

News analysis

Hydrogen industry struggling to meet great green expectations

Shift away from emissions-intensive production of fuel will take time



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In the vast deserts of Western Australia, investors aim to create a green fuel to hasten an end to the world's dependence on polluting coal, oil and gas and speed up the fight against climate change.

Using abundant sun and wind, the idea is to deploy vast arrays of solar panels and wind turbines to create hydrogen-based fuels that can be exported to power the global economy.

Projects are already in development and the vision is to create this new industry in a matter of years, not just in Australia but also globally.

There is only one problem. While the green hydrogen industry is growing, momentum is not quite as fast as many hope. Currently, most hydrogen is produced from fossil fuels, which are emissions-intensive.

But the focus of most investment now is on green hydrogen using renewable energy.

"We need to get lift-off. I think a lot of things happen once we get these projects off the ground," said Mr Vinay Khurana, vice-president of the hydrogen market at Technip Energies, a French engineering and technology company.

Like many who spoke at the recent Gastech 2023 conference in Singapore, Mr Khurana said there was urgency in accelerating the development of the hydrogen industry, as global carbon emissions keep growing.

One of the fuel's key attractions is that when burned, it does not produce planet-warming carbon emissions.

There is no shortage of interest or investors.

According to the industry-backed Hydrogen Council, more than 1,000 projects requiring US\$320 billion (S\$437 billion) have been announced globally, nearly 800 of which aim to be commissioned by 2030.

Yet only a fraction of these, representing US\$29 billion in investment value, have been given the financial go-ahead to proceed, the council said in May 2023.

There is no shortage of government support, either, with a growing number of governments crafting national hydrogen strategies, including Singapore.

The Republic has set a goal for hydrogen to account for at least half of Singapore's entire fuel mix by 2050, making it a key part of the nation's goal to achieve net-zero emissions by mid-century.

And the International Energy Agency has said hydrogen could meet 10 per cent of total final energy consumption globally by

Future fuel

Governments and investors see green hydrogen as key to keeping the global economy humming, while cutting carbon emissions that are heating up the planet. However, large-scale production is still in its infancy, and supply chains to transport hydrogen throughout the world also need to be developed.

Uses of hydrogen-based fuels

- Power generation
- Shipping
- Land transport such as cars and trucks
- Heavy industry, such as steelmaking

The hydrogen is "green" because it is produced using renewable energy, and releases a very small amount of greenhouse gas emissions when burned.

AUSTRALIAN RENEWABLE ENERGY HUB (AREH)

Large-scale hydrogen production will require large amounts of renewable energy, and is most likely to take place in remote areas with much sun and wind exposure. One such project, AREH in the Pilbara region of Western Australia, is in the planning stages.

KEY FEATURES	Full scale
Total power generation capacity	1.6 million tonnes of green hydrogen or
26GW (2 times Singapore's total generation capacity)	9 million tonnes of green ammonia per annum
Area 6,500 sq km (about 9 times the size of Singapore)	

Source: INTERCONTINENTALENERGY.COM STRAITS TIMES GRAPHICS

2050.

So what is holding things back? "Nothing's really holding the industry back per se. It is a new industry, one that has to scale up more quickly than any other industry at this scale has," said Mr Alex Tancock, chief executive and co-founder of green hydrogen project developer InterContinental Energy.

Mr Tancock's company is developing four large-scale projects in Australia, Oman and Saudi Arabia, and has received backing from oil giants such as Shell and BP and major green energy investors such as Macquarie Capital and Macquarie's Green Investment Group. Singapore's sovereign wealth fund GIC is a strategic investor in InterContinental Energy.

The most advanced project is the Australian Renewable Energy Hub in Western Australia's Pilbara region.

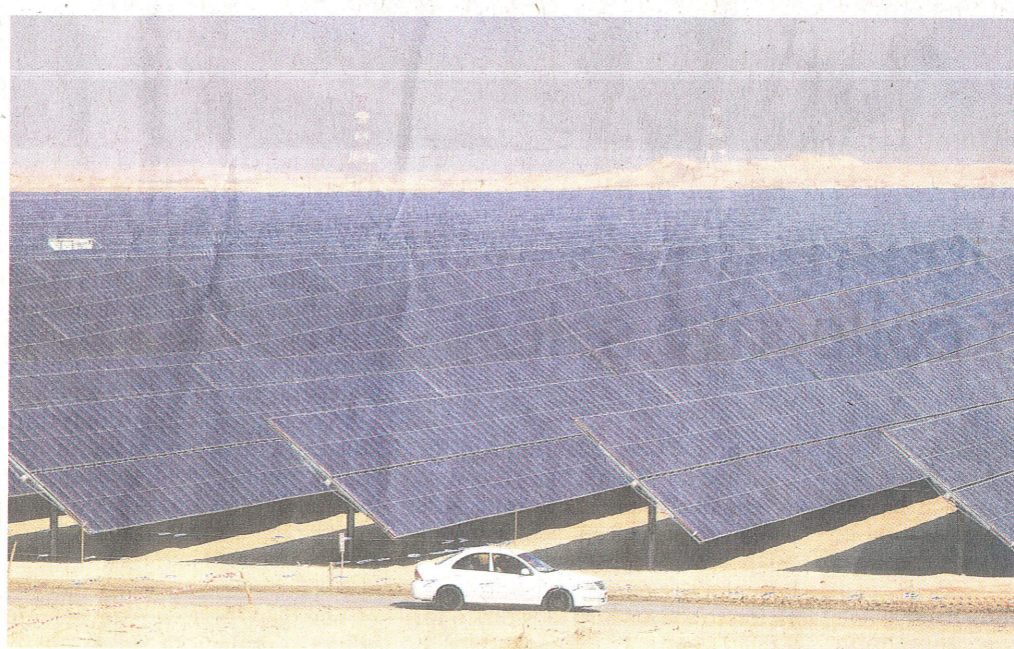
Construction is still a few years away, Mr Tancock told The Straits Times' Green Pulse podcast, but the aim is to complete the project in phases.

When completed, the project will cover 6,500 sq km, about nine times the size of Singapore, and generate 26 gigawatts (GW) of electricity from wind turbines and solar panels.

That large amount of power equates to roughly twice Singapore's power generating capacity, underscoring the multibillion-dollar price tag for big green hydrogen projects.

The electricity powers machines called electrolyzers that split water into hydrogen and oxygen.

At full scale, the project will be able to produce up to 1.6 million



The Al Dhafra solar photovoltaic independent power producer project in the United Arab Emirates' capital Abu Dhabi. Green hydrogen proponents believe the fuel will follow in the footsteps of solar and wind to become an affordable source of energy. PHOTO: AFP

tonnes of green hydrogen or nine million tonnes of green ammonia per year, much of it for export but also likely for use in local industries.

Globally, clean hydrogen production is less than one million tonnes a year, the Hydrogen Council says.

But it is growing, with China bringing online several projects in 2023 and major investments under way in the United States, Europe and the Middle East.

In Saudi Arabia, the Neom Green Hydrogen Company recently announced the go-ahead for a US\$8.4 billion project that will produce green ammonia, with completion in 2026.

Hydrogen, the most abundant element in the universe, can be added to other elements and compounds to create a range of combustible fuels.

Green ammonia can be used to

make fertiliser, power ships or generate electricity.

Green methanol can also be used to power ships.

Pure hydrogen can be used as a fuel for lorries and other heavy vehicles, and as an alternative fuel in energy-intensive industries such as steelmaking that traditionally rely on coal or gas.

For now, there is not enough supply, and herein lies one of the major barriers facing the hydrogen industry.

It needs to rapidly scale up production to meet expected demand.

Also needed is the necessary infrastructure, such as ships to carry hydrogen and hydrogen-based fuels, new pipelines and port handling equipment, plus new safety protocols.

All of this is being developed,

but still needs to be deployed at scale - and soon.

Singapore, for instance, is planning trials of green ammonia bunkering, and major shipbuilders are developing liquid green ammonia carriers and liquid hydrogen carriers.

"Customers need to know there is going to be safe and reliable supply," said Mr Wilbur Mok, Asia president for Air Products. The US industrial gases and chemicals company is a major producer of hydrogen from fossil fuels and is also developing green hydrogen production.

This is because customers will need to invest in new equipment, such as pipelines, and change some of their operations to adapt to hydrogen fuels.

So they need certainty, he told the Gastech 2023 conference during a panel discussion.

Developers also need security of

long-term demand before committing to major investments.

Dr David Burns, vice-president for clean energy at Linde, the world's largest industrial gases company, told the Gastech panel: "We're looking over the next 10 years to spend US\$50 billion on clean energy. But we're not going to be able to do that unless we have off-takers and well-defined end-use applications."

Another problem is costs for early movers.

Developers say that government subsidies are needed to help defray some of the initial investment costs and higher initial costs of green hydrogen to stimulate demand.

"Project sponsors will be willing to spend the significant development capital required only where there is a clear path to both subsidy and offtake if and when certain milestones in development are able to be met," said Ms Kate Vidgen, head of industrial transition and clean fuels at Macquarie Group.

Ms Vidgen said the Australian government's A\$2 billion (S\$1.74 billion) Hydrogen Headstart programme showed the right approach.

The programme aims to provide revenue support for large-scale green hydrogen projects through competitive production contracts.

These will help bridge the commercial gap for early projects, the government said.

The Singapore Government is also providing support to develop the industry, as is the United States government.

The Biden administration's Inflation Reduction Act (IRA), which has nearly US\$400 billion in support for clean energy, includes a production tax credit award up to US\$3 per kg of hydrogen.

That has stimulated green hydrogen projects in the US, speakers at the Gastech panel said.

Ms Vidgen told The Straits Times the IRA tax credit was a major reason a Macquarie managed fund recently invested in Atlas Agro, which is developing a green ammonia plant in Washington state.

The project aims to produce ammonium nitrate fertiliser and displace existing fossil fuel-based imports.

Others point to the large amount of land some projects will occupy.

And some say the huge amount of renewable energy would be better used to decarbonise the power sector and other industries first.

"Green hydrogen is poised to become a crucial resource, especially considering the substantial amount of clean electricity required to make it," said Mr Matt Gray, chief executive officer of Transition Zero, a financial analytics company.

"(Yet) the buzz surrounding green hydrogen risks diverting attention away from cheap and readily available solutions like bulk renewables and grid improvements," he told ST, adding that green hydrogen should be earmarked for uses where direct electrification is unfeasible.

Mr Tancock of InterContinental Energy is not too worried about the rate of progress, saying wind and solar went from being niche products two decades ago to the cheapest source of electricity today. Rapid investment and technological improvements led to wind and solar energy costs plunging below the costs of fossil fuel energy.

The same is happening with green hydrogen.

He said that "we've seen this story before, and we know how it ends" - with green hydrogen becoming an affordable source of energy for the global economy.

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UK economy shrinks in July, reviving risk of recession

LONDON - The British economy shrank at the fastest pace in seven months in July as strikes and wet weather hit activity harder than expected, reviving fears that a recession may be under way.

Gross domestic product slipped 0.5 per cent month on month in July following a 0.5 per cent gain in June, the Office for National Statistics (ONS) said on Wednesday. Economists had expected a contraction of 0.2 per cent. Services, construction and manufacturing all shrank.

Britain's economy, which the Bank of England (BOE) expects to stagnate at best for much of the next two years, is now losing steam in the face of a sharp increase in

borrowing costs. That may give policymakers pause for thought when they decide next week whether to raise interest rates again in their fight to tame inflation.

"Underlying growth has lost momentum since earlier in the year," said Mr Paul Dales at Capital Economics, noting a mild recession may in fact have begun. "This data suggests GDP growth in the third quarter as a whole is likely to fall well short of the Bank of England's 0.4 per cent quarter-on-quarter forecast."

That is bad news for Prime Minister Rishi Sunak, who faces the prospect of a general election next year with his Conservative Party

lagging far behind the Labour opposition in opinion polls.

The pound fell after the report, trading at US\$1.2458. Money markets are pricing in a quarter-point rise to 5.5 per cent with the possibility of a further increase by the year end. However, BOE governor Andrew Bailey has signalled that the most aggressive hiking cycle since the 1980s is almost complete.

The main cause of the contraction was the dominant services sector, which fell 0.5 per cent in July. Cool and rainy weather depressed retail sales during the month. Output was also dented as doctors, teachers and rail staff walked off the job in their disputes with the government over pay.

"The broader picture looks more positive, with the economy growing across the services, production and construction sectors in the last three months," said Mr Darren Morgan, director of economic statistics at the ONS.

Activity in the information and communication sector also fell in July, particularly in computer programming and consultancy, after three consecutive months of growth. The ONS said strikes held back recruitment, especially in the National Health Service. Wet weather hurt retail sales, construction and outdoor venues.

Offsetting the falls in health, consulting and retail was a big increase in recreational experiences

as people went out. The arts, recreation and entertainment sector grew by 6.6 per cent - the best growth since May 2021. Within that, sports, amusement and recreation activities grew by 12.4 per cent while creative arts and entertainment grew by 4.9 per cent.

There were also declines in other sectors, including construction and industrial production.

In construction, households cut back on repair and maintenance, a sign that inflation is eating into incomes. The sector shrank 0.5 per cent as a whole, largely due to a fall in demand among private housing. There was also a slowdown in the housebuilding sector. The ONS said the unusually cold and wet July weather may have been to blame.

Data on Tuesday showed the labour market, closely watched by

the BOE for signs of persistent inflation, is cooling down.

The latest GDP estimate may well be revised later in September, when the ONS will release new estimates consistent with its "Blue Book" changes.

Those changes rewrote the narrative of the Covid-19 pandemic, with the economy larger than previously thought at the end of 2021 and above pre-pandemic levels. However, they provided no guide to how the economy has fared since then, a period of rising inflation and interest rates.

"Higher interest rates and sticky inflation are having a more significant effect on the economy," said Mr Neil Birrell, chief investment officer at Premier Miton. "All eyes will be on the (BOE) for the announcement of the rate decision." BLOOMBERG