H2Teesside Project

Planning Inspectorate Reference: EN070009

Land at 'The Foundry' and in the vicinity of the former Redcar Steel Works site, Redcar and in Stockton-on-Tees, Teesside

Document Reference: 5.3 - Need Statement

APFP Regulations 5(2)(q) Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

Applicant: H2 Teesside Ltd

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GLOSSARY

ABBREVIATION	DESCRIPTION
Applicant	H2 Teesside Limited
BEIS	(Former) Department for Business, Energy & Industrial Strategy
CCC	Climate Change Committee
CCUS	Carbon Capture, Usage and Storage - is group of technologies designed to reduce the amount of carbon dioxide (CO2) released into the atmosphere from coal and gas power stations as well as heavy industry including cement and steel production. Once captured, the CO2 can be either re-used in various products, such as cement or plastics (usage), or stored in geological formations deep underground (storage).
CO2	Carbon Dioxide - an inorganic chemical compound with a wide range of commercial uses.
DESNZ	Department for Energy Security and Net Zero.
DCO	A Development Consent Order made by the relevant Secretary of State pursuant to The Planning Act 2008 to authorise a Nationally Significant Infrastructure Project or Project of National Significance. A DCO can incorporate or remove the need for a range of consents which would otherwise be required for a development. A DCO can also include rights of compulsory acquisition.
ECC	East Coast Cluster
EIA	Environmental Impact Assessment - a term used for the assessment of environmental consequences (positive or negative) of a plan, policy, program or project prior to the decision to move forward with the proposed action.

ABBREVIATION	DESCRIPTION
EIA Regulations	The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017.
ES	Environmental Statement - a report in which the process and results of an Environment Impact Assessment are documented.
GHG	Greenhouse Gas
H2	Hydrogen
H2T	The H2Teesside Project.
LCHS	Low Carbon Hydrogen Standard
N2	Nitrogen
NDC	Nationally Determined Contribution
NEP	Northern Endurance Partnership
NSIP	Nationally Significant Infrastructure Project - defined by the Planning Act 2008 and covering projects relating to energy (including generating stations, electric lines and pipelines); transport (including trunk roads and motorways, airports, harbour facilities, railways and rail freight interchanges); water (dams and reservoirs, and the transfer of water resources); wastewater treatment plants and hazardous waste facilities. These projects are only defined as nationally significant if they satisfy a statutory threshold in terms of their scale or effect.
NZT	The Net Zero Teesside Project.
O2	Oxygen
PA 2008	The Planning Act 2008 - setting out the legislative regime for Nationally Significant Infrastructure Projects.
PINS	The Planning Inspectorate - an executive agency of the Department for Levelling Up, Housing and Communities responsible for administering DCO applications on behalf of the relevant Secretary of State.
PNS	Project of National Significance – a project directed into the PA 2008 regime by a section 35 Direction.
Proposed Development	The H2Teesside Project.
SoS	Secretary of State - the decision maker for DCO applications and head of a UK Government department.
STDC	South Tees Development Corporation - a Mayoral Development Corporation responsible for approximately 400 hectares of land south of the River Tees in the borough of Redcar and Cleveland.

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EXECUTIVE SUMMARY

H2Teesside will be one of the UK's first commercial-scale blue hydrogen production facilities, intended to produce hydrogen as a low-carbon fuel source or feedstock for nearby industrial installations. This document sets out the need for the H2Teesside development, with reference to the Government's objectives for decarbonising the power and industrial sectors and achieving the legally binding commitment to achieve 'net zero' in terms of greenhouse gas emissions by 2050.

The UK has a clear strategy for action to bring greenhouse gas emissions to net zero; the UK Government published a Net Zero Strategy (March 2023), including the Net Zero Growth Plan which makes the economic case for net zero.

The need for low carbon infrastructure in the UK is well recognised, with the National Policy Statement for energy recognising that to achieve the goals it has set out will require a 'significant amount of new energy infrastructure'. This includes both infrastructure for converting primary energy sources like wind into usable energy forms such as electricity or hydrogen, as well as for the storage and distribution of primary fuels and energy carriers across the UK. It recognises that hydrogen distribution and pipelines should be a 'critical national priority', as is low carbon infrastructure subject to a section 35 Direction.

The UK Government has identified that low carbon hydrogen has an important role to play in reaching net zero. This was reaffirmed in the 'Hydrogen Strategy Delivery Update' (DESNZ, December 2023).

The Department for Energy Security and Net Zero (DESNZ) has identified that demand for low carbon hydrogen will come several sectors, including industry, power, heat and transport. DESNZ notes that if demand for hydrogen in key sectors is at the top end of their forecasted ranges, the UK could need up to 40 TWh of hydrogen supply in 2030 to meet this demand domestically. By 2035, DESNZ expects demand for hydrogen to increase sharply and notes that 'we need production to be ready to meet this demand'.

The UK Government also recognises hydrogen's role in supporting greater energy security in the UK. Hydrogen can be used as a long-term store of low carbon energy and could provide critical flexibility for the power system.

The Government's approach to developing low carbon hydrogen production encompasses multiple production routes, including both Carbon Capture Storage (CCS) enabled (blue) and electrolytic (green) hydrogen, provided they comply with the UK Low Carbon Hydrogen Standard (LCHS). The Government's 'Hydrogen Production Roadmap' notes that analysis by both DESNZ and the Climate Change Committee has indicated that CCS-enabled (blue) hydrogen will be important in scaling up production into the 2030s and can be consistent with the UK's net zero commitments.

The Teesside area is responsible for a significant portion of UK carbon emissions. It is an area that has a proud industrial heritage but has suffered from the decline of heavy industries such as steel, coal and shipbuilding in recent years. H2Teesside can strengthen Teesside's development into the UK's leading hydrogen hub, creating new high-quality jobs, supporting local education and skills development and kick-starting a highly skilled UK-based hydrogen supply chain.

Teesside is a prime location to focus efforts to decarbonise industry. The cluster is an existing UK energy hub and is tightly packed with existing pipeline corridors and other infrastructure that will make construction of the proposed development more efficient.

H2Teesside will generate economic benefit to the local area, providing both direct and indirect jobs during the construction and operational phases, as well as safeguarding jobs and businesses in Teesside by helping local industries decarbonise.

1.0 INTRODUCTION

1.1 Background

1.1.1 This Need Statement (EN070009/APP/5.3) has been prepared by H2 Teesside Limited. It forms part of the application (the 'Application') for a Development Consent Order (a 'DCO'), that has been submitted to the Secretary of State (the 'SoS') for the Department of Energy Security and Net Zero ('DESNZ'), under Section 37 of 'The Planning Act 2008' (the 'PA 2008') in respect of the H2 Teesside Project.

1.1.2 The Applicant is H2 Teesside Limited, a bp company. H2 Teesside Limited will be the lead developer of the Proposed Development and bp will be appointed as the operator of the Proposed Development. The Applicant is seeking development consent for the construction, operation (including maintenance) and decommissioning of the H2Teesside Project, including associated development (together the *'Proposed Development'*) on land within the boroughs of Redcar and Cleveland and Stockton-on-Tees, Teesside and within the borough of Hartlepool, County Durham.

1.1.3 Development consent is required for the Proposed Development as it is the subject of a Direction (dated 22 December 2022) made by the SoS under Sections 35(1) and 35ZA of the same PA 2008. The DCO, if made by the SoS, would be known as *'The H2 Teesside Order'* (the 'Order').

1.2 Overview of the Proposed Development

1.2.1 H2Teesside would be one of the UK's first commercial-scale (blue) hydrogen production facilities, intended to produce hydrogen as a low-carbon fuel source or feedstock for nearby industrial installations, supplied via an integrated pipeline network.

1.2.2 The Proposed Development comprises construction, operation (including maintenance) and decommissioning of:

- an approximately 1.2 gigawatt thermal (GWth) blue hydrogen production facility (including on-site hydrogen storage);
- hydrogen gas pipeline to deliver low carbon hydrogen to 'offtakers'; and
- the CO_2 export, natural gas, electricity, water, oxygen (O_2) and nitrogen (N_2) connections required for the facility to operate.

1.2.3 The Hydrogen Production Facility would produce low carbon H_2 that is compliant with the UK Government's Low Carbon H_2 Standard (DESNZ, 2023), which defines what constitutes low carbon H_2 up to the point of production. The intent of the standard is to ensure new low carbon H_2 production makes a direct contribution to the UK's greenhouse gas (GHG) emissions reduction targets.

1.2.4 The low-carbon hydrogen produced by the Proposed Development would be supplied via a new hydrogen pipeline network to existing businesses on Teesside. By replacing the use of natural gas, the Proposed Development would help existing heavy industry on Teesside reduce their carbon dioxide emissions, consistent with

the Government's objective to decarbonise the UK economy and achieve its legally binding target of net zero greenhouse gas emissions by 2050.

1.2.5 The Proposed Development would export carbon dioxide (CO_2) to the Northern Endurance Partnership (NEP) offshore storage facility under the North Sea via NEP infrastructure on the adjacent Net Zero Teesside (NZT) site, including the high-pressure compression facility and the CO_2 export corridor. The NEP high-pressure compression equipment and the associated high-pressure CO_2 export transport pipeline and offshore Endurance CO_2 store do not form part of the Proposed Development; they have been consented separately.

1.2.6 The Proposed Development and NEP form part of the East Coast Cluster ('ECC'). The ECC has been selected as one of the first two carbon capture, usage and storage ('CCUS') clusters to be taken forward by the UK Government. The ECC has the potential to remove almost 50% of the UK's total industrial clusters carbon dioxide emissions, protect thousands of jobs and establish the region as a globally competitive climate friendly hub for industry and innovation. The ECC will include a diverse mix of low-carbon projects, including industrial carbon capture, low-carbon hydrogen production, negative emissions power, and power with carbon capture. In March 2023, the Proposed Development was selected by DESNZ as one of the first three projects to connect to the ECC.

1.2.7 The Proposed Development would be one of the UK's largest blue hydrogen production facilities with a capacity of up to 1.2 gigawatts ('GW') thermal, representing more than 10% of the Government's hydrogen production target of 10 gigawatts by 2030. This equates to the production of approximately 160,000 tonnes of low carbon hydrogen per annum. The Proposed Development would export approximately 2.8 million tonnes of captured CO_2 (1.4 Mt for each phase) to NEP for offshore storage. No temporary CO_2 storage is required on-site.

1.2.8 A description of the elements of the Proposed Development and the Works Nos. is set out at Schedule 1 of the draft DCO (EN070009/APP/4.1). The ancillary and further development required in connection with and subsidiary to the above elements of the Proposed Development is also detailed at Schedule 1 of the draft DCO.

1.2.9 A more detailed description of the Proposed Development and how it will operate is provided at Chapter 4 '*Proposed Development*' in ES Volume I (EN070009/APP/6.2). The areas within which each of the main elements of the Proposed Development are to be built are denoted by the coloured and hatched areas on the Works Plans (EN070009/APP/2.4).

1.3 The Applicant

1.3.1 The Applicant is H2 Teesside Limited, a bp company. H2 Teesside Limited will be the lead developer of the Proposed Development. bp will be appointed as the operator of the Proposed Development.

1.3.2 Subject to a final investment decision ('FID') and shareholder agreements, the Proposed Development is being developed by the following partners ('Project Partners'), with bp leading as operator:

- bp plc., a company incorporated in England and Wales (company number 00102498); and
- Abu Dhabi National Oil Company P.J.S.C. ('ADNOC'), a company existing under the laws of the Emirate of Abu Dhabi.

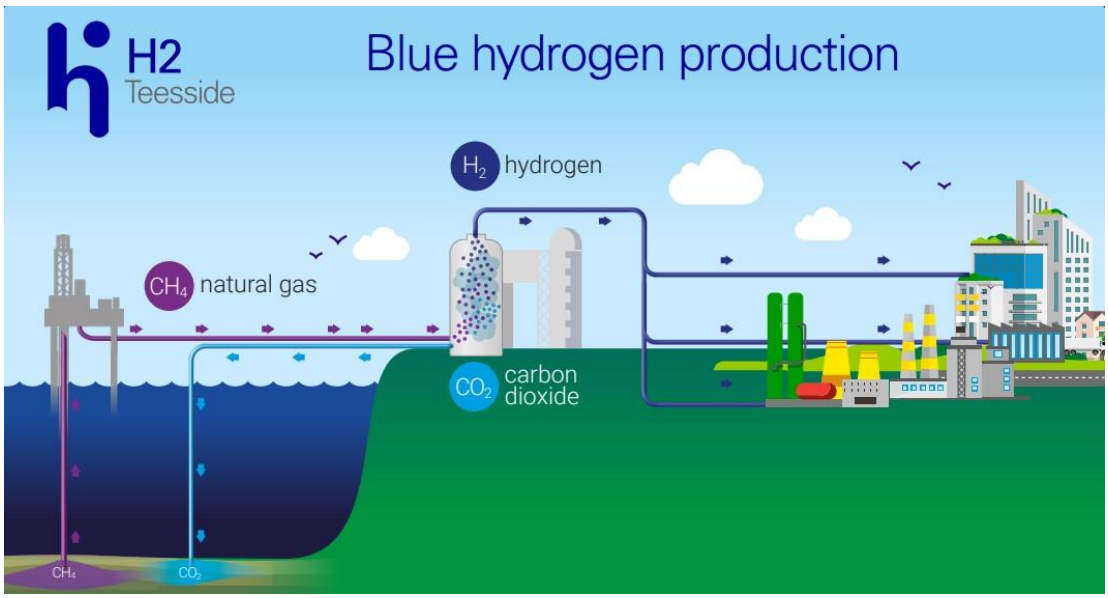
1.4 CCS-enabled (blue) Hydrogen

1.4.1 Blue hydrogen, sometimes referred to as CCS-enabled low carbon hydrogen, is hydrogen that is produced from natural gas (methane) with the majority of the CO_2 produced during the process being captured and stored permanently. In the UK, blue hydrogen must adhere to the Government's '*Low Carbon Hydrogen Standard*' (LCHS), which limits the overall carbon intensity of the hydrogen.

1.4.2 CCS is the term for a group of technologies that remove CO_2 from sources such as industrial processes and power plants, transport it – most often by pipeline – and then securely store it. Storage sites are located several kilometres underground and are subject to stringent tests to ensure that they are geologically suitable. In the UK, it is expected that the storage sites would be located offshore, in areas such as the North Sea.

1.4.3 Blue hydrogen can provide the scale and reliability required for industrial processes and play a crucial role in helping carbon intensive sectors decarbonise, particularly in industries that are difficult to electrify.

Figure 1: CCS-enabled (blue) hydrogen process



1.5 The Site

1.5.1 The Proposed Development Site (the 'Site') lies in Teesside within the administrative boundaries of Redcar and Cleveland borough south of the River Tees and within Stockton-on-Tees and Hartlepool Boroughs north of the Tees.

1.5.2 The hydrogen production facility and its ancillary development (also referred to as the *'Main Site'*), including its carbon capture and compression facilities, would be located on part of the Foundry Site, which forms part of Teesworks, within the borough of Redcar and Cleveland and which is adjacent to NEP infrastructure. Teesworks is a major brownfield industrial site and Freeport, part of which was formerly occupied by the Redcar Steel Works.

1.5.3 The Proposed Development Site extends to approximately 507 hectares ('ha') in area on both the north and south sides of the Tees. The Main Site comprises approximately 86 ha of Teesworks former industrial land that was used for steel production, including a mix of industrial buildings. The topography of the Main Site is relatively flat, with typical ground levels being between 6 - 8 m Above Ordnance Datum (AOD).

1.5.4 The area surrounding the Proposed Development Site is characterised by industrial land uses. To the north-east of the Main Site lie the coastal areas of South Gare and Coatham Dunes (outside the areas of ongoing industrial redevelopment), which are nationally and internationally important environmental sites and community assets. To the south of the Main Site lies the Northumbrian Water Ltd.'s Bran Sands wastewater treatment works, operational lands of PD Ports' Teesport, and the Wilton International Site chemical complex. The Proposed Development Site extends westward across the River Tees through the industrial complex at Seal Sands, and toward industrial and residential areas at Billingham and Port Clarence.

1.5.5 A more detailed description of the Site and its surroundings is provided in Chapter 3 '*Description of the Existing Environment*' in the Environmental Statement ('ES') Volume I (EN070009/APP/6.2).

1.6 Purpose and Structure of this Document

1.6.1 The purpose of this document is to set out the need that exists for the Proposed Development, with reference to the Government's objectives for decarbonising the power and industrial sectors and achieving the legally binding commitment to achieve 'net zero' in terms of greenhouse gas emissions by 2050.

1.6.2 This Need Statement should be read alongside the Planning Statement (EN070009/APP/5.3). That Statement sets out how the Applicant has taken account of relevant planning policy and the extent to which the Proposed Development complies with the policies within those NPSs, as well as any other matters that are 'important and relevant' to the SoS's determination of the DCO Application, as well as consideration of the tests set out in section 104 of the PA 2008.

2.0 NEED FOR LOW CARBON INFRASTRUCTURE

2.1 Risks of Climate Change

2.1.1 The Intergovernmental Panel on Climate Change (IPCC) published its Sixth Assessment Report (AR6) in 2021. This provides the most recent, comprehensive scientific assessment of climate change. AR6's key findings include:

- Unprecedented Changes: Human-induced global warming of 1.1 degrees celsius has led to unprecedented changes in the earth's climate. These changes include rising sea levels, extreme weather events, and rapidly disappearing sea ice. Additional warming will intensify these impacts, affecting heat extremes, heavy rainfall, and regional droughts.
- Dangerous Tipping Points: Rising global temperatures increase the likelihood of reaching dangerous tipping points in the climate system. Once crossed, these tipping points trigger self-amplifying feedback such as thawing permafrost or massive forest dieback, further exacerbating global warming.
- Urgent Action Needed: The Report emphasises that immediate, rapid, and large-scale reductions in greenhouse gas emissions are crucial. Without such actions, limiting warming to 1.5 degrees celsius (or even 2 degrees celsius) will be beyond reach. However, the IPCC also highlighted pathways to reduce emissions, scale up carbon removal, and build resilience, emphasising that a safe, liveable future is still possible.

2.2 Case for Action – Achieving Net Zero in the UK

2.2.1 The UK was the first major economy to create a legally binding target to bring greenhouse gas emissions to net zero through the Climate Change Act 2008 (2050 Target Amendment) Order 2019. This target was set considering the latest scientific evidence and was recommended by the Climate Change Committee (CCC), the UK's independent climate advisory body.

2.2.2 The UK Government has a range of policies aimed at reducing greenhouse gas emissions which cause climate change. The Government published its *'Net Zero Strategy (Build Back Greener)'* on 19 October 2021 (updated April 2022). It set out policies and proposals for decarbonising all sectors of the UK economy to meet the Government's net zero target by 2050.

2.2.3 In making the case for action, the Net Zero Strategy (p. 38) states:

"The science is clear, we know that human activity is changing our climate and that this will have a devasting impact on human lives, the economy, and the natural world – ranging from the extinction of some species and the melting of ice caps to extreme weather patterns threatening our homes, businesses, and communities… We need to act urgently and reduce emissions globally to limit further global warming."

2.2.4 On the pathway to achieving net zero emissions, the UK sets interim targets known as carbon budgets and adheres to Nationally Determined Contributions (NDCs).

Carbon budgets impose limits on the total greenhouse gas emissions that the UK can emit over 5-year periods. NDCs represent commitments made by Parties under the Paris Agreement, outlining their specific plans to reduce their greenhouse gas emissions and align with the Agreement's temperature goals.

2.2.5 In 2020, the Government communicated to the UN Framework Convention on Climate Change (UNFCCC) its NDC pledge to reduce UK emissions by at least 68% by 2030 on 1990 levels. In June 2021, the government set in law the sixth carbon budget (CB6) limiting greenhouse gases emitted from 2033 to 2037. CB6 reduces emissions by approximately 78% by 2035 compared to 1990 levels.

2.2.6 The Net Zero Strategy was followed in March 2023 with a suite of publications under the policy paper, 'Powering Up Britain' that included the *'Powering Up Britain: Net Zero Growth Plan'* and '*Powering Up Britain: Energy Security Plan*'. The Net Zero Growth Plan makes the economic case for next zero, highlighting that '*global action to mitigate climate change is essential to long term prosperity – the overall costs and risks of global warming to be equivalent to losing between 5% and 20% of global GDP each year'.*

2.2.7 Also published in March 2023 was the Carbon Budget Delivery Plan, which set out the Government's projections for how the different initiatives in the Net Zero Strategy would help to achieve the relevant carbon budgets on a sector basis, including power, fuel supply and industry.

2.2.8 The Net Zero Growth Plan describes the relationship between energy security and net zero as being '*two sides of the same coin*' while the Energy Security Plan states that the '*rapid shift to clean energy generation and greater energy efficiency provides the most effective route to ensuring both climate and energy security, helping to avoid risks associated with dependency on fossil fuel imports*'.

2.3 Need for Low Carbon Infrastructure Including Hydrogen

2.3.1 Drawing on the strategy documents referenced above, the Overarching National Policy Statement for Energy (NPS EN-1) (designated in January 2024), summarises the Government's objectives for the energy system as follows:

"to ensure our supply of energy always remains secure, reliable, affordable, and consistent with net zero emissions in 2050 for a wide range of future scenarios, including through delivery of our carbon budgets and Nationally Determined Contributions." (para 2.3.3)

2.3.2 The NPS recognises that achieving these goals will require 'a step change in the decarbonisation of our energy system' (para 2.3.3) and a *'significant amount of new energy infrastructure, both large nationally significant developments and small-scale developments determined at a local level'* (para 2.3.4). This includes both infrastructure for converting primary energy sources like wind into usable energy forms such as electricity or hydrogen, as well as for the storage and distribution of primary fuels and energy carriers across the UK.

2.3.3 New infrastructure will also be needed for capturing, transporting, and safely storing carbon dioxide emissions. The NPS notes that as the UK decarbonises,

alongside electrification, *'low carbon hydrogen is also likely to play an increasingly significant role'* (para 2.3.7).

2.3.4 It is stated (paragraph 3.3.59) that all generating technologies (which are said to include low carbon hydrogen) are urgently needed to meet the Government's energy objectives by:

- providing security of supply by reducing reliance on imported oil and gas, avoiding concentration risk and not relying on one fuel or generation type;
- providing an affordable, reliable system through the deployment of technologies with complementary characteristics; and
- ensuring the system is net zero consistent by remaining in line with our carbon budgets and maintaining the options required to deliver for a wide range of demand, decarbonisation and technology scenarios, including where there are difficulties with delivering any technology.

2.3.5 Furthermore, the NPS sets out that the Government considers the *'need for such infrastructure is urgent'* and that UK's energy security and net zero ambitions will only be delivered if *'we can enable the development of new low carbon sources of energy at speed and scale'* (paragraph 4.2.2). It notes that Government has concluded that '*there is a critical national priority (CNP) for the provision of nationally significant low carbon infrastructure'* (paragraph 4.2.4).

2.3.6 Critical national priority infrastructure includes:

- hydrogen distribution, pipelines and storage (paragraph 3.4.22); and
- energy infrastructure directed into the NSIP regime under section 35 and fits within the normal definition of low carbon; with footnote 27 of the NPS making clear that this includes blue hydrogen.

2.3.7 CNP status means that the Secretary of State will take *'as the starting point for decision making that such infrastructure is to be treated as if it has met any tests which are set out within the NPSs, or any other planning policy, which requires a clear outweighing of harm, exceptionality or very special circumstances'* (paragraph 4.2.16).

2.3.8 Furthermore, *'where residual non-HRA or non-MCZ impacts remain after the mitigation hierarchy has been applied, these residual impacts are unlikely to outweigh the urgent need for this type of infrastructure. Therefore, in all but the most exceptional circumstances, it is unlikely that consent will be refused on the basis of these residual impacts'* (para 4.2.15).

2.4 Independent Review of Net Zero

2.4.1 On 13 January 2022, the Department for Business, Energy & Industrial Strategy (BEIS) published *'Mission Zero: Independent Review of Net Zero'*. The review was commissioned by the BEIS Secretary of State in September 2022 and conducted by former Energy Minister Chris Skidmore MP. The review made 129 recommendations

to Government and proposed 25 key actions. In March 2023, the Government published its response to the review stating:

"We agree with the review's conclusion that net zero is the growth opportunity of the 21st century and could offer major economic opportunities to the UK – but that decisive action is needed to seize these. Other countries such as the USA with the Inflation Reduction Act are moving quickly, and we must do the same. We are focused on unlocking the ambition of places and communities to deliver net zero by 2050".

2.4.2 This view echoes the Government's previous conclusion in the Net Zero Strategy that the sooner we act on climate change the lower the costs will be (Net Zero Strategy, page 39.) This draws on the Office for Budget Responsibility's analysis showing that there could be significant fiscal benefits from early action to transition to net zero, meaning the costs will be lower than if we delay (OBR, *Fiscal Risk Report*, 2021).

2.4.3 In conclusion, there is a clear and urgent need for low carbon infrastructure to address the threat of climate change and maximise the economic growth opportunities of achieving net zero emissions. Low carbon hydrogen production and distribution are strategically important elements of low carbon infrastructure, which is explored in further detail in the following section.

3.0 NEED FOR LOW CARBON HYDROGEN INFRASTRUCTURE

3.1 UK Hydrogen Strategy

3.1.1 The UK Hydrogen Strategy (August 2021) first set out Government's vision for the role hydrogen will play in the UK reaching net zero. It also illustrated the scale of the challenge to realise this ambition, noting that while almost no low carbon hydrogen is produced today, Government estimates that 240 - 500 TWh could be required by 2050, '*which is similar in scale to existing UK electricity use'*.

3.1.2 The Government's recent '*Hydrogen Strategy Delivery Update*' (DESNZ, December 2023) reaffirmed the opportunity and need for low carbon hydrogen in the UK:

"To help deliver deep decarbonisation of heavy industry and transport, as well as helping to build a resilient and secure net zero energy system, while capturing economic benefits and green jobs. Producing, transporting, storing and using hydrogen will require new technology, infrastructure, supply chains, investment, jobs and skills to make our vision for hydrogen in the UK's future energy mix a reality."

3.1.3 Further analysis on demand for low carbon hydrogen was set out most recently in the Government's '*Hydrogen Transport and Storage Networks Pathway'* document (Dec 2023) and summarised on page 11 of the '*Hydrogen Production Roadmap'*:

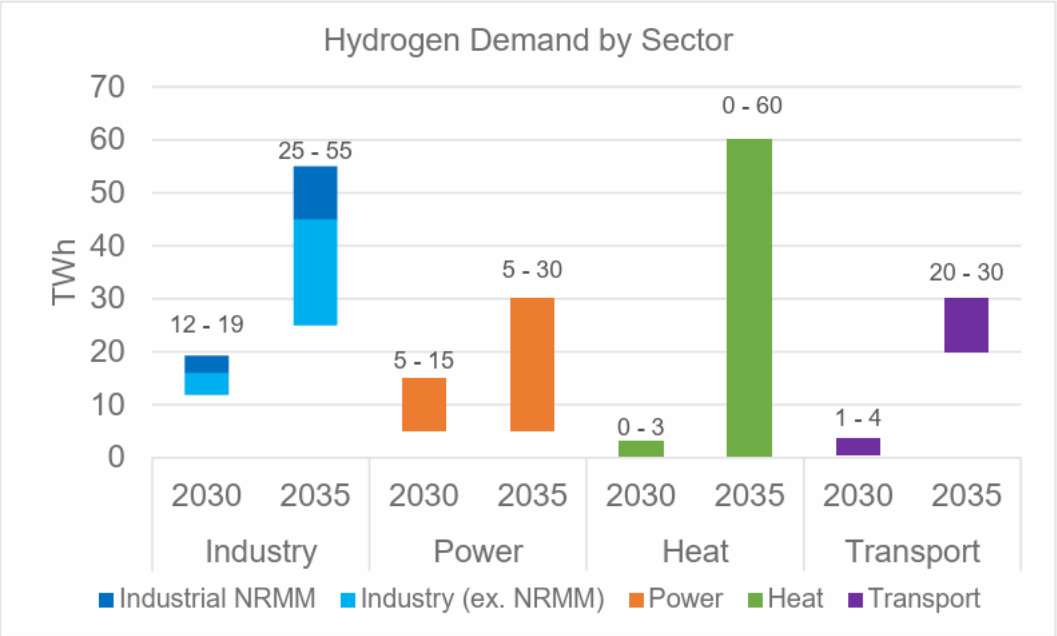
"Low carbon hydrogen is a leading option to decarbonise industrial processes that are harder or more expensive to electrify, and can provide cleaner, homegrown energy for power, transport, and potentially heating.

It will play a vital role in enabling these sectors to contribute to our aim to have slashed emissions by 78% by 2035 in line with Carbon Budget 6, decarbonise the UK power system by 2035, subject to security of supply, and keep us on track towards delivering our legally binding target of net zero greenhouse gas emissions by 2050."

3.2 Low Carbon Hydrogen Demand by Sector

3.2.1 **Figure 2** shows the Department for Energy Security and Net Zero's estimates of potential ranges for hydrogen demand across key sectors in 2030 and 2035.

Figure 2: Government Estimates of Potential Hydrogen Demand Across Sectors in 2030 and 2035



3.2.2 DESNZ notes that if demand for hydrogen in key sectors is at the top end of the ranges the UK could need up to 40 TWh of hydrogen supply in 2030 to meet this demand domestically. The figure also indicates that by 2035, DESNZ expects demand for hydrogen to increase sharply and notes that '*we need production to be ready to meet this demand*' (page 12, '*Hydrogen Delivery Roadmap'*).

3.3 Low Carbon Hydrogen's Role in Decarbonising Industry and Power

3.3.1 Government's ambition is to achieve 50 TWh of industrial fuel switching to low carbon fuels by 2035 to help meet Carbon Budget 6, on the pathway to net zero. This could deliver average annual Carbon Budget 6 carbon savings of 7.6 Mt CO_2e (page 68, *Carbon Budget Delivery Plan*). This is primarily to be reached via switching from fossil fuels to electricity and hydrogen. Hydrogen provides a low carbon alternative to fossil fuels used in industrial heating, and DESNZ highlights its role in both *'indirect applications such as steam boilers and Combined Heat and Power (CHP) systems, and direct heating processes, for example glass melting'* (page 25, Hydrogen Strategy Delivery update).

3.3.2 The Government is committed to decarbonising the UK power system by 2035, subject to security of supply. Government considers hydrogen be a potentially key low carbon flexible generation technology to support both the decarbonisation of the power system, whilst providing security of supply and providing a decarbonisation pathway for unabated gas generation. Government analysis shows that having hydrogen available in the power system could achieve lower emissions at a lower cost than scenarios without hydrogen. The Hydrogen Strategy Delivery Update states '*long duration energy storage, supplied primarily by hydrogen, could*

provide between £13 billion and £24 billion in savings to the electricity system between 2030 and 2050' (page 27).

3.4 Low Carbon Hydrogen in the NPS

3.4.1 The NPS-EN1 reiterates that 'low carbon hydrogen could be capable of replicating the role of natural gas in the electricity system, including providing both firm, flexible capacity in the future and a decarbonisation route for unabated combustion power plants' (paragraph 3.3.49). More broadly, the NPS EN-1 states that 'there is an urgent need for all types of low carbon infrastructure to allow hydrogen to play its role in the transition to net zero' (paragraph 3.4.12). The NPS (at paragraphs 3.4.12 to 3.4.22) states:

- The Government is committed to developing low carbon hydrogen, which will be critical for meeting the UK's legally binding commitment to achieve net zero by 2050, with the potential to help decarbonise vital UK industry sectors and provide flexible deployment across heat, power and transport.
- The Government's view is that a twin track approach of developing both green and blue hydrogen production will be needed to achieve the scale of low carbon hydrogen production required for net zero.
- While the development of this market is uncertain, the UK could become both an exporter and importer of low carbon hydrogen, potentially necessitating current gas infrastructure to be reconfigured or for new infrastructure to be put in place.

3.4.2 The NPS-EN1 notes that *'where the application is for hydrogen infrastructure not covered by sections 15-21 of the Planning Act (i.e. such as the Proposed Development), the Secretary of State should give substantial weight to the need established at paragraphs 3.4.12 to 3.4.22 of this NPS'* (paragraph 3.2.12).

3.5 Energy Security

3.5.1 As well as being critical to net zero, the Government also recognises hydrogen's role in supporting greater energy security in the UK. Hydrogen can be used as a long-term store of renewable energy and could provide critical flexibility for the power system. This potential has come into increasing focus since the invasion of Ukraine in 2022 and has accelerated efforts to develop the hydrogen economy.

3.5.2 In April 2022 the Government doubled its hydrogen production capacity ambition to have up to 10 GW of capacity by 2030, as set out in the *'British Energy Security Strategy'*. It also expanded the range and number of policy mechanisms being introduced, including annual allocation rounds for electrolytic hydrogen production and designing hydrogen transport and storage business models by 2025.

3.5.3 The Government has indicated that this increased ambition, alongside interim ambitions to have up to 1 GW CCUS-enabled and up to 1 GW electrolytic hydrogen capacity in construction or operation by 2025, has guided its approach to designing funding support for hydrogen projects.

3.6 The Need for Multiple Low Carbon Hydrogen Production Routes

3.6.1 As the NPS notes, the Government's approach to developing hydrogen production encompasses multiple production routes, including both CCS-enabled (blue) and electrolytic (green) hydrogen, provided they comply with the UK *'Low Carbon Hydrogen Standard*' (LCHS). The LCHS provides clarity about the types of hydrogen production Government wishes to bring forward in the developing UK hydrogen economy, and enables it to support investment, innovation and commercialisation of new production technologies which are consistent with the UK's net zero commitment.

3.6.2 The Government's *'Hydrogen Production Roadmap'* notes that analysis by both DESNZ and the Climate Change Committee has indicated that CCS-enabled blue hydrogen will be important in scaling up production into the 2030s and can be consistent with the UK's net zero commitments. Page 13 highlights that '*CCUS-enabled hydrogen plants currently offer the largest individual production capacities of any projects in the current UK pipeline, with the ability to produce hydrogen at consistent baseload from the mid-2020s onwards'*.

3.7 The Role of CCS-enabled Hydrogen

3.7.1 Commenting on sources of available hydrogen in the 2030s, the Climate Change Committee stated in March 2023that *'it is implausible that all UK hydrogen demand could be met from domestic non-fossil production by 2035, given likely limits on the rate at which renewable generation capacity can feasibly be built. Zero-carbon electricity must be prioritised for displacing unabated fossil generation and meeting increasing demands from electric vehicles and heat pumps'*.

3.7.2 In the CCC's analysis of options to meet potential hydrogen supply shortfalls, they conclude on page 100 of the same Report that '*it is unlikely that any contributions from green hydrogen imports, or electricity imports for domestic green hydrogen, would remove the need for blue hydrogen on a 2035 timescale. […] Blue hydrogen will therefore have an important part to play in filling the gap between domestic production and demand'.*

3.8 Enabling Low Carbon Hydrogen Production Within Industrial Clusters

3.8.1 The UK is committed to deploying CCUS in two industrial clusters by the mid-2020s and four clusters by 2030, with the aim of capturing and storing 20 – 30 Mt CO_2 per year by 2030. The intention is for each of these clusters to contain projects spanning multiple capture sectors, including low carbon hydrogen production. The Government has selected or intends to select clusters and capture projects through the CCUS cluster sequencing process, with Government funding allocated via bilateral negotiations.

3.8.2 The Government has stated its intention to allocate up to 4 GW of the UK's 2030 10 GW ambition to CCUS-enabled hydrogen through CCUS allocation rounds for Track-1, Track-1 expansion and Track-2, subject to project assessment, cluster assessment and successful negotiations with projects.

3.8.3 The ECC has been announced as one of the Track-1 clusters in the *'Hydrogen Strategy Delivery Update',* which described the latest developments regarding the allocation of support to CCS-enabled projects. H2Teesside is a core part of the ECC and was selected by the Government as one of the *'emitter projects*' to be supported within that cluster in March 2023:

"In keeping with our approach to supporting multiple production routes, we are progressing with the negotiations for the capital and revenue funding for the UK's first commercial-scale CCUS enabled hydrogen production plants. We announced the HyNet and East Coast clusters progressing in Track-1 and have advanced to negotiating and shortlisting eight CO2 emitter projects, including two CCUS-enabled hydrogen projects as part of Phase 2 of the process.

Maintaining our high tempo delivery, we announced our intention to expand the Track-1 clusters and launched Track-2 of the Cluster Sequencing Process in March 2023. We will launch a process shortly to begin further expansion of Track-1 clusters, beyond the initial deployment, identifying and selecting projects to fill the available storage and network capacity anticipated to be available in and around 2030. Carbon capture and hydrogen are closely related, and we continue to develop policy that acknowledges these links and complements both technologies."

3.8.4 In conclusion, this section has demonstrated that there is a clear need for low carbon hydrogen to strengthen energy security and achieve the UK's net zero targets, particularly to support decarbonisation of industry and power sectors. This is supported by the Government's 'Hydrogen Strategy' and forecasted hydrogen demand figures. The Government's 'Hydrogen Production Roadmap' also clearly highlights the importance of CCS-enabled blue hydrogen, particularly to support the scale up of low carbon hydrogen production through the 2030s. The need for and importance of low carbon hydrogen infrastructure is reflected in the NPS which came into force in January 2024.

3.8.5 There is also an evident economic need for low carbon infrastructure. This is described in the next section.

4.0 THE ECONOMIC NEED FOR LOW CARBON INFRASTRUCTURE

4.1 The National Need for Low Carbon Infrastructure as an Economic Driver

4.1.1 The energy transition and net zero are among the biggest opportunities in the UK. The Government is committed to ensuring that the UK takes advantage of its early mover status. The ambition is to hit the net zero targets while delivering among the cheapest wholesale electricity prices in Europe. To meet this target, it needs to significantly reduce emissions across all sectors and adopt a transition to low carbon infrastructure. The Prime Minister's commitment at COP27 to achieve nation's net zero target and Nationally Determined Contribution (NDC), to create new high-wage and skilled jobs and protect UK energy security, highlights the need for low carbon infrastructure to achieve national climate objectives and position the UK as a competitive player in the global economy. Government's UK Hydrogen Strategy (2021) states:

"Analysis suggests that in 2030 the UK hydrogen economy could be worth £900m and support over 9,000 jobs. Around a quarter of these jobs could be driven by British supply chain export."

4.1.2 It goes on to emphasise the importance of investing in hydrogen technologies as a means to drive economic growth, create jobs, capitalize on export opportunities, and facilitate the transition to a sustainable and low-carbon energy future.

4.1.3 The shift towards a green and sustainable future will enable new alternatives to enhance the UK economy and generate significant amount of green, high skilled jobs. This transition is not only geared towards economic growth but also towards safeguarding the environment for future generations. Stated in Government's Powering up Britain: Net Zero Growth Plan (2023), *'the policies and ambitions government have committed to will help leverage around £100 billion of private investment as new industries and innovative low carbon technologies develop, and the ambitions will support up to 480,000 jobs in 2030'*.

4.2 The Need for Low Carbon Infrastructure in the Local Area

4.2.1 A significant portion of carbon emissions from UK industrial clusters come from Britain's historic engine room, Teesside, a region in the north of England with a proud industrial heritage and home to a diverse cluster of industrial, power and hydrogen companies. These businesses, employing thousands of people, are united by a common challenge – the need to decarbonize their operations to help the UK reach net zero by 2050.

4.2.2 Government's Energy White Paper (2020) notes (page 124) that many clusters are in regions in need of economic revitalisation and that decarbonising those clusters can act as a driver of prosperity for the surrounding areas. Furthermore, it states that investments in key technologies like CCUS and hydrogen will be crucial to enhancing local economic growth and creating jobs together with prosperity.

4.2.3 The ECC is committed to play a vital role in the Teesside. On the ECC's website, it states that *'By its strength in diversity, the East Coast Cluster stands ready to remove*

50% of the UK's industrial cluster CO_2 emissions, protect thousands of jobs and establish the Teesside region as a globally competitive climate-friendly hub for industry and innovation'.

4.2.4 Teesside is a prime location to demonstrate hydrogen at a commercial scale. There are multiple industries within the Teesside cluster who have expressed an interest in the use of low carbon hydrogen to support their decarbonisation.

4.2.5 Tees Valley has suffered from the decline of heavy industries such as iron, steel, shipbuilding, and the chemical industry. The region has recently faced high unemployment and low levels of economic activity, with heavy industry like steel reducing activity and closing plants, including the iconic Redcar facility. This, in part, reflects a general loss of competitiveness in heavy manufacturing in the UK and the restructuring of the UK economy towards advanced manufacturing and services. Local labour market dynamics reflect this challenge of reskilling.

4.2.6 Despite high unemployment from closures, businesses in the region frequently report a skills shortage. According to the *'Tees Valley Strategic Economic Plan'* (2023), due to local region's ageing workforce, there will be a need around 2,000 replacement jobs in the low carbon/ process, chemical and energy sector. H2Teesside is uniquely place and it can strengthen Teesside's development into the UK's leading hydrogen hub, creating new high-quality jobs, supporting local education and skills development and kick-starting a highly skilled UK-based hydrogen supply chain.

4.2.7 Teesside also faces favourable prospects due to a dynamic business and institutional culture. Tees Valley is prioritizing the need for innovation and strategic shift to low carbon practices in order to achieve the area's ambition to '*deliver the UK's first fully decarbonised industrial cluster by 2040'* (Net Zero Strategy for Tees Valley, 2023[1]) - and *'to introduce new processes and practices which reduce carbon emissions, increase productivity and the availability of high value jobs'* (Tees Valley's Strategic Economic Plan, 2023[2]) which makes the region a suitable match for H2Teesside project deliverables.

4.2.8 In addition to the environmental need to decarbonise, it also provides a route to grow and level up the economy, both in the UK and in the local Teesside area. The need for low carbon infrastructure highlights the dual significance of addressing climate change and revitalizing economies. It is expected that the H2Teesside project will bring about a number of benefits to the local area in regard to sustainable development, job creation and regional revitalization as described in the next section.

[1] Net-Zero-strategy-Digital.pdf (teesvalley-ca.gov.uk)

[2] TVCA207-SEP-Document-Full-WEB-1.pdf (teesvalley-ca.gov.uk)

5.0 BENEFITS TO THE LOCAL AREA

5.1.1 H2Teesside offers the opportunity to support the decarbonisation of the Teesside cluster. The area is a prime location to demonstrate hydrogen at a commercial scale, for a variety of reasons, which means that the decarbonisation can be carried out in an efficient and cost-effective manner.

5.1.2 Blue hydrogen production relies on having a suitable transport and storage route for produced CO_2. The NEP project, which has been selected by the UK Government as a Track 1 cluster of the Carbon Capture, Usage and Storage (CCUS) cluster sequencing process, is in Teesside. This project provides the infrastructure required to capture and store the CO_2 produced during the blue hydrogen production process. The H2Teesside project is additional anchor project for NEP, providing momentum for it to be taken forward alongside NZT Power.

5.1.3 The Teesside industrial cluster is tightly packed, making it a good location to decarbonise effectively and efficiently. Low carbon blue hydrogen produced at H2Teesside can be transported to customers relatively easily and at low cost.

5.1.4 Teesside is already a UK energy hub, with access to gas from UK gas fields and offshore wind supply, helping ensure national energy security. H2Teesside, along with its sister project HyGreen Teesside and other proposed projects in the area, can help Teesside become the UK's leading hydrogen hub.

5.1.5 As Teesside is an industrial area, existing pipeline corridors can be used, where possible, to minimise the footprint and impact of the infrastructure required.

5.1.6 There are multiple industries within the Teesside cluster that have expressed an interest in the use of low carbon hydrogen to support their decarbonisation.

5.1.7 Teesside has several existing industrial parks which could attract new business entrants, including potential users of low carbon hydrogen, to build upon an initial infrastructure investment.

5.1.8 Project Union is a National Gas initiative to develop a hydrogen *'backbone'* to link industrial clusters around the UK, while East Coast Hydrogen will provide the local infrastructure required to connect the East Coast region to the National Gas network. According to the East Coast Hydrogen Delivery Plan (Footnote 3) the first phase of Project Union will focus on connecting the Teesside and Humberside industrial clusters. Therefore, low carbon hydrogen projects in Teesside will have the opportunity to connect to the hydrogen backbone from as early as 2028.

5.1.9 The Proposed Development Site is well position to deliver low carbon hydrogen to the Teesside cluster whilst limiting impact on the environment. For example:

- the Main Site comprises land that has been previously developed and is situated in an industrial setting with few immediate receptors;
- the Main Site is located directly adjacent to the NEP project, thereby minimising the length of the CO_2 connection pipeline;

[3] East-Coast-Hydrogen-Delivery-Plan-Report-1.pdf (eastcoasthydrogen.co.uk)

- the existing utility and transport infrastructure around the Main Site means less construction work than might otherwise be required;
- re-use of pipeline corridors, where possible, mitigates the potential impact of building through non-purposed land.

5.1.10 H2Teesside intends to be the catalyst for use of low carbon hydrogen in the Teesside cluster. It has the potential to attract new industries keen to take advantage of the availability of low carbon hydrogen for use as a fuel or feedstock.

5.1.11 The Teesside region also stands to benefit more generally from greenhouse gas emissions reductions, including those delivered by H2Teesside. Whilst the positive impact of greenhouse gas reductions is global, local areas such as Teesside are part of that global receptor.

5.2 Economic Benefits

5.2.1 As stated in the socio-economic assessment in the Environmental Statement (ES, Volume I, EN070009/APP/6.2), it is estimated that there would be a peak construction workforce of 1,300 workers. Of these jobs, around 585 are expected to be from the Middlesbrough and Stockton travel to work area (TTWA). It is estimated that these 780 net additional construction jobs would generate £38.1m GVA per annum during the construction phase, of which £28.6m will be generated by the 585 jobs in the Middlesbrough and Stockton TTWA.

5.2.2 During operation, the workforce would be approximately 130 operational workers per day across both Phases 1 and 2. However, as described in the socio-economic assessment in the Environmental Statement (EN070009/APP/6.2), the gross operational employment has been assessed to be 58 gross direct jobs as a worst-case. It is estimated that the 58 net additional operational jobs would generate £2.8 m GVA per annum in this phase, of which £2.1m would be generated by the 44 jobs in the Middlesbrough and Stockton TTWA.

5.2.3 Importantly, by helping local industries to decarbonise their operations through offtake agreements, H2Teesside will help to safeguard existing jobs and businesses in Teesside. It will also help efforts to attract new businesses to the region who are seeking to utilise low carbon hydrogen produced at scale.

5.3 Social Benefits

5.3.1 bp actively collaborates with local councils, authorities, charities, education institutions and various industry bodies to support community development initiatives and social mobility to help enable a just transition in the Tees Valley.

5.3.2 H2Tesside plans to contribute £19.5 million in funding to socio-economic development initiatives in Teesside, with a priority focus in education and skills. This funding will help to inspire the next generation of Science, Technology, Engineering and Maths (STEM) talent, develop future skills to meet the demands of the growing renewable and low carbon sector and ensure local people benefit from near-term job opportunities.

5.3.3 bp will undertake a community needs assessment and community baseline assessment, which includes engaging with local stakeholders. The outputs of these assessments will ensure that bp's social investments are underpinned by evidence.

5.3.4 Additionally, bp actively participates in the Green Jobs Delivery Group and Local Skills Improvement Plan (LSIP) Advisory Group, which provides industry leadership and influence to bolster skills and competency provisions for Teesside's clean energy projects.

5.3.5 As part of bp's social investment in education to date, bp has worked in partnership with Redcar & Cleveland College to help develop a new Clean Energy Education Hub at the College, which opened its doors in 2023. In September 2023, the College welcomed the first cohort of 21 school leavers onto the Teesside bp-funded Clean Energy Technician Scholarship – a bespoke two-year engineering programme which specialises in developing skills in renewable and low carbon industries. In November 2023, it was announced that bp would be extending the programme to another 20 young Teessiders in 2024.

5.3.6 bp has expanded its collaboration with the Skills Builder Partnership to support schools in Teesside. The programme brings together educators, employers and skills-building organisations around a shared approach to building the essential skills for success. In 2022/2023, the programme reached 192 teachers and 2,050 students across seven schools locally.

5.3.7 bp has supported the University of York's Centre for Industry Education Collaboration (CIEC) *'Children Challenging Industry'* programme. In backing 22 primary schools, the aim of the initiative is for young people to see how scientific concepts are applied from classroom scenarios into real life. In 2022/2023, 17 bp volunteers supported this initiative which has reached 582 students and 187 teachers across 20 schools locally.

5.3.8 In January 2024, bp announced a partnership with social mobility charity *'Career Ready'* to provide employability support and opportunities in the Tees Valley. Together with Career Ready, bp will help provide support up to 40 young people from underrepresented socio-economic backgrounds in the region, ranging from one-to-one mentoring and paid work experience placements to skills masterclasses and workplace visits.

5.3.9 The H2Teesside project stands to bring many benefits to the local area, both from an economic perspective by offering employment opportunities and create highly skilled workforce, safeguarding existing industries in Teesside, as well as by helping to enable a just transition in the Tees Valley through supporting community development initiatives and social mobility. H2T demonstrates its long-term commitment to driving a just transition both regionally and nationally.

6.0 EXPERIENCE OF THE PARTNERSHIP

6.1.1 bp is a large, global, integrated energy company with over 100 years of experience in the delivery and operation of complex, integrated, major energy projects. This includes developing robust tailor-made commercial structures that enable timely project execution and development of resilient operating models.

6.1.2 ADNOC is playing a leading role in the development of clean energy technologies and the decarbonisation of ongoing and future hydrocarbon production, in partnership with other State Oil Enterprises and private international partners. The company joined state-owned Mubadala Investment Company to form the Abu Dhabi Alliance in January 2021, aimed at establishing Abu Dhabi as a leader of low-carbon green and CCUS-enabled hydrogen internationally. ADNOC brings a strong financial basis, experience in hydrogen production and a commitment to decarbonise.

6.1.3 bp and ADNOC announced the formation of a strategic partnership to provide clean energy solutions for the UK and UAE. The two companies intend to continue decarbonising existing oil and gas operations using methane detection, CCUS and pioneering digital technologies. This strategic partnership has the potential to lead to billions of dollars of investment into clean and low carbon energy, creating potentially thousands of energy jobs in the UK and UAE. Leveraging learnings from projects described below ensures deployment of industry-leading capabilities to execute H2Teesside.

6.1.4 The Partnership benefits from significant access to expertise in the field of hydrogen, with relevant experience as follows:

- ADNOC produces over 300 kt per year of Hydrogen in its downstream facilities, mainly based in UAE where it is used for industrial purposes.
- ADNOC announced that it will advance a world-scale 1 million tons per annum CCUS-enabled ammonia production facility in Ruwais, Abu Dhabi. The facility secured a final investment decision in 2023. It will be developed at the new TA'ZIZ industrial ecosystem and chemicals hub.
- ADNOC has delivered pilot cargoes of blue ammonia to customers in Asia and Europe.
- bp is a partner in the ADNOC Onshore joint venture and as part of that joint venture, bp is the technical lead of the Bab field. Bab is one of the largest oil fields in the world. The Bab field is piloting CO_2 injection where the CO_2 is captured at Emirates Steel. It replaces natural gas injection and involves ADNOC and bp working jointly on this complex project through the integration of multiple operating assets in Abu Dhabi.
- bp has experience working with partners to develop and operate CCUS projects, including CO_2 capture and injection in Algeria, Indonesia and as the lead developer of the NEP transport and storage system. bp has a track record of operating hydrogen facilities (producing 370 kt/year, consuming 600 kt/year,

3000 MWth) and in delivering the engineering components of CCUS-enabled hydrogen projects.

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