

Written Evidence Submitted by Tees Valley Combined Authority (HNZ0081)

Introduction

The Tees Valley Combined Authority welcomes the opportunity to contribute to this inquiry.

We are partnership of Darlington, Hartlepool, Middlesbrough, Redcar & Cleveland and Stockton-on-Tees local authorities and the Local Enterprise Partnership, working with the wider business community and other partners to make local decisions that support the growth of our economy.

Under a devolution deal, we have taken on responsibilities previously held by Whitehall including transport, infrastructure, skills and business investment.

Our locally agreed Local Industrial Strategy (2019) sets out to make the Tees Valley the UK's first net zero industrial cluster through the deployment of advanced technologies such as Hydrogen and CCUS coupled with renewable energy and a global leader in clean energy with the objective of being entirely carbon neutral by 2050.

The Tees Valley is the UK's largest producer of accessible hydrogen and has a unique combination of established hydrogen infrastructure, experience in operating hydrogen systems at scale and proven innovation specialisms in developing hydrogen technologies. This combination qualifies it to be one of - if not the first - hubs for deploying hydrogen at scale to decarbonise homes, industry and transport

In recent months we have been announced as the first national Hydrogen Transport Hub, aiming to bring together industry and expert researchers to develop hydrogen technology and infrastructure which can power buses, heavy goods vehicles, trains, boats and aeroplanes, making the Tees Valley a global pioneer in industrial research on the subject of hydrogen as a fuel and a research and development and deployment hub for hydrogen transport.

It is estimated that in realising these and other ambitions, the hydrogen sector could add up to £7bn to regional economy between by 2050 and create around 1,000 jobs. This will be critical to support 'levelling up' across the country based on local assets and expertise. It will also support achievement the government's net-zero.

We believe that the government's net zero agenda is best delivered if hydrogen energy is paired with carbon capture, utilisation and storage and renewable energy, especially the offshore wind resources from the Dogger Bank developments.

The Tees Valley is already host to the UK's largest hydrogen production facility, selected as an ideal location for a world scale carbon capture and storage project projected to capture 10 million tonnes of CO₂ a year and with ready access to more than a gigatonne of CO₂ storage, as well as a landing for energy from the major offshore wind farms at Dogger Bank.

As one of the UK's most significant sources of CO₂ emissions, we are also clear that the Tees Valley has a key role to play in meeting the government's net zero emissions targets whilst maintaining economic activity and providing a platform for developing the capabilities needed to radically change our energy, transport and industrial systems.

The recently published Energy White Paper outlines plans for the creation of "Superplaces" which combined both production routes and innovative applications for energy. We believe that such a place already exists in the Tees Valley where all the elements exist in one compact region to rapidly deploy hydrogen technology across all possible end use sectors.

The suitability of the Government's announced plans for "Driving the Growth of Low Carbon Hydrogen":

The Committee on Climate Change has stated that the UK will need to generate 270TWh of low carbon hydrogen in order to meet its Net Zero targets.

The only way to achieve this at scale and at speed is to build on existing expertise and infrastructure and to exploit natural UK advantages in offshore wind and geology, particularly in the North Sea.

Much of the focus of the government's "Driving the Growth of Low Carbon Hydrogen" is on hydrogen production which is a long-term challenge, but where UK companies such as Johnson Matthey based here on Teesside already have the technology needed.

The scale and timescales the government has outlined are eminently achievable in terms of volume production using either carbon capture utilisation and storage equipped plants or via large scale electrolysis, such as that envisaged under the Net Zero Tees project, a consortium of major energy companies aiming to deliver the UK's first net zero industrial cluster on Teesside by 2040. In our view there are no significant technological risks to the deployment of Hydrogen that cannot be overcome and without building the systems the real opportunities for development and cost reduction will not emerge.

It is essential however to establish demand and a distribution system alongside the production facilities.

We feel that this work would be best co-ordinated by a single-agency responsible for the delivery of the hydrogen element of the UK's energy system. This currently involves the Department of Business Energy and Industrial Strategy, the Ministry of Communities, Housing and Local Government and the Department of Transport.

Even with a focus on areas with the most mature infrastructure the previously announced Net Zero Hydrogen Fund is likely to be insufficient without private sector and further national investment. The former can only be delivered through effective, stable and robust business models which recognise the variety of end uses for hydrogen.

Once business models and delivery structures are in place, significant private sector investment will be unlocked, leading not only to Net Zero Industrial Clusters, but also Net Zero transport and heating

We concur with the Committee on Climate Change's view that the decarbonisation of our industrial and energy system and the achievement of Net Zero target will be impossible without carbon capture and storage systems. Hydrogen at scale and in the timescale needed can only be delivered using this process, and as such this should be viewed not as a risk but a solution and an opportunity for significant environmental and economic progress. There is of course a need for risks to be managed/ mitigated and for sizeable government investment, but the real risk is inaction.

The progress of recent and ongoing trials of hydrogen in the UK and abroad, and the next steps to most effectively build on this progress;

Recent small-scale trials have been successful and should be expanded to locations where the presence of existing infrastructure would minimise the costs of expansion to supply local

or national large-scale demonstrations for heat via blending and into industrial production as well as electricity generation and for transport applications

As we have outlined, the Tees Valley is the ideal location for such trials given our links to the gas transmission system and the availability of volumes of gas for conversion as well as industrial sites for CCS and hydrogen production from gas or from renewables by electrolysis (where existing electrical system capacity also exists)

We believe the government must urgently determine the role of Hydrogen in the gas grid to unlock significant investments in infrastructure, Hydrogen production and heating technologies.

As the national Hydrogen Transport hub we are seeking Department for Transport support to conduct the following trials in the Tees Valley.

- Hydrogen Trains.
- Hydrogen Buses
- Hydrogen marine and port operations
- Hydrogen HGV Trials
- Public vehicle Hydrogen trials – including emergency vehicles, refuse collection and local authority fleets

The engineering and commercial challenges associated with using hydrogen as a fuel, including production, storage, distribution and metrology, and how the Government could best address these.

There are no engineering challenges which require further research. We acknowledge that development research and cost reduction is needed, and this will only come through infrastructural investment.

The real hurdle is the commercial challenge. Currently the development of hydrogen power is a public good for which there is little market support. If our supply chain and our current users are to benefit from low carbon hydrogen we will need to support them with early market entry opportunities including, for example, low carbon hydrogen for ammonia, which can only be done in the Tees Valley where exiting production plants were originally designed for such possibilities.

The infrastructure that hydrogen as a Net Zero fuel will require in the short- and longer-term, and any associated risks and opportunities.

Significant elements of this infrastructure are already found in the Tees Valley - unlike anywhere else in the UK.

Existing expertise and logistics infrastructure in Tees Valley to support the deployment of hydrogen a Net Zero fuel this includes:

- The UK's largest merchant Hydrogen production plant and an established industrial ecosystem anchored by an internationally significant chemical cluster.
- Significant Offshore Wind and renewable energy.
- Large scale hydrogen use in industry
- England's largest exporting port.
- Proximity to North Sea carbon storage sites.
- An international airport.

- Vast pipeline network; including natural gas pipelines, hydrogen pipelines and corridors for CO2 lines.
- National and international transport links, both road, rail and shipping.
- A network of innovation assets such as the Centre for Process Innovation, TWI and the Materials Processing Institute with internationally recognised research and facilities focussed on low carbon energy and circular economy principles including how to reduce carbon emissions and re-use waste in industrial processes.

Given the need to achieve rapid decarbonisation large volumes of decarbonised hydrogen are needed at low cost and this can only be achieved quickly enough using natural gas coupled with carbon capture, utilisation and storage.

Tees Valley is the location for the Net Zero Teesside project, a £3bn investment by five major oil and gas companies in the UK's first CCS power plant. This project aims to deliver the world's first Net Zero industrial cluster by 2040. This infrastructure, along with significant renewable energy planned for the region, will in turn allow the cluster to supply low carbon fuel in the form of Hydrogen to the rest of the UK.

Renewable electricity can then be included to make hydrogen as it becomes increasingly available beyond 2030. Again, the Tees Valley's proximity to the Dogger Bank puts it in prime position to host both production routes and to provide low carbon electricity and hydrogen to the UK energy system.

Cost-benefit analysis of using hydrogen to meet Net Zero as well as the potential environmental impact of technologies required for its widespread use; and

Research by McKinsey carried out on behalf of the Hydrogen Council has recently concluded that not only that when it comes to hydrogen "scale up will be the greatest driver in cost reduction" but that the cost of investment "varies significantly across the regions" due to the impact of the comparative proximity to inputs such as feedstocks and the existence of supporting infrastructure such as storage facilities, energy supplies and distribution pipelines.

The report stated that the best way to unlock the "critical role hydrogen could play in global industrial carbonisation" in a cost-effective manner is by:

- Reducing market uncertainty – which can be achieved through the development of appropriate business models for hydrogen.
- Focus on scaling up applications - which can be achieved through focusing investment on existing infrastructure, technology and expertise.
- Seeking complementarity - which can be achieved through pairing hydrogen with carbon capture, utilisation and storage.

The post-Covid-19 economic recovery package developed by the Tees Combined Authority has a clear focus on interventions that offered the greatest cost-benefit impacts. Our analysis concluded that £100 million package of investment designed to drive innovation and clean growth and establish Tees Valley as a world leader for clean energy, low carbon and hydrogen could result in a social value of over £125 million to the economy by bringing forward jobs and supporting innovation and growth, with potentially far greater long run impacts if it succeeds in catalysing regional growth.

The environmental and economic benefit of reusing the existing gas grid, avoiding costs and technical challenges of very large-scale battery storage and the difficulty and cost of very large-scale electricity infrastructure upgrades need to be considered.

The relative advantages and disadvantages of hydrogen compared to other low-carbon options (such as electrification or heat networks), the applications for which hydrogen should be prioritised and why, and how any uncertainty in the optimal technology should be managed.

We believe that the £240m Hydrogen Fund should prioritise the following investments.

- To support the capital costs of implementing the UK's first Hydrogen CCS plant at scale (supporting the conversion of the UK's largest merchant Hydrogen plant to produce low carbon Hydrogen)
- To support initial operation of the UK's first Hydrogen CCS plant as demand develops for green Hydrogen
- To build the Hydrogen supply chain into the UK early, and capitalise on the opportunity for first mover advantage
- Develop hydrogen transport infrastructure without which hydrogen transport cannot be deployed.

As part of our aim of becoming the UK's hydrogen capital, the Tees Valley outlined in our Local Industrial Strategy our intention to establish a nationally recognised Net Zero Innovation Centre. This centre would build on the skills, infrastructure, and existing innovation strengths in our region to develop, demonstrate and deploy new hydrogen applications, including specific support for developing innovative technologies to address other key hurdles in the overall decarbonisation challenge. Alongside this, we will establish a major 'hydrogen factory' for the UK, supporting the development of new facilities, such as domestic heating that can help address the challenges of decarbonisation. The Centre, coupled with wider hydrogen-based activity, will enhance the vital national role we will play to increase the use of hydrogen as a clean energy source – for transport, industry and communities.

Focus of the Hydrogen Centre's activity will include:

- Development of new processes for making products such as net zero carbon aviation fuels through a hydrogen-based bio centre using CO₂ as a main feedstock, supported by the availability of low carbon hydrogen and the region's growing biotech capability at the Centre for Process Innovation and elsewhere.
- Exploring conventional & biotechnology-based approaches using hydrogen to provide a potential solution to the problem of recycling and reusing polymers, which Tees Valley is ideally situated to develop and deploy at scale;
- Building on the hydrogen refuelling stations already under development, at the Material Processing Institute and Teesside Advanced Manufacturing Park, to expand transport applications within the region, and specifically the deployment of hydrogen trains.
- Exploring the use of hydrogen applications in industry as a fuel or as a feedstock and supporting the development of the hydrogen in homes safety case by identifying community pilots.

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