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By electronic submission **Public Version**

Submission: Role of Western Australia in the Decarbonisation of our Major Trading Partners

We welcome the opportunity to make a submission and are happy to appear before the inquiry to provide any clarifications and additional information as required.

Executive Summary

This submission by Sustainable Energy Now (SEN) addresses *the Inquiry into the Role of Western Australia in the Decarbonisation of our Major Trading Partners*. Our purpose is to provide evidence-based analysis to inform policy, highlighting that effective support for our partners' decarbonisation hinges on overcoming persistent misconceptions that currently distort strategic planning.

Current policy thinking is clouded by several key misconceptions, which we detail in this submission, including Hydrogen as a fuel, gas as a transition fuel, and the Safeguard Mechanism drives decarbonisation.

Furthermore, we find that Carbon Capture and Storage (CCS), while applicable in specific, limited pre-combustion contexts, is not a scalable or economically viable decarbonisation pathway for post-combustion emissions due to cost and technical challenges.

We urge the Committee to base its recommendations on rigorous engineering and economic realities. Prudent government investment and policy courage are required to overcome barriers and position WA as a leader in the global energy transition through value-added green exports, not perpetuated fossil fuel reliance.

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Terms of Reference (Public Version)

On 21 August 2025, the Legislative Assembly referred the following terms of reference to the Economics and Industry Standing Committee:

That the Economics and Industry Standing Committee inquire into and report on the role of Western Australia in the decarbonisation of our major trading partners.

The Committee is to consider and make recommendations on:

1. The pathways our major trading partners have to decarbonising and the potential for Western Australia to contribute through:

a) LNG exports, to provide energy security as they exit coal and transition to renewable energy.
b) Blue and green fuels, such as hydrogen and ammonia.
c) Green iron.
d) The importance of carbon capture and storage to the above.

2. The Committee will consider:

a) Any current barriers to investment in large scale decarbonisation projects and the pathway to green fuels.
b) Opportunities for State and Federal support.

Decarbonisation Pathways

SEN, Greenpeace Asia Pacific, and Springmount Advisory have worked with independent experts to model WA's emissions and consider the appropriate decarbonisation pathways in a report currently under development. This work has helped inform SEN's submission.

Whilst every industrialised economy has a different context, there are broad similarities in the available technological decarbonisation pathways for the various sectors: electricity; transport; industrial; agricultural. In broad terms, ignoring the agricultural sector and in the context of the terms of reference, these are:

- Renewable energy;
- Electrification;
- Alternative industrial processes;
- Replacement fuels;
- Carbon capture and storage;
- Carbon abatement.

These pathways can be used singularly or in combination.

Continued combustion of gas is not a recognised pathway.

Western Australia can contribute to the decarbonisation efforts of our trading partners as noted in the Barriers to Decarbonisation Investment section below.

Common Misconceptions Distorting Policy

There are a number of misconceptions in energy transition policy circles. Widespread misinformation and disinformation, combined with advertising, donations, lobbying and political pressure from vested interests, keen to maintain business as usual[1], and state government political expediency, has negatively impacted public energy policy thinking here in WA and elsewhere.

We have outlined a few of these misconceptions with reference to supporting information.

The WA Treasury Corporation document Decarbonising Western Australia and Our Trading Partners: Financial Solutions for the Benefit of All West Australians[2] contains these misconceptions in addition to a number of what appear to be misleading statements.

Misconception 1 - Hydrogen (Green or Blue) as a Fuel

Green hydrogen where to next? was the title of a public talk hosted by SEN and the Hydrogen Society of Australia at the State Library Theatre in October 2024[3] that looked at the role of hydrogen with the following speakers:

- **Fraser Maywood** - Chair of Sustainable Energy Now;
- **Lalit Dogra** - WA government's renewable hydrogen strategy;
- **Kelsey Cross** - Fortescue Hydrogen Systems;
- **Max van Someren** - Bivios techno-economics expert.

According to the IEA Global Hydrogen 2023 Review[4] worldwide hydrogen production was 95 Mt in 2022 and linked to more than 900 Mt of CO2 emissions. Traditional uses of hydrogen include crude oil refining, the chemical industry (as a feedstock) and the iron and steel industry (as a reducing agent, not a fuel).

Currently most hydrogen is produced and consumed **in-situ**. The IEA Review noted that hydrogen is not a global traded commodity. This is because hydrogen, in any form, is very inefficient and expensive to make, store and transport.

Ross Garnaut's 2019 book "Superpower – Australia's low carbon opportunity" used the unfortunate phrase "bottled sunshine" to describe how Australia's renewable energy resources could be turned into an exportable fuel in the form of liquified hydrogen.

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[1] https://www.abc.net.au/news/2025-09-29/trump-climate-hoax-comments-and-fossil-fuel-lobby/105810870
[2] https://www.watc.wa.gov.au/media/qr5jfb5z/decarbonising-western-australian-and-our-trading-partners.pdf
[3] https://sen.asn.au/wp-content/uploads/SEN-Presents-October-2024-Green-Hydrogen-Where-to-Next_redacted.pdf
[4] https://www.iea.org/reports/global-hydrogen-review-2023

"Bottled sunshine" was a mistake and engineering, economics, geo-politics and a series of cancelled hydrogen related export projects around the world have since tempered that idea into a more realistic one. Garnaut and many others now see renewable energy being used in the production of finished or semi-finished products (also known as 'embodied energy') with green hydrogen being used as a chemical feedstock, not as a fuel.

The efficiency and economics of hydrogen production, storage, transport and use as a fuel, including derivatives like ammonia, are very unattractive. There is no 'learning rate' that will improve the thermodynamics or materially impact the costs associated with the hydrogen 'as a fuel' supply chain to be anywhere competitive against alternatives[5] . This hydrogen ladder[6] provides insights to pragmatic hydrogen use cases. This Imperial College London Annual Lecture 2024 - Michael Liebreich. Global Energy Transition Trends and Hydrogen[7] is worth watching to dispel the 'hydrogen as a fuel' misconception.

There is currently a policy lag within the WA Government with respect to hydrogen (including derivatives such as ammonia) in that there is still talk of "green or blue fuels", including as exports to our trading partners. This is despite the compelling evidence that hydrogen as a fuel has no future. Pemier Cook's CEDA speech in July'25[8] is a case in point as to the persistence of this misconception.
There appears to be little understanding in WA energy policy circles of how energy flows within an economic system. This Deutsche Welle video[9] explains the flow of primary energy, secondary energy, and final energy into useful work. It also highlights the amount of rejected or wasted energy associated with fossil fuels and related appliances.

Hydrogen has a future in a decarbonising world, not as a fuel or energy carrier, but as a valuable chemical feedstock produced and used locally in fertilizer products, explosives or as reducing agent in green iron and steel production in place of metallurgical coal.

Misconception 2 - Gas is Cleaner than Coal

Gas emissions when measured at the point of combustion are generally lower than coal, leading to the idea that Australia can help decarbonise its trading partners by continuing LNG exports. This is a popular, self-serving, persistent and false narrative:

- When the whole of supply chain emissions from field reservoir to final customer burner are taken into account then emissions from burning gas are often higher

[5] Alternatives include the direct use of electricity noting that electricity is a key cost in the production of green hydrogen. Thus making green hydrogen as a fuel virtually impossible to compete against the direct use of renewable electricity. It makes no sense to use electricity (which is pure work in thermodynamic terms) to make fuel, and then burn that fuel to generate electricity (work) that could have been delivered by electricity directly.
[6] https://www.linkedin.com/pulse/hydrogen-ladder-version-50-michael-liebreich
[7] https://www.youtube.com/watch?v=w0Q9cuF8zKg
[8] https://www.youtube.com/watch?v=VEnOFIhzouY&t=316s
[9] https://www.youtube.com/watch?v=EVJkq4iu7bk

than coal as Robert Howarth from Cornell University[10] and others have highlighted;

- Continued investment in LNG displaces investment in renewables as CSIRO[11] in a study for Woodside highlighted;
- A follow-up WA cabinet in confidence report by Deloitte, completed in early 2025, has not been released suggesting it supports CSIRO's findings that WA gas is displacing renewable energy more than it is displacing coal in Asia;
- In any event, burning any form of hydrocarbons is not going to decarbonise any economy, here or overseas;
- When a nation's energy security, cost and environmental impacts (including air quality) are considered, then renewable energy represents a much better option to the use of any fossil fuel. China for one[12] has recognised this and is investing heavily in the roll-out of renewables and in the electrification supply chain on the way to becoming a powerful electro-state.

There is another related carbon accounting misconception that WA's emissions can rise because somehow the Scope 3 emissions of our neighbours are falling by burning Australian LNG. This idea, presumably addressed under Paris Agreement Biennial Transparency Reports, would need to be scientifically robust and consistent with technical and legal guidance in the Paris Agreement. Our view is that it would be very easily challenged and cause further embarrassment to Australia on the world stage[13].

Misconception 3 - Gas as a Transition Fuel

Gas as a transition fuel, a bridge fuel, as a partner to or supporting renewables, doesn't stand up to critical scrutiny:

- Electrical generation systems can transition directly from coal to renewables without a transition via gas;
- Gas can be used to firm renewables (as is in Australia) but each jurisdiction will have alternatives to firm renewables - gas is not a universal firming solution;
- Gas is a fuel that is used less and less in the energy transition as the contribution from renewable energy and storage ramps up;
- Batteries are fast becoming a more efficient and effective alternative to gas as a source of peaking energy and firming services in power generation. This change can happen very quickly as we've seen in the rapid build-out of large scale batteries in Australia. Bill McKibben recently noted[14] that "California, the world's fourth-largest economy, is using 40 percent less natural gas to generate

[10] https://news.cornell.edu/stories/2024/10/liquefied-natural-gas-carbon-footprint-worse-coal
[11] https://www.woodside.com/docs/default-source/sustainability-documents/climate-change/modelling-the-emissions-impact-of-additional-lng-in-asia.pdf
[12] https://climateenergyfinance.org/wp-content/uploads/2025/05/Monthly-China-Energy-Update-May-2025.pdf
[13] https://www.theguardian.com/australia-news/2020/nov/18/australias-climate-record-labelled-simply-embarrassing-and-among-worst-of-g20-nations
[14] https://www.rollingstone.com/politics/political-commentary/solar-is-liberation-energy-climate-oligarchs-trump-1235396243/

> electricity than it did two years ago, simply because it's built out so many solar farms and battery arrays"

The gas / LNG industry is a mature one with an uncertain demand outlook which creates significant investment risk, especially for high cost LNG producers like Australia in light of strong growth in supply. The inherent nature of the gas industry's business model means **they have to double-down on gas** in order to monetise undeveloped gas. This article[15] provides additional context in understanding the gas industry's business model and their role in slowing down the energy transition.

Misconception 4 - The Safeguard Mechanism is Driving Decarbonisation

There is a misconception that, in the absence of a carbon price, the Safeguard Mechanism (SM) is effective in driving industry decarbonisation and related innovation.

SEN has spoken to organisations managing industrial assets under the Safeguard Mechanism to understand how the capital allocation process works in relation to sustaining capital projects. The feedback was that an internal shadow carbon price was the main driver in carbon reduction related projects rather than the SM ratchet. SM obligations were being met by offsets.

Hence, Australian Carbon Credit Units (ACCUs) are barriers to decarbonisation, rather than solutions.

Alcoa's CEO, Bill Oplinger, has stated that the company (in the context of its Australian operations) will be a "big user of gas for a long time into the future"[16]. Alcoa has secured a 10-year gas supply agreement with Chevron, starting in 2028, for its Western Australian alumina refineries[17]. Clearly Alcoa can manage their SM obligations whilst still burning large amounts of gas without any tangible signs of major decarbonisation.

There appears to currently be a lack of effective policies or green premiums or trade barriers to drive industrial decarbonisation in Western Australia. This in turn negatively impacts the WA domestic electricity offtake market and related investment.

Misconception 5 - Critical Minerals are Excluded from Decarbonisation

The current WA Government line being promoted is that critical minerals mined and processed in Australia are essential for the manufacture of technology used by the rest of the world to decarbonise, so they get a 'free pass' from needing to be decarbonised themselves.

The Premier talked about critical minerals and rare earths in the recent CEDA speech[18] and directly linked them to continued use of Domgas (and continued LNG export) when he said

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[15] https://www.linkedin.com/pulse/clean-energy-transition-role-fossil-fuel-companies-fraser-maywood

[16] https://www.afr.com/companies/manufacturing/alcoa-ceo-pushes-for-nuclear-and-gas-says-batteries-can-t-save-smelters-20250501-p5lvov

[17] https://www.alcoa.com/australia/en/news/releases?id=2024/12/alcoa-secures-long-term-gas-supply-for-wa-operations&year=y2024

[18] https://www.youtube.com/watch?v=VEnOFIhzouY&t=316s

"These opportunities have been largely created by secure, affordable energy delivered in large part by the domestic gas supplied by our LNG exporters over the last 35 years".

The list of critical minerals[19] includes Lithium and with Australia's plentiful resources we are on the way to developing another high-emissions industry when with some forethought, planning and, if required, Government support, we could have a fully decarbonised Lithium industry.

What message about the need to decarbonise does it send to others within the broader Australian mining and metals sector? and the message to our regional trading partners?

Green Iron

We support the development of an Australian Green Iron Industry, and other industries where it makes economic and or strategic sense to manufacture in Australia. This is especially true where we can use our renewable energy and minerals advantage to embody energy in semi-finished or finished products that add value in comparison to the traditional shipment of raw materials.

Economic diversification and decarbonisation of the WA economy requires closer cooperation with our main trading partners to maximise Australian opportunities. This has wider foreign relations and defence implications not addressed herein.

Carbon Capture and Storage

CCS or CCUS is central to policies that support the continuing use of fossil fuels. Unfortunately CCS (and related technology direct air capture) are both costly and impractical in that they do not scale sufficiently to make a material impact to overall emissions. Further, the industry is looking to taxpayer funding of CCS.

Pre-combustion CCS should continue to be a mandatory requirement for gas field development with CO2 content (such as Gorgon that has CCS and Barossa that does not have CCS in the current field development plan). Post-combustion CCS (including capture of CO2 emissions in the production of blue hydrogen from gas) is unworkable as outlined in this SEN CCS information sheet[20].

CCS generally only works in practice for gas reservoirs with high CO2 where you have a valuable commodity, in high concentrations and at high pressure. In absence of a very large carbon price, post combustion CCS is unlikely to work economically as you have a waste stream, at low concentrations and at low pressure.

Talk of repurposing Oil & Gas facilities as CCS sites, as promoted by some operators and taken up by some in government, are designed primarily to promote the concept of CCS to the uninformed and hence maintain social licence / or to delay decommissioning expenditure. Similarly the idea of importing CO2 from our trading partners for sequestration in Australia is wishful thinking.

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[19] https://www.ga.gov.au/scientific-topics/minerals/critical-minerals

[20] https://sen.asn.au/wp-content/uploads/SEN-Did-You-Know-Fact-Sheets-CCUS.pdf

Re-use of CO2 as syn-fuels, whilst feasible, is not cost-effective nor desirable compared to alternatives.

Bio-fuels, such as Canola for bio-diesel, if carefully managed, are feasible and practical for niche applications where alternatives to fuel are genuinely challenging.

We recognise that new science and genuine innovation may change the economics of post-combustion CCS.

The recently announced Horizon Power CCS pilot trial[21] on small diesel engines using technology from Kapture, a Melbourne-based start-up, is a case in point. The pilot tested the application of Kapture's novel carbon capture technology that directly captures CO2 emissions from the exhaust of a diesel generator and stores the CO2 as a sediment for later sequestration into concrete. Kapture has demonstrated the process through its partnership with Permacast in Perth. Whilst interesting, and Horizon are to be applauded for their approach to innovation generally, key questions still remain:

- What are the costs and how are those costs recovered?
- What would drive operators, say in the private sector, to adopt post combustion CCS in the absence of a large carbon price? (noting the Safeguard Mechanism doesn't apply to smaller diesel burning installations)
- Is there any green premium? Does partially green concrete attract a higher price?
- This is a niche application - does it scale to make a material difference? (other benefits notwithstanding such as local air quality, community benefits, company net zero pathway).

Barriers to Decarbonisation Investment

It is unclear from the terms of reference if this refers to the decarbonisation of WA industry or that of our trading partners. We have taken the the view, informed in part by this WA Treasury Corporation document[22], that the two are linked, such that if WA can demonstrate how to successfully decarbonise our industry sectors (without offsets), whilst maintaining our economic prosperity then this provides a model and opportunity to help our trading partners decarbonise via:

- Successful case studies - lead by example;
- Provision of technology and know-how;
- Supply of processed green minerals (supplying non-green 'critical minerals' falls short of decarbonising industry);
- Supply of finished or semi-finished green products;
- Supply chain integration;
- Co-investment;

[21] https://www.horizonpower.com.au/about-us/news-announcements/carbon-capture-trial-supports-decarbonisation-of-diesel-generators/

[22] https://www.watc.wa.gov.au/media/qr5jfb5z/decarbonising-western-australian-and-our-trading-partners.pdf

- Co-funding in research and technology development (WA research facilities are lagging in this regard - e.g. industrial process heat and storage).

Barriers to decarbonisation include:

- WA government's ambition to "become a renewable energy powerhouse[23]" whilst continuing to pursue policies that mean that WA emissions will rise;
- Ineffective decarbonisation strategies without substantial plans as highlighted in the WA's Government's Sectoral Emissions Reduction Strategy[24];
- Lack of effective policies or green premiums to drive industrial decarbonisation - the Safeguard Mechanism is largely ineffective in the absence of a price on carbon to drive real change (ACCUs are more barrier than solution);
- Approving new mines and minerals processing plants that are not carbon neutral at the start;
- Lack of prudent and timing investment into economic diversification noting that Governments may not always be able to pick winners but screening out 'duds' is easier given the right resources;
- Lack of scientific and engineering input into policy development, e.g. thinking there are economically feasible pathways for green and blue fuels;
- Thinking about replacement fuels rather than the more practical alternatives of electrification and / or industrial process redesign;
- Lack of timely investment in common user infrastructure such as transmission in WA. Whilst a small step forward, the recently launched SWIS transition plan, lacks clarity on funding allocation beyond previous announcements on Clean Energy Link North construction funding, and funding for further expansion studies [25].

Opportunities for State and Federal Support

Government planning is underway to diversify the WA economy[26] and to decarbonise the WA economy[27], both of which will require significant State and Federal investment to execute in what needs to be a plan-led, major change in industrial policy.

In order to arrive at prudent investment decisions, misconceptions and wishful thinking impacting policy thinking will have to be dispelled. In addition, more robust techno-economic analysis and support is required to improve decision making quality in the overall policy development process.

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[23] https://www.wa.gov.au/organisation/energy-policy-wa/the-south-west-interconnected-system-transmission-plan-future-ready-transmission-network-was-main-electricity-system

[24] https://www.watc.wa.gov.au/media/qr5jfb5z/decarbonising-western-australian-and-our-trading-partners.pdf

[25] https://www.wa.gov.au/government/media-statements/Cook%20Labor%20Government/SWIS-Transmission-Plan-to-make-WA-a-renewable-energy-powerhouse-20250918

[26] https://www.wa.gov.au/government/publications/diversify-wa-2024-update

[27] https://www.wa.gov.au/system/files/2024-07/sers-final-report-20240702.pdf

Conclusions

Current decarbonisation policy thinking is clouded by a number of misconceptions:

- Misconception 1 - Hydrogen (Green or Blue) as a Fuel
- Misconception 2 - Gas is Cleaner than Coal
- Misconception 3 - Gas as a Transition Fuel
- Misconception 4 - Safeguard Mechanism is Driving Decarbonisation
- Misconception 5 - Critical Minerals are Excluded from Decarbonisation

Carbon Capture and Storage is not a credible decarbonisation pathway due to cost, inability to scale sufficiently and funding challenges.

Green Iron with the right investment strategies, including support from our trading partners, is a promising new green industry.

There are significant opportunities for Australia to help decarbonise their regional trading partners, continued LNG supply is not one of them.

Significant State and Federal Government investment is required to diversify and decarbonise WA's economy. Prudent investment decisions will require misconceptions and wishful thinking impacting policy thinking to be dispelled.

We hope you find our submission sufficiently interesting: we are happy to appear before the inquiry to provide any clarifications and additional information as required.

Yours sincerely

Fraser Maywood
Chair, Sustainable Energy Now

Submission approved by the SEN Committee on 7th October 2025 by circular resolution

Sustainable Energy Now (www.sen.asn.au) formed in 2006 is a grass-roots not-for-profit member based advocacy group promoting renewable energy and decarbonisation. Supported by the best science and our own modelling and simulation, we advocate on how Western Australia can make a swift and orderly transition to clean renewable electricity safely, reliably, and affordably with commercially proven technologies.