

# ESG Focus: Aust Green Hydrogen Hopes Hit

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ESG Focus: Australia's Great Hydrogen Hope

As Europe and the US move ahead with funding for hydrogen projects, Australia's ambitions are under threat.

- Australia's huge natural advantage
- Innovation could be game-changer and cuts both ways
- Biodiversity could change the playing field
- Paris Accord may force global hands
- Australian corporates need certainty

By Sarah Mills

The Australian Government identified green hydrogen as a major Australian export opportunity as far back as 2014, when it proposed the establishment of the Asian Renewable Energy Hub (AREH) in Western Australia's Pilbara.

AREH is a project spanning 660,000 hectares of wind turbines and solar arrays aimed at exporting electricity to south-east Asia, Singapore in particular, through a submarine cable.

In the ensuing years, more hydrogen hubs were proposed for Gladstone and the Cooper Basin in Queensland; the Eyre Peninsula in South Australia, the Gippsland Basin in Victoria, Bell Bay in Tasmania, and smaller hubs in the Hunter Valley and Snowy Hydro.

ASX-listed companies were swift to announce a plethora of projects, many of which are awaiting final investment decisions (FID) later this year.

But recent global developments have shifted the playing field and, pending FIDS, 2023 could be the year when Australia's green hydrogen industry shifts from hero to zero – a fact widely acknowledged by the industry's leaders.

A decade of investment is at stake.



## Cons Are Stacking Up

This article examines the existing and future threats to Australia's ambitions to become a global exporter of green hydrogen.

Given Australia is not a dominant global player in the grey hydrogen market, and given the logistics and infrastructure challenges

surrounding the transport of hydrogen, this journalist has long harboured a degree of scepticism (but remained open minded) about the country's ability to compete on the global green hydrogen stage.

Then last August, the US Inflation Reduction Act introduced tax credits of US\$3kg for 10 years for US-based green hydrogen manufacturers and a 30% investment tax credit – and already capital is flowing in the country's direction.

A month before that, the European Commission under European State aid rules nominated hydrogen as an "Important Project of Common European Interest" and this March launched the Clean Hydrogen Partnership and forged ahead with the European Hydrogen Bank.

These developments, combined with the fact that China is already the world's largest producer of grey hydrogen and electrolyzers, and has proposed one of the world's largest green hydrogen projects through Sinopec, suggest Australia's green hydrogen prospects have dimmed somewhat.

In one sweep of the US presidential pen, Australia morphed from a "Saudi" of green hydrogen (as Fortescue Metal's ((FMG)) chief Andrew Forrest put it), to a potential banana republic of green hydrogen. (Saudi Arabia, by the way, has its own green hydrogen and ammonia ambitions.)

The Australian government appears neither willing nor able to match the subsidies on offer.

Director of Climate Energy Finance Tim Buckley says, at some stage, the government will be forced to introduce a carbon price if it wishes to continue doing business, but expects that will be at least three years down the track. He also expects the government will likely introduce subsidies before the end of the decade.

Meanwhile, producers operating in US, EU and China markets enjoy an added advantage of large domestic, proximal markets, which do not have the same infrastructure and transportation challenges facing Australia. A skills drain to those countries is an added threat.

#### Industry Faces More Challenges Than Just Subsidies

Not only has a green hydrogen arms race officially begun, but 2023 is being mooted as the year of impact.

A range of **innovations** are expected to hit the market this year, which could reduce the size of broader green hydrogen prospects, particularly in the area of battery storage, which we discuss in a separate article.

Much depends on ammonia conversion and the energy options available to other countries with weak renewables options; innovation in the green-hydrogen generation, transport and infrastructure fields; and innovation in rival energy technologies, such as battery storage, nuclear reactors, and catalysers.

**Paris Accord imperatives** may well result in a doubling down on renewables production in order to meet climate goals and possibly a prioritisation of new nuclear technologies at green hydrogen's expense.

Also, the green hydrogen prospect **was probably never as large** as many made out. More energy is needed to operate a hydrogen economy than is used in today's economy.

Bloomberg NEF estimates that generating enough green hydrogen to meet a quarter of our energy needs would take more electricity than the world generates today from all sources combined and an investment of US\$11trn in production, storage and transportation infrastructure.

Given cheap renewable energy, green hydrogen has long primarily been mooted for use in grid stability; reducing hard-to-abate emissions-heavy industry emissions; and for long-haulage.

Another obstacle is simply **geopolitics**.

The stakes are high. As Fortescue's Forrest says, the hydrogen opportunity would dwarf Australia's largest export industries of fossil fuels and iron ore.

GDP equals energy. Yes, Australia has a massive critical minerals prospect, but everyone knows the main game is energy. No prisoners will be taken and, as interest rates rise, the risks of being too cavalier in the new energy world could expose smaller, less connected players as targets.

So it is not surprising that Fortescue beat a hasty retreat from the Sun Cable joint venture with Mike Cannon-Brookes. Forrest may have sniffed the political, financial and geopolitical wind, and is battenning down the hatches.

Macquarie Group ((MQG)) backed out of its green hydrogen and ammonia production joint venture with the Port of Newcastle on the grounds that the electrolyser and ammonia production plants were technically feasible but not commercially viable.

It's one thing for Australia to pay \$300bn-plus for a dubious nuclear submarine purchase as part of a general defence umbrella, and another \$300bn to toe the global line on the pandemic, but backing the hydrogen industry with subsidies would require Australia step out from its subservient global role – a culturally alien act.

The government also has to consider the innate risks of the venture, and its country's inability to compete in a global subsidies war.

CEO and founder of UK-based Australian-owned Quinbrook Infrastructure, a multi-billion investor David Scaysbrook told Renew Economy it would be "fiscally insane" for Australia to match the investment and production tax credits offered by the IRA.

But Forrest argues the stakes are worth it.

And, given the government already subsidises the oil and gas industry to the extent it would not be profitable otherwise, it becomes difficult to argue against subsidising other energy industries, particularly given, as Climate Energy Finance's Buckley points out, the government is likely to introduce subsidies before 2030 anyway.

It may be a moot point. The Australian Energy Market Operator is already assuming less green hydrogen exports.

So it is perhaps a good thing that final investment decisions on many of Australia's major green hydrogen projects are due towards the end of 2023.

#### Down But Not Out Subsidies Not Insurmountable

Australia has suffered a massive blow to its ambitions, but the industry's demise is not yet a *fait accompli*.

Just this March, Fortescue Metals' chief Andrew Forrest warned Australia was in danger of missing the green hydrogen bus if it failed to match the US and EU subsidies – and he was not underestimating the state of affairs.

The Clean Energy Council has suggested the government increase and extend the Renewable Energy Target scheme as a simple and effective defence.

Given the industry is nascent and few technologies have reached commercialisation, the three-year wait for the introduction of a carbon price that Climate Energy Finance's Buckley estimates may not break the camel's back.

Despite the hype, offtake agreements are thin on the ground globally, but as soon as pens start hitting paper (and I'm not talking memorandums of understanding) the game is on.

Many of the mooted US projects will take at least two to three years to complete and during that time, green hydrogen technologies are expected to scale and costs to fall sharply. Already, markets are witnessing a doubling down on green hydrogen investments, such as the fast-tracking of the Eyre Peninsula project, due for completion in 2025, to gain first-mover advantage.

Still, with a roughly 50% capital expenditure advantage in the US for production facilities, most observers are expecting all of Australia's governments will need to at least make their intentions clear about the future of green hydrogen, even if subsidies are slower to materialise or more targeted, before Australia's majors make their final investment decisions this year. Multi-party support for strengthening Australia's climate policy architecture is in place.

#### Natural Advantage Still Plays in Australia's Favour

Geoscience Australia says 11% of Australia's land mass could be highly suitable for renewable hydrogen production.

Australia has what appears to be an incomparable advantage in the green hydrogen market – vast solar, wind, and most interestingly - water resources.

As biodiversity kicks in and water becomes an increasingly contentious and costly issue, it stands to reason that Australia's case improves.

They say Australia is a dry country, but that's not entirely true. Australia receives more rain per capita than most other countries in the world.

Australia receives 140 megalitres of water per person, which compares with 130 for Brazil, 33 for the US, 6 for Japan, and 4 for the UK.

The equation is somewhat reversed when looking at pure millilitres (which is not surprising given the percentage of desert in Australia).

Australians use only 0.4% of total precipitation and about 5% of runoff, most of which finds the sea.

Also, the Department of Climate Change, Energy, Department and Water estimates that to be a major global supplier of green hydrogen by 2050 would require about one third of the water that Australia's entire mining industry uses now.

At the moment, AREH is expected to tap local aquifers, but theoretically, there is nothing to stop the capture of a small percentage of the vast seasonal precipitation in the Top End to feed electrolysis.

Except biodiversity strictures and the Federal Government, which overrode Section 100 of the Constitution to return water to "the environment".

It is possible the government could manage water resources in favour of green hydrogen if biodiversity strictures allow. How this plays out is yet to be seen.

#### Innovation Climate Water nexus

Meanwhile, green hydrogen technology is expected to scale sharply this decade, driving a sharp reduction in costs.

Already, the cost of electrolyzers are set to fall -75% according to NEL. Catalytic technologies, which we discuss in a separate article, could eliminate the need for electrolyzers altogether, sharply altering the prospects for green hydrogen, particularly Australia's green hydrogen, once a price is placed on water.

But for now, what Australia really needs is innovation in hydrogen and ammonia transport and infrastructure to be globally competitive.

The Department of Climate Change, Energy, the Environment and Water, (DCCEEW ) estimates the cost of storing hydrogen will fall by up to -40% by 2025 as ammonia, and up to -80% as liquid hydrogen.

The CSIRO has developed ground-breaking technology that converts ammonia to high-purity hydrogen at its point of use, using thin vanadium membranes to allow hydrogen to pass through while blocking other gases. It is undertaking a two-year demo project.

If this were to be achieved, then everything would boil down to carbon and water pricing – the carbon differential between mining and shipping essential minerals for batteries, and hydrogen, being the deciding factor.

Should green hydrogen prove victorious in markets such as the US, then Australia might not be completely out of the race and may be

able to rise on the shirt-tails of competitors' innovations.

Much emphasis is being placed on incumbent advantage (and no doubt duration of off-take agreements), but in the wash, in a mature market, green hydrogen will just be a commodity, for which price remains the deciding factor.

### Innovation Cuts Both Ways

While innovation can favour green hydrogen, it can also undercut it.

Rival technologies, particularly modular nuclear reactors using thorium would seriously undercut Australia's target markets – that is countries with less abundant renewables sources and difficulties with onshore electrolysis.

The Netherlands, for example, is already constructing factories to produce nuclear reactors en-masse that can be rolled out and put on the back of a truck. Old, uranium-driven nuclear technology can't compete on costs and is an environmental no-starter.

So it is innovation, more than subsidies, that could well spell the death of Australia's green hydrogen industries and highlights the dangers of subsidising such a nascent industry.

### Wait And See Approach Justified

It is easy to understand why many of Australia's largest companies have sat on the innovation fence – not that this is likely to win them any favours with big capital, which would like to see them do their share of the heavy lifting.

With the exception of Fortescue Metals and Mike Cannon Brookes, Australia's energy majors in particular have preferred to take a wait-and-see approach.

In fact, their timing may have been perfect, given the dovetailing of the impact of global subsidies and innovation in 2023 and 2024.

Woodside Energy ((WDS)) perhaps has the most ambitious hydrogen projects among the energy incumbents, with its "H" projects in Australia and Oklahoma, but to date its financial commitment has been slim.

Given US subsidies, the company now considers the Oklahoma project to be the most prospective. FIDs for the Australia projects are expected late this year.

Non-listed Infinite Green Energy, run by former Woodside Energy executive Peter Coleman, plans a green hydrogen plant at Arrowsmith near Perth. Construction was supposed to commence last quarter.

Companies such as Rio Tinto ((RIO)), BHP Group ((BHP)) and Santos ((STO)) will not be able to sit on the fence much longer as regulators and big capital target green washers. Big capital and regulators will be reviewing the percentage of company budgets spent on decarbonisation and innovation within the next year or two and are promising to act accordingly.

### Paris Accord Imprimatur May Force Hand

Another looming threat to hydrogen's prospects may be Paris Accord imprimatur, a factor acknowledged by BHP CEO Mike Henry in a recent interview in The Australian Financial Review.

This argument is put by former university economics professor Steve Keen (now Crowdfunded Professor of Economics on Patreon) in his Rebel Economics masterclass.

Apart from pointing out the fact the world is already missing its Paris climate targets, Keen attempts to debunk the entire climate mitigation and remediation economic camp, claiming climate change will force the issue and most likely within the next few years, and goes so far as to call into question the future of capitalism itself.

Basically, after shooting down the assumptions underlying the mainstream economic models of climate change, Keen says that within the next few years, massive climate and potentially mass starvation events will cause the world to divert all resources to renewables until the technology for thorium-powered modular nuclear reactors (about a decade away) is mastered.

He advises this would need to be supported by relative cheap geo-engineering, whitening the earth's surfaces.

The only good thing about this prediction is that the timeframe is short and won't leave anyone guessing.

However, even in this scenario, pink hydrogen would have a future, suggesting investment in hydrogen infrastructure would not be wasted. The nuclear industry is starting to lean towards the concept of hydrogen production, suggesting a strong future.

Meanwhile, BHP's Henry seems to suggest the fact that Paris Accord targets have not been met will be sufficient to create a similar double-down on renewables.

### Geopolitics

Then of course, there is geopolitics.

Assuming the state of play remains (i.e. no innovation and no Paris-Accord mandates) Australia's hydrogen industry does stand to benefit from geopolitical events.

While Carbon Tracker estimates the Ukraine War has triggered more than US\$70bn in new hydrogen proposals globally, the odds of Australia being able to take advantage of this capital shift are limited given most of the major markets plan to develop onshore green hydrogen capabilities.

That leaves Australia competing with China, Europe and the US for export markets.

China could potentially compete with Australia as a supplier of green hydrogen to Japan and Korea (which are considering using green

hydrogen to power manufacturing industries such as steel, fertilisers and refineries), but it is likely the latter two will seek to gain energy independence from China.

The governments of both have isolated green hydrogen as a future source of energy.

The US will also seek to export to these markets and will experience the same infrastructure and transport hurdles as Australia (albeit with a 30% subsidy advantage).

However, it has yet to be seen how the Australia-US AUSMIN alliance will play out in terms of climate co-operation.

The East Asia Forum observes that climate has been woven into the AUSMIN defence alliance and that the US might support Australia's energy ambitions in order to allow regional partners to diversify their energy sources, although concedes the US may choose to "go it alone", particularly if they are funding it alone. And it may well be that the US would prefer Australia be reduced to a supplier of critical minerals and keep coughing up hundreds of billions for nuclear submarines instead.

Both Japan and South Korea are examining options to produce green hydrogen onshore (through ammonia conversion at the very least) and establish hydrogen storage infrastructure in port areas near manufacturing centres.

Australia may not be one of the biggest grey hydrogen exporters in the world, but it is one of the top three exporters of hydrogen to Asian markets, so its foray into the hydrogen market is at least backed by expertise, strong existing relationships and a strong hydrogen-related safety track record.

It is also worth noting the Middle East, Saudi Arabia and United Arab Emirates have announced aggressive strategies for blue and green hydrogen, with export plans for Asia and Europe. This puts recent Saudi and UAE commitments to sell oil to China in yuan in a new light - the USD-oil nexus that has presided for the past 50 years has been broken and the oil majors are currying favour as they jockey to retain their status in a new-energy and geopolitical world.

### In conclusion

This year is shaping up as a decisive one for the billions of dollars of proposed green hydrogen investments by ASX-listed companies, which we will examine in our next article on this subject.

The major problem for Australia, a primary producer, as a green hydrogen exporter is that the majority of the world's emissions and GDP come from the manufacturing sectors.

If you assume that energy is equal to GDP, most GDP is derived from transforming energy into other goods.

Given the challenges and costs in storing and transporting hydrogen and ammonia (not to mention energy costs of transportation once carbon pricing is introduced), most countries will need to establish hydrogen production facilities close to manufacturing areas, which Australia is not.

Add innovation into the mix and the fact that, outside of heavy industry and long-haulage, hydrogen is unlikely to be adopted as a fuel source, even green hydrogen's prospects appear uncertain.

Hence, inventor and renewables advocate Dr Saul Griffiths' sensational recent claim that Australia has drunk the Kool-aid on green hydrogen may not be that far off the mark.

Much will depend on the rate at which costs fall in both renewables, green hydrogen production and storage, and nuclear energy; innovation in rival technologies; and the parameters set down by biodiversity regulation.

Most scientists concur the only way to reach climate commitments is through the rapid deployment of renewables and it is broadly acknowledged that Australia is ideally positioned to supply the world with the critical minerals needed for their production.

Critical minerals are by far our safest bet. The question now is: how safe do we want to play?

The answer should be revealed either this year or next.

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