The hydrogen market and opportunity in Oceania

By **Joanna Sampson**

Hydrogen is poised to fulfil its potential as a clean alternative to hydrocarbons in the global pursuit of decarbonisation to address climate change. Australia and New Zealand are both investigating the most appropriate applications and transition pathway for hydrogen within their energy systems and economies, making best use of their existing natural, social, cultural, human and financial resources.

In September 2019, New Zealand revealed its *Green Paper – A Vision for Hydrogen in New Zealand* that lays out the role hydrogen can play in the country's economy. While hydrogen produced from fossil fuels and industrial processes (brown, blue and grey) may play a role in the transition of New Zealand's regions and existing industries, the government considers there is greater opportunity for New Zealand in exploring the use of its renewable energy to produce green hydrogen as an alternative fuel for domestic use and for export.

Two months later (November 2019), Australia released its National Hydrogen Strategy setting out a vision for a clean, innovative, safe and competitive hydrogen industry that benefits all Australians. Australia has the resources, and the experience, to take advantage of increasing global momentum for clean hydrogen and make it the next energy export. There is potential for thousands of new jobs, many in regional areas – and billions of dollars in economic growth between now and 2050.

Market – Australia

Hydrogen has gained much attention in Australia this year, with the country's Chief Scientist Dr. Alan Finkel even hailing it the "hero" fuel in Australia's quest to reduce emissions and combat the effects of climate change.

It was also named as one of five priority technologies in the Morrison Government's first Low Emissions Technology Statement – the first milestone in Australia's Technology Investment Roadmap.

"It has been named a priority technology by the Federal Government, partially due to the potential economic benefits – a new clean hydrogen export industry in Australia could bring as much as $26 billion a year in additional GDP and 16,900 new jobs by 2050," Dr. Fiona Simon, CEO of the AHC, told H2 View.

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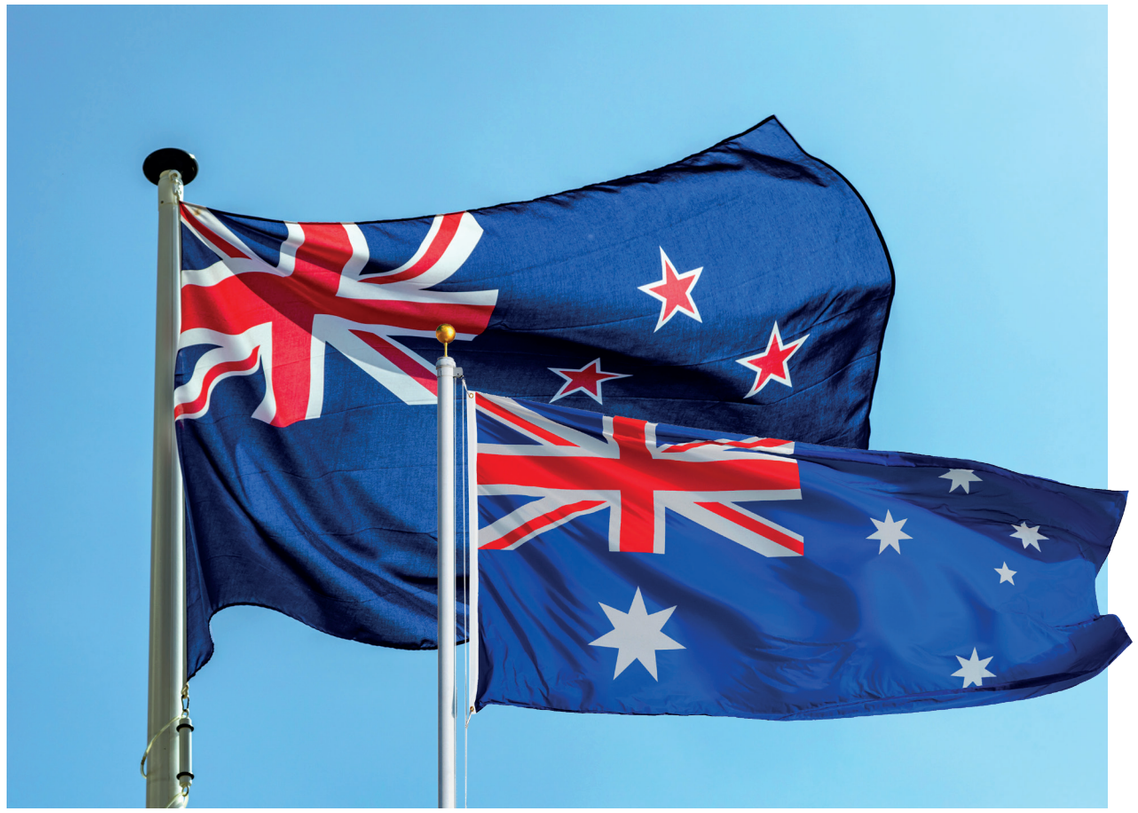
"Australian industry is alive to the opportunities presented by hydrogen. Members of the Australian Hydrogen Council (AHC) are at the fore, demonstrating how hydrogen can be used domestically for a range of applications, such as blending into gas networks and for different fuel cell vehicles. Our members are also working hard on the future export market to meet the needs of our international trading partners."

"Our reputation as a reliable supplier of energy and our bilateral trade agreements means that the export opportunity is vast. Agreements are in place with Japan, Korea, Germany and Singapore to investigate hydrogen supply chains. The AHC has MoUs in place with seven countries and we recently co-founded the German-Australian Hydrogen Alliance to serve as a liaison between German and Australian organisations."

Domestically, Australia is exploring how hydrogen can be used to heat homes, fuel transport, and power industry. There are more than 50 hydrogen projects happening across Australia today, including the Asian Renewable Energy Hub (AREH), which will generate 26,000MW of renewable energy and establish Australia as a major exporter of green hydrogen.

"Further, the National Hydrogen Strategy, released this time last year, seeks to position the Australian hydrogen industry as one of the world's top three hydrogen exporters by 2030. In September this year the Federal Government also released its Low Emissions Technology Statement, which states a 'stretch target' of 'H_2 under 2', which means a price of A$2 per kilogram of hydrogen produced," Simon added.

"Another highlight was the expansion of funding and longevity of the Australian Renewable Energy Agency (ARENA), which is critical for the hydrogen sector. ARENA now has a guaranteed baseline funding of $1.43bn over 10 years. Continued government investment in hydrogen, which now includes hydrogen fuel cell vehicles being eligible under the new $74.5m Future Fuels Fund and setting up a hydrogen export hub worth $70.2m, demonstrates the important role hydrogen will play in Australia's future energy mix."



"We have a vision to be a world leader in hydrogen export, but to get there we need to build the right foundations starting now."

Market – New Zealand

The existing conventional hydrogen market in New Zealand is dominated by major industrial manufacturers: methanol production, ammonia/urea production, refining and steel production. The majority of hydrogen is produced in-house from domestic natural gas SMR facilities, with a hydrocracking facility utilising crude feedstock for the refinery and with a smaller proportion of electrolytic hydrogen for steel production.

The green hydrogen market in New Zealand is a nascent industry, however a number of initiatives are being matured, Andrew Clennett, CEO and co-founder of Hiringa Energy said. Green hydrogen supplier Hiringa is working to establish a network of 100 hydrogen stations across New Zealand by 2030, plans which have received initial feasibility funding support from the New Zealand Government, to supplement significant private sector investment.

The government has sought to introduce early stimulus with a number of other initiatives receiving financial and regulatory support too. Ports of Auckland, Auckland Transport, Auckland City Council and Kiwirail have received co-funding from the Low Emission Vehicle Contestable Fund (LEVCF) for the purchase of a hydrogen bus and three cars that will be fuelled by a hydrogen refuelling station to be developed by the Ports of Auckland; FirstGas, a New Zealand natural gas transmission and distribution network owner operator, has received contributory funding for a pipeline conversion and blending study looking at the opportunities for utilisation of the existing gas transmission and distribution network; and Hiringa Energy's and Ballance Agri-nutrients' $60m wind to green hydrogen and ammonia industrial joint venture project is set to receive a $19.9m investment from the Provincial Growth Fund.

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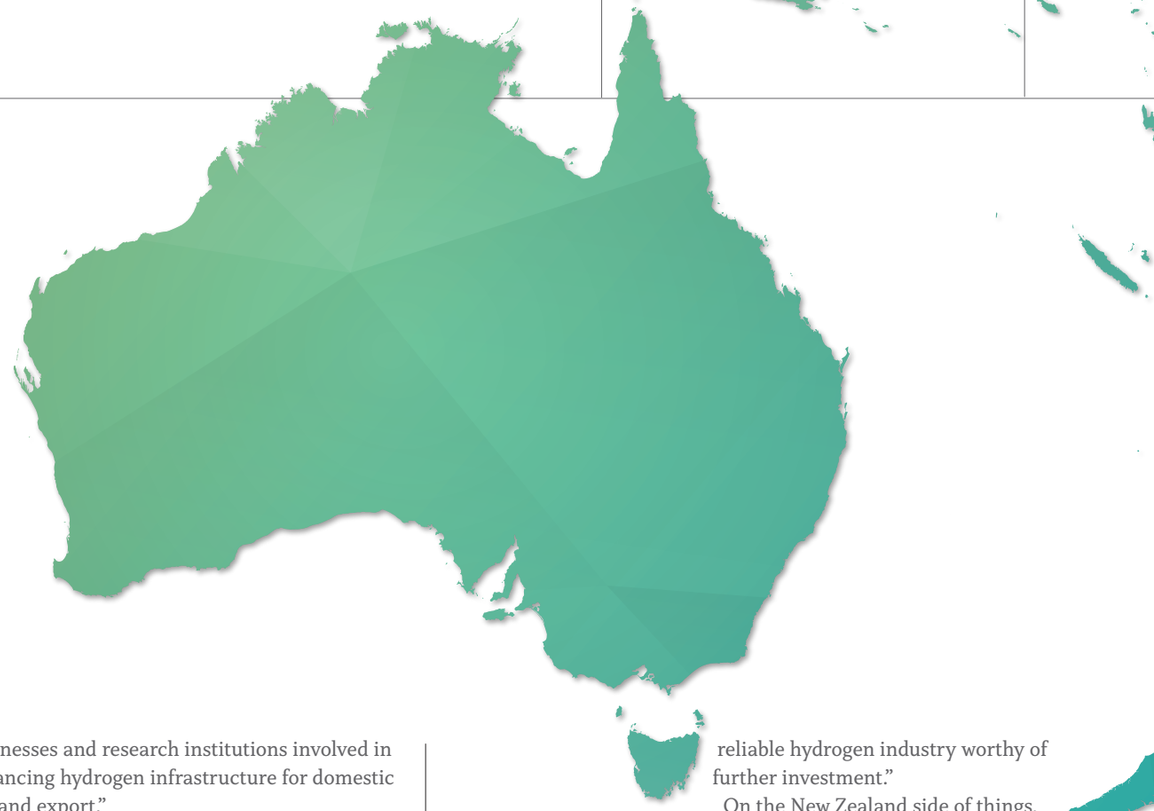
Industry, regional and central governments, and universities are also together advancing hydrogen energy as a low emission fuel source in the country through the New Zealand Hydrogen Association. Formed in September 2018, and led by Dr. Linda Wright, >>



>> the Association is currently comprised of 37 of New Zealand's most progressive organisations, with members representing the breadth of the economy, including electricity and gas generation and distribution networks, road and maritime transport providers, R&D institutions, engineering and roading specialists, vehicle manufacturers, economic development agencies and local government. Wright said the association provides a cross sector focus on the domestic and international opportunity for the production and use of clean hydrogen as New Zealand and the rest of the world transitions to alternative low emissions fuels.

Highlighting some big hydrogen developments from 2020, Clennett said, "Halcyon, a joint venture between New Zealand's Tuaropaki Trust and Japan's Obayashi have been finalising the installation and commissioning of their geothermal electricity to hydrogen pilot plant. The project involves the installation of a 1.25MW electrolyser and compression equipment. The project is intended to pilot green hydrogen production for export and supplying green hydrogen to the growing New Zealand industry."

"Hiringa Energy has been finalising Phase 1 of our hydrogen refuelling network, which will install eight stations across New Zealand focussed on heavy transport. These stations will cover 100% of the North Island road freight routes and 82% of the South Island. Hiringa have developed agreements with several partners throughout the hydrogen value chain to support this roll-out."

Australia's hydrogen opportunity

There are two hydrogen markets in Australia. The first has existed for a long time and uses hydrogen made from fossil fuels for industrial purposes. The second is the future market for clean hydrogen and that is where is opportunity lies, Simon explained to H2 View. "In 2020, we got a glimpse of how hydrogen can have a transformational impact on our energy mix but also what is required to get the clean hydrogen industry to scale," she said.

"In 2021, there is an opportunity to get necessary regulations and policies in place that provide investors with the confidence necessary to invest in mega projects. We have the pilots and demonstration projects and now need to move to mega projects to come online to get to scale. This is how costs can reduce to H_2 under $2."

"With more and more projects coming online, we can see the opportunity – and the Australian appetite – to produce and use hydrogen for transport, decarbonising the gas networks, electricity storage, as an industrial feedstock, and for remote area power systems."

"For example, Australia's first remote microgrid using renewable hydrogen was recently announced and is set to power 100 residential homes in Denham, Western Australia. This will show that renewables can supply reliable, clean energy to remote communities long past 2021."

New Zealand's hydrogen opportunity

Several of the New Zealand projects mentioned in this article will move into execution mode through 2021, with refuelling stations online by late 2021. Hydrogen policy developments will also continue, with the National Hydrogen Strategy and Road Map programmed for delivery in 2021, along with a continuation of the recently commenced Hydrogen Standards & Regulatory Review.

A range of hydrogen export projects are being considered, with key locations including in Taranaki on the West Coast of the North Island and at Tiwai Point in South Island. with key locations including Taranaki in the North Island and at Tiwai Point in the South Island. Meridian Energy, New Zealand's third largest listed company, has publicly announced its interest in developing a major hydrogen plant in Southland using electricity from its 850MW Lake Manapouri Power Station, following the closure of the Tiwai Aluminium smelter scheduled for 2021. Wright said this is an intergenerational opportunity to use this existing asset to achieve climate change objectives and there are a number of international companies showing interest in partnering with New Zealand companies, such as Meridian Energy, to produce green hydrogen for export and domestic use.

"The opportunity for nations such as Japan, South Korea and Singapore to trade hydrogen at scale as a pathway to advancing the decarbonisation of the Asia Pacific region will be expedited if supply and demand side partners across the region collaborate now to overcome technical challenges," Wright told H2 View. "There is also opportunity to establish compatible and cohesive policies that support the development of hydrogen commodity trading and supply chains."

"The New Zealand Hydrogen Association is developing international partnerships across the Asia Pacific Region, including with the Australian Hydrogen Council, and provides direct links to New Zealand's most progressive and innovative businesses and research institutions involved in advancing hydrogen infrastructure for domestic use and export."

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Challenges

With opportunity comes challenges, and for Simon getting to scale is the biggest challenge hydrogen faces right now.

"It is a truly exciting time, with huge potential for Australia in its ability to decarbonise, while growing regional economies and technology capabilities. So, we can see the size of the prize, and important policy foundations have been laid so we can get there," she said.

"What needs to happen now is to build on those foundations to turn strategy into reality. We do have huge enthusiasm and appetite to test the waters, but we don't yet have the means to harness this to get to scale, such as through targets that provide bankable support for investors, so we can get major projects deployed."

"In the view of the Australian Hydrogen Council, the next step in developing a world-scale hydrogen industry in Australia is to develop a comprehensive and actionable Hydrogen Market Development Plan. One that at the least maps H_2 under $2 to 2030."

"We also need policy to activate markets and drive both the supply and demand side of the market. More supply will reduce the cost of production and more demand will create market pull to ensure supply increases."

"Compliance standards will also ensure that industry meets a minimum standard and can provide the ground rules to ensure a safe, reliable hydrogen industry worthy of further investment."

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On the New Zealand side of things, Clennett said as per the global challenges, the capital costs of hydrogen FCEVs remains a challenge for adoption.

"The New Zealand Government is looking to apply mechanisms developed for the roll out of BEVs to stimulate the heavy FCEV market, which provides a high impact emission reduction market. Examples include road user charge exemptions and vehicle capital stimulus," he explained.

"The remote aspect and relatively high costs of hydrogen systems provides a barrier to widespread adoption. Scale is required to gain access to the technology at a competitive price. Strategies have been developed such as Hiringa's refuelling network approach, designed to create scale and network effect efficiency."

Wright added, "No one entity or country can do this alone and we need to develop deep international partnerships and work collectively to overcome the challenges that undoubtedly lay ahead as we seek to deploy at scale. Delivering innovation through collaboration will be a catalyst for the hydrogen export opportunity."

"We need financial incentives in order to drive behavioural change away from our reliance on fossil fuels. These policy mechanisms must underpin the investment required to deliver the scale of infrastructure necessary to transition to the low emission future we are committed to, not just in New Zealand but in partnership with our Oceanic neighbours." H2V