

Hydrogen power and ports

Hydrogen has a promising future, but how can ports best exploit its potential?



Sometimes the sea lane to decarbonisation can seem shrouded in fog, making it difficult to envision a future of net zero technology.

There are many methods available to us to achieve net zero. One of the many challenges arising from the scramble to decarbonise, is to ensure you are both making the right decisions at the right time and choosing the correct direction of travel. Many organisations are enthusiastic in their ambition to head towards a less polluted world, but they are cautious to start down a path that could be the wrong one. You may be asking: What technologies do we use? What is the *right* solution, and when should we implement it? All the answers to these questions are unique to each organisation – and here at Frazer-Nash we've been giving them a lot of thought.

Using hydrogen to support decarbonisation

To meet 2050 targets for decarbonisation, up to 25% of our energy will come from green hydrogen (i.e. hydrogen that has been created using renewable sources of energy)¹. At Frazer-Nash we believe green hydrogen has the potential to play a big part in the decarbonisation of our economy and offers a powerful and flexible tool in our arsenal to combat climate change. With our Systems Approach to solving complex problems, we've been asking ourselves how hydrogen can, and should, be used to reduce emissions from ports and wider decarbonisation supply chains.

In order to look forward, we can recognise and build on the advantages ports already bring to the country. The first step in understanding the right net zero path to choose is to understand what a port is for. Ports are the way our economy links itself to the world,

Find out more

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importing and exporting millions of tonnes of goods each year and connecting us to the global economy. Technologies that enable ports to achieve net zero status need to make the job of a port easier and must add value to their ability to connect our economies to the rest of the world.

Given ports are some of the most internationally connected sites in the country, they have opportunities to enable the hydrogen economy to take root and grow, by linking key suppliers of hydrogen to customers. Indeed, this connectivity could allow them to achieve net zero status by being a key link in the net zero chain. Ports have the potential to be a 'hydrogen economy enabler' linking users and exporters to producers and the wider supply chain, or even enabling other industries (such as non-renewable offshore energy) to transition to net zero.

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*Figures from the
Energy Systems Catapult 2020*

Frazer-Nash has recently been investigating the benefits hydrogen can offer to ports, supporting the Western Isles Council as it explores the feasibility of being a hydrogen hub. Unlike other industries,

many ports have the real estate and space to be able to generate green hydrogen successfully; they also have the connections to the decarbonisation supply chain and wider hinterland where consumers of green hydrogen are located. Hydrogen liquefaction and regassification, ammonia handling and storage, electricity generation from hydrogen sources, all these ideas and possibilities are prime for exploitation by the ports and harbours sector. Generating green hydrogen at ports may make sense because they are at the increasingly important sea-to-land interfaces. Ports are hubs for distribution and storage, and are often co-located with large-scale industry making them prime locations for the decarbonisation supply chain.

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*Keir Gravil
Frazer-Nash Business Manager*

Overcoming barriers to development and Implementation

However, while green hydrogen is a very promising part of the solution to our emissions problems, there are challenges in developing the interdependent technical-economic infrastructure and processes that can advance the economy towards net-zero by 2050. Decisions now that require investment and reflect immediate opportunities must form a sound – but also flexible and adaptable – foundation, to support future development. Hydrogen infrastructure can be expensive, and its development within ports can often be limited to more localised projects (such as using hydrogen fuels for vehicles on site) due to the potential costs. Government policies that commit to investment, in areas such as hydrogen handling and transportation infrastructure, are key to reduce the risks in travelling down the hydrogen path. Indeed, support from central government is key. Without major policy shifts to focus on supporting a nationwide hydrogen-based economy, it is likely that hydrogen will remain a local affair, confined to areas with relatively niche demands for hydrogen, rather than a powerful national solution to our decarbonisation plans.

From a ports' perspective, the most important question is what investments make sense now and what make sense in the future? To answer this question is not easy, but uncertainty is not the insurmountable challenge it is often thought to be. The first step on the journey is understanding an organisation can equip itself to be positioned for future opportunities when they arise.

Why is hydrogen a good solution for ports to explore further?

Hydrogen is an important part of what will become a complex and evolving national energy infrastructure. It is a key part of the net-zero energy mix that offers some possible quick wins and promises to be a key and enduring part of the future. It makes sense to seek to embrace the hydrogen-related challenges now, so that we can exploit the substantial associated opportunities.

1. Hydrogen is flexible, it can be used as a fuel for ship propulsion, but it can also be distributed around a port and the port's hinterland to benefit local industry and the wider national energy mix.
2. Ports have potential to act as hydrogen hubs and processing areas, especially for liquefaction and regassification of hydrogen or its processing from compounds such as ammonia or methane.
3. There is potential for hydrogen to generate a surplus of energy, which can be exported and improve energy security for the UK.
4. The flexibility of hydrogen means that collaboration is possible, reducing the risks and pitfalls of technology development.
5. With government investment, hydrogen can be a nationwide solution to the problems facing sustainability targets and be a valuable part of our energy mix.

At Frazer-Nash, we have a lot of experience of supporting organisations to start on their decarbonisation journey, helping them develop knowledge and understanding so they can remain responsive and adaptable. We help guide thinking, whether on the development of viable technologies that solve existing problems, or the consideration of potential future problems that will need resolution. Areas where we've been providing support.

Equally important is the question: who can I help and how can I enable others to start down the same path? Opportunities to develop technology are more likely to succeed when we're all working together. Ports working as enablers for other industries to decarbonise will provide synergies that reduce the costs and risks associated with hydrogen infrastructure. If ports can enable energy companies to grow their hydrogen technologies, the path to the hydrogen economy becomes a lot easier, and the sea fog disappears, allowing us to clearly see the decarbonised, net zero future.