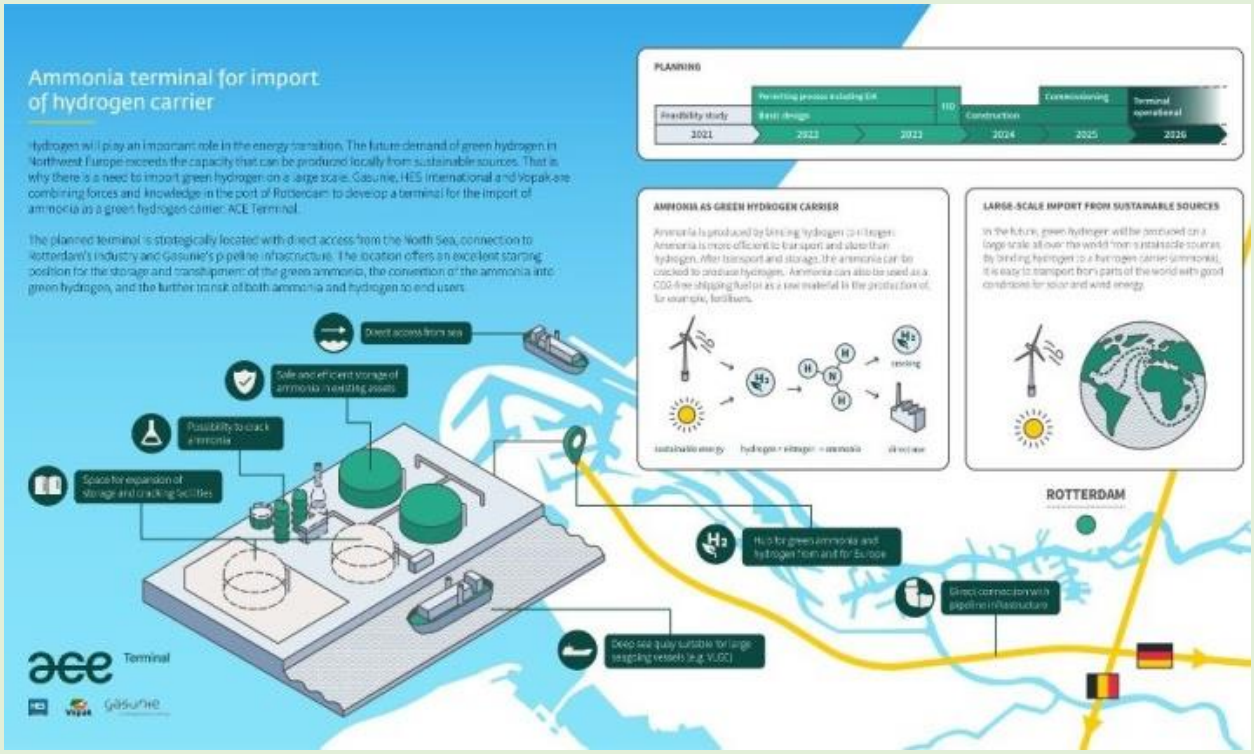
Ammonia and Hydrogen

Refineries, big oil & gas, and the chemical sectors

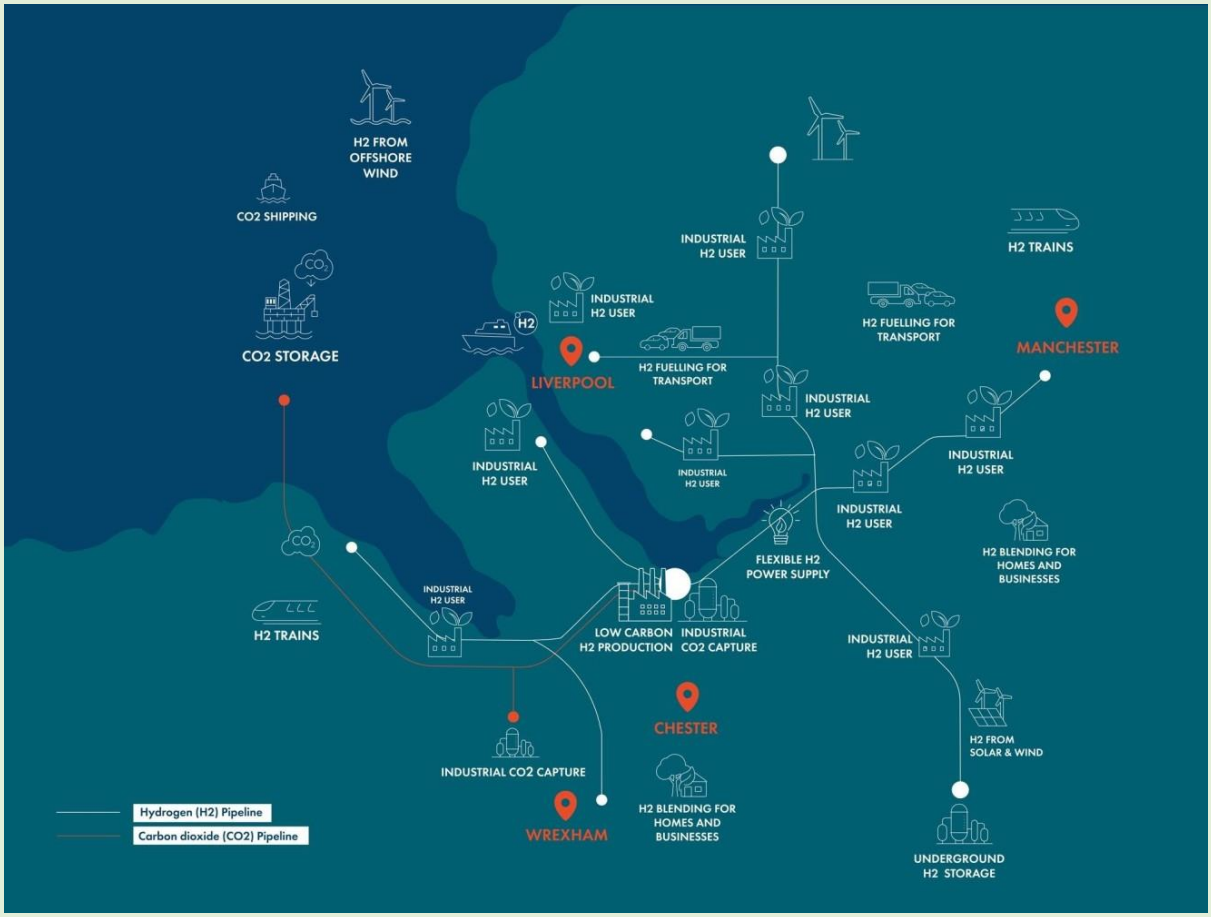


Todays' announcement that ConocoPhillips and JERA Americas are one step closer to realising their proposed two-million-tonnes-per-annum ammonia plant on the US Gulf Coast is a significant sign of progress for the nascent sector.

In a bid to accelerate the production and supply of low carbon fuel to the US, Europe, and Asia, the duo has signed a Heads of Agreement with German energy company Uniper.

Under terms of the deal, Uniper will purchase ammonia from the site. It is hoped the project will also include

carbon capture and sequestration (CCS) capabilities.It ties into a series of announcements earlier in the year which are worth re-visiting.



Announcement regarding ammonia docking facilities and cracking plants prompted me to update the community with a series of global projects involving ammonia, and especially its keys interaction with refining and refineries.

This perhaps is not so surprising as oil and gas majors look to transition in a way that keeps the existing skill sets relevant, avoids

certain decommissioning costs and ensures that their expertise continues to add value to the coming hydrogen economy.

Ammonia is widely used by the agricultural sector as a fertiliser. It is caustic and has caused issues around the world, especially in Beirut, which although not directly related to the ammonia likely to be used for shipping such devastation and loss of life under the ammonia banner causes concern amongst the stakeholder community.

But ammonia has a number of upsides. It’s similar to hydrogen in chemical composition albeit with nitrogen which need dealing with. Further. it's already a commodity already used and requires a lot of hydrogen in its production.

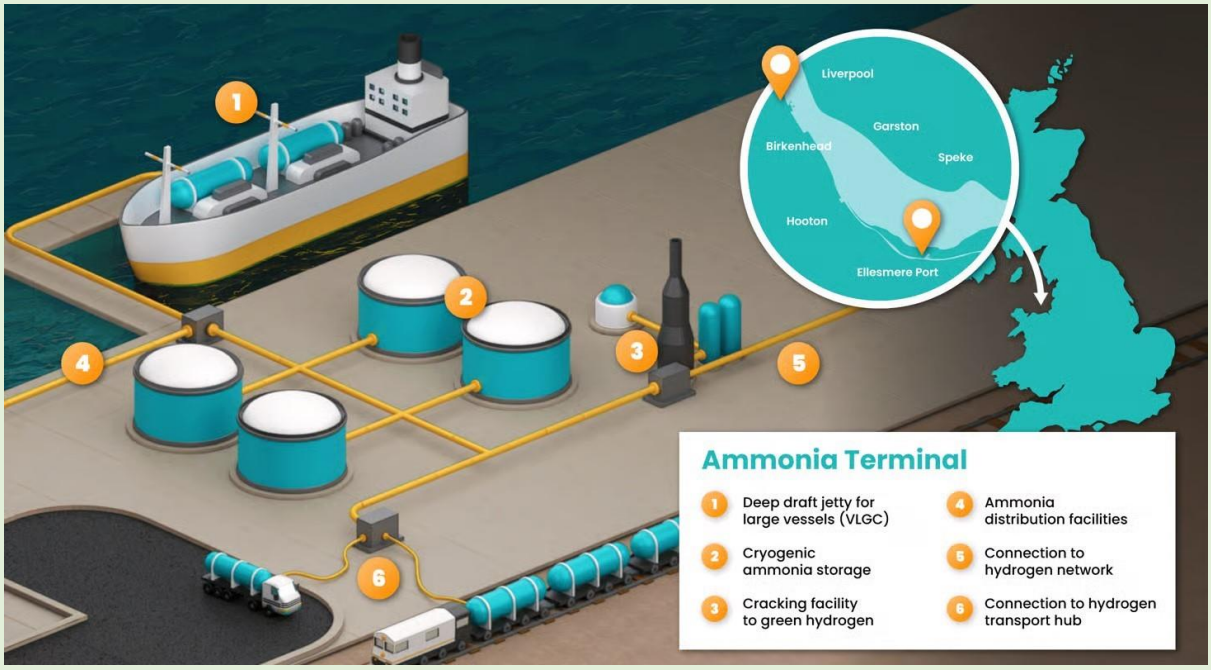
More surprisingly, it can carry four times as much hydrogen as hydrogen in its own right and at a much more user-friendly minus 33 degrees - than the minus 2053 degrees required for liquid hydrogen.

Several studies indicate that it might be a good long term storage solution for hydrogen itself one of the aspects exercising the industry itself so when given the dangerous nature of the substance requires an advanced skill set to deal with. Luckily, over 140 ports around the world already deal with ammonia, and oil and gas majors know how to handle it and want to build upon and monetise their historical expertise.

It's against this backdrop that we Stanlow which is a pivotal part of the Hynet proposals which have already kept the community updated. But one of several ammonia plants ranging from Brazil, USA, Saudi Arabia, Oman, India, Namibia, and South Africa. Others will follow.

Ammonia can used in its own fuel cells and indeed as a fuel in its own right. The PPA’s - the power purchase agreements - may specify that the product is in the form of so many kilogrammes of hydrogen

and the cracker facility which can do this - although it requires a further energy input.



We see from the above image labelled (3) the cracking facility to reconstitute ammonia back into hydrogen.

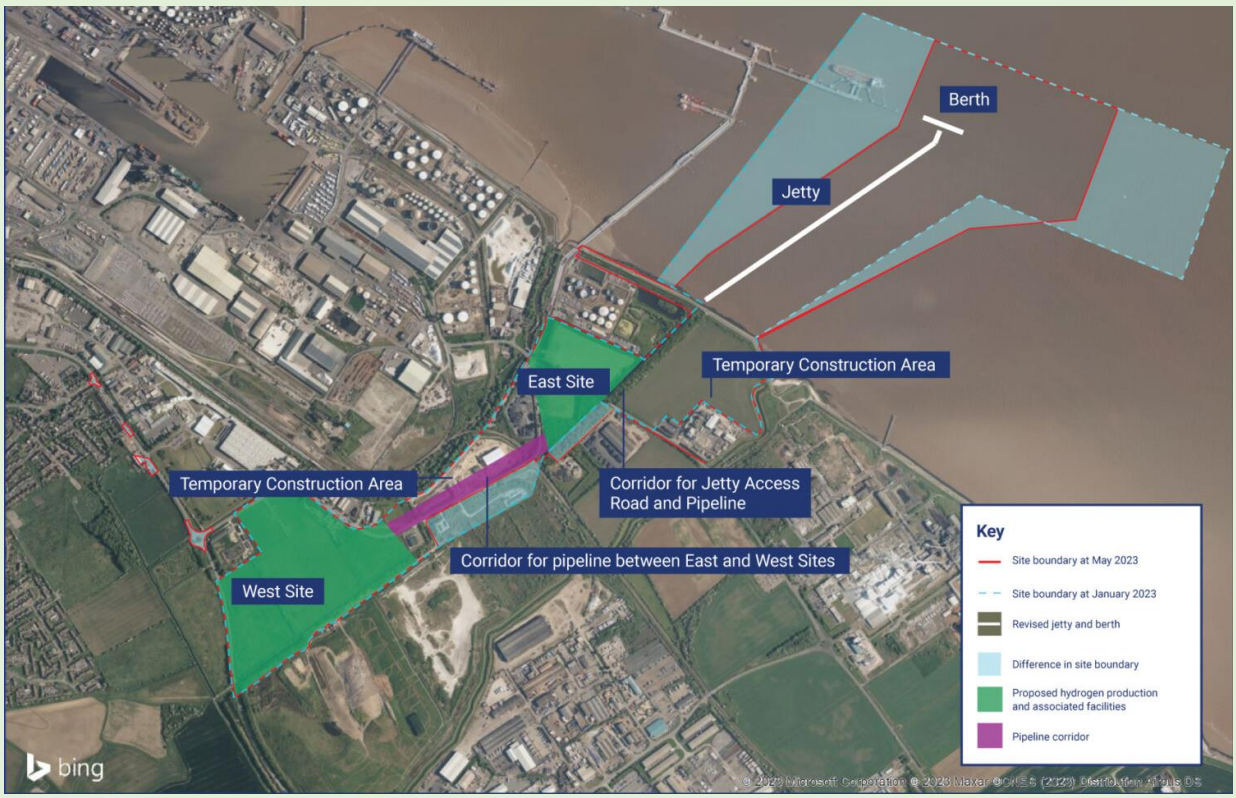
Planning applications are augmenting MOU's or Memorandums of Understandings as the hydrogen economy gets underway here in the North West of England with hynet

Hynet has at its centre Ellesmere Port and the former Shell, now Essar refinery at Stanlow, sited with deep water access in mind a hundred or so years ago.

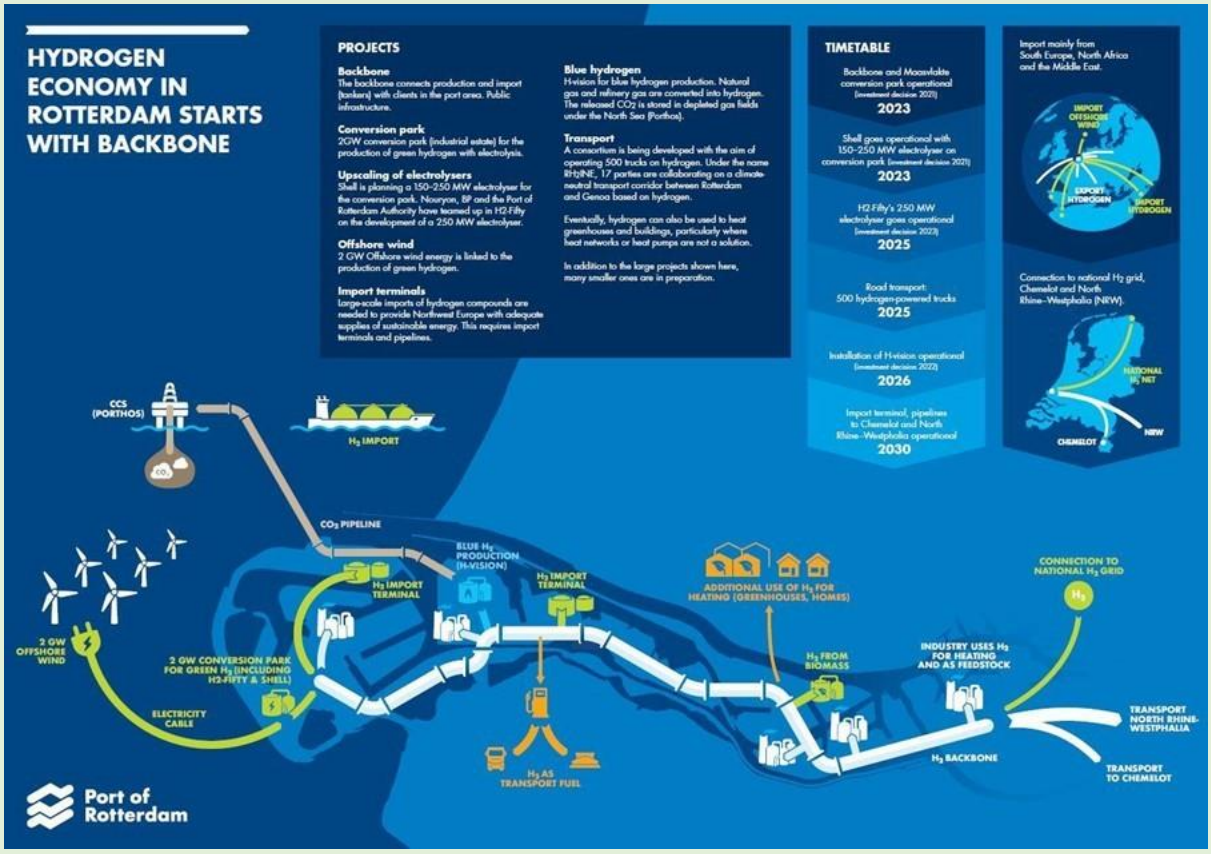
As part of the announcement, existing ammonia storage facilities will be expanded, and the new terminal will include a deep-water jetty designed for VLGC vessels, an ammonia cracking facility, connections to a hydrogen vehicle refuelling hub.

The new terminal will be able to handle imports & storage of more than one million tonnes of ammonia per year from an under-development, 1 GW ammonia production project in Gujarat, India. Operations are scheduled to begin in 2027, with feasibility work underway.

Essar announced their planning application and it's interesting that Hynet on the West and Net Zero Humber on East Coast are also moving forward with activity around the port of Immingham.



Also in the public domain are development deep water ports in Holland Germany. These are based around refineries around Heide in Germany, Pernis in Holland linking up to another crucial hub at Maasvligte off Rotterdam.



Europe’s largest port, Rotterdam forms a nascent ammonia cluster with shipping links involving major companies such as unit pack and shelf to make it to happen.

Opportunities around the European Green Deal and I've come across them at locations right which fossil ship ranging from Brazil to Namibia and South Africa to so if we can move and store quadruple the amount of hydrogen with ammonia.

Shipping is expensive but megaproject developers are looking at key locations encompassing Oman, Saudi, Brazil, Namibia, India and South Africa and nearer to home Antwerp, Wilhelmshaven, Immingham and of course, Stanlow.

I'll continue tracking the ammonia shipping routes for you. Feel free to join with me and the over 3500 strong community of experts: https://bit.ly/3lb7XRH

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