HYDROGEN SOUTH WEST

2023 PROSPECTUS

The South-West: Accelerating the Change Through Hydrogen Innovation and R&D

HYDROGEN SOUTH WEST

Foreword from the Chair

The South West has unique strengths that position it to take advantage of the development of hydrogen and the shift to net zero. These can propel our region to create thousands of green jobs, boost productivity, support UK net zero targets, and drive exports.

We host the world's leading aerospace cluster outside of the United States and the UK's most productive tech cluster. A home for advanced engineering, the region is set to host the country's first gigafactory. A nexus already exists of global companies, SME supply chains, research & innovation centres, and world-leading universities.

Hydrogen South West was formed by companies in the region to build on these strengths and create a hydrogen ecosystem. Our partnerships will overcome the challenges of decarbonisation and unlock investment to create sustainable economic growth.

Our membership is expanding rapidly, with scores of companies of all sizes, organisations, and education establishments joining our original founding businesses.

By working together, we will Accelerate the Change.

Simon Earles
Chair, Hydrogen South West

Who we are

Our Board

Bristol Airport · The Bristol Port Company · Airbus · Wessex Water · GKN · Wales & West Utilities · hynamics · Costain · easyJet · WSP · National Composites Centre

Supporting Organisations

GWA · BusinessWest · EY · Western Gateway / Porth y Gorllewin · Great South West

Supported by a network of members from across the South West.

This combination of industrial experience, delivery expertise and regional knowledge presents a formidable opportunity to accelerate the UK's transition to alternative power at scale.

Working together, this diverse group of companies make up Hydrogen South West. They present an opportunity to accelerate decarbonisation through the transition to a hydrogen fuelled economy beyond heavy industrial clusters.

Shared ambition

Hydrogen South West will capitalise on our region's innovation and R&D base, and our globally significant sectors such as aerospace and nuclear to accelerate the change.

Our partnerships are developing and deploying new technology in export-focussed and high-value sectors, and generating investment opportunities. We will provide solutions for hard-to-decarbonise sectors, accelerating the UK's transition to net zero 2050. Together our companies and organisations can deliver for the South West, for the UK, and shape global markets.

Together, we are:

- Creating partnerships between sectors and developing a hydrogen supply chain. Together we aim to deliver distributed hydrogen production, storage, and transportation systems at scale. Making the most of the unique hydrogen innovation and R&D in the region.
- Creating investment opportunities by creating scalable projects beyond heavy industrial clusters.
- Positioning the South West as a Centre for Excellence for skills, innovation and research, creating a thriving 'living lab' environment for long-term R&D to solve key hydrogen challenges.
- Raising the profile of hydrogen innovation and opportunities across the South West, creating an environment where businesses can develop innovative decarbonisation projects.

The hydrogen opportunity

The UK has advanced plans to create hydrogen ecosystems in areas with traditional heavy industry, where carbon capture can be combined with hydrogen use to decarbonise major emissions.

This forms a critical part of the UK's move to net zero emissions, but the opportunity for hydrogen goes beyond heavy industry.

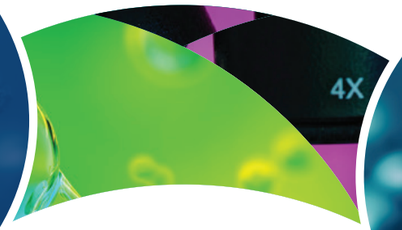
The South West's economy is well placed to utilise hydrogen, unlocking investment, and creating high-skilled green jobs. A foundation of global companies, national research & innovation centres, established supply chains of hundred of firms, and specialisms such as aerospace and nuclear, are ready to be built upon.

Our region can both support the UK's transition to net zero by 2050 and drive green economic growth.

"...supporting areas such as the South West, where leading organisations have formed a hydrogen consortium to create an infrastructure ecosystem to bring the benefits of hydrogen and drive growth and jobs in the region."

Rt Hon Chris Skidmore MP, Net Zero Review

Home to 14 of the 15 most significant aerospace companies in the world.



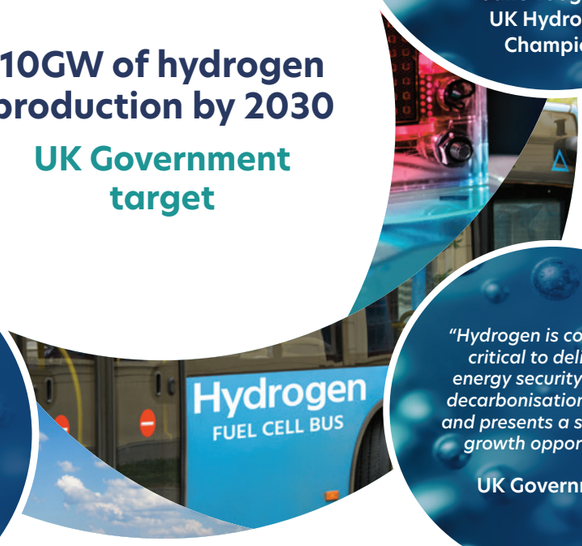
"The South-West Cluster... has an outstanding hydrogen opportunity centred around aviation innovation."

Jane Toogood, UK Hydrogen Champion

10GW of hydrogen production by 2030

UK Government target

The UK Government has recognised the South West of England as a High Potential Opportunity (HPO) for the development, demonstration, and adoption of new and emerging aviation technologies. The introduction of hydrogen powered aircraft is a unique opportunity for the South West, with the potential to deliver £20bn in regional GVA and 15,000 jobs.[1]



"Hydrogen is considered critical to delivering energy security and our decarbonisation targets, and presents a significant growth opportunity."

UK Government

The South West's hosts the UK's most productive tech sector.

[1] Hydrogen South West Impact Report, Ananda Nidhi L, University of Exeter , (October 2022)

HYDROGEN SOUTH WEST

Make it, move it, use it

Our broad partnership of businesses and organisations has the capability to make significant capital investment, working to the joint aim of creating an ecosystem of generation, transportation, and end-use of hydrogen.

Our founding members include leading brands easyJet, Airbus and EDF's Hynamics; industrial heavyweights GKN Aerospace; consultants and engineers Costain and WSP; and regional leaders Bristol Port, Bristol Airport, Wales and West Utilities, and YTL Wessex Water.

They are supported by a network of other companies, SMEs, and start-ups. This combination of industrial experience, delivery expertise and regional knowledge presents a formidable opportunity to accelerate the UK's transition to alternative power at scale.

By decarbonising transport, commerce and power, we can secure the future of key industries, drive sustainable growth and upskill the region.

Innovation nexus

ZEROe

Airbus: Liquid Hydrogen Powered ZEROe passenger aircraft

Airbus's UK engineering and test teams at the ZeroE Development Centre (ZEDC) in Bristol are currently researching and developing Hydrogen aircraft fuel systems, which is required for the entry into service of its ZEROe hydrogen-powered aircraft by 2035.

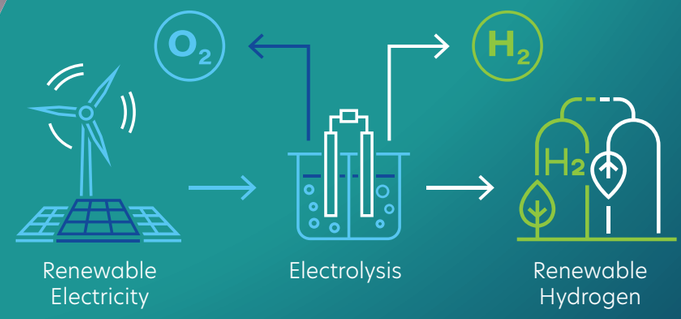
The team in Filton are also developing new wing, landing gear and manufacturing technologies to meet the aircraft's performance aims and industrial ramp up.

Carlton Power - green hydrogen generation

Carlton Power, one of the UK's most experienced energy infrastructure development companies has secured the UK Government's support to build a green hydrogen hub on land within the Langage Energy Park, Plymouth.

Carlton's 10MW hydrogen hub project at Langage is the first of its kind in the South West and will form part of the Plymouth & South Devon Freeport which secured UK Government backing in December 2022.

Langage will provide local companies - for example energy intensive industries or those with transport fleets - with easy access to hydrogen fuel. In addition, the hydrogen hub will support the further growth of renewable electricity generation in the South West (and newer forms like marine energy) by utilising it to produce and store hydrogen at times when renewable output is high, but electricity demand is low.



Hydrogen storage tank

National Composites Centre: UK Engineers at the NCC, alongside UK SME partners B&M Longworth Ltd and Cynget Texkimp, are developing disruptive technologies that enable sustainable hydrogen storage solutions by successfully reclaiming continuous carbon fibres from a whole pressure vessel and re-using them to manufacture a new pressure vessel.

Demand for carbon fibre is expected to grow five-fold between 2025 and 2030, exceeding global manufacturing capacity. Creating viable, low-cost recovery processes, that retain the inherent strength of continuous carbon fibres for recycling, is therefore key to the development of the hydrogen economy.

HyDUS Long-term storage solution

Hynamics (EDF Group), UKAEA, Urenco, University of Bristol

The University of Bristol in collaboration with EDF, UKAEA and Urenco have been awarded £7.7m to develop innovative technology to store hydrogen for long durations using a depleted uranium 'bed' (Hydrogen in Depleted Uranium Storage - HyDUS). This hydrogen storage approach is aimed at longer-term energy storage and will enable improvements in energy storage density.

H2GEAR

GKN Aerospace, Institution for Advanced Automotive Propulsion Systems (IAAPS)

GKN Aerospace is leading a ground-breaking collaboration programme, called H2GEAR, to develop hydrogen-powered aircraft. The project, which includes IIAPS, Bristol Airport and easyJet, is a pioneering collaboration initiative with theaim to develop a liquid hydrogen propulsion system for sub-regional aircraft that could be scaled up to larger aircraft.

The H2GEAR team is undertaking details design and then testing of cryogenic electric motor and fuel cells, which will culminate in ground-testing of a full system-level propulsion system.

Appledore Clean Maritime Innovation Centre

Tower Group, University of Plymouth, Centre for Future Clean Mobility at the University of Exeter

The North Devon facility will become a centre of excellence for clean-propulsion shipbuilding and Floating Offshore Wind (FLOW) innovation. The development will establish the area as a global-leading research and development destination for innovation in clean maritime technology and support industries.

The Cornwall-based Tower Group is leading a consortium to deliver the UK's first green hydrogen marine ecosystem around Appledore Docks. Tower Group is one of many SMEs that have joined Hydrogen South West, working with large companies to form a new supply chain.

ZeroAvia

Based at Cotswold Airport, ZeroAvia is producing the world's first practical zero emission aviation powertrain, initially targeting 20-seat airplanes to start replacing jet fuel. The company has ambitions to develop powertrains for 100-200 seat aircraft by 2029.

In January 2023, their test 19-seat Dornier 228 aircraft proved the concept of hydrogen-powered flight, taking to the skies with its leftside propeller powered by a hydrogen-electric powertrain.

Zero Avia has secured backing from United Airlines, Alaska Air Group, and received investment from Amazon's Climate Pledge Fund.

Example pilot projects:

Project Acorn

Bristol Airport, easyJet

easyJet aims to begin flying hydrogen powered narrowbody aircraft as soon as they are commercially viable and are engaged in research and development with multiple partners. As part of this journey, the company is developing a trial of hydrogen powered ground equipment at Bristol Airport.

This work will be key to building the ability to safely and efficiently store and handle hydrogen in an airport and will contribute to the development of new regulations required for future aircraft operations.

Hydrogen Hub

Hynamics (EDF Group), Airbus, easyjet, Wales & West Utilities and Bristol Port

A study is underway to explore how Bristol Port could be configured to accept hydrogen or ammonia by ship, power landside vehicles with hydrogen and establish a hydrogen production facility at the port.

The project includes developing a local pipeline supporting Airbus' future hydrogen-powered aircraft. The first potential end-users are focused in the public transport, logistics and static/mobile plant sectors.

Centre for Future Clean Mobility

University of Exeter

The Centre for Future Clean Mobility (CFCM) was established with £2M of funding for equipment from the Heart of the South West LEP in 2021.

CFCM has a rich history in driving innovation in clean powertrains for various sectors including maritime, defence, rail, and off-highway. Its collaborative efforts involve regional SMEs like Lynch Electric Motors, as well as regional, national, and multinational businesses such as Supacat, Quattro Group, Babcock, and Rolls-Royce.

The Centre's close collaboration with its partners spans from providing fundamental innovation support to powertrain prototyping and testing, all the way to product development.

World-leading Research and Innovation

The South West is home to pioneering research and innovation activity. Focused on accelerating the hydrogen economy in the region and across the UK, this spans universities, innovation organisations and national and multinational companies.

Our members are at the forefront of this work, recognition of the importance of a thriving R&D environment in underpinning our hydrogen future. Together they are also delivering projects to realise this.

GW4 Alliance

The GW4 Alliance connects four of the most research-intensive and innovative universities in the UK: Bath, Bristol, Cardiff and Exeter. The GW4 Alliance supports research and innovation communities of scale and capability that will deliver a step change in world-class research that could not be achieved by one of the institutions alone.

A thriving Hydrogen Ecosystem is highly dependent on innovation that draws upon the collective strengths of universities and business, industry and civic authorities as demonstrated by the collaborations starting to form across our region. Working in partnership with the Western Gateway, the GW4 Alliance has developed a vision for the development of a Hydrogen Ecosystem and is well placed to deliver research and innovation to achieve a Net Zero economy faster through the power of hydrogen.

The GW4 Alliance has the ability to support a Hydrogen Ecosystem including multi-million-pound investments in green hydrogen capacity and academic expertise spanning the whole systems approach from hydrogen production, storage and distribution to energy system integration, policy and economics, public behaviour and acceptance.

National Composites Centre

The National Composites Centre is the UK's world-leading composites research and development centre, driving innovation through collaboration. Working across all manufacturing sectors, and with organisations of all sizes, the NCC is focused on Composites, Hydrogen, Digital Engineering and Sustainability, providing access to state-of-the-art technology and composites engineering capability.

The unique benefits of composites - lightweight, strong, durable and design flexibility - make them the only practical solution for storing compressed hydrogen. Specialist engineers at the NCC are exploring innovation in the design and manufacture of hydrogen pressure vessels, pipes, and cryogenic tanks, with a focus on developing sustainable solutions. The ambition is to develop a dynamic supply chain and seed manufacture in the UK.

IAAPS

IAAPS (Institute for Advanced Automotive Propulsion Systems) is a national centre of excellence supporting the transport industry in the transition to net zero.

IAAPS combines cross-sector academic rigour with commercial focus to support industry in the development and adoption of clean, efficient and affordable zero carbon propulsion technologies for integration into commercial applications. IAAPS' expertise is based on over 40 years of propulsion systems research at the University of Bath and enables a broader experimental approach than conventional test facilities.

A green hydrogen manufacturing capability is being develop by IAAPS to support research and innovation into sustainable propulsion technologies, focussed on the hard-to-electrify sectors of aviation, marines, and heavy duty transport.

Workforce transformation

Producing, transporting and using hydrogen will require skills and experience that already exist in the South West, and wider UK. However, we need to build on these, to ensure the industry has the "right people, with the right skills, at the right time" to accelerate the transition to hydrogen.

The Hydrogen South West Skills Consortium was established to understand how best to create a highly trained hydrogen focused workforce, to establish routes to deliver skills interventions and to support the South West to become a regional Centre of Excellence for hydrogen skills and innovation.

Developing, rolling out, and running on new fuel is complex, and there are many interdependencies between projects. For one to succeed, others must be in place to support and multiple industries must work together.

In addition to the support of the region's major universities, Hydrogen South West has formed partnerships with Further Education Colleges and the regional Institute of Technology, drawing upon their existing close relationships with regional businesses.

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Developing skills partnerships

Fundamental to the continued growth and success of hydrogen is enhancing skills and delivering new job opportunities to ensure a sustainable future.

The National Composites Centre, West of England Institute of Technology, and Business West work in partnership to deliver a Hydrogen Pathways Programme. This series of webinars explores how hydrogen will fuel the and associated skills needs in the short and long term. Through convening industry focus groups Hydrogen South West is also exploring how joint working could create a skills pipeline.

In partnership with the High Value Manufacturing Catapult (HVMC), Hydrogen South West developed a series of six online Hydrogen Awareness Modules designed to improve understanding of hydrogen technologies and capabilities across companies and its employees.

Hydrogen South West also supports the national Hydrogen Skills Alliance, a collaboration between Cogent Skills and the High Value Manufacturing Catapult (HVMC).

West of England IoT Hydrogen Bootcamp

Part funded by the Department for Education's Skills For Life programme, the West of England Institute of Technology created a Hydrogen Bootcamp.

This created an introductory course designed for those working in aerospace, advanced manufacturing, construction, logistics, and distribution centres. This created a base knowledge of the opportunities afforded to industry by hydrogen and was supported by Hydrogen South West.

Developing skills in your business

Fundamental to the continued growth and success of hydrogen is enhancing skills and delivering new job opportunities to ensure a sustainable future.

To get business prepared ahead of the curve, Business West, Hydrogen South West, National Composites Centre and The Institute of Technology, have partnered to deliver a programme of webinars to raise the profile of Hydrogen, and provide a collaborative platform to discuss the sector specific strategies.

Joining us on the journey

Joining Hydrogen South West gives organisations the chance to connect with industry leaders and gain access to a powerful cluster of infrastructure experience and expertise.

Together, we can make the strongest case for investment by demonstrating viability and value, building public and political support.

Members gain access to pilot projects and joint funding bids, the opportunity to connect with industry leaders, and become involved in our events.

Join today.

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