

Stephenson Harwood's Hydrogen 3rd Quarterly Insight

This is Stephenson Harwood's third hydrogen quarterly insight which is aimed at providing you with legal updates relevant to the industry and bring you up to speed on some of the most exciting hydrogen developments in a number of key sectors.

For us in Stephenson Harwood (and most likely the world), the release of the UK's Hydrogen Strategy in seems a lot longer than four months ago. Overall, we believe that its publication has given a major boost of confidence to the UK market. There is however a considerable amount of work for the UK Government to do throughout 2022 to build on the strategy. Our thoughts on the strategy can be found [here](#).

More recently, hydrogen has received considerable attention during COP26. The EU and a number of other countries confirmed that hydrogen was central to decarbonising heavy industry, long haul freight and aviation. Encouragingly, hydrogen therefore featured in a number of carbon-free pledges made at COP26. The European Union also confirmed it expects 40 gigawatts of green hydrogen electrolyzers will be in place by 2030. To speed up the production and sale of green hydrogen, the European Commission is set to launch a new hydrogen research partnership with industry in the coming months.

In addition to COP26, there have been nearly weekly announcements across the UK and Europe of exciting green and blue hydrogen projects.

Grab a cup of coffee (or mulled wine) and let us quickly bring you up to speed on the most talked about hydrogen developments over recent months.

From all of us at Stephenson Harwood LLP, we wish you a happy and healthy festive season.

Hydrogen policies

Scottish government unveils £100m funding for five-year plan

On 10 November 2021, the Scottish Government published its Draft Hydrogen Action Plan. This sets out Scotland's strategic approach for committing £100m to hydrogen projects over the next five years to fund studies for large-scale and pilot renewable hydrogen production projects. The aim is for Scotland to produce 5GW of hydrogen by 2030, and 25GW by 2045. There are three interesting points to note:

- **Strategic locations of hydrogen projects:** the Scottish Government believes that *"Scotland's unique selling point of its natural resources, infrastructure and skilled energy resource could enable it to become a low-cost producer of hydrogen in Europe"*. As a result, it is no surprise that Aberdeen – *"one of Europe's most advanced hydrogen cities"* – is receiving £15million of hydrogen investment.
- **Exploration of blue hydrogen:** funding will be allocated to carbon capture and storage clusters, in parallel with the development of hydrogen technologies, because they *"underpin"* Scotland's route to net zero by 2045. This demonstrates the Scottish Government's view that blue hydrogen is an important part of a *"just"* transition to net zero.
- **Hydrogen export ambitions:** Scotland will produce a "Hydrogen Export Plan" by 2026. The aim is to develop terminals and infrastructure with this goal in mind, and eventually to export hydrogen to Northern European nations such as Germany, Denmark and France.

UK policy pre-COP26

Since the last Stephenson Harwood quarterly update, the major pre-COP26 policy announcement was [BEIS' Net Zero Strategy](#) announced in October 2021. The strategy included a new £140million for the Industrial and Hydrogen Revenue Support scheme. The aim is to bridge the gap between industrial energy costs from gas and hydrogen (e.g. CCS clusters) and helping green hydrogen projects to get off the ground.

UK policy during COP26

The main hydrogen-related announcement was that nuclear small modular reactors ("**SMRs**"), recently backed with £210million by BEIS, are anticipated to produce hydrogen as a by-product of nuclear. Meanwhile, there were multiple striking private-

sector announcements during COP26 that will support UK policy going forward. For example:

- Publication of the Hydrogen Council's "Policy Toolbox" on 3 November 2021: this authoritative annual publication is essential reading, not least because it will support key policymaking across the world. The report delves into the 520 large-scale hydrogen projects announced to date globally, and offers suggestions for policymakers in tackling challenges such as the \$540billion investment gap.
- The world's largest producer of conventional hydrogen, Air Products, called on policy makers to focus on boosting low-carbon hydrogen demand in carbon-intensive industries. Air Products stated that the supply side can be scaled up easily, but that the demand side still requires work. In particular, Air Products suggested that the steel, cement and the chemicals industries could be targeted, with a global carbon tax being beneficial to creating such demand.

Projects

Green hydrogen developments

- BP has announced plans to build a green hydrogen production facility – known as HyGreen – at Teesside in the North East of England. The 60MW plant will use renewable energy to create hydrogen at the Teesside freeport, as part of the East Coast cluster. This announcement is hot on the heels of BP's news in our August edition that BP made public plans build a blue hydrogen power plant close to the Humber estuary.
- Further South, the Port of Shoreham in West Sussex has granted H2 Green (a subsidiary of energy developer Getech) permission to develop a new energy hub. The green hydrogen will initially be used to power the Port's fleet of 12 HGVs and 39 forklifts, which will be converted from diesel. Hydrogen production will then be expanded and refuelling made available to the 800 HGVs that use the port daily, as well as to port and coastal marine vessels. The hope is to produce 10-15 tonnes of hydrogen daily.

Protium – Budweiser deal

- The UK's leading green hydrogen energy company, Protium, has gone public on a £100m tie-up with Budweiser Brewing Group to revolutionise the brewer's on-site transport and energy generation and consumption at its

brewery in Magor, Wales. This is part of Anheuser-Busch InBev's 2025 sustainability goals which include a target for 100% of its electricity throughout its worldwide operations to come from renewable sources.

Hydrogen storage

- Glasgow is set to be home to a first-of-a-kind hydrogen storage project. The Whitelee green hydrogen project has received almost £10m in government funding to develop the UK's largest electrolyser. Developed by ITM Power and BOC, in conjunction with Scottish Power's Hydrogen division, the state-of-the-art facility will be able to produce 2.5 to 4 tonnes of green hydrogen per day – which, once stored, is enough to provide the equivalent of enough zero-carbon fuel for 225 buses travelling to and from Glasgow and Edinburgh each day. The safe and efficient storage of hydrogen is a key part of helping to solve the intermittency problems associated with energy demand.

Marine

The marine industry continues to adapt rapidly to global pressures to decarbonise. A wide range of vessels are now being developed that utilise green hydrogen as fuel instead of traditionally high-carbon bunkers. The industry is at the forefront of pioneering projects that attempt to transform hydrogen into a readily accessible alternative fuel. These range from novel hydrogen manufacturing initiatives to facilitating the transport of hydrogen to where it is needed.

Fuel cell developments

- Genevos has been chosen by the European Marine Energy Centre ("**EMEC**")'s Hydrogen working group to provide a hydrogen fuel cell to power a zero-emission Ro-Ro ferry based in Orkney, Scotland: the MV Shapinsay. This project will feature a range of different hydrogen applications, such as storage, the supply of on-board auxiliary power using hydrogen fuel cells, and the use of hydrogen in a conventional ferry propulsion engine. According to EMEC Hydrogen's development manager, the findings of this project "*will be applicable to all island and coastal environments where vessels provide vital lifeline services*".
- A new high-speed vessel is set to be built at the Norwegian shipyard Grovfjord Mekaniske Verksted using hydrogen fuel cells developed by TECO 2030, to assist the Port of Narvik in reducing its diesel consumption and carbon

emissions. Planned for completion in 2023, this vessel is projected to keep a pace of 23 knots. To support the development, a consortium of eight project partners is currently seeking public funding.

Other hydrogen fuel developments

- Wärtsilä has partnered with RINA, ABB, Helbio and a major energy company to accelerate the marine sector's transition away from reliance on LNG to use of hydrogen by offering a new, low-carbon fuel. The concept is based on combining LNG with steam to produce hydrogen and CO₂, eliminating the need to store hydrogen onboard. The hydrogen will then be mixed with natural gas within the internal combustion engines or in fuel cells, and used as a fuel. The necessary equipment can easily fit on the deck of a commercial vessel.
- AqualisBraemar LOC Group has been awarded funding by the UK government for a project seeking to build a barge that can produce and store green hydrogen for bunkering. It is intended the barge will be moored at a particular port and will produce and store hydrogen, before providing hydrogen to other vessels bunkering at the same port. The project remains at the stage of feasibility studies and commercial validity case-study analyses.

Harnessing wind energy technology

- An MoU has been signed to develop the world's first floating wind turbine that will be used as an offshore hydrogen production system. The project combines the expertise of Lhyfe, producer of green hydrogen, with that of DORIS, an engineering and project management group. It is anticipated that, if successful, this could be a key development in producing green hydrogen. The first prototype is expected to be completed in 2025.

Hydrogen transfer

- Seanovent Engineering and Strohm have also signed an MoU to develop hydrogen transfer solutions. Under this partnership, Strohm will utilise its thermoplastic composite pipe ("**TCP**") technology to transfer hydrogen produced in wind turbines to the shore, via subsea pipeline infrastructure. TCP is particularly advantageous as it has no maintenance requirements, is suitable for 30 years of operations, and is flexible and lightweight. As such, smaller vessels will be able to install the pipeline, reducing cost.

Aviation

Despite the many difficulties of decarbonising aviation, innovation abounds in the sector and developments this quarter highlight some of the different ways in which hydrogen could be utilised to green the skies.

Methanol

- It was recently announced that Element 1 Corporation, a provider of hydrogen generators, has entered an agreement with investment banking firm NEXA Capital Partners LLC. The two will work to promote uptake of Element 1's methanol to hydrogen generators, specifically for use with fuel cell systems and on electric vertical aircraft. Methanol provides more recoverable hydrogen for the same volume of fuel as liquid hydrogen and, unlike hydrogen, it is liquid under normal conditions so can be transported by more conventional means. It is therefore argued that by generating hydrogen from methanol onboard there will be cost and performance benefits.

Synthetic hydrogen-based jet fuel

- The RAF and Zero Petroleum have set a new Guinness World Record for the first successful flight using only synthetic fuel made from hydrogen. The plane utilised Zero Petroleum's UL91 synthetic fuel, which is created using hydrogen extracted from water and carbon from atmospheric carbon dioxide. UL91 is capable of being used in place of traditional jet fuel, with no modifications to the engine or the aircraft being necessary. Jeremy Quin, UK Minister for Defence Procurement, acknowledged UL91's benefits: "Whilst green technologies like electric and hydrogen power generation are viable for many RAF platforms, high-performance aircraft require a liquid fuel alternative, like the UL91, to maintain operational capabilities."

easyJet

- easyJet has announced it is joining the Race to Zero global campaign, setting an ambitious goal of net-zero carbon emissions by 2050. Its director of flight operations stated that hydrogen is expected to play a crucial role in the airline meeting this target, citing energy density as a key factor in determining which technologies will decarbonise its flights. The carrier has been collaborating with Airbus since 2019 to develop a hydrogen-powered aircraft, and has called on governments to provide financial and regulatory

support for zero-emission technologies in the aviation sector.

Automotive

Over the past three months, governments and businesses have continued to embrace the use of hydrogen in the transportation sector.

Zero-emissions transport

- At COP26, representatives of governments, businesses and other relevant organisations made declarations on accelerating the transition to 100% zero-emissions cars and vans. Please see [this link](#) for the full declarations.
- As mentioned above, BP is planning on building a 60MW green hydrogen facility on Teesside by 2025 to fuel a 'green transport hub', with an estimated cost of about £100 million. This would produce enough hydrogen for 1,300 new lorries to run on green hydrogen. BP then plans to extend the electrolyser capacity to up to 500MW by 2030.

Hydrogen cars

- From 2021 to 2024, Bosch will be investing £850 million into fuel cell technology to power hydrogen cars. It has also estimated that the mobile fuel cell component market will have reached a value of £15.37 billion by 2030.

Trucks and HGVs

The drivers of trucks and heavy goods vehicles have received a great deal of media attention in recent months, but in the green energy space the conversation has continued on how these vehicles can be effectively decarbonised.

- BP and Daimler are joining forces to develop 25 hydrogen refuelling sites which will service heavy goods vehicles, using hydrogen created from renewable sources. BP is aiming to produce and supply the hydrogen for this initiative this decade, so that hydrogen-powered lorries can be transporting freight in the UK by 2025.
- Outside of the UK, DHL Express will pilot its first hydrogen-powered truck in an aim to decarbonise its operations, with Apple to be the first to trial the new initiative. The truck, operated by Dutch Nassau Sneltransport, covers a daily distance of around 200 km, running the cross-border route between the Netherlands and Belgium. The truck refuels on a daily basis in Breda at a mobile fuel station from Wystrach.

Construction vehicles

JCB, which makes construction equipment in the UK, has announced it is spending £100m on a project to produce "super-efficient hydrogen engines" to power its machinery. It has also signed a deal to take 10% of the green hydrogen produced by Australian firm Fortescue Future Industries and then distribute it, along with firm Ryse, around the UK.

Over the last quarter rail manufacturers and leasing companies have made clear their commitment to hydrogen technology, with a stream of developments as the rail industry searches for low carbon alternatives that can be deployed where electrification of track is not economically possible.

Impact of UK Hydrogen Strategy

- The UK's Hydrogen Strategy identified a role for hydrogen on lines where it made operational and economic sense to deploy the same. The Strategy envisages using hydrogen across a range of transport modes by 2030, including rail, lorries and buses, and ties in with the Government's investment of £3 million earlier this year for the Tees Valley Hydrogen Transport Hub. This aims to bring together research, testing and trials to produce multi-modal transport pilot schemes using hydrogen technology for operation by 2025.

Developing common standards

- In France, Alstom has signed an agreement with EDF's hydrogen subsidiary Hynamics to optimise hydrogen refuelling equipment for passenger trains and define an international standard to minimise refuelling times. One of the main issues surrounding take-up of hydrogen power within the rail industry internationally is a lack of common standards. The United Kingdom's Rail Safety and Standards Board has been working on appropriate standards and frameworks for hydrogen-powered train units, depots, supply and trackside battery systems. It will be interesting to see whether the agreement between Alstom and Hynamics will feed into or draw on this work.

Hydrogen-powered rail transport

- Birmingham University and Porterbrook showcased their HydroFLEX train at COP26 in Glasgow in November. HydroFLEX is Britain's first hydrogen-powered train and was the culmination of an £8 million research project that involved retrofitting a 30-year-old class 319 diesel powered locomotive with hydrogen fuel cells, to produce a unit with a top speed of 100mph. Although health and safety regulations meant the train's hydrogen cells could not be used at COP26, visitors were able to view its internal technology, which is designed to run on green hydrogen.
- Alstom and Eversholt Rail have signed an MoU to design, build, commission and support a fleet of 10 three-car hydrogen multiple units. It is intended that the units will be built in the United Kingdom and based on Alstom's existing Aventra platform, with final contracts to be signed in early 2022.

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Staying in touch

Having already been instructed on a high number of UK and EU based hydrogen projects, Stephenson Harwood has a leading team of specialist lawyers with true strength and depth of knowledge in all aspects of hydrogen production, storage and transportation in a broad range of sectors.

If there is anything arising from our newsletter, or if you have any questions about the content covered in our previous editions or online seminar series, we are very happy to set up a zoom call to discuss or alternatively, please email us.

Our previous quarterly updates can be found here:

[Hydrogen quarterly insight - March 2021 \(shlegal.com\)](https://www.shlegal.com/insights/hydrogen-projects)

[Hydrogen quarterly insight - August 2021 \(shlegal.com\)](https://www.shlegal.com/insights/hydrogen-projects)

Our previous online hydrogen seminars can be found here: <https://www.shlegal.com/insights/hydrogen-projects>

Episode 1 discussed the terminology, technology and why hydrogen is becoming an essential part of sustainable energy strategies.

Episode 2 explored major UK hydrogen projects with hydrogen developers, who discussed feasibility studies, construction, production, storage, usage and other project considerations.

Information contained in these insights and seminars should not be applied to any set of facts without seeking legal advice.

If you would like your technology, company and/or project listed in our next insight, please let us know and we will happily discuss it further.

Further insights by Stephenson Harwood LLP can be found [here](#).

We also have an information hub solely focussed on offshore energy which can be found [here](#).