HYDROGEN
THE NEXT GOLD RUSH

AKROM

ABOUT AKROM

Akrom is a specialist consultancy business based in WA which focuses upon the development of innovative solutions for the Oil & Gas and Mining industry. Akrom offers high-value supply chain, procurement and contracting consultancy services to help its client base secure best in class solutions to its SCM challenges. The practice embraces a client-focused and collaborative approach for each engagement, transferring critical knowledge every step of the way.

ABOUT THE AUTHOR

Gonzalo Barbot is an experienced Business consultant in Australia with +4 years of experience in top-class companies. He holds a bachelor's degree in Industrial Engineering, expertise in Data Analysis, Business Intelligence and Supply Chain Disciplines.

INTRODUCTION

The world is moving to a low-carbon future. Hydrogen offers diverse applications as an energy carrier and chemical feedstock and has great potential to support decarbonisation of the world's energy and industrial sectors. Because of this, there is a growing global demand for renewable and low-emissions hydrogen.

Factors including reductions in renewable electricity costs, technology developments, the emergence of export markets and an increasing focus on decarbonising the global economy have created a growing demand for low-emissions hydrogen. By capitalising on its comparative advantages, Western Australia can establish itself as a leading participant in this rapidly developing global market.

As well as diverse applications as an energy carrier, renewable hydrogen has the potential to displace the use of fossil fuels in energy applications such as transport, heat and power generation. It can also provide a carbon-neutral feedstock for a wide variety of industrial processes and provide energy storage and other services to support the reliability of the electricity grid.

GLOBAL CONTEXT

The current global demand for hydrogen is more than 70 million tonnes per year. The majority of this hydrogen is not produced through low-emissions methods and is mainly used for oil refining and chemical production.

The future global market for hydrogen is expected to focus increasingly on low-emission production methods with growing use for energy purposes. The International Energy Agency forecasts strong growth in demand for hydrogen over the next decade.

Countries such as Japan and South Korea have signalled an intention to import low-emissions hydrogen for energy and transport purposes.
The Japanese Government has a target to procure 300,000 tonnes of low-emissions hydrogen annually by 2030. South Korea is aiming to produce 6.2 million hydrogen cars for domestic use and export, as well as build 1,200 refuelling stations by 2040.

The value of Australia's potential low-emissions hydrogen exports could reach $2.2 billion by 2030 and $5.7 billion by 2040.

JAPAN, THE NEW HYDROGEN NATION

Japan was the first country to adopt a "Basic Hydrogen Strategy" as early as 2017. This strategy primarily aims to achieve cost parity with competing fuels such as gasoline in the transportation sector or liquefied natural gas (LNG) in power generation and covers the entire supply chain from production to downstream market applications.

Toyota, Honda, Nissan, Tokyo Gas and Iwatani Corp. together with 6 other companies, including Japanese infrastructure developers and investment companies, founded the joint venture “Japan H2 Mobility (JHyM)” in 2017 to accelerate the deployment of hydrogen filling stations throughout Japan with the help of government subsidies. In cooperation with the Japanese government, JHyM plans to build a total of 80 new hydrogen filling stations by early 2022. The joint venture now has more than 20 participating companies.

The Association of Hydrogen Supply and Utilization Technology (HySUT) draws attention to the fact that in for the number of hydrogen fueling stations to increase, there need to be both a reduction in costs and an increase in reliability. One of the most important factors to achieve this would be the establishment of a supply chain, in which all filling station components such as production unit, control panel, safety equipment and dispenser are offered under uniform hydrogen component standards, which is not the case at the moment. Uniform standards would also contribute to shortening design and production times and to being more flexible, when it comes to combining components from different manufacturers.

STRATEGY

Japan will aim to make hydrogen a power source viable enough to produce the output of more than 30 nuclear reactors by 2030, the Nikkei newspaper reported on Tuesday.

To achieve that goal in its bid to reduce carbon emissions Japan will have to make a technology now in its infancy commercially viable at scale, as the world accelerates an energy transition to prevent the worst impacts of climate change.

The government will provide 2 trillion yen ($19 billion) of funds to support efforts to make hydrogen viable as a fuel for electricity generators that burn without emissions, the Nikkei reported, without citing the source of its information.

JAPAN, THE NEW HYDROGEN NATION

BUILDING HYDROGEN'S GLOBAL SUPPLY CHAIN

Japan leads the effort in building an international hydrogen supply chain to manufacture large quantities of liquefied hydrogen overseas and to supply it to Japan by sea.
As members of the CO2-free Hydrogen Energy Supply-chain Technology Research Association (HySTRA), KHI and Iwatani Corp., Japan's sole supplier of liquid hydrogen, are conducting a pilot demonstration for an international liquefied-hydrogen supply chain using hydrogen produced from coal in the state of Victoria, Australia.

This flagship project launched in 2015 with subsidization from New Energy and Industrial Technology Development Organization (NEDO). In 2021, the world's first liquefied-hydrogen carrier, built by KHI, will make its first round-trip between Japan and Australia. And Iwatani will load, unload, and store the liquefied hydrogen.

Before implementing this large-scale overseas hydrogen supply chain, Iwatani is working on producing clean hydrogen from brown coal in Hokkaido, Japan.

AUSTRALIA AND JAPAN ALLIANCES

Fortescue Metals Group (Fortescue) has signed a Memorandum of Understanding (MOU) with Kawasaki Heavy Industries (Kawasaki) and Iwatani Corporation (Iwatani) to develop a business model for the supply of liquid hydrogen into Japan.

Under the MOU, the three parties will establish the Global LH2 Consortium to facilitate collaboration for the establishment of large scale, liquid hydrogen production and supply capabilities.

The Consortium will focus on joint activities associated with the development of renewable hydrogen projects in Australia and overseas, with a view to establishing liquid hydrogen supply chains and the distribution and offtake of liquid hydrogen within Japan.

Additionally, Iwatani is studying the production of green hydrogen with Australian power company Stanwell.

WA CONTEXT

Renewable hydrogen is an emerging technology that will play an important part in Western Australia's energy future. Western Australia has many attributes that provide a strong comparative advantage in the growing global renewable hydrogen market including world-class renewable energy resources, a large unpopulated landmass, established energy infrastructure and strong trading partnerships with Asia.

Western Australia is one of the best places in the world for a renewable hydrogen industry. It has an exceptional competitive advantage for the production, use and export of renewable hydrogen.

It has many attributes that provide a comparative advantage for the production, use and export of renewable hydrogen, including:

1. Renewable energy resources Western Australia is home to high-intensity renewable energy resources. Western Australia's solar is amongst the highest irradiance in the world and, due to being on the western edge of the continent, it has excellent wind resources.

2. Land With an area of 2.5 million km2 (one-third of the Australian continent), low intensity land use combined with low population density, Western Australia is well placed to develop large-scale renewable energy generation.

3. Existing infrastructure Western Australia has world-class industrial and export infrastructure that can accommodate the development of the hydrogen industry

4. Strong existing industry presence Because of Western Australia's established LNG industry and its ability to develop collaborative and globally competitive supply chains, many of the world's largest oil and gas companies have a local presence. Several major companies have expressed intentions to develop hydrogen projects in regional Western Australia.

5. Skilled workforce Western Australia retains a technically skilled workforce with expertise across the energy sector and relevant research capabilities amongst various institutions. A skilled workforce will be essential to build a local hydrogen industry.

6. Access to markets Another comparative advantage for Western Australia is its geographical proximity to Asia and its long-term presence in these markets. There is potential to further strengthen Western Australia's strong partnerships with Japan and South Korea which are key partners in the growing market for renewable hydrogen. This industry also presents opportunities for technology partnerships in Asia and Europe.

TRANSITION

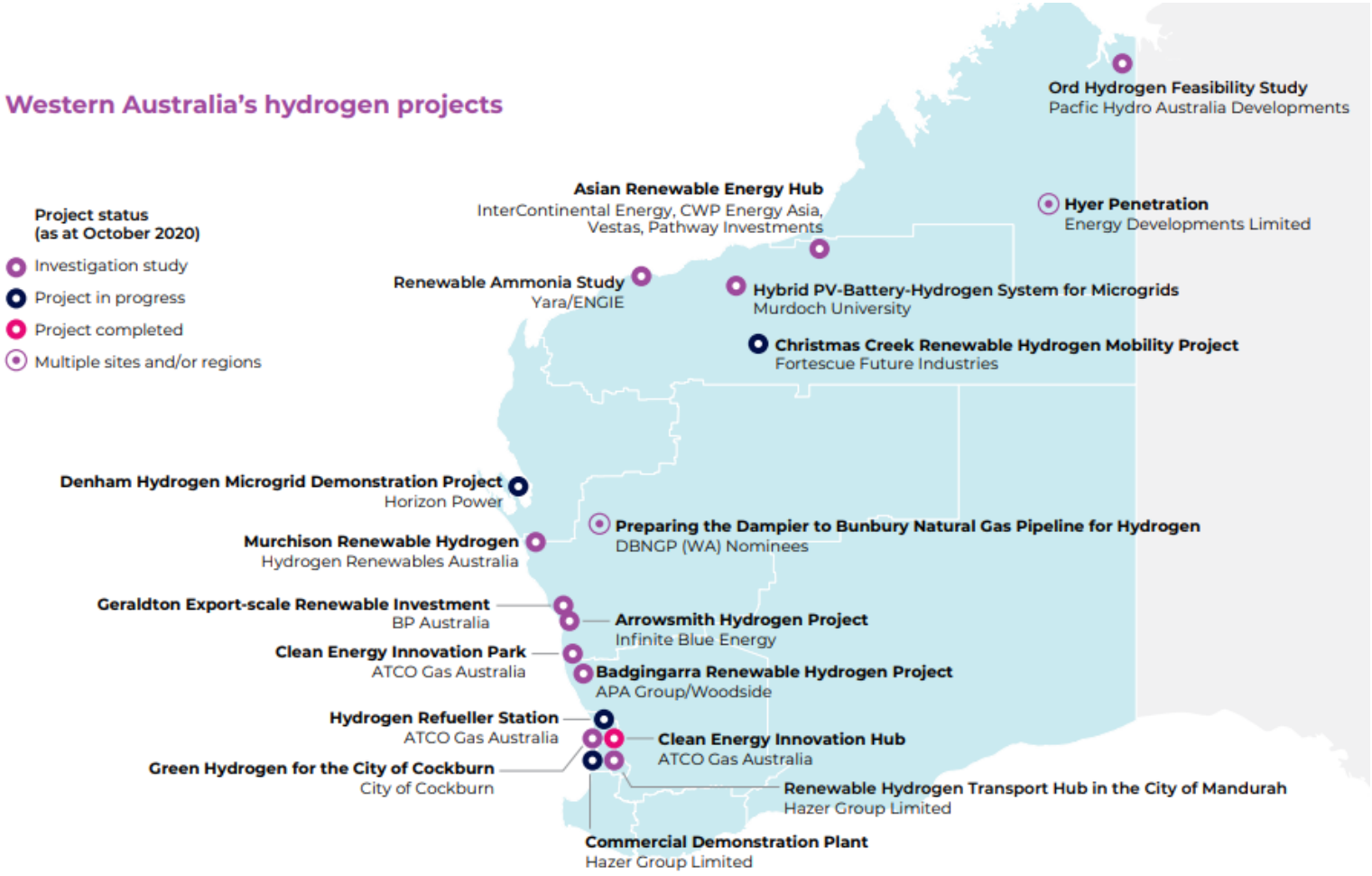
The export of renewable hydrogen from Western Australia to countries that are highly dependent on imported energy supplies and lack sufficient domestic renewable energy resources represents a significant economic opportunity for the State.
The global market for low-emissions hydrogen will be competitive. By capitalising on its comparative advantages, Western Australia can establish itself as a leading participant in this rapidly developing global market.

The resource sector of Western Australia has historically been a major contributor to the GDP of the State and leading resource companies recognise that transition of their operations to a low-carbon future is necessary. This transition presents an opportunity to diversify the economy across a range of upstream and downstream activities. It will also provide local jobs, benefit regional communities, contribute to skills development and economic diversification as well as contributing to global efforts to reduce carbon emissions.

The Strategy recognises the fast pace of technological change and that there may be new developments in hydrogen production that are low emissions. However, the word ‘renewable’ has been maintained in the title to signal the end goal and where Western Australia will have the strongest advantage

PROJECTS

The WA Government is providing project facilitation services for major renewable projects, assisting them to navigate government regulation and requirements.



WA STRATEGY

Western Australian Renewable Hydrogen Strategy builds on the State's renewables potential, technical expertise and global reputation to further position Western Australia as a key player in future energies.
The Strategy will look at developing Western Australia's domestic production capabilities and opportunities for downstream processing. It will also look at ways to drive local content, so Western Australian suppliers are in the box seat to capitalise on the potential of hydrogen.

Focus areas:

Export: the global market for renewable hydrogen is expected to grow significantly over the coming decades. Western Australia is well placed to capture a significant share of this market due to its excellent renewable energy resources, skilled oil and gas workforce, proximity to Asia and export infrastructure.

Hydrogen blending in natural gas networks: the global market for renewable hydrogen is expected to grow significantly over the coming decades. Western Australia is well placed to capture a significant share of this market due to its excellent renewable energy resources, skilled oil and gas workforce, proximity to Asia and export infrastructure.

Remote applications: renewable hydrogen can reduce reliance on diesel for remotely located industries and communities.

Transport: fuel cell electric vehicles present an early opportunity for hydrogen utilisation for mobility and freight transport

SOURCES

- Western Australian Renewable Hydrogen Roadmap - Department of Jobs, Tourism, Science and Innovation
- Western Australian Renewable Hydrogen Strategy - Department of Primary Industries and Regional Development
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- JAPAN, THE NEW HYDROGEN NATION - Switzerland Global Enterprise
- Australia, Japan agreement an exciting step towards hydrogen future - Ministers for the Department of Industry, Science,Energy and Resources
- Japan; Strategic Hydrogen Roadmap - New Zealand Foreign Affairs & Trade
- Global liquid hydrogen consortium established to develop supply chain between Australia and Japan - Fortescue