Hydrogen East

H2 News Hub

Issue 7

H2 East

June 2021

Top stories

In Issue 7 of **Hydrogen East**'s Sector Review, we take a look at important publications and developments over the month of May (2021).

Hydrogen East released its study into the potential for hydrogen production to transform the Bacton terminal into an international clean energy hub, stimulating local markets for clean transport solutions and supporting the decarbonisation of the East Anglian economy.

Both low-carbon and renewable hydrogen are needed for a faster, lower risk, cost-effective path to Net Zero, according to **Hydrogen4EU**, which released its study into how hydrogen can contribute to the EU's climate goals.

The **CBI** explored how to establish a competitive, dynamic and future-focused UK following the shocks of Brexit and Covid-19, finding a decarbonised economy would bring many "prizes" that could be captured by 2030, including £8bn in hydrogen electrolyser production revenues.

Elsewhere, **IEA** released two reports, one exploring the hydrogen potential of north-western Europe, while the other mapped out a global pathway to Net Zero, featuring a role for hydrogen.

Contents

Upcoming webinars

8 June – **KTN:** Industrial Energy Transformation Fund Competition Briefing | **9 June** – **Mission Hydrogen:** How to meet the safety challenges of hydrogen | **10 June** – **UKHFCA:** The case for blue hydrogen | **10 June** – **IChemE:** An introduction to hydrogen safety | **16 June** – **IChemE:** Hydrogen as a transport fuel and in the gas network | **16 June** – **HTP2:** Building your Hydrogen Valley project | **17 June** – **Energy Voice:** Hydrogen projects, infrastructure and finance

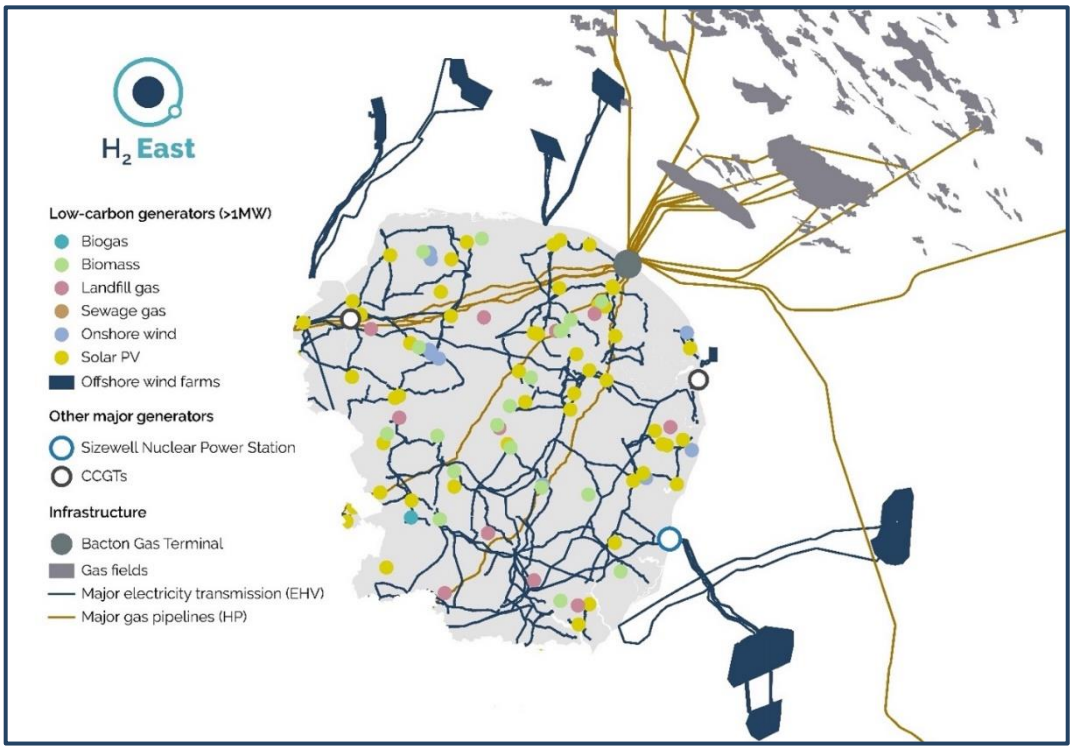
Study highlights potential role of Bacton as an energy hub

A new study has been released highlighting the potential for hydrogen production transforming the Bacton terminal into an international clean energy hub, stimulating local markets for clean transport solutions and supporting the decarbonisation of the East Anglian economy.

The study, '*Bacton Energy Hub: Exploring the potential for hydrogen in the New Anglia region and around the Southern North Sea'* has been delivered by a collaborative partnership, led by Hydrogen East, with funding and support from OGTC, the Offshore Renewable Energy Catapult, North Norfolk District Council, and New Anglia Local Enterprise Partnership, New Anglia Energy, Opergy, and Xodus Group.

Figure 1: Norfolk and Suffolk Energy Infrastructure Map

(Source: Hydrogen East)



The report shows that Bacton has excellent connections into the onshore gas network that could support the flow of sizeable quantities of hydrogen into the GB system. Bacton is uniquely connected to Europe, via two gas interconnectors, both of which now accommodate two-way flows and could provide hydrogen export opportunities in the longer term.

There are also options for infrastructure re-use for Carbon Capture Utilisation and Storage (CCUS) in the Southern North Sea (SNS), anchored by a blue hydrogen production facility at the terminal with CO2 being stored in the Hewett field. The existing 6GW+ of offshore wind off East Anglia, and further offshore wind build out, is likely to significantly increase periods of surplus electricity production; electrolysis could act as an offtaker for this energy, which might otherwise be constrained off the system.

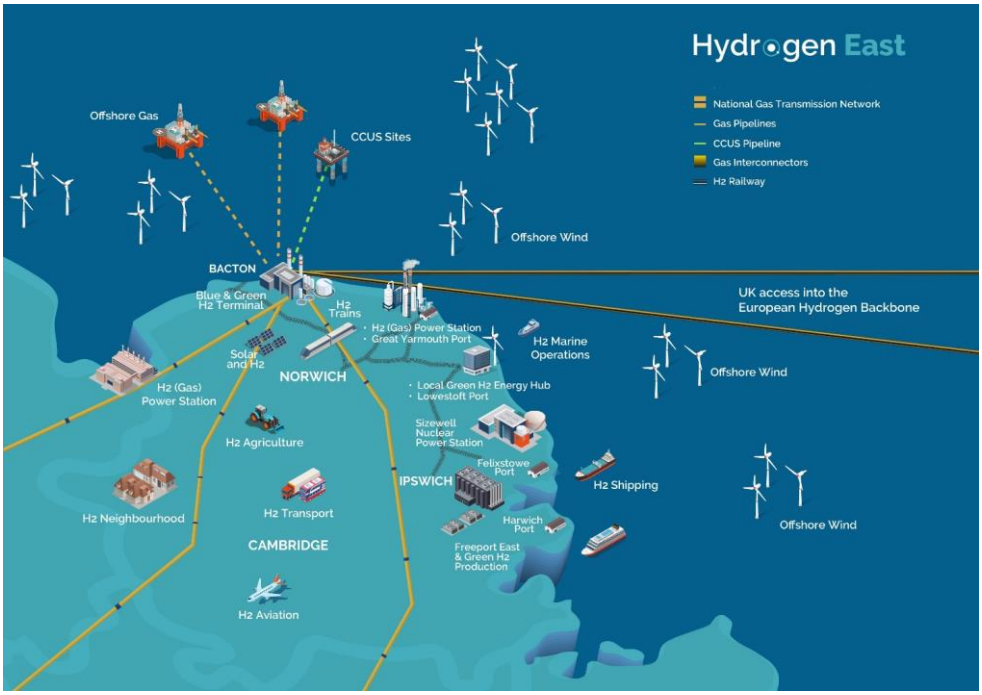
There is 573MW of operating distributed solar PV with another 81MW in planning, which could support early deployment of behind-the-meter electrolysis. The onshore electricity network in Norfolk and Suffolk is constrained to varying degrees, with much of the region subject to Active Network Management, whereby generators have no firm connection rights and are paid to

curtail energy. This has important implications for the scale and location of potential green hydrogen development onshore.

The report also found that local demand for hydrogen is already beginning to emerge in a range of important sub-sectors, and there is scope to build this organically. Provisional demand assessments, restricted to sub-sectors only at this stage, indicate that local hydrogen demand in 2050 could very conservatively exceed 10TWh in a *'Central Scenario'*. Future stages will expand this research to cover important sectors such as construction, shipping and aviation, which will significantly increase provisional demand estimates.

Figure 2: Hydrogen East's Regional Hydrogen Network vision

(Source: Hydrogen East)



In one Bacton Energy Hub illustrative pathway, the *Facilitated Model*, Hydrogen East described an actively planned, cross-vectoral approach, This would consist of an optimised energy hub that integrates all relevant sectors active in Norfolk and Suffolk across heat and transport, as well as electricity. There are material contributions from blue hydrogen from SNS and green hydrogen from offshore wind but also including nuclear power and heat, and local solar at scale.

Nigel Cornwall, Director of Hydrogen East, said: "Developing the options for a potential Bacton Energy Hub will help to facilitate and accelerate the transition towards net zero emissions. It is a key regional project, which could realise extensive potential benefits both in terms of supporting delivery of the Local Industrial Strategy and the stated aim of enabling Norfolk and Suffolk to become the UK's Clean Growth Region. It will contribute to Hydrogen East's driving objective of Norfolk and Suffolk becoming a significant regional hydrogen economy."

With early sponsorship support from EDF Energy and others, further scoping and development will be undertaken on a range of hydrogen and other Net Zero demonstration projects, starting with a 'Local Energy Hub' on Lowestoft's PowerPark.

A copy of the *Bacton Energy Hub Summary Report* is available for download on the Hydrogen East website, here, along with slides and a recording of the launch event. The full *Bacton Energy Hub Technical Report* is to be made available, on request, in early June.

G7 ministers signal commitment to hydrogen

G7 ministers responsible for climate and the environment have recognised the importance of renewable and low-carbon hydrogen on the pathway to Net Zero.

On 21 May, G7 members released a statement following their virtual summit, making a series of commitments that will ensure climate, biodiversity and the environment are at the heart of a worldwide recovery from Covid-19. These include phasing out government funding for fossil fuel projects internationally, with an end to all new finance for coal power by the end of 2021, alongside increased support for clean energy alternatives, such as wind, solar and hydrogen.

On hydrogen, the G7 pledged to step up efforts to advance commercial-scale hydrogen from low-carbon and renewable sources across their economies. This includes support for fuel cell deployment globally and helping to realise the development of a future international hydrogen market that creates jobs for both current and future workers within the energy sector.

The G7 have acknowledged the importance of taking early action to decarbonise hard-to-abate industrial sectors and will target greater levels of innovation funding to lower the costs of industrial decarbonisation technologies. These include use of hydrogen, electrification, sustainable biomass, CCUS and synthetic fuels, such as ammonia and fuels made from hydrogen. They are also committed to developing strategies and actions that enhance their focus on the security of innovative, clean, safe and sustainable energy technologies, with it citing hydrogen, as well as smart grids and related infrastructure, including accommodation of sustainable biofuels alongside system integration of renewables among others.

UK set for first renewable hydrogen project using food waste

BayoTech and IBMS Group have joined forces to launch the UK's first renewable hydrogen project using biomethane from food waste as feedstock.

Announced on 24 May, the project will produce 1,000kg of renewable hydrogen a day, fuelling zero emission vehicles in the regions of London and Surrey. Biomethane will be produced from food waste at IBMS' multi-purpose eco-facility, before then being converted into renewable hydrogen using BayoTech's on-site hydrogen generation technology. The system is due to come online during the first half of 2022.

Adoption of a regional hydrogen production and distribution model can see costs, storage and transportation all reduced, resulting in a significantly lower carbon footprint overall compared to traditional models and electrolyser systems. In future phases of the project, carbon capture will be introduced, taking it from carbon neutral to carbon negative. After the initial project's launch next year, the companies are aiming to roll out further projects across multiple UK locations, creating a national network of carbon negative hydrogen production facilities.

Clean Power Hydrogen agrees deal with Octopus Hydrogen

Clean Power Hydrogen (CPH2) has won an order from Octopus Hydrogen for the supply of a 1MW electrolyser.

On 25 May, it confirmed that the 1MW Membrane-Free Electrolyser is due for delivery to Octopus Hydrogen's site late in 2021. It will produce up to 45kg of hydrogen a day, with the system incorporating cryogenic separation technology, meaning it can generate hydrogen with a purity of up to 99.999% and oxygen, with 99.5% is suitable for medical use.

It will support Octopus Hydrogen as it prepares to supply green hydrogen as a service for heavy goods transportation, energy storage, industrial applications and aviation across the UK, Europe and Australia. It is striving to remove the infrastructure cost and complexity from the end user, while accelerating adoption of green hydrogen as a fuel.

Consortium aims to put Flemish region in driving seat for hydrogen economy deployment

A duo of Flemish research centres have joined forces with industry, combing together as the Hyve consortium to push green hydrogen production forwards.

On 28 May, imec and VITO, along with Bekaert, Colruyt Group, DEME and John Cockerill signalled their intention to invest in cost-efficient, sustainable production of green hydrogen at a gigawatt level. The goal is for their efforts to result in placing the Flemish region in the driving seat for the deployment of a hydrogen economy and the transition towards carbon neutral industry in Europe. The consortium will work to make green hydrogen competitive through merging expertise in developing new components for electrolysis with material suppliers, integration companies that will integrate the new components into their electrolysers, and companies that will use the infrastructure to generate green hydrogen.

The research centres – imec and VITO – will leverage their knowledge to boost the efficiency of the electrolyser technology, with Bekaert supplying the appropriate materials and John Cockerill, specialising in the production of alkaline electrolysers, integrating the results into its production. DEME is aiming to use the electrolysers to convert wind and solar energy into green hydrogen and derived products, namely e-fuels. Through the Hyport-concept, it will strive to import cheap green hydrogen products into Europe, which are complementary to local European production.

Colruyt Group, meanwhile, will support research applications for sustainable transport. The retailer is already running a hydrogen filling station, testing hydrogen-powered forklifts along with heavy-duty trucks, collaborating on a green hydrogen plant in Zeebrugge and exploring e-fuels through Dats24.

Scottish Cluster looks to highlight importance of CCS and hydrogen

Communities, industries and businesses are to come together in a bid to deliver carbon capture and storage (CCS) and hydrogen in support of net zero goals.

On 13 May, the Scottish Cluster was established as a "unification and collaboration" of industries, communities and businesses in Scotland, calling on the Scottish and UK governments to deliver actions necessary for CCS, hydrogen and other low carbon technologies to enable the decarbonisation of industry and facilitate a low carbon economy. They have also launched the "Back the Scottish Cluster" campaign in support of this aim.

It brings key stakeholders and key industries across Scotland together, along with academia, communities and the public sector to create a unified voice, advocating for CCS, hydrogen and low carbon technologies in Scotland's decarbonisation pathway. It has a clear decarbonisation roadmap in place, along with access to key infrastructure and a series of CO_2 reduction projects aligned with net zero goals.

The cluster has the potential to address up to 9mn tonnes of CO_2 that current come from Scotland's top emitting sectors, while establishing a substantial CO_2 transportation and storage solution, including shipping CO_2 through Scottish Ports. This will be key in reducing industrial emissions from areas around the UK and as far as Europe which are in need of access to such facilities.

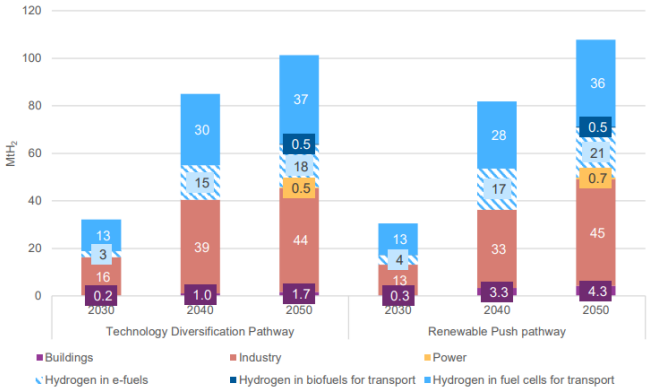
The project partners from the Acorn CCS and Hydrogen Project are also involved in the cluster and it is through this project that Scotland has unique CO_2 storage potential. Come the mid-2020s, Acorn's CCS and hydrogen systems will offer crucial backbone infrastructure to the cluster and this will be able to scale as demand to store CO_2 grows. This will cost effectively transform Scotland's carbon intensive industries, resulting in a fairer, more resilient economy, while sustaining and creating low carbon jobs UK-wide.

Hydrogen set to unlock renewable energy integration

Hydrogen production and use in Europe is set for substantial growth, with both low carbon and renewable hydrogen needed for a fast, lower risk, cost effective path to Net Zero.

Figure 3: Evolution of hydrogen energy-related demand 2030 to 2050

(Source: Hydrogen4EU)



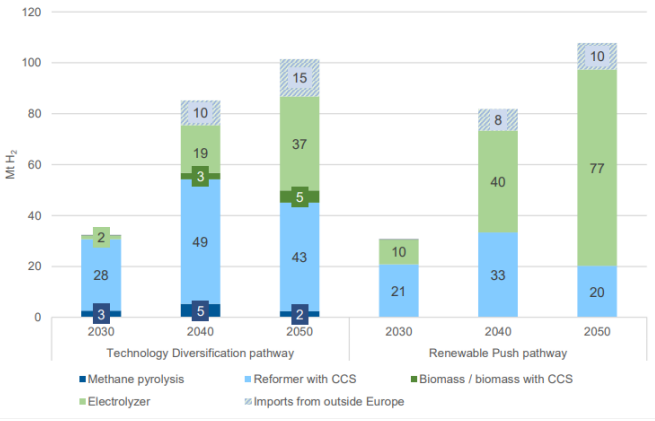
On 4 May, Hydrogen4EU published a report on how hydrogen can contribute to the EU's climate goals. It explored two main pathways to Net Zero, "technology diversification" (TD) where an array of decarbonisation technologies and approved national targets are considered and "renewable push" (RP), which prioritises renewable energy deployment and more ambitious policies.

Both pathways see half of final energy consumption come from non-electrified sources. Hydrogen demand hits 100Mt by 2050, with the majority from transport (50Mt) and industry (45Mt). It can act as a cost-efficient solution for hard-to-abate energy uses in these sectors, while the RP pathway also sees hydrogen absorb, store and transport additional energy from higher renewables generation. The next 30 years will see production ramp up in pursuit of Net Zero, with 2030 to 2040 a key period. Here, uptake of the hydrogen economy must be accelerated as output rises from 30Mt to 75Mt. Low-carbon hydrogen will drive the establishment of the hydrogen economy, with renewable hydrogen taking over towards 2050, especially in the RP pathway - becoming the biggest production source by 2040.

Low-carbon hydrogen's development is dependent on the parallel deployment of the CCUS value chain and ability of CO2 storage capacities to grow rapidly up to 2050. Renewable hydrogen's development calls for significant investment underpinned by accelerated deployment of renewable and electrolyser supply chains. In the RP pathway, over 1,800GW of dedicated solar and wind capacity is needed, alongside 1,600GW of electrolysers for renewable hydrogen to sustain an upward trajectory to 2050.

Figure 4: Evolution of European hydrogen supply, 2030 to 2050

(Source: Hydrogen4EU)



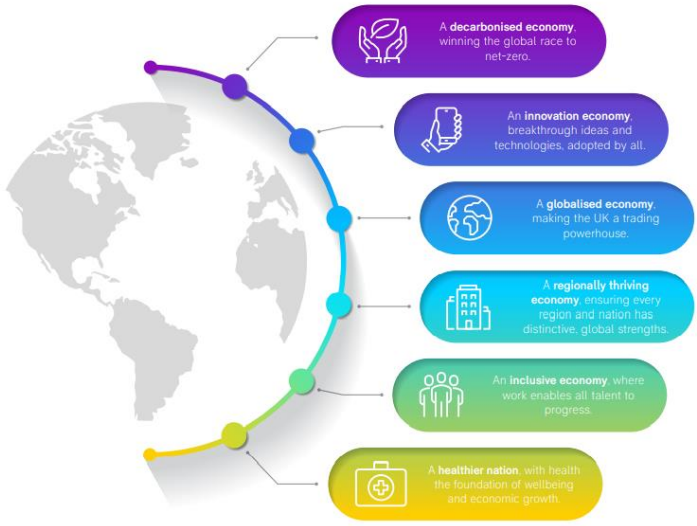
There is a difference of more than €2tn in the cost of the two pathways, with RP's focus on renewable assets and electrolysers leaving it with a higher capital intensity. In contrast, the TD approach underscores the value of an agnostic approach with a level playing field between technologies and supply options. It allows for the de-risking of investments, relieving of some of the financing and technological bottlenecks and enables a more competitive, efficient energy system. It would save around €70bn per year or €1tn by 2050.

Hydrogen key to winning Net Zero race

Decarbonisation, innovation and levelling up have all been identified as driving factors behind an economic plan that could be worth £700bn.

Figure 4: The six business-led opportunities the UK could capture by 2030 worth £700bn

(Source: CBI)



On 24 May, the CBI published its report, *Seize the moment: how can business transform the UK economy?*, exploring how to establish a competitive, dynamic and future-focused UK following the shocks of Brexit and Covid-19, with COP26 on the horizon.

It identified six business-led opportunities to pursue, or prizes, that the UK could capture by 2030, worth around £700bn, that would transform the economy: innovation, globalisation, regionality, inclusivity and health, with employee health and wellness seen as the foundation of firm level productivity and national economic growth.

A decarbonised economy and winning the global race to Net Zero was also identified as offering significant opportunities, such as capturing £8bn in additional revenues from hydrogen electrolyser production. Other economic opportunities coming from additional decarbonisation exports to the EU include electric vehicles and vehicle batteries (£18bn), carbon capture, usage and storage (£1bn) and offshore wind goods and services (£3bn).

The report outlined how progressing the development of hydrogen will be a key part of efforts to realising a decarbonised economy, calling for business and government to join forces and work together to secure a growing share of low-carbon exports in markets such as hydrogen, along with electric vehicles (EVs), offshore wind and carbon capture. The Government was also told to clarify its envisaged role for hydrogen and propose business models to improve its investment prospects within its forthcoming Hydrogen Strategy.

Elsewhere, it stressed the need to see through the transition to new, low-carbon power sources and a flexible smart energy system and accelerate progress in cutting emissions beyond the power sector. To unlock investment, meanwhile, it urged the Government to implement long-term incentives for energy efficiency improvements, and mandate all new domestic boiler installers, post-2025, are part of a hybrid system or are hydrogen-ready.

It also emphasised the need for the Government to back the aforementioned key technologies – EVs, offshore wind, carbon capture and hydrogen – with high exporting potential by leveraging the UK's competitive strengths. It recommended a commitment of developing seven gigafactories by 2040 to support the EV market, while setting out a clear route to market for hydrogen through new Contracts for Difference auctions.

Electrolyser capacity set for a thousand-fold increase by 2040

Electrolyser projects are set for a thousand-fold increase from the 0.2GW operating today, with 213.5GW planned for delivery by 2040, according to a new report from Aurora Energy Research.

On 11 May, the researcher published a report outlining how the majority (85%) of these electrolyser projects will be in Europe, with Germany (23%) accounting for the most. Germany is the most attractive market for low-carbon hydrogen investment on the continent, though Aurora acknowledged the "promising policies and strategies" that have been released in Italy, Poland and the UK.

Increasingly, governments around Europe have been setting their sights on low-carbon hydrogen's potential. There has been a particular focus on promoting electrolysers with the EU targeting 40GW by 2030, while national governments have pledged 34GW by the same date. Germany already has a 9GW pipeline of projects, ahead of the Netherlands (6GW) and the UK (4GW) as companies respond to the opportunity.

As well as growing in number, projects are scaling up fast as the technology and supply chain matures. Most projects today range between 1-10MWs but come 2025, a typical project will be between 100-500MW, supplying local clusters. By 2030, projects will be 1GW or more with large-scale hydrogen export projects emerging, deployed in countries that are benefiting from cheap electricity.

The cost of power and carbon footprint will be the key determining factors in driving the success of green hydrogen from electrolysis. France is set to have the lowest grid power prices to 2040, followed by Germany, as well as the lowest grid carbon intensity, alongside Norway and Sweden. Electrolysers can bypass the grid in an effort to achieve the lowest carbon footprint, connecting directly with renewable power sources. As the EU begins to determine carbon footprint thresholds within their laws and policies, the label of "sustainable hydrogen" will increasing be reserved for renewable-connected electrolysers.

H2 Green and Element Two join forces on UK's first hydrogen network

H2 Green and Element Two have entered into a strategic agreement with the goal of accelerating the creation of the UK's first hydrogen network.

On 5 May, Getech – H2 Green's parent company – announced that the agreement will see H2 Green supply green hydrogen to Element Two's refuelling stations, while further delivering a pathway by which the two companies can align production and distribution strategies across their respective land portfolios. The hope is to build an efficient, reliable hydrogen network, spanning England, Scotland and Wales, leading to widespread adoption of hydrogen mobility technologies.

The companies have agreed mutual options to co-locate their respective hydrogen refuelling stations and hydrogen production and storage assets, committing to a 12-month negotiation framework. This framework will seek to result in an agreed joint asset development roadmap, which is then taken forwards; an initial demonstration project; and the successful negotiation of a binding long-term co-development and offtake contract.

Element Two is aiming to deploy 800 hydrogen refuelling pumps nationwide by 2027, rising to 2,000 by 2030, goals strengthened through H2 Green supplying it with green hydrogen. The companies will also use state of the art analytical software, created by Getech, along with substantial data gathered by Element Two on customer habits to analyse efficiencies for the benefits of both of their customer bases.

Green Distilleries Competition set to move to second phase

Feasibility studies funded through the first round of the government's Green Distilleries Competition have been published.

In January, 17 distilleries were awarded funding – between £44,000 and £75,000 – to complete a feasibility study on proposed green solutions, which included hydrogen, biofuel boilers and geothermal energy within their production processes. The studies mark the first phase of a £10mn competition driven by the idea that the UK's distilleries – which grew by 20% in 2019 – can be "at the heart" of a green, resilient recovery from Covid-19.

Environmental Resources Management (ERM) found liquid organic hydrogen carriers (LOHC) to be a viable option for transporting, storing and delivering hydrogen to a distillery for heat production. It wants to conduct a demonstration trial for the technology to prove itself under real-world conditions. The European Marine Energy Centre (EMEC), leading the HySpirits 2 project, concluded dual fuelling burner systems as the most appropriate way of deploying green hydrogen to decarbonise distilling. This is as it allows fuel flexibility during the broader energy system transition to widespread hydrogen use.

John Fergus & Co with Arup adjudged decarbonising InchDairnie distillery with hydrogen, either produced onsite or imported through larger-scale local suppliers, to be technically feasible. A transitional model was found to be most successful, limiting costs in phase 2, which will see a system design including solar PV electrolysis and biomethane pipeline. The site could potentially be "significantly carbon negative" by 2030.

Locogen and Logan Energy investigated the techno-economic feasibility of converting an operational distillery – Arbikie Highland Estate – that uses gas oil for distillation to hydrogen. It found converting it to use green hydrogen produced onsite from electrolysis from wind and solar to be "relatively simple" and, as most operational distilleries have similar systems, "readily replicable" as well. Colorado Construction & Engineering examined using hydrogen and biofuel burners for decarbonised power in distilleries, proposing bio oils are used for distillery heat with hydrogen in a two stage burner, when hydrogen is available at a competitive cost.

Protium, Deuterium, Bruichaladdich Distillery and ITPEnergised provided a technically feasible, commercially robust, accelerated configuration for deploying Dynamic Combustion Chamber (DCC) technology and associated electrolysers and storage at Bruichaladdich by the end of 2021. The technology sees hydrogen and oxygen combusted in a burner with little or no radiant heat at around 2,800˚C before being provided to the boiler through an electrolyser. The demonstration project set for phase 2 could cut emissions by 15% with the potential for this to rise to 100%, once fully scaled.

Supercritical Solutions assessed switching to zero emission hydrogen from LPG at the Ardmore Distillery, finding it would reduce CO2e by 615g per litre of whisky. Producing, storing and consuming hydrogen onsite could be cost neutral with LPG by the end of the decade and cost neutral with natural gas by 2040.

Locogen and Logan Energy also explored using hydrogen to heat thermal oil to replace steam in the distillation process, using Benbecula Distillery as a real world test case. The solution would see the distillery supplied with a zero-carbon fuel with hydrogen produced offsite and power purchased from existing operational windfarms. It could save 874tCO2 per year for the distillery and over 26,500tCO2 over 25 years.

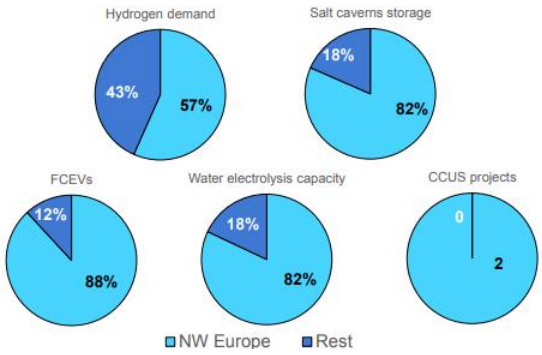
IEA highlights hydrogen potential of north-western Europe

The north-western European region is critical to achieving Europe's hydrogen and wider decarbonisation ambitions, according to a report.

The International Energy Agency (IEA) and Clingendael International Energy Programme (CIEP) published the findings from a study they had carried out, exploring the potential for hydrogen in north-western Europe. The region was found to be well placed to lead hydrogen adoption as a clean energy vector. It currently accounts for 5% of global hydrogen demand and 60% of European demand. It is home to the largest industrial ports on the continent, where the majority of demand stems from, and has a well-developed natural gas infrastructure connecting these ports with other industrial hubs.

Figure 5: The role of north-western Europe in the European hydrogen landscape

(Source: IEA)



The region has vast, underutilised potential renewable energy in the North Sea, which is central to decarbonisation strategies for countries in north-western Europe. Converting offshore wind energy into hydrogen would enable these countries to absorb high volumes of wind generation into their energy systems and markets, facilitating sector integration. Further opportunities in the North Sea include the potential for large underground carbon dioxide storage and offshore hydrogen storage.

However, while the current policy landscape can create some momentum towards such a transformation, realising the full decarbonisation potential of hydrogen in the region will call for more ambitious policies and strengthened coordination among governments, facilitating the development of an integrated regional hydrogen market.

While the current pipeline of projects will not be enough to achieve national ambitions, national policies that include some of the wider European energy transition goals would likely see enough of an expansion in the pipeline, from now to 2030, to change this. In mapping out a vision to 2030, the report found new industrial applications could lift hydrogen demand by a third as hydrogen supply sees a significant shift towards low carbon production. Despite natural gas remaining the main source of production by 2030, up to half (50%) would use carbon capture with electrolysis making a significant impact, reaching 20% of total supply.

IEA and CIEP went on to highlight several prioritises to be addressed in regional dialogues,. These include building on the large unused potential to cooperate on hydrogen in the north-western European region, which already has cooperative platforms in place, in a bid to identify opportunities to develop cross-border initiatives and projects that could lead to the development of an integrated hydrogen market in the region. Countries should also work together to identify what is needed to develop an integrated regional market; develop supporting schemes that can advance technology frontiers and market size scale-up of all steps in the value chain in a coordinated way; and design a strategy to address emissions from existing hydrogen producing asset. At the same time countries should develop new production capacities for low-carbon hydrogen to meet demand stemming from new applications.

Hydrogen given backing in multi-million green funding package

The Government has unveiled a £166.5mn cash injection for green technologies to drive the UK closer to achieving its climate ambitions.

On 24 May, BEIS outlined how the investment package – awarded to innovators, businesses, academics and heavy industry across the UK – will accelerate the delivery of key technologies such as carbon capture, greenhouse gas removal and hydrogen, while creating more than 60,000 jobs. The funding includes £37.5mn for greenhouse gas removal methods, £20mn for the next generation of CCUS technologies and £20mn for a new virtual Industrial Decarbonisation Research and Innovation Centre, set to be run by Heriot-Watt University. It also includes £60mn to support the development of low-carbon hydrogen in the UK and for identifying and scaling-up more efficient solutions for making clean hydrogen from electrolysis. The funding will help to create around 8,000 hydrogen jobs and push the UK closer to using low-carbon hydrogen in key industries, such as transport and heavy industry.

With the funding announcement, the expressions of interest process for both the Hydrogen Supply 2 (HYS2) and the CCUS innovation competitions has now opened.

The £60mn HYS2 competition will be divided into two streams – both worth £30mn – with the first supporting development of solutions to a market entry stage, helping to increase competition and maximise potential future cost reductions and foster export opportunities. It will be run over two phases – feasibility, then demonstration – and split into four categories: low-carbon hydrogen production; zero carbon hydrogen production; hydrogen storage and distribution; and net zero hydrogen supply solutions. The second stream will target more developed projects, ensuring UK hydrogen supply solutions remain competitive and maximise cost reduction for projects deployed in the 2020s.

Elsewhere, industry and academic-led projects can apply for CCUS innovation 2.0 funding, as the Government aims to broaden the audience from the traditional power sector's interest in CCUS innovation to gain greater interest from the next generation of CCUS technologies in the industry, waste and power sectors.

Kwarteng discusses government approach to scaling-up hydrogen economy

The Government will aim to scale-up the hydrogen economy in a similar way to how it has offshore wind, Business Secretary, Kwasi Kwarteng, has told MPs.

On 18 May, Kwarteng spoke in the House of Commons on the progress being made towards the ambitions of the 10-point plan for a green industrial revolution announced by the Prime Minister last November. Following the plan signals the Government's commitment to meeting the fourth and fifth carbon budgets, he said, Kwarteng assured that further strategies for different sectors of the economy will be set over the next year. These include a heat and buildings strategy, as well as the government's hydrogen strategy both expected early Summer. The hydrogen strategy will be underpinned by a £240mn Net Zero Hydrogen Fund investment, supporting both green hydrogen from electrolysis and blue hydrogen enabled by CCUS.

Responding to a point raised by Shadow Secretary, Ed Miliband, on how "hundreds of millions" of investment in hydrogen, while welcome, is dwarfed by "billions being invested by others", Kwarteng compared it to the manner in which the offshore wind sector has been scaled-up. Here, private sector investment has been very successful in driving deployment, which is the reason why the UK has a commanding position. Instead of the Government writing cheques, it has created incentives for the private sector to invest and it will now endeavour to do the same to scale up the hydrogen economy.

Port of Cromarty Firth secures pathway to import green hydrogen

The Port of Cromarty Firth has signed a Memorandum of Understanding (MoU) with Gen2 Energy AS of Norway, creating a commercial pathway to import green hydrogen.

The partnership, announced on 24 May, focuses on the Firth's plans for a large electrolyser facility, as well as guaranteeing green hydrogen for those who want access to it, by the mid-2020s. This means they can now have the confidence to make concrete plans for switching their infrastructure. It also supports the Scottish Government's ambitions of becoming a leading hydrogen nation, generating 5GW of renewable and low-carbon hydrogen by 2030.

The agreement adds an "international angle" to the ambition of producing, storing and supplying hydrogen in the Cromarty Firth to the Highland region and other parts of Scotland, along with the UK and Europe. The Firth will become the UK trans-shipment hub for Gen2 Energy's hydrogen, which is produced from Norway's surplus renewable energy and will be shipped across the North Sea, before being distributed by road, rail and sea.

OGTC and partners to invest £1mn to scale-up hydrogen-enabling technologies

The OGTC has extended its latest Call for Ideas and will invest £1mn in technologies that can accelerate hydrogen production, transportation, storage and utilisation.

On 12 May, it outlined how the call follows recent government announcements, highlighting the Scottish Government's Hydrogen Policy Statement and £10bn funding set out in the North Sea Transition Deal as particularly influential. Submissions must focus on technologies that will decarbonise offshore operations, help the UK to become the world's first net zero basin and require academic R&D to accelerate development. The deadline for submissions is 14 June.

Specific areas of interest include optimising the production of blue hydrogen and bulk hydrogen transportation. The former would relate to innovation in low-carbon hydrogen production with CCUS, with the main innovation gap involving the separation of hydrogen or carbon to improve yield and carbon capture. The latter relates to enabling effective transportation of renewable energy to utilisation and storage locations, with challenges including effective hydrogen carriers and pipeline repurposing.

Elsewhere, OGTC is also looking for innovation technology ideas that focus on long-term hydrogen storage, enabling intermittent renewable electricity to become a round-the-clock resource on a path towards a carbon-free grid, and hydrogen/hydrogen carrier utilisation, where applications include power generation for offshore platforms and a transportation fuel for the marine sector.

Platform launched to connect hydrogen start-ups

Startupbootcamp has unveiled a new world-first global platform, H2 StartupBase, which maps the world of hydrogen start-ups.

On 28 May, at the launch of the Greater Geelong Hydrogen Technology Cluster – which Startupbootcamp is leading – it outlined how the platform will help to accelerate and connect hydrogen start-ups locally, nationally and internationally with projects and customers. It already features over 3,500 hydrogen-related start-ups and organisations from around the world and will continue growing in future.

The Greater Geelong Cluster, which is one of the 13 regional Hydrogen Technology Clusters announced by National Energy Resources Australia, as it looks to establish a national cluster network. It will look to identify collaboration opportunities and projects, with the cluster focusing on helping decarbonise sectors such as manufacturing, agriculture, energy and transportation to create a market for hydrogen.

Hydrogen part of narrow, but viable global net zero pathway

Hydrogen and hydrogen-based fuels are key elements of a global pathway to Net Zero published by the IEA on 18 May.

Figure 6: New low-emissions industries – including hydrogen – flourish in 2045

(Source: IEA)

The IEA Net Zero by 2050: A Roadmap for the Global Energy Sector warns that climate pledges by governments to date fall short of what is needed to achieve the target. In its pathway, it sets out more than 400 milestones to guide the global journey to Net Zero, it calls for immediate, massive deployment of all available clean and efficient energy technologies alongside a global push to accelerate innovation..

As for hydrogen and hydrogen-based fuels, they will fill gaps where electricity is unable to easily or economically replace fossil fuels, as well as in areas where limited sustainable bioenergy supplies cannot cope with demand.

Initially, hydrogen use will be focused on converting existing uses of fossil fuel energy to low-carbon hydrogen in ways that do not immediately need new transmission or distribution infrastructure. Global hydrogen use will grow from less than 90Mt in 2020 to over 200Mt by 2030, with the proportion of low-carbon hydrogen rising from 10% to 70% in the same timeframe. Hydrogen will also be blended with natural gas in the gas networks, with the global average blend 15% hydrogen in volumetric terms, cutting CO_2 emissions by 6%.

This will lead to a rapid scaling-up of electrolyser manufacturing capacity as new hydrogen transport infrastructure develops in parallel, sparking cost reductions for electrolysers and hydrogen storage. Stored hydrogen will balance seasonal fluctuations in electricity demand and imbalances that arise between hydrogen demand and its supply for off-grid renewable systems. The 2020s will also see large increases in the installation of end-use equipment for hydrogen, leading to over 15mn hydrogen fuel cell vehicles on the road by 2030.

From 2030, low-carbon hydrogen use will expand rapidly in all sectors. In the electricity sector, and hydrogen and hydrogen-based fuels will offer an important low-carbon source of flexibility, through retrofitting existing gas-fired capacity to co-fire with hydrogen and some retrofitting of coal-fired power plants to co-fire with ammonia. While only accounting for around 2% of overall electricity generation in 2050, it will result in very large volumes of hydrogen and ensure the electricity sector is an important driver of hydrogen demand. In transport. Hydrogen could also provide one-third of fuel use in trucks and over 60% of total fuel consumption in shipping.

Of the 530Mt of hydrogen produced in 2050, a quarter (25%) will be produced in industrial facilities. Almost 30% of low-carbon hydrogen used in 2050 will take the form of hydrogen-based fuels, with electrolysers providing an increasing share of hydrogen production (60%). Global hydrogen trade will develop across the pathway, with large volumes exported from gas and renewables-rich areas in the Middle East, Central and South America and Australia to demand centres in Asia and Europe.

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This publication is a compendium of news stories we posted during the prior month focusing on policy, regulatory and market developments in the fast-moving hydrogen space.

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