achieved at the lowest cost possible while maximizing energy security, which includes security of critical supplies and grid stability.

In order to reach a country's net zero goal at least cost while maintaining economic growth, a range of solutions, both local and regional will be required:

- Local – harnessing cost-effective storage if available while taking into account CO₂ point sources, transport options and geological storage capacity.
- Regional – some countries have limited storage, but could still use hydrogen and other feedstocks from fossil fuels with the storage occurring in natural aquifers (in Australia, Malaysia or Indonesia for example).

For example, it is likely that the majority of clean hydrogen, ammonia and other derivative clean energy fuels for Japan, South Korea and Taiwan will need to be imported.

Japan is actively exploring a global supply network for clean energy production, shipping and other applications. This included investing in the Hydrogen Energy Supply Chain project which trialled hydrogen production from coal gasification in Australia for importation to Japan. This is a significant example of Japanese, Australian and Victorian government collaboration with the private sector to build international supply chains.

Another is Japan's desire to import ammonia supplies from countries including Australia, with geological storage in the producing country. This was highlighted recently when two major Japanese companies, J-Power and Marubeni announced their investment in the CTSCo Project to unlock more than a billion tonnes of permanent CO₂ storage capacity in Queensland

Japan's strategy, which has a strong element of international cooperation, could have a positive global impact and contribute to the creation of new synergies regarding international energy trading and business cooperation. These will be crucial to drive investment and make technologies more affordable ⁶.

⁶ Greg Kelsall and Paul Baruya, *The role of low emission coal technologies in a net zero Asian future*, International Centre for Sustainable Carbon, January 2022, p. 173.

Recently Saudi Arabia Aramco made a shipment of clean ammonia to Germany, having previously also sent supplies to Japan. This activity proved the full value chain from hydrocarbons to hydrogen, then to ammonia and capture of all associated emissions and will support new trade opportunities.

These examples illustrate the potential for Australia, with its secure energy resources, to capitalise on the opportunity to be part of these supply chains, to utilise our resources for the manufacture of new energy products and to support the decarbonization of our neighbors by opening up our vast potential for geological storage of CO₂.

1.5 Green energy momentum

Renewable or green energy capacity is accelerating globally and has great potential to reduce prices and dependence on traditional energy sources such as fossil fuels. Wind and solar PV technology is considered to be one of the cheapest forms of energy. This is very encouraging and we maintain that to achieve decarbonization ambitions we will need all available technology.

The challenge for green energy in the short term will be how fast it can decrease in cost. At present green product attracts a premium price at a time where the clean energy market is nascent. For example, BloombergNEF analysis suggests that the cost of producing green hydrogen is currently AUD \$4.36 per kilogram at its cheapest and will still be around AUD\$1.55 by 2030. By contrast, Japan reportedly paid less than AUD 93 cents per kilogram for the world's first blue ammonia cargo from Saudi Arabia ⁷.

As a future commodity there will be opportunities for competitively priced green energy but the market will likely scale at what countries can afford sooner, which may be clean products that utilise technology such as CCUS. This is why we suggest Australia should also focus in the short to medium term on becoming a clean energy superpower as we transition towards green.

2. The role of key Commonwealth agencies including Austrade, in identifying new trade and inward investment opportunities, and assisting Australian companies to access these opportunities, including through whole of government coordination of investment

Australia has firmly committed to net zero and with the change of government further strengthened our ambition in the medium term to 2030. However, our continued economic prosperity and productivity performance depends on access to all forms of energy and internationally competitive industries.

The role of commonwealth agencies, including Austrade should be to develop stable policy and support all LETs regardless of their fuel source. If the technology reduces existing emissions, it should be pursued provided commercial considerations also stack up. Supporting viable low emission technology also supports prosperity in Australia. It increases jobs, it builds new skills and it positions Australia as a good place for investment.

⁷ <https://www.bloomberg.com/news/articles/2022-09-28/europe-s-blue-ammonia-cargoes-from-saudi-arabia-uae-won-t-be-carbon-free?leadSource=verify%20wall> Accessed: 8 Nov 2022

3. Areas of growth, and how can these be accelerated and/or assisted, including through the use of Commonwealth Special Investment Vehicles; and how Australia can capitalise on existing and future trade agreements and economic frameworks with countries or regions around the world.

There is an immense opportunity for investment and trade growth with our existing partners. Japan, as one example, is a trusted trading ally. Recently, Japanese Prime Minister Fumio Kushida told journalists that Australia is the most important country for Japan's energy policy ⁸ and is looking directly at Australia to support their energy transition by supplying hydrogen and ammonia.

State run Japan Oil, Gas and Metals National Corp (JOGMEC) have publicly stated that they intend to pursue neutrality by focusing on blue hydrogen and ammonia projects for the time being ⁹ given green hydrogen still faces cost hurdles amongst other things.

We would again encourage the Australian government to take a technology agnostic approach to the energy transition. Markets are developing at pace and supply chains are opening for decarbonised energy. We agree there is a lot of support globally for green energy products but maintain that in the short to medium term as supply and demand for energy increases, there is an opportunity to secure Australia's future green prosperity with clean energy.

⁸ <https://www.reuters.com/world/asia-pacific/energy-security-agenda-when-australia-japan-leaders-meet-2022-10-21/>
Accessed: 8 Nov 2022

⁹ <https://www.reuters.com/business/energy/japans-jogmec-support-blue-hydrogen-ammonia-projects-2022-09-06/> Accessed:
8 Nov 2022