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Frequently Asked Questions Renewable Hydrogen

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Frequently Asked Questions

Renewable Hydrogen

What is renewable hydrogen?

Hydrogen can be produced by electrolysis where electricity is used to split water into hydrogen and oxygen. If renewable generation is the source of the electricity, then renewable hydrogen is produced without greenhouse gas emissions.

There are also other methods of producing renewable 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.

How is hydrogen stored?

Hydrogen gas can be compressed and stored in specially designed cylinders. 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.

Liquid hydrogen can also be stored in heavily insulated, cryogenic tanks. Chemical conversion to ammonia, liquid organic hydrogen carriers or other chemicals are other ways to store hydrogen atoms.

How is hydrogen transported?

Hydrogen can be transported in pipelines. Hydrogen can also be transported by truck and rail in pressurised cylinders.

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.

Is hydrogen safe?

Like other fuels, hydrogen is flammable. Hydrogen powered vehicles are on the roads in several countries and safety standards have been developed.

Hydrogen is 14 times lighter than air, so any leak will rapidly diffuse into the air. However, there is still the risk of ignition, so specific safety features are installed at refuelling stations including hydrogen detectors.

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 trials in select areas in the coming years.

Where is 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.

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 the Tokyo Olympics in mid-2020 a showcase for hydrogen technologies such as fuel cell electric buses.

Which WA regions could produce hydrogen?

Low-carbon hydrogen is likely to be produced in a range of locations throughout WA. At the moment, the Pilbara is likely to be the area with the most renewable hydrogen production due to the excellent renewable energy resources in that region and the strong presence of the existing mining and gas industries. It is also expected that production will occur in the Mid-west where there is substantial wind and solar opportunities, as well as a reticulated gas network and the South West Interconnected System.

How much water will renewable hydrogen production use?

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

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 powered 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.