LLOYD'S

Event one: 20 June 2022

Risk revealed by Lloyd's: Hydrogen

Lloyd's Futureset

bp

Event round up

On Monday 20th June, the Lloyd's Futureset team welcomed bp's insurance team and their VP of Green Hydrogen, James Paterson to One Lime Street. In an engaged and informed discussion, underwriters, brokers and insurance professionals shared their view on hydrogen as a critical source of energy in the race to net zero and the risks it presents.

Key insights

What's the opportunity?

1. There 's lots of new hydrogren projects being announced globally
2. While not all of these projects will be materialised, if only a fraction are then there is a lot to do, and it is very promising for the industry and energy sector

200+ new hydrogen projects globally

What are the different types of hydrogen?

1. **Grey hydrogen** is produced using natural gas as an input and processed with steam methane reforming to remove the H from the C. The output is hydrogen, and ~9kg CO_2 per 1kg of hydrogen
2. **Blue hydrogen** is similar to grey hydrogen but adds carbon capture and storage to capture **95.5%** of carbon emissions
3. **Green hydrogen** has zero carbon emissions. It uses water as an input and in its process uses an electrolyser powered by renewable energy

Feedstock	Process	Output
Natural gas (CH_4)	Reforming	CO_2 H_2

Feedstock	Process	Output
Natural gas (CH_4)	Reforming with Carbon Capture and storage	Blue H_2

Feedstock	Process	Output
Water (H_2O)	Electrolysis powered by renewables	Green H_2

Read Lloyd's Futureset's climate action report on greener energy

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Hydrogen energy is not a recent technology it has been around for more than 50 years, and the industry is well experienced around how to handle hydrogen energy and manage risks.

Grey hydrogen is the existing predominant one, there is a lot of grey hydrogen that we are producing today (110Mt per year), used mostly to refine oil and in the industrial sector producing ammonia.

Reaching net zero by 2050 is ambitious, but...

Hydrogen can offer a potential solution for the most challenging sectors to decarbonise: Steel, cement, chemicals, residential heating, aviation and marine transport

Hydrogen storage can support system balancing, by acting as a bridge to match intermittent energy sources (solar and wind), from times when energy is generated but not consumed, to times when there is demand .

Why is green hydrogen happening now?

- **Technology**
  In five years, green hydrogen could reach cost parity with grey hydrogen as the cost of renewable energy and electrolysers continues to drop
- **Customer demand**
  More than ever people are putting pressure on their governments to implement net zero action plans, and shareholders are putting pressure on their corporations to get to net zero by 2050
- **Green Finance**
  Private capital, coupled with public funding has increased, helping to close the financial gap of green hydrogen, and enabling countries to meet their clean energy target commitments

Hydrogen has high optionality in applications

This brings with it complexity across the supply chain. After its production , hydrogen could require compression, storage, transformation to ammonia and e-fuels, and a range of options for its distribution including trucks, existing gas pipelines, or internationally by ships where ammonia is leading as energy carrier. In the downstream there is an exciting optionality in applications around feedstock, fuels, and heat.

The most compelling short-term opportunity for blue and green hydrogen is replacing the current grey hydrogen usage of 110Mt per year. This usage is equivalent to avoiding the carbon emissions of 215 million gasoline-powered passenger vehicles driven for one year in the USA.

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How hydrogen can be applied

1 Supporting feedstock

In the next 5-10 years the main use for green hydrogen will be replacing the use of grey hydrogen in chemicals and products. In chemicals the main opportunities are in oil refining and producing ammonia. In products, the short-term opportunity is producing cement.

2 Fuels for transport

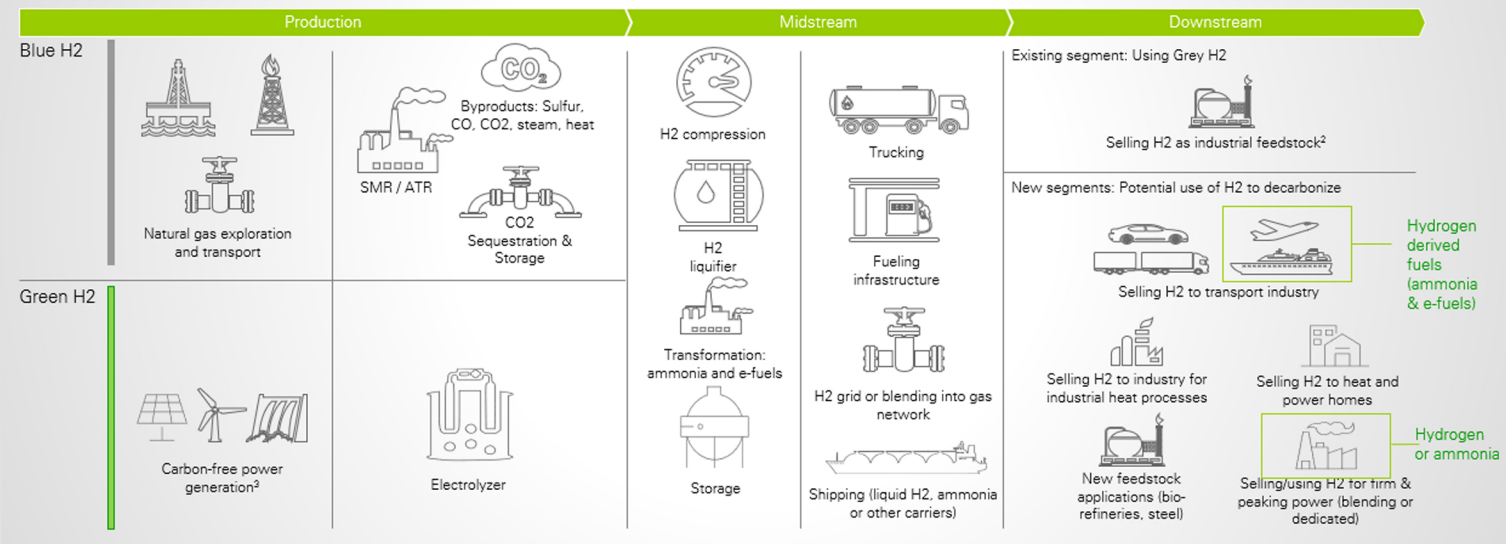
The opportunities in the short-term are in international marine shipping and trains, and in the medium-term, trucks, and aviation.

3 Heat

Heat for the industry and building sectors. These opportunities are more in the long-term offering low carbon heat to decarbonise high energy intensity industrial sectors and supplying clean heating in buildings.

How hydrogen is supplied

*Graphic supplied by bp



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