Q&As - Murchison Renewable Hydrogen Project

THE PROJECT

What is the Murchison Renewable Hydrogen Project?

The Murchison Renewable Hydrogen Project is a large-scale 5000 MW renewable energy project being proposed by Hydrogen Renewables Australia (HRA).

What infrastructure is required for a project of this size?

The project will see the construction of infrastructure including:

- A combined wind and solar farm providing a total maximum of 5000 MW of installed capacity
- Desalination plant capable of supplying pure water
- Electrolyser plant capable of producing large scale and low-cost hydrogen
- A potential spur pipeline connecting to the Dampier to Bunbury pipeline to enabling gas blending
- Coastal terminal facility for ships to take hydrogen to overseas markets

Where will the project be situated?

The project will be situated on Murchison House Station, north of Kalbarri in the mid-west region of Western Australia.

What will the project produce?

The project will produce low-cost, renewable or 'green hydrogen' with an output of up to 5,000MW; which roughly equates to 15% of what we expect the Japanese energy market to be by 2030.

Why do we need this project?

The Murchison Renewable Hydrogen Project ultimately meets the growing demands of the Asian energy market – notably Japan and Korea – while also creating jobs and economic opportunities for Australia and supporting the global transition to zero emissions energy.

Why are you proposing this project here in Western Australia?

WA's mid-west region has some of the best wind and solar capabilities in Australia. Studies[1] show that this area's richness in renewable resources indicate that it would be a great spot for the cost-effective production of green hydrogen. Benefits include:

[1] Based on an independent AECOM study (*Co-location investigation: a study into the potential for co-locating wind and solar farms in Australia, AECOM, 2016*) of the best combined wind and solar resources across the country that were used to find the best location after considering permitting/environmental and land issues.

- Pastoral lease area of around 120,000 hectares capable of supporting a large-scale development
- No unmanageable, environmental nor permitting issues matters are expected
- Availability of water from desalination
- Proximity to Asian markets and Dampier to Bunbury natural gas pipeline

What benefits will this project bring to Australia and the mid-West of Western Australia?

The project will contribute significantly to the national, state and local objectives for new investment, new jobs, renewable energy sources and new export markets.

Our long-term aim is to export 'green hydrogen' to the booming international markets, notably Japan and Korea, creating significant job and economic opportunities for Australia and the mid-west of Western Australia.

What is the estimated value of the green hydrogen industry?

The value of Australia's potential low-emissions hydrogen exports could reach $2.2 billion by 2030 and $5.7 billion by 2040[2].

What industry has the biggest demand for hydrogen?

Hydrogen is used in a range of industries including ammonia production, oil refining, metallurgy, chemicals and glass manufacture, steel welding, electronics as well as some food production processes. Due to global decarbonisation efforts, there is growing interest in renewable hydrogen as a versatile energy carrier and feedstock.

What countries have the biggest demand for hydrogen?

Japan and South Korea have both announced 2030 targets for low-carbon hydrogen for energy purposes. These markets are currently showing the largest demand for low-carbon hydrogen. Japan is well advanced in its plans to make Tokyo Olympics in mid-2020 a showcase for hydrogen technologies such as fuel cell electric buses.

How long will it take for the project to reach full capacity?

It will take up to six years to scale up the project to enable exports to Japan and South Korea, ramping up to full capacity by 2028. However, we have already begun having important conversations with key stakeholders to start this process.

[2] Western Australian Renewable Hydrogen Strategy, Department of Primary Industries and Regional Development

Who is delivering the project?

HRA has assembled an excellent team of local and international experts, covering technical, legal, market, financial, environmental and stakeholder engagement & communications. HRA has also joined forces with the leading infrastructure company Siemens to deploy the latter's Silyzer electrolyser at the Murchison project. The Murchison Renewable Hydrogen Project consists of:

- Hydrogen Renewables Australia
- Siemens Limited
- WSP
- Finlaysons Lawyers
- Nation Partners

What stage is the project at?

The project is at an early stage.

- We have just secured a long-term agreement with pastoral lessees of the Murchison House Station
- We have had discussions with key WA and Federal Government representatives and the local Northhampton Shire Council.
- In a significant milestone, HRA has executed a Heritage Agreement with the Nanda Aboriginal Corporation (NAC) to govern the conduct of site resource monitoring investigations.
- HRA and NAC have commenced the development of an Indigenous Land Use Agreement that is planned to be finalized during 2020.
- We are now moving into a community consultation phase to identify how we can deliver the best outcome for the people within the area.

What do we plan to do in the future?

HRA has identified three stages of the project into the future:

Stage 1 – Demonstration – potential to develop a green hydrogen project for transport fuels targeting regional needs
Stage 2 – Gas blending – expand project to supply into the nearby Dampier to Bunbury natural gas pipeline. Potential to blend with natural gas. Close proximity to pipeline requiring a spur line
Stage 3 – Export to Asia – expand project to supply Asian markets. Develop a terminal station west of site to fuel ship tankers. Subject to customer needs the hydrogen offtake could be either in the form of ammonia or liquified hydrogen.

What are the next steps?

With the project still in its early stages, there is still plenty that we need to understand and develop to move the project forward. This will include:

- Install wind and solar monitoring equipment to assess the quality of the combined wind and solar resource

- Prepare and undertake a detailed stakeholder engagement and communications plans, putting community first
- Scope and undertake preliminary site layout of wind and solar plant
- Scope and undertake preliminary design and siting of the electrolyser and desalination plant
- Undertake environmental and permitting studies to obtain development approval
- Continue to work with NAC to achieve a mutually beneficial indigenous land use agreement (ILUA)
- Undertake socio-economic impact study of the project on local, regional and state economies
- Determine, in cooperation with Australian Gas Infrastructure Group the feasibility of gas blending
- Expand discussions in Asia and Europe with potential hydrogen off-takers and equity investors

What is involved in the wind and solar monitoring?

We will install wind and solar monitoring facilities on 5 locations across Murchison House Station to gather data and assess the resource quality of the areas where we are considering at placing wind turbines and solar installations. This is typically undertaken with met masts that have anemometers and pyrometers installed. The met masts have a height of around 100 metres and are secured by guy wires.

Will there be a visual impact of this equipment?

The visual impact of the wind and solar testing equipment is expected to be low and similar to low visual impact of existing radio and telecommunications towers that are installed on Murchison House Station.

Why are we consulting?

We are keen to hear from you – the local community. We want to collect, at this early stage in the project, as many of the concerns, issues and suggestions in order to consider those matters in our project planning.

Will these two community information sessions be the only time we hear from you?

These sessions are just the start of our consultation with the community. This is a long-term project and there will be ongoing engagement throughout the process as we want to ensure a community first based approach to this project.

How can I have my say?

There will be plenty of opportunities for you to share your views on the project, as planning and site investigations progress.

Get in touch with us if you would like to discuss an idea or opportunity. At this stage, enquiries can be made to info@hydrogenrenewablesaustralia.com for more information.

HYDROGEN

Why use hydrogen?

Hydrogen is an excellent way to store, carry and transport energy, with each kilogram of hydrogen containing 2.4 times as much energy as natural gas.

What can you use hydrogen for?

Similar to natural gas, hydrogen can be used as an energy source to heat buildings, power vehicles and generate dispatchable electricity. Hydrogen is an energy carrier, not an energy source. The energy it carries can be released as heat through combustion, or as electricity through a fuel cell.

Why do we need hydrogen?

Not only is it a clean energy source, the worldwide demand for hydrogen is set to increase substantially over the coming decades. Production costs are falling, technologies are progressing, and the push for non-nuclear, low emissions fuels is building momentum.

What is green hydrogen?

Green hydrogen is the term commonly used for hydrogen which is produced using purely renewable energy such as wind or solar.

Why would we use green hydrogen?

Decarbonising energy systems is an important step in preventing damage to Earth's climate. By using renewable energy to create hydrogen energy we are ensuring the sustainable approach and method to this emission-free energy source.

Where do you find hydrogen?

Unfortunately, we don't usually find hydrogen in the form we can use as a fuel; hydrogen is bound up in substances like water, natural gas, coal and biomass. This means that we have to extract it.

How is hydrogen renewable?

Unlike natural gas or petrol, when hydrogen is burned there are no CO_2 emissions. The only by-products are water vapour and heat.

Does it produce carbon emissions?

By extracting hydrogen from water it does not produce any carbon emissions, but by extracting it from natural gas, coal and biomass, this method does release carbon emissions. HRA is not looking at producing this type of green hydrogen.

How is renewable hydrogen produced?

Renewable hydrogen is produced by splitting water molecules into hydrogen and oxygen through a process called *electrolysis*, powered by solar, wind or hydroelectricity.

What is an electrolyser?

An electrolyser is a device where the process of electrolysis occurs. The device consists of a positive electrode and a negative electrode, separated by an electrolyte or a membrane.

How does an electrolyser split water into hydrogen and oxygen?

When an electrical current is applied between the electrodes, hydrogen is formed at the negative electrode and oxygen at the positive electrode. The hydrogen is then collected and compressed for transmission while oxygen is realised into the atmosphere.

How big can electrolysers be?

Electrolysers vary in size from home-made hobby kits to massive industrial machines.

How much water will renewable hydrogen production use?

Renewable hydrogen production through electrolysis requires around 9 litres of water per kg of hydrogen.

Are water limitations not an issue?

Where water availability is likely to be an issue, proponents are looking at desalination plants. Significant research is also being undertaken to investigate the potential use of wastewater for hydrogen production.

Are there any other ways to produce hydrogen?

There are other methods of producing hydrogen including from biogas, pyrolysis, solar thermal energy and even microbes.

How is low-carbon hydrogen produced?

Hydrogen can also be produced by steam reforming fossil fuels, typically natural gas. If carbon capture and storage is used to minimise greenhouse gas emissions, this method results in low-carbon or zero-emissions hydrogen.

Is hydrogen an energy source?

No, hydrogen is an energy carrier, not an energy source. The energy used to produce the hydrogen is released at the point of use.

How safe is Hydrogen?

Given their combustible nature, all conventional fuels have some degree of risk associated with their use. The risk with hydrogen is similar to natural gas.

Is hydrogen safer than other gases?

Hydrogen is the lightest gas, meaning it rises faster and disperses quickly, reducing the risk of a gas explosion. Additionally, hydrogen is odourless, colourless and non-toxic which makes it difficult to identify leaks or fires, but this can be avoided by adding coloured compounds and odorants.

How is hydrogen stored?

To store and transport hydrogen economically over long distances it must be compressed or liquefied; alternatively, it can be chemically converted to a hydrogen-containing liquid or incorporated into a solid substrate. For vehicle applications, the hydrogen is typically stored at a pressure 70 MPa. There are also much lower pressure canisters that utilise metal hydrides to absorb hydrogen like a sponge.

How do you liquefy hydrogen for storage and transport?

Hydrogen liquefication involves compression and cooling via processes similar to those used in the LNG industry.

Where is hydrogen stored?

Once hydrogen is liquefied, it can be stored in specially designed cylinders or large insulated cryogenic tanks in the form of liquefied tanks, tube trailers or in underground salt caverns.

How will HRA store their green hydrogen?

At this early stage, HRA has not yet committed to a storage technique. Customer demand, cost and safety will likely determine the storage facilities that we use in the future.

How is hydrogen transported?

A variety of pressure vessels can be used for storage and distribution such as a compressed hydrogen ‘tube trailer’ or pipelines. Hydrogen can be transported by truck and rail in pressurised cylinders or alternatively it can be injected into existing gas pipeline infrastructure.

How is hydrogen exported in large scale?

For exports, there are many options being investigated with the three main shipping options being liquid hydrogen, ammonia or liquid organic hydrogen carriers. Methanol is also an option, but production requires a source of carbon-dioxide.

When could we first see hydrogen blended in the WA gas distribution network?

ATCO is already undertaking renewable hydrogen blending trials in a demonstration gas network in Jandakot. It is hoped this will lead to larger trails in select areas in the coming years.

Aren’t battery powered vehicles the future of transport?

Battery powered cars and larger vehicles are suitable for many people, particularly those living in urban areas. Hydrogen vehicles can have advantages associated with range, heavy loads and refuelling times. Thus, it is likely that there will be a mix of vehicles on the road in the future. Hydrogen is expected to be a more suitable fuel for long range trucks, trains and ships.

Can hydrogen be an energy source here in Australia?

Hydrogen also has the potential to be an energy source in remote areas of Australia, such as mining sites, with fuel cells running on hydrogen produced on-site replacing diesel generators.

Can we use hydrogen energy in Australian cities?

In the Australian domestic market, there are many opportunities to use hydrogen as an alternative to natural gas. Progress in hydrogen technologies will make these opportunities increasingly attractive over time.