

The role of hydrogen in Cornwall and the Isles of Scilly: Executive Summary

Opportunities assessment for hydrogen in a green recovery and decarbonised economy



This report was
produced for

Cornwall Council and the Cornwall and
Isles of Scilly Local Energy Partnership

Issue date

15/07/2021

Version

Executive summary

Written by:

Grace Millman and Kerry Hayes, Regen

Approved by:

Ray Arrell, Regen



Regen, Bradninch Court. Exeter, EX4 3PL

T +44 (0)1392 494399 E admin@regen.co.uk www.regen.co.uk

Registered in England No: 04554636

All rights reserved. No part of this document may be reproduced
or published in any way (including online) without the prior
permission of Regen

Executive Summary

Regen was commissioned by Cornwall Council and the Cornwall and Isles of Scilly LEP to conduct a short opportunity study, identifying the potential for hydrogen as a low carbon fuel and as a driver for innovation and economic growth in the Cornwall and Isles of Scilly area, focusing on the period to 2030.

The opportunity assessment summarised the current UK hydrogen policy landscape, outlined current and pipeline hydrogen activity in Cornwall and the Isles of Scilly, and identified several sector-specific and general opportunities for hydrogen development in the region. As part of the assessment, Regen engaged several key Cornish organisations and stakeholders to gauge the scale of opportunity for hydrogen in the region generally and for specific sectors.

UK hydrogen policy and the hydrogen value chain

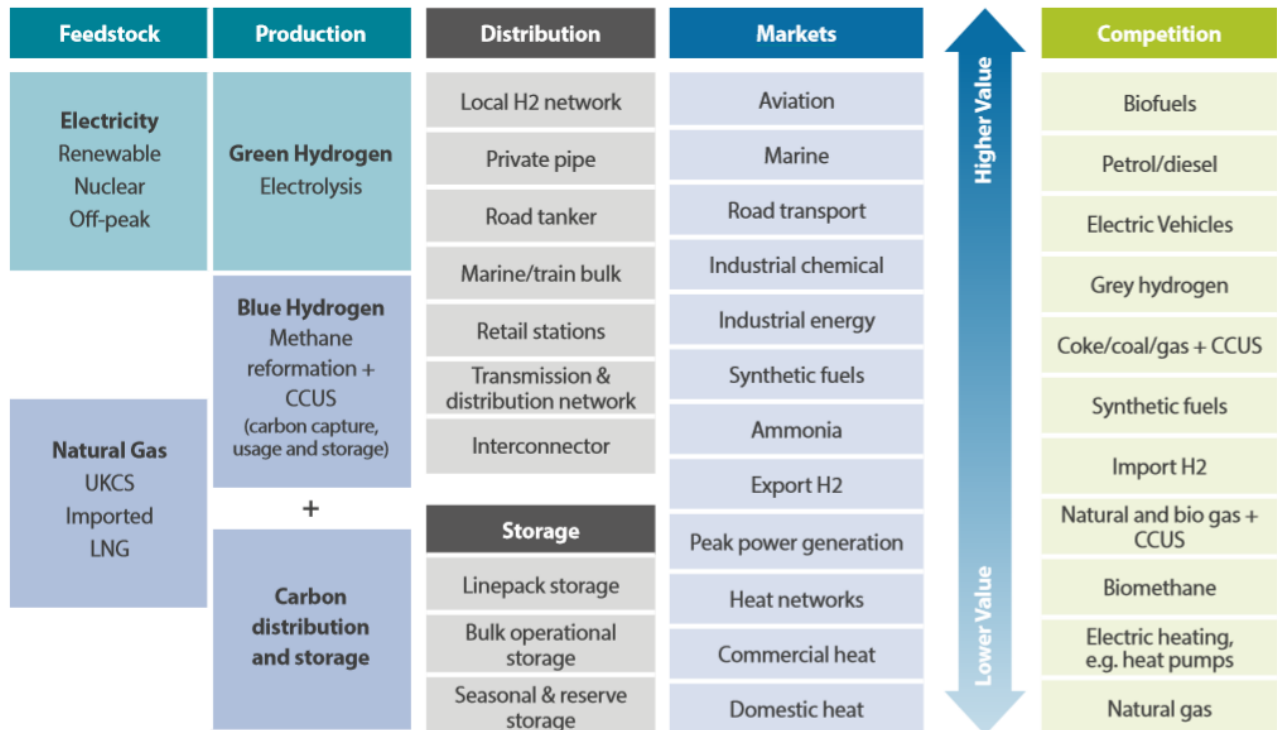
Hydrogen is not a new fuel and has been used for some time within chemical processes and as a feedstock for ammonia. However, the production and wider use of low carbon hydrogen is still a nascent technology sector, which is beginning to gain momentum because of its potential as a new energy source for areas of industry and transportation which could otherwise be difficult to decarbonise. At present, most low carbon hydrogen activity is driven by research and innovation funding, including a few trial projects based around areas of likely demand and production.

Although low carbon hydrogen production is still very small scale, the UK government has set a target of 5 GW of low-carbon hydrogen capacity and an associated volume production target of 42 TWh by 2030. In order to meet these targets, strategies to produce hydrogen both through the reformation of natural gas combined with carbon capture and storage ('**blue hydrogen**') and via electrolysis powered by renewable energy ('**green hydrogen**') are being pursued by government. As well as UK support, the development of hydrogen energy technology is gaining traction internationally with significant investment in Europe and the USA, and most significantly in Japan, South Korea, and China. Some of the key decisions that will impact the use of hydrogen in Cornwall, such as its use in transportation, aviation, and marine industries will be determined by other actors in the global market, including vehicle and equipment manufacturers.

Low carbon hydrogen has a multifaceted value chain, with multiple means of production, different storage and distribution channels and a very wide range of potential end use markets both for hydrogen, and for fuels that can be derived from hydrogen. The emerging low carbon hydrogen sector can be considered as a set of related but distinct markets and supply chains. There is not yet a single integrated market for hydrogen in the way there is for natural gas and electricity. Distinct markets and value propositions exist for hydrogen products, ranging from existing uses, new high-value applications in transport and industrial processes, and potentially lower-value applications such as a fuel for heating or to generate electricity. Implementing hydrogen into the UK energy system will require aligned strategies, policies, and new markets for the production, storage, transportation, and sale to end consumer sectors.

While there is a broad consensus that low carbon hydrogen has a significant role to play to enable the UK to meet its net zero targets, the scope and extent of hydrogen use is still a subject of uncertainty and debate, and there are several potential hydrogen futures.

The hydrogen value chain



In all scenarios, it is expected that a significant amount of decarbonisation in the UK will come through the electrification of as many parts of our energy system as is viable and practical. This includes electric vehicles replacing internal combustion engine vehicles, and electrically driven heat pumps replacing natural gas boilers in homes and businesses. However, it is widely accepted that not all parts of the UK's economy can be easily electrified. In industries heavily reliant on high grade thermal energy (e.g., the manufacture of steel and cement), or fuel for heavy transport and aviation, electrification is not as readily applicable. This is due to the high temperatures needed in some industries and the challenges of power-to-weight and energy density of batteries in heavier vehicles. Low carbon hydrogen is recognised as a viable alternative to fossil fuels in some of these sectors. Hydrogen may also have a role to play in system balancing, using very low-cost electricity during times of over-supply to convert, store and transport renewable energy across the energy system.

In the near term to 2030, the focus of the UK government's industrial policy is the development of large industrial clusters combining hydrogen demand customers and large-scale production. These are likely to be based around existing chemical, refining, and heavy industry clusters in the North East (Teesside), North West (Runcorn), Scotland (Grangemouth and Firth of Fife) and South Wales (Milford Haven and Swansea/Port Talbot). Cornwall does not have the scale of industry, and particularly chemical processes, to be considered in the first tranche of hydrogen industrial clusters. The question which this study addresses is the extent to which Cornwall and the Isles of Scilly can target hydrogen opportunities, and take advantage of innovation investment, in areas

where Cornwall has a particular advantage and interest. These areas include, for example, the maritime industries, specialist vehicles and, because of the Aerohub and Space port, possibly the trial of hydrogen-based aviation fuels.

Existing hydrogen activity in Cornwall and the Isles of Scilly

Research carried out for this report found no operational hydrogen production sites in Cornwall and the Isles of Scilly. Cornwall, and the south west generally, are not focus areas for hydrogen trial projects and there is no active hydrogen industry group; but there is activity linked to hydrogen research and development across the region. This includes:

- **Aerospace Cornwall**, who are supporting the development of commercial green hydrogen by awarding grant funding to companies developing future of energy projects.
- **TFP Hydrogen Products**, who specialise in next generation hydrogen technologies. They were awarded match funding of £72,602 from Aerospace Cornwall in 2020 to develop coatings for Polymer Electrolyte Membrane (PEM) water electrolyzers. This technology could enable a reduction in hydrogen production costs, by increasing both energy efficiency and the design life of the electrolyser. TFP Hydrogen Products is branching out into green hydrogen with the demands of the aerospace sector in mind.
- **Camborne School of Mines**, who are researching decarbonisation options for mining vehicles.
- **University of Exeter**, which has a campus in Penryn and is currently conducting research into the production of green hydrogen in its renewable energy department.
- **Soguard Hydrogen Producers Ltd**, a Cornish company that specialised in hydrogen technology, production, and installation equipment. (Note: This registered company was dissolved in March 2021).
- **Marine-i**, a research programme designed to enable innovation in the marine technology sector in Cornwall and the Isles of Scilly. It is part funded by the European Regional Development Fund, and involves partners from the University of Exeter, University of Plymouth, Offshore Renewable Energy Catapult, Cornwall College Group, Cornwall Marine Network, and Cornwall Development Company. Although covering all aspects of marine innovation, the project has recognised the opportunity in hydrogen, with green hydrogen being earmarked as “a major theme running through many of Marine-i’s activities in the near future”.
- **Smart Islands**, a project on the Isles of Scilly to tackle the challenges of sustaining a remote island community by moving towards a low carbon economy. As part of this, Waves4Power and Marine-i will conduct a year-long research programme to identify the potential for wave, tidal, floating wind, and hydrogen technologies around the Isles of Scilly. This will result in the creation of a new databank, which will underpin key decisions about marine renewable energy development on the islands.
- **Cornwall Marine Hydrogen Centre**, a new research and development facility in Falmouth. The 18-month project funded by the European Development Fund will explore the optimum setup for the storage and conversion of hydrogen into electricity, in the context of marine vessels.
- **Plymouth hydrogen technology summit**, which is proposed to take place in 2021, with a view to producing a feasibility report in December 2021.

- **Undercover zero**, a research and development centre based in Camborne, aiming to drastically reduce the water, heat, and energy demand for industrial processes by developing innovative carbon free technologies, systems, and processes. One of their proposed projects is “Undercover Laundry”, a laundry and linen hire service. The project is looking to establish a pilot laundry in Tolvaddon, Camborne that produces and uses green hydrogen onsite.

Opportunities for hydrogen in Cornwall and the Isles of Scilly

Opportunities for hydrogen in Cornwall and the Isles of Scilly were identified by considering the region’s unique geography, resources, strategic and decarbonisation priorities, existing hydrogen and non-hydrogen activity, and via engagement with a range of key and regional stakeholders.

The focus of the research was the period to 2030, and opportunities identified are therefore relatively near term. These opportunities are also focused on innovation, trials of new technology and the development of a strategy that will enable Cornwall and the Isles of Scilly to take advantage of future hydrogen opportunities.

Hydrogen production

Cornwall does not have the attributes for large scale blue hydrogen production, existing chemical and refining, access to natural gas landings, locations for large scale hydrogen and CO₂ storage and large-scale hydrogen demand for industry.

The strong renewable energy resources in Cornwall, including onshore wind, solar, and future offshore wind developments, are suited to the production of smaller and medium scale green hydrogen, to take advantage of low cost (and potentially constrained) renewable electricity. This aligns with Cornwall Council and the Council of the Isles of Scilly’s ambitions to be carbon neutral by 2030. Green hydrogen tends to be more suited to decentralised, small-scale hydrogen production, for example within an industrial cluster or at a hydrogen refuelling station, which would reduce the need for significant transportation and storage. Before 2030, it is likely that new hydrogen production facilities will be located close to demand, within industrial and chemical processing clusters and transport hubs, with relatively short or onsite distribution channels. Over time, larger green hydrogen production facilities may be more cost effective due to economies of scale. These can be achieved as hydrogen electrolyzers are modular and can be scaled up. There is also potential to import hydrogen or ammonia into Cornwall, via shipping into Cornish ports.

However, hydrogen electrolysis requires high quality water as an input, with approximately 9 litres of water needed to produce 1 kg of green hydrogen. The risk of water resource issues in the south west as a result of hydrogen production is currently low, but this could increase in the future and be compounded by the effects of climate change and so should be considered when deciding on the location and deployment of electrolyzers. Further engagement with South West Water would be recommended.

Hydrogen transportation, imports, and storage

This study has not undertaken an in-depth review of hydrogen storage options in Cornwall, however, there does not appear to be an obvious large scale natural storage solution such as salt caverns used to store natural gas. It would however be worth asking the Camborne School of

Mines to confirm this view. Assuming the initial focus of hydrogen use in industry, maritime, and some heavy transport, the requirements for storage will be logistical, with suitable storage likely to be located on-site or near sources of energy demand. Existing fuel bunkering sites at Falmouth could be considered, as well as the existing fuel terminal at Plymouth. This could include importing hydrogen or ammonia potentially via road and ship tanker, from hydrogen production facilities elsewhere in the UK. The safe handling of hydrogen and ammonia needs to be considered, especially in the context of marine industries at Falmouth and other Cornish ports.

Sector-specific hydrogen opportunities

The opportunities for hydrogen in Cornwall and the Isles of Scilly by 2030 are shown below:

Opportunities for hydrogen in Cornwall and the Isles of Scilly by 2030



There are significant opportunities for hydrogen activity in the region by 2030



Maritime and marine



Specialist vehicles



There are some opportunities for hydrogen activity in the region by 2030



Industrial processes



Transport



There are limited opportunities for hydrogen activity in the region by 2030



Heat



Agriculture



Power



There are opportunities for low carbon hydrogen in Cornwall and the Isles of Scilly by 2030, but they are focused on specific applications that are difficult to decarbonise through more conventional methods, such as decarbonising some maritime vessels and heavy vehicles. Many of these opportunities may not be realised until the latter part of this decade or beyond, due to the low carbon hydrogen sector still emerging. Drivers such as central government strategy, future market regulation, project developer appetite and hydrogen technology development will all need progress before any significant uptake is seen. Hydrogen is also set to be a relatively expensive fuel, and this could be a big hurdle for many sectors before they are willing/able to switch.

Government support, combined with locational demand, will be required to bring down the price of green hydrogen and incentivise fuel switching in carbon intensive industries.

Overall, further engagement with key sector stakeholders and electrolyser developers would enable Cornwall Council and the Isles of Scilly LEP to better understand the scale and location of the potential future demand for hydrogen in Cornwall. This could be achieved by Cornwall Council setting up a **Cornwall hydrogen working group**, as has been seen in South Wales. This structured engagement could then be complemented by a spatial analysis of the electricity and gas networks, to identify potential strategic locations for electrolysers in Cornwall and the Isles of Scilly. Cornwall Council should also engage with BEIS' upcoming hydrogen strategy and wider government departmental strategies related to hydrogen, as there may be the potential to influence policies to ensure that Cornwall and the Isles of Scilly are appropriately represented.

In addition to these considerations, some conclusions and recommendations for specific sectors can be summarised below:

Marine and maritime

Hydrogen and ammonia have been identified as potential low carbon fuels for marine vessels. There is a significant amount of research and development activity investigating vessel fuel and propulsion systems, which could in turn lead to a radical change in maritime energy demand. There are therefore opportunities for hydrogen to decarbonise some maritime transport in Cornwall and the Isles of Scilly by 2030, however this is likely to be dependent on regulation. The government's Maritime 2050 strategy aims to have zero emission ships commonplace globally by 2050, with all new vessels operating in UK water by 2025 to be designed with zero emission propulsion capability. The plan envisages that, by 2035, low or zero emission fuel bunkering options are readily available across the UK. For Cornwall, a prime opportunity may be to develop a cluster of hydrogen activities around Falmouth port and linking these to Plymouth and other ports within the south coast marine hub. These opportunities include ship fuel and propulsion research and development through the new Cornwall Marine Hydrogen Centre, ship conversion and re-fitting at Pendennis Shipyard and A&P's docks, and the supply of hydrogen (or ammonia) as a low carbon bunker fuel. Collaboration with Falmouth port to carry out a feasibility assessment for hydrogen could be undertaken to explore the opportunities further. This could include practical considerations, such as a safety assessment, as well as an economic study of the opportunity of hydrogen for Falmouth. The introduction of hydrogen into Cornwall's maritime sector is likely to create new jobs and increase economic activity in the area by 2030.

There is also an opportunity for ports around Cornwall and the Isles of Scilly to decarbonise their smaller vessels, ferries, and fishing fleets using hydrogen. International shipping is charged with a 40% reduction by 2030, but there is also a need for change in smaller fishing vessels, ferries, and pleasure boats. Working with the Marine-i programme and the Cornwall Marine Network, Cornwall Council could engage with the ports to identify the best decarbonisation route for any new vessels. Cornwall Council could also encourage and support proposals for the Clean Maritime Demonstration Competition fund.

Collaboration with the University of Plymouth and the University of Exeter, as well as other marine industry groups in Plymouth, Portland, and Portsmouth/Southampton will be important to share

knowledge and seek investment. Exploring the strategic opportunities for hydrogen in the Cornwall marine and maritime sector could be achieved through a hydrogen working group.

Specialist vehicles

For hydrogen as a fuel for road transport in the Cornwall and the Isles of Scilly, there is the potential for a focus on decarbonising specialist vehicles such as quarry vehicles, dump trucks, road gritters, and forklifts. Firstly, by continuing to work with Corserv and Bennamann, Cornwall Council can understand the potential of biomethane resources for their vehicles and to consider the integration of a hydrogen electrolyser into Corserv's depots.

In addition to this, with renewed mining activity, the launch of two new lithium extraction companies, the existing china clay industry in Cornwall and the number of associated specialist vehicles in Cornwall and the Isles of Scilly, the decarbonisation of heavy vehicles is a significant challenge for a number of industry organisations. With the Treasury's plans to remove the current subsidy on red diesel for many applications could cost the quarrying and mining industries significantly, which would increase the incentive to switch to alternative fuels such as hydrogen. This will be dependent on the rate at which hydrogen-powered mining vehicles are made available by manufacturers, though these are already being developed. Cornwall Council should look to engage with key stakeholders in the geo-resource sector, including china clay and lithium production, and electrolyser developers to understand the options for a hydrogen cluster in the St Austell area.

Industrial processes

There is an opportunity for the active china clay, aggregate, and laundry industries in Cornwall to decarbonise some of their high temperature processes using hydrogen, but this is likely to depend on the level of industry reform by 2030. There are limited opportunities for hydrogen in other Cornish industrial processes due to the existing electrification options for low-grade heat.

From undertaking regional future energy scenario analysis for Wales and West Utilities in 2019, Regen assessed the major natural gas consumers within the south west region, including an assessment of larger 'daily-metered' industrial-scale consumers such as china clay drying, aggregate/asphalt extraction, laundry, textile manufacturing, and packaging. The largest natural gas consuming sector in Cornwall is the china clay industry, accounting for c. 78% daily metered consumption in Cornwall in 2018. (Note domestic, commercial, and smaller industrial users that are non-daily metered were not part of this analysis). The introduction of hydrogen into the china clay drying, aggregate extraction, and laundry industries could have significant decarbonisation potential, though with other potential low carbon solutions on the table, the role and scale of hydrogen for industrial processes in Cornwall is unclear. Cornwall Council could seek to engage existing high gas/thermal energy demand customers, electrolyser developers, and local renewable generators to explore the possibility of a hydrogen cluster in St Austell. This could be a topic explored in more detail through the formation of a hydrogen working group.

Transport – road vehicles

Hydrogen could potentially be a fuel for multiple types of road vehicles in the future. However, a nationwide rollout of personal electric cars is likely to limit the opportunity for hydrogen cars.

Hydrogen is often considered as a low carbon fuel for buses and vehicle fleets; however, Cornwall Council have an existing strategy focused on electrification and biogas which they plan to use to decarbonise their vehicles by 2030.

Transport – rail

There may be an opportunity for Cornwall to convert its rural train lines to hydrogen, but further engagement with Network Rail's decarbonisation plans would be recommended, to understand how and where hydrogen could feature (or not) in the region.

Aviation

There are significant research and development opportunities within the aviation sector, focusing on improving and decarbonising aircraft. Hydrogen, or more likely synthetic fuels manufactured using a hydrogen feedstock, could provide the aviation sector with at least part of its low carbon energy solution.

There is therefore an opportunity to further collaborate with Aerohub, Spaceport and Newquay airport to explore the feasibility of introducing hydrogen-based fuels into the aviation sector, potentially looking at the short flight between the Cornwall mainland and the Isles of Scilly.

Heat for domestic and commercial buildings

At a national level it is uncertain whether hydrogen will become a widespread fuel for use in domestic and commercial heating. A key issue remains the cost of hydrogen compared to natural gas, and to other low carbon heating solutions. If hydrogen is used as a general heating fuel it is likely to be introduced in regional clusters near areas of large-scale hydrogen production and storage, for example in the north east of England and south Wales.

Wales and West Utilities plan for the infrastructure in Cornwall to be "hydrogen-ready" by 2035¹, with a consistent hydrogen supply into the south west being delivered by 2040. Due to large areas of Cornwall being off-gas and a lack of significant thermal industrial clusters, Cornwall is unlikely to be a priority region for hydrogen network innovation trials or significant hydrogen production centres. The long-term solution for low carbon heating is uncertain, and the UK will need to make a number of strategic decisions about whether to convert the whole or, more likely, parts of the gas network to hydrogen and/or biomethane. Cornwall Council should engage with Wales and West Utilities' Regional Decarbonisation Pathways consultation and Western Power Distribution's electrification plans and future scenarios for hybrid and non-hybrid heat pump deployment.

In the meantime, Cornwall should pursue an energy efficiency and electrification decarbonisation strategy, especially targeting new buildings, off-gas grid areas and properties that can be converted to air and ground source heat pumps. There may also be opportunities to use locally produced biomethane and deep geothermal heat networks. Cornwall Council have already made a commitment to no longer provide natural gas as a source of energy in new build homes, and

¹ See reference from WWU about aims for net zero ready networks by 2035:

<https://www.wwestutilities.co.uk/news-and-events/wales-west-utilities-breaks-ground-at-new-redruth-depot/>

instead are supporting the use of greener alternatives. They could also ensure that all council owned housing developments align with the Future Homes Standard.

Agriculture

Hydrogen could be used as a fuel in farm machinery, with several agricultural machinery manufacturers already developing hydrogen, dual fuel, and synthetic fuel vehicles. A focus within Cornwall has been the trial of biomethane in a number of Cornwall Council's dairy farms, which has the advantage of potentially being produced on-site using slurry and farm waste feedstocks. Cornwall Council, working with Corserv and Bennamann, could use the outcomes of these trials to better understand the scale of opportunity for biomethane in agricultural vehicles and identify if there are any gaps where hydrogen could be needed.

There are opportunities to trial hydrogen-based fuels in farm vehicles across Cornwall, with farms not owned by the Council potentially being interested in using hydrogen to decarbonise their equipment. With plenty of viable space, farmers may be able to produce hydrogen on-site, using electricity to power equipment and infrastructure. Surplus energy could be sold to the grid, allowing farmers to gain passive income from hydrogen production.

The potential for ammonia to be used as a fertilizer is also a potential opportunity that should be explored further with the agricultural sector in Cornwall.

Power

Nationally, hydrogen has the potential to be used as a fuel for peaking power generation, for use at times of high electricity demand or imbalance. The extent to which hydrogen peaking plants will be deployed will depend on a number of factors including the cost of hydrogen, the price volatility of electricity and competition from alternative flexibility technologies, such as electricity storage and demand side response. Hydrogen fuelled peaking generation is likely to be located near large scale hydrogen storage and existing gas fuelled generation. This makes hydrogen peaking plant development in Cornwall fairly unlikely.

For companies that currently make use of fossil fuel fired generation for back-up supply or onsite generation (e.g., natural gas CHPs or diesel), hydrogen is one possible alternative future fuel. Discussions with small-scale generator operators did not suggest any near-term appetite for hydrogen-based fuels for these types of assets. Hydrogen generator technology availability, the location of future hydrogen production and cost-benefit comparisons with alternative options, will collectively influence the uptake of small-scale hydrogen generation in Cornwall.

There are however opportunities in Cornwall to operate hydrogen electrolyzers as flexibility assets to reduce electricity network constraints. Cornwall Council should therefore continue to engage with renewable asset owners, both the gas and electricity networks and developers to assess the opportunity for hydrogen electrolyzers.

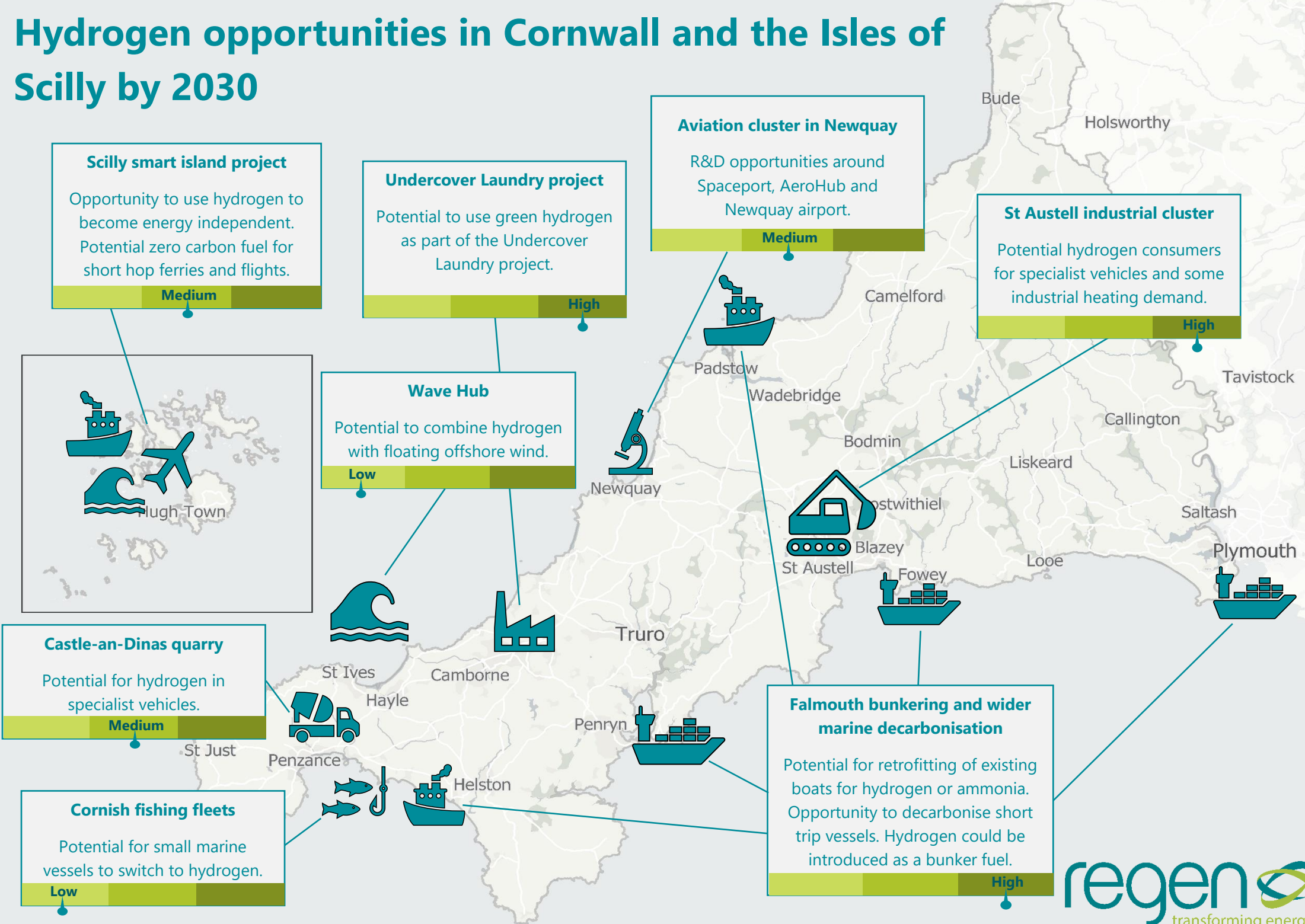
Sector-specific summary table

Sector		Conclusions	Rating	Recommendations
Marine and maritime		There is a cluster of hydrogen opportunities around Falmouth port, including research and development, ship conversion, and for hydrogen (or ammonia) as a low carbon bunker fuel.	High	Collaboration with Falmouth port to carry out a feasibility assessment for hydrogen could be undertaken to explore the opportunities further. This could include practical considerations, such as a safety assessment, as well as an economic study of the opportunity of hydrogen for Falmouth.
		There is an opportunity for ports around Cornwall and the Isles of Scilly to decarbonise their small vessels using hydrogen. This will be dependent on maritime regulation.	Medium	Work with Cornish ports to identify the best decarbonisation route for any new vessels, potentially through forming a hydrogen working group, to explore the role of hydrogen in maritime decarbonisation.
				Encourage/support proposals for the Clean Maritime Demonstration Competition.
Transport		There is a research and development opportunity for Cornwall and the Isles of Scilly, with the presence of the University of Exeter, Wave Hub, and links with the University of Plymouth.	High	Continue research into ammonia and hydrogen as zero carbon bunker fuels and engage with the new Cornwall Marine Hydrogen Centre.
				Coordinate with Plymouth to share knowledge and support introduction of hydrogen into the marine industry.
Transport	Road transport	There is limited demand for hydrogen in small road vehicles, due to existing electrification and biomethane plans.	Low	Continue to pursue electrification of small road vehicles in Cornwall. Continue to work with Corserv and Bennamann to understand the potential of biomethane resources for buses and council vehicles.
	Rail	There is an opportunity for Cornwall to convert its rural train lines to hydrogen, however this will depend on national rail decarbonisation plans.	Low	Further engagement with Network Rail decarbonisation plans to understand how and where hydrogen could feature.

	Aviation	There is an opportunity to decarbonise 'short hop' flights using hydrogen, however this is dependent on technology, regulation, and private investment.	Medium	Explore the feasibility of introducing hydrogen into short flights between the Isles of Scilly and Cornwall.
		There is a research and development opportunity within the aviation sector in Cornwall and the Isles of Scilly.	Medium	Engage with Aerohub, Spaceport, Virgin, Newquay airport and other stakeholders about the possibility for a hydrogen research/ demonstration project.
	Specialist vehicles	There is a cluster of opportunities around St Austell with potential specialist vehicle fuelling demand from industrial companies, including Imerys, British Lithium, and Cornish Lithium.	High	Cornwall Council to engage with demand customers, electrolyser developers, and local renewable generators to explore the options for a hydrogen cluster in St Austell.
				Consider as a discussion topic as part of forming a Cornwall hydrogen working group.
		Decarbonisation of specialist vehicles is a challenge for many businesses in Cornwall. Hydrogen could be used as an alternative fuel, although this is dependent on the role of biomethane in these applications in Cornwall.	Medium	Continue to work with Corserv and Bennamann to understand the potential of biomethane resources for specialist transport.
				Individual industries to consult with specialist vehicle manufacturers.
		Consider the integration of a hydrogen electrolyser into Corserv's depots.		
Industrial processes	There is an opportunity for the active china clay, aggregate, and laundry industries in Cornwall to decarbonise some of their high temperature processes using hydrogen, but this is likely to depend on the level of industry reform by 2030.	Medium	Cornwall Council could engage existing high gas/thermal energy demand customers, electrolyser developers and local renewable generators to explore the possibility of a hydrogen cluster in St Austell.	
			Consider industrial processes as a discussion topic as part of forming a hydrogen working group.	

		British Lithium and Cornish Lithium both plan to be carbon neutral upon operation, using innovative technologies to switch to low carbon electricity in their industrial processes.	Low	Support lithium companies in Cornwall to achieve net zero emissions upon operation.
Power	Power generation	Hydrogen is unlikely to be a fuel for power generation in Cornwall by 2030.	Low	Explore decarbonisation options for gas CHPs and backup generation.
	Power demand	In principle, there is an opportunity to alleviate some electricity network constraints by producing hydrogen from curtailed renewable energy, however the business model is challenging, and the end demand for the produced hydrogen is unclear.	Medium	Continue to engage with renewable asset owners, both the gas and electricity networks and developers to assess the opportunity for hydrogen electrolyzers.
Heat		With significant regions of Cornwall being off-gas and no strategic industrial clusters, it is unlikely that hydrogen will become a general heating fuel in Cornwall, though it could have some specific heating applications.	Low	Engage with Wales and West Utilities' Regional Decarbonisation Pathways work and Western Power Distribution's electrification plans.
				Engage further with WPD and Regen regarding future scenarios (DFES 2021) for hybrid and non-hybrid heat pump deployment.
				Ensure Cornwall Council's social housing developments align with the Future Homes Standard.
Agriculture		Hydrogen could be used as a fuel in farm machinery, but the current focus in Cornwall Council's dairy farms is to trial the use of biomethane. Non-council farms could look to hydrogen to decarbonise their machinery.	Low - Medium	Working with Corserv and Bennamann, use the outcomes of the trials to better understand the scale of opportunity for biomethane in agricultural vehicles and identify if there are any gaps where hydrogen could be needed. The potential for ammonia to be used as a fertilizer could be explored further with the agricultural sector in Cornwall.

Hydrogen opportunities in Cornwall and the Isles of Scilly by 2030



References

Committee on Climate Change, [Hydrogen in a low-carbon economy](#), 2018

Johnny Gowdy, Regen, [Building the hydrogen value chain](#), 2021

HM Government, [UK Energy White Paper](#), December 2020

TFP hydrogen projects, [website](#)

Waves4Power, [The Isles of Scilly](#), 2017

Cornwall Marine Hydrogen Centre, [website](#)

Marine-i, [website](#)

K&L Gates LLP, [Water resource considerations for the hydrogen economy](#), 2020


D.J. Evans and S. Holloway, [A review of onshore UK salt deposits and their potential for underground gas storage](#), 2009

GOV.UK, [Maritime 2050: navigating the future](#), 2019

Cornwall Council, [Climate Change Plan: creating the conditions for change through direct action and a new form of place-based leadership for Cornwall to become net carbon neutral](#), July 2019

Network Rail, [Traction decarbonisation network strategy](#), 2020

UK:100, [Cornwall biomethane pilot](#), March 2020

This report was produced for	Cornwall Council and the Cornwall and Isles of Scilly Local Energy Partnership
Issue date	15/07/2021
Version	Executive summary
Written by:	Grace Millman and Kerry Hayes, Regen
Approved by:	Ray Arrell, Regen 
<p>Regen, Bradninch Court. Exeter, EX4 3PL +44 (0)1392 494399 admin@regen.co.uk regen.co.uk Registered in England No: 04554636</p>	<p>All rights reserved. No part of this document may be reproduced or published in any way (including online) without the prior permission of Regen.</p>