Humber Zero

Planning for a low carbon future in the Humber

UK's 10 Point Plan for a Green Industrial Revolution



Point 1 Advancing Offshore Wind

Point 2 Driving the Growth of Low Carbon Hydrogen



Point 3 Delivering New and Advanced Nuclear Power



Point 4 Accelerating the Shift to Zero Emission Vehicles

Point 5 Green Public Transport, Cycling and Walking



Point 6 Jet Zero and Green Ships



Point 7 Greener Buildings

Point 8 Investing in Carbon Capture, Usage and Storage



Point 9 Protecting Our Natural Environment



Point 10 Green Finance and Innovation

- Establish 2 industrial clusters by mid 2020's
- 4 industrial clusters and 10 mtpa of CO₂ stored by 2030
- Support for 50,000 jobs by 2030
- £1bn of public investment by 2025
- Savings of 40mt CO₂ between 2023 and 2032*

*approx 9% of 2018 UK emissions



Humber Zero

Immediate, large-scale industrial decarbonisation





() World class partners removing up to 8MT/CO₂ per annum by mid 2020s

() Rapid and cost-effective decarbonisation the Humber Refinery

- Europe's only supplier of graphite coke for EV batteries and consumer goods
- Developing new low carbon liquid fuels, including sustainable aviation fuels

1200 MW of low carbon power at VPI Immingham

- Providing power and steam to industry and grid
- Flexibility and stability services to National Grid

Post combustion and hydrogen hybrid which retains optionality for UK consumers

- Both green and blue hydrogen combined with baseload CCS
- Innovate UK already funding Gigastack with Phillps 66/ITM/Orsted
- Port of Immingham providing transport and low carbon product export market
- Creates 2,500 jobs during construction, 200 permanent jobs, safeguards 20,000 direct and indirect jobs in local industry





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The University Of Sheffield.



national**grid** ventures





Humber Zero

Overall configuration





- > Post combustion capture of heaters and stacks flue gases
- > Amine based licensed technology
- > Shared compression into third party pipeline
- > Hydrogen refuelling of geographically remote heaters
- > Green hydrogen allows earlier deployment



Strategic Fit

CO₂ Transportation & storage



- Humber Zero is the gateway to Humber decarbonisation
- Credible route to at-scale capture from 2026 (8MPTA CO₂ by 2030);
- Repurposing LOGGS 36" trunkline offers route to rapid deployment of CO₂ transport and storage;
- Depleted gas reservoirs with **robust operator-knowledge** of injection, storage and containment potential.



Multiple nearby T&S options available to Humber Zero: Endurance (Equinor/NGV) and Viking, Victor and V field (Chrysaor) storage options available.



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Contribution to UK Net Zero by 2050

Humber Zero a Gateway to decarbonizing Humber Industrial Cluster

- Deployment of multiple technology pathways at scale
 - Post-Combustion Capture, Green and Blue Hydrogen
- Decarbonisation of over 25% of Humber Cluster from Immingham industrial site
- Anchor for multiple offshore CO₂ storage sites under development
 - Endurance (Equinor/National Grid)
 - Viking/Victor and V fields (Chrysaor)
- Connecting Western Humber emitters
- Export / Import potential for CO₂ and low carbon products through ABP Immingham deep water port







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Contribution to UK Net Zero by 2050

Humber Refinery: Building the UK supply chain for EV Batteries and Low Carbon Liquid Fuels



"A core building block on the road to building a UK-based EV battery manufacturing capability"

UK's Advanced Propulsion Centre



- UK Champion in global **Electric Vehicle** value chain
 - Humber Refinery is the only European producer of speciality graphite coke
 - World scale production, equivalent to millions of EV batteries per year
 - Working with UK government and proposed Gigafactories
- First refinery in UK to produce finished fuels from waste
 - Biogenic waste derived feedstock from the UK and overseas
 - Doubling processing capacity by end of 2020
- Working with the DfT on Development Fuels
 - Next generation advanced motor fuels
 - First at-scale deployment in the UK planned at Humber in Q4 2020
- Capable of producing Sustainable Aviation Fuel today
 - Post Defstan update, Humber Refinery plans to deliver UK's first SAF
 - Leveraging existing multi £B refining infrastructure

CCUS at Humber Refinery represents decarbonisation of strategic UK infrastructure

