1. Introduction

Welcome

Welcome to our public consultation on proposals that form part of Humber Zero, a set of large-scale decarbonisation projects with the potential to prevent up to 8 million tonnes of carbon dioxide (CO_2) from the Immingham industrial area entering the atmosphere each year by 2050. The proposals we are consulting on now will provide an immediate reduction in carbon emissions and will preserve jobs in critical industries in the Humber region, maintaining its role as an industrial hub.

We are consulting on the first phase – the introduction of new post-combustion carbon capture technology and infrastructure to existing facilities within the Phillips 66 Limited Humber Refinery and the VPI Immingham LLP Combined Heat and Power Plant. These proposals are a critical component of Humber Zero and will contribute significantly to the overall CO_2 reduction figure. They are expected to collectively prevent up to 3.8 million tonnes of CO_2 from entering the atmosphere each year by 2028.

Your views are important to help us develop our proposals and better understand any potential impacts they may have on you. We'd like to hear what you think, so please read our consultation materials and share your ideas and any questions with us. Information on how you can provide your feedback is given on **Board 8.**

Who are we?

Own and operate the Humber Refinery at Eastfield Road, South Killingholme. The Humber Refinery is one of the most sophisticated in Europe; it is highly integrated, energy efficient and manufactures both fuels and specialist products. It is Europe's only supplier of graphite coke for Electric Vehicle batteries and consumer goods and is a UK leader in the production of lower carbon liquid fuels.

Own and operate the gas-fired Combined Heat and Power Plant located on Rosper Road. The plant operates 24/7 to provide the electricity and steam that is critical to the operation of the neighbouring refineries and also to the National Grid.

Where is Humber Zero?

Humber Zero is a project located within the Immingham industrial area, approximately 1 kilometre from the south bank of the Humber Estuary.

Location of the Phillips 66 Limited Humber Refinery and the VPI Immingham LLP Combined Heat and Power Plant, part of the Immingham industrial cluster

The Humber region is the UK's biggest industrial cluster and biggest industrial emitter, emitting 40% of the UK's industrial emissions.

Our project is strategically placed close to two proposed CO_2 transportation pipelines for taking captured CO_2 offshore for permanent storage (see **Board 4** for more information). It has the potential to play a major role in the decarbonisation of industry and power generation within the Humber region.

2. A low carbon future

What is net zero?

Net zero refers to achieving a balance between the amount of greenhouse gas emissions produced and the amount prevented from entering the atmosphere. When the amount of emissions produced are cancelled out by the amount blocked, the UK will be a net-zero emitter. CO_2 is one of the main greenhouse gases that is damaging to the atmosphere, so reducing CO_2 emissions is a key component of reaching net zero.

The Climate Change Act 2008 committed the UK Government to an 80% reduction in greenhouse gas emissions relative to levels in 1990, by 2050. In 2019, this legally binding target was made more ambitious, with the UK Government needing to reach net zero (i.e. 100% reduction) by 2050. This can only be achieved by reducing emissions across all sectors of the UK economy, including heavy industry.

What is carbon capture?

Humber Zero will reduce industrial greenhouse gas emissions by capturing some of the carbon emissions from the Phillips 66 Limited Humber Refinery and the VPI Immingham Combined Heat and Power Plant and at the source (i.e. before they enter the atmosphere) and compressing them ready for safe storage or export.

The captured carbon will then be taken offshore via a pipeline and stored under the North Sea (more information about this is given on **Board 3**). The carbon will be injected into layers of solid rock filled with interconnected pores, trapping and locking the CO_2 in place, preventing it from being released into the atmosphere.

This overall process is referred to as Carbon Capture and Storage (CCS) and, combined with hydrogen production, is one of the government's tools for achieving net zero in 2050.

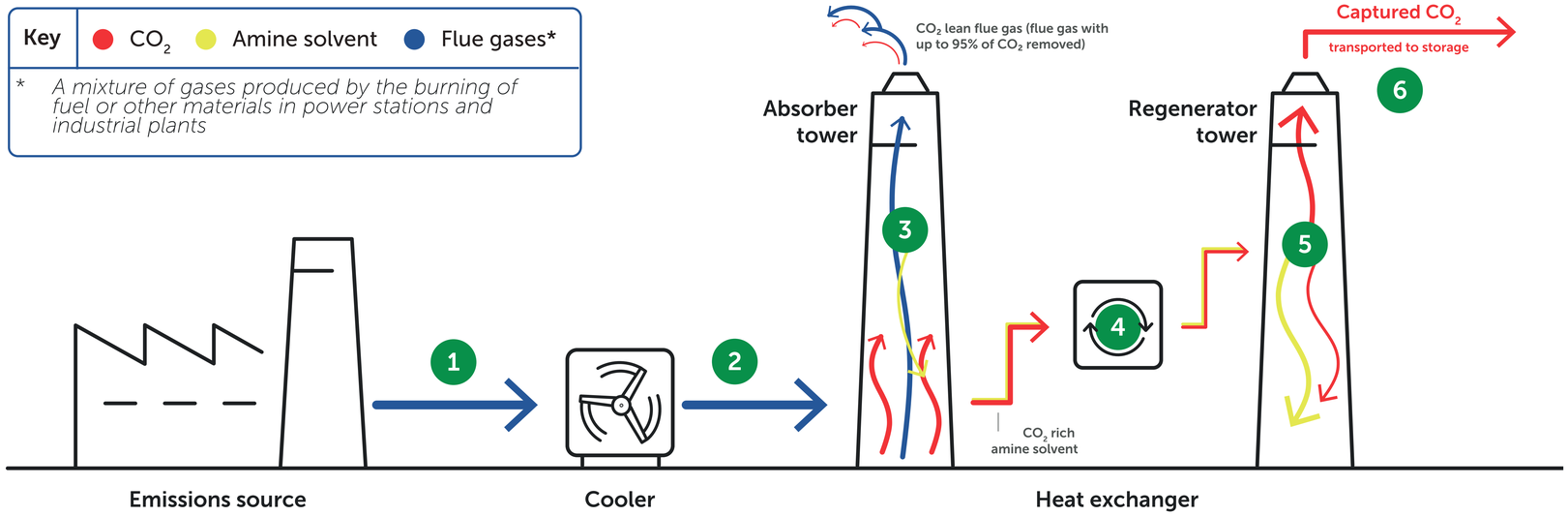
Funding and government support

The UK Government is committed to decarbonising the country's national emissions in order to meet its legal commitment to achieve 'net zero' emissions by 2050. It has a target of capturing 20-30 million tonnes of carbon dioxide a year by 2030 (equivalent to the annual emissions from 4 million cars).

- The UK Government has a ten-point plan to achieve the target and Point 8 specifies the need to invest in carbon capture. In 2020, the UK Government announced a £1 billion Carbon Capture, Usage and Storage Infrastructure Fund that provides industry with the certainty required to deploy this technology at pace and at scale.
- There is a plan to invest in four industrial clusters in areas such as the Humber (as well as in North East England, North West England, Scotland and Wales). These clusters will be the starting point for a new carbon capture industry, which could support up to 50,000 jobs in the UK by 2030.

The steps involved in carbon capture are outlined in the graphic below.

1. Flue gas containing CO_2 leaves the Phillips 66 Limited Humber Refinery and VPI Combined Heat and Power Plant.
2. The flue gas is cooled and treated before entering the absorption tower.
3. Flue gas comes in contact with a chemical called amine and absorbs the CO_2.
4. The CO_2 rich amine solvent is heated in the heat exchanger.
5. The regenerator tower reverses the chemical reaction, separating the CO_2 from the solvent.
6. The pure CO_2 is transported via a pipeline to a permanent storage facility, or for export.



3. What is Humber Zero?

Our vision

Our vision for Humber Zero is driven by our two aims of decarbonising critical industry and protecting the local economy.

Humber Zero is a set of decarbonisation projects with the potential to prevent up to 8 million tonnes of CO_2 from entering the atmosphere each year by 2050. Our proposals are the first phase of this and will adapt existing industry, safeguard jobs and create opportunities in the lower carbon economy.

Local context

- The Humber region produces many of the everyday products we take for granted in the UK, from construction materials to chemicals, food to fuel. The region generates 20% of UK's electricity and produces a third of the UK's fuel.
- Estimated emissions from Humber industries were 14.8 million tonnes of CO_2 in 2017, plus a further five million tonnes emitted from a number of power generators in the region.
- There are 55,000 jobs in the manufacturing sector in the region and 20% of the economy derives from energy intensive industry. The sector provides around 15% of local jobs and 23% of the gross value added to the local economy.

Project statistics

- Prevention of up to 3.8 million tonnes of CO_2 from entering the atmosphere each year by 2028 – a significant proportion of the UK government's national target.
- Total creation of up to around 2,500 jobs during construction, up to around 200 permanent jobs and safeguarding of up to around 20,000 direct and indirect jobs in the Humber region.
- Total investment of £1.2 billion in the initial phase.

Funding and government support

Humber Zero is seeking access to a number of funding streams to support the development of carbon capture. This project could deliver a significant proportion of the government's national target by 2030, and will see investment of around £1.2 billion to develop the carbon capture phase.

In March 2021, UK Research and Innovation (UKRI) announced that the Industrial Strategy Challenge Fund awarded around £12.5 million from for the front-end engineering design (FEED) stage of the project. Phillips 66 Ltd and VPI are match funding a further £12.5 million in total.

The proposals

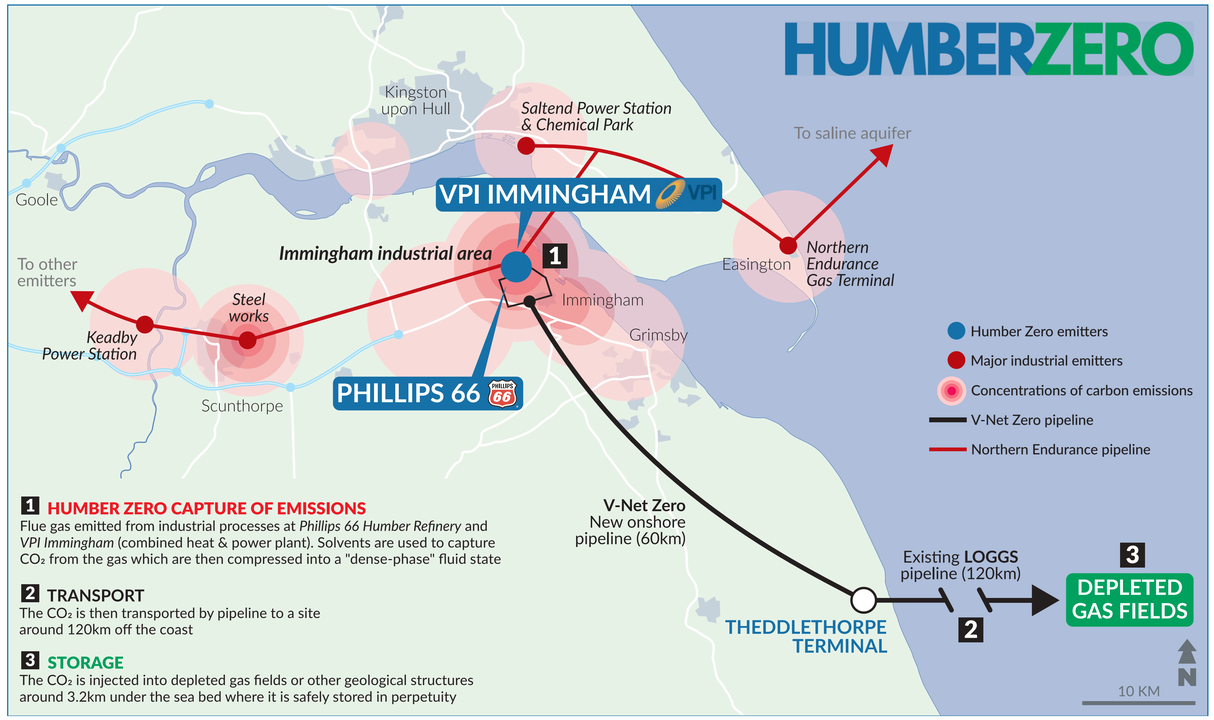
Our proposals will retrofit carbon capture and storage technology into some of the processes at the Phillips 66 Limited Humber Refinery and the VPI Immingham Combined Heat and Power Plant.

Post-combustion, the CO_2 emissions from some of the processes at both facilities (which are normally released to the atmosphere as a greenhouse gas) will be captured at the source and compressed. The CO_2 will then be transported off site via one of two pipelines (separate independent projects that are also under development by other companies, shown below) for storage under the North Sea.

In particular, Humber Zero will deliver post-combustion carbon capture plants:

- within the Phillips 66 Limited Humber Refinery for the Fluid Catalytic Cracker; and
- for two of the gas turbines and auxiliary boilers within the VPI Immingham Combined Heat and Power Plant.

Each of the plants will have its own CO_2 compression facilities.

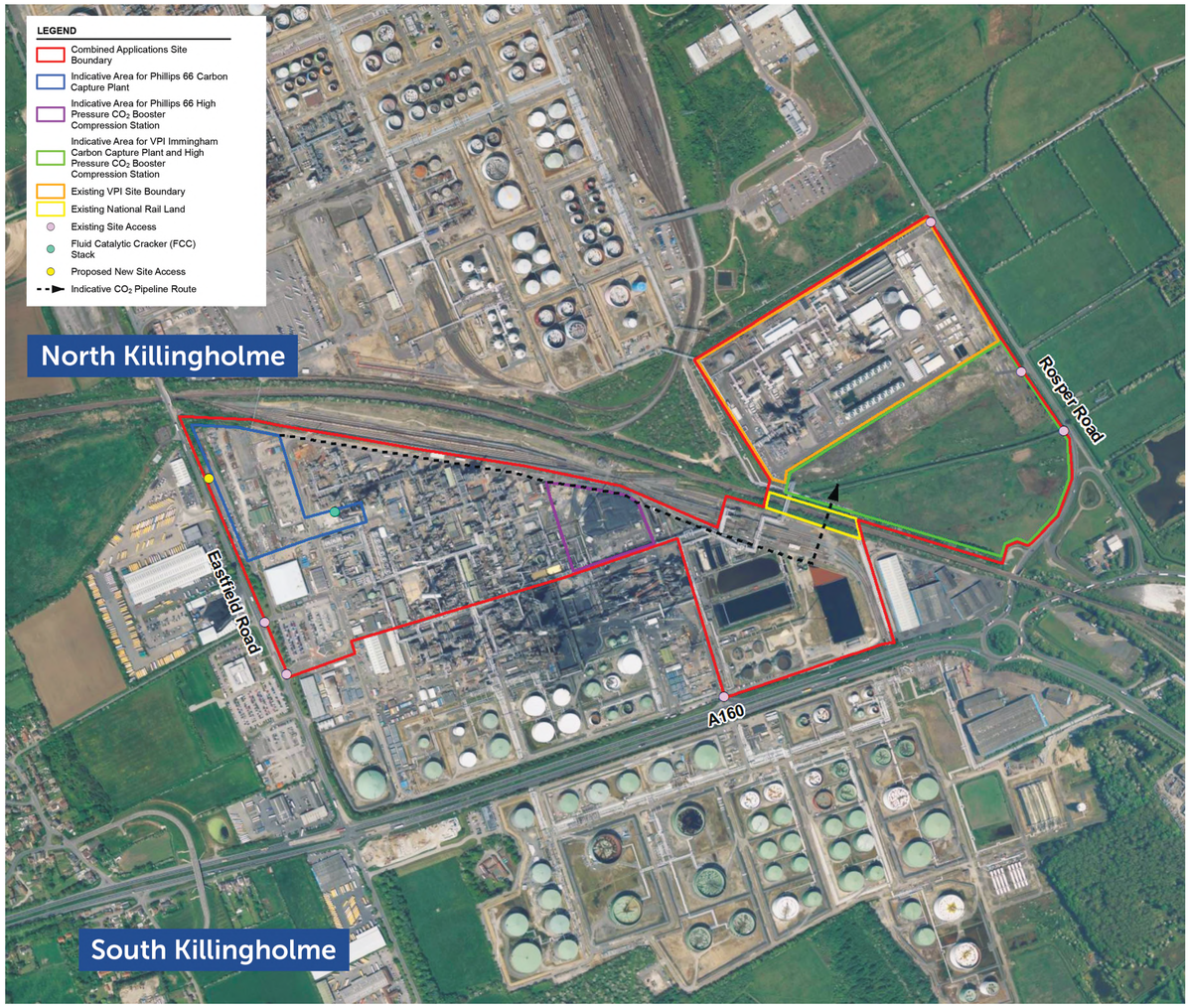


Humber Zero facilities and potential connections

4. What is Humber Zero?

The proposals (continued)

The plan below shows indicative locations for the proposed post-combustion carbon capture plants and CO_2 compression facilities. You can view visualisations showing how the facilities may look as part of this consultation.



Location of proposals within the site boundary

Construction management

Construction is expected to start in late 2023 (you can see the full project timeline on **Board 8**).

We always aim to minimise any disruption during construction by coordinating with other projects planned in the area and communicating details with local residents, businesses and road users well in advance.

We will also use modular methods of construction, taking road restrictions for loading into account. Building the modular elements will remain local as far as possible, securing local jobs, which also helps to reduce our carbon footprint.

Construction materials will be transported via the docks, where possible, to reduce the impact on local traffic movement.

For the absorber tower, we will use a slip form concrete method, which is quick and continuous.

These construction methods mean that we would expect construction to be complete in two to three years.

5. Benefits of Humber Zero

Our proposals will have significant environmental, economic, and social benefits for the Humber region and the UK as a whole. This will include preventing carbon emissions reaching the atmosphere, improving local green space, providing job and training opportunities for local people, as well as future-proofing current jobs and driving inward investment.

Quick facts

The Humber region generates 20% of UK's electricity

The Humber region can produce a third of the UK's fuel

Total creation of around 2,500 jobs during construction, 200 permanent jobs and safeguarding of around 20,000 direct and indirect jobs in the Humber region

The Humber Refinery is Europe's only supplier of graphite coke for electric vehicle batteries

Prevention of up to 3.8 million tonnes of CO_2 from entering the atmosphere each year by 2028 – a significant proportion of the government's national target

Environmental benefits

- **Lower carbon emissions contributing to net zero carbon**
  Our carbon capture proposals help to reduce carbon emissions, actively contributing towards the national net zero carbon target (see **Board 2** for more information).

- **Improve local air quality**
  Our proposals will contribute to lower overall pollutant emissions (So_x, NO_x and dust), improving local air quality.

- **Biodiversity net gain**
  Our proposals will mitigate for the loss of habitats from the development areas and also enhance habitats to achieve a 10% net gain of biodiversity value, as measured by a standard metric.

  We are exploring options that will either enable us to increase biodiversity value on site or in the wider area.

Social benefits

- **Supporting the development of new skills**
  Delivering initiatives to upskill local people to enter the industry and offer long-term career opportunities. We will do this by supporting science, technology, engineering and mathematics (STEM) through local careers events, mentoring students and offering apprenticeships, work experience and site visits. Alongside this we will also promote opportunities for women in engineering.

Economic benefits

- **Future proofing highly skilled, local jobs**
  This phase of Humber Zero will not only create jobs during its construction and when the facilities are operational, but will also safeguard existing highly skilled local jobs. By decarbonising, Humber industry will continue to thrive and will also be able to remain competitive with other similar industries around the world.

- **Support local supply chain**
  Phillips 66 Limited and VPI Immingham LLP are major contributors to both the local and national economy. Local contract companies support us by providing everyday services and products from facilities and catering to fabrication and skilled labour, which support jobs in the extended supply chain.

  In order to sustain itself and remain competitive, our proposals will decarbonise the industry, safeguard jobs in the local economy and supply chain, and enable the provision of decarbonised power to businesses and homes across the region.

  In the construction phase, we will use local suppliers where possible, to further support the local supply chain.

- **Drive inward investment**
  Our proposals are a significant step towards making the UK a global leader in lower carbon technologies. So far, £12 million government investment will support the project, match funded by Phillips 66 Limited and VPI Immingham LLP with a further £12.5 million.

6. Managing local impacts

Our approach

We understand our responsibility to consider and minimise the impact our work has on our neighbours, our staff and the environment. This means safety will always be our number one priority and that we will have rigorous safety procedures in place during construction and once operational, and will also carefully consider our impacts on the local environment.

The following sections set out our approach to safety, as well as some of the surveys we have undertaken to support an environmental assessment for the scheme. This assessment will look at the likely significant effects of the development on the environment and help ensure that suitable measures to minimise them are included within the overall scheme.

Our assessment will consider topics such as traffic, noise and vibration, air quality, visual impacts, landscape, heritage, ecology and water. Full information on all of these will be included as part of the planning application.

Safety is a priority

Phillips 66 Limited and VPI Immingham LLP consider the safety of workers and the public to be the top priority in the ongoing operation of the facilities and in the development of Humber Zero.

As critical industries that are already subject to regulations, and we have rigorous safety management systems in place to manage the hazards and risks of our processes and activities.

This level of rigour will be applied to the development of the Humber Zero project, including through the construction phase, to ensure the safety of everyone affected by our operations.

We pride ourselves on industry-leading safety performance and are committed to maintaining this performance through the execution and operation of Humber Zero.

Air quality

We are currently undertaking monitoring at 10 locations within 2 kilometres of the site, to determine the background concentrations of Nitrogen Dioxide (NO_2) in the area. The monitoring will be carried out for three months and this will help us understand the background context for the scheme, and any impacts the proposals will have on it.

Air quality impacts during construction will likely only affect neighbouring industrial land. Standard practice measures during construction will help minimise any impacts, including dust suppression (dampening) and minimising emissions from on-site plant and vehicles (such as turning off engines when not in use, prioritising delivery by rail, if possible, and prioritising electric- or battery-powered plant).

Noise

Phillips 66 Limited and VPI Immingham have years of experience managing large projects. We will be considerate neighbours during construction and minimise impacts though good site practice and other techniques agreed with the local council.

To inform this, we are currently undertaking noise monitoring around the site in locations agreed with the local authority, and this will help us understand the background context. The impacts of the proposals on local air quality will then be determined using computer modelling.

Ecology and biodiversity net gain

We have undertaken habitat surveys and surveys for over-wintering and breeding birds, invertebrates, great crested newts, reptiles, bats, water voles, otters and badgers to help ensure that any required mitigation can be provided. There is very limited ecological habitat within the development areas at the Phillips 66 Limited Humber Refinery, whereas the development area for the VPI Immingham LLP carbon capture plant comprises mainly grassland and scrub.

On top of environmental initiatives already delivered by Phillips 66 Limited, VPI Immingham LLP are considering opportunities to provide biodiversity net gain. This could comprise new habitat creation and/ or improvements to existing habitats within and near to the development site.

Ecology survey

7. Future phases and wider context

Our vision

The Humber region emits more CO_2 than any other industrial cluster in the UK – 50% more than the next largest – which provides significant opportunity to shift towards a lower carbon future. Our vision is to play a key role in decarbonising the region, both through this project, future Humber Zero proposals, and working closely with other stakeholders in the local area.

Our proposals form part of a wider vision for the region, which will see a number of projects in areas with high concentrations of heavy industry working alongside each other to accelerate efforts to create a decarbonised industrial cluster and contribute to the UK's goals for a green industrial revolution and reaching net zero.

Future carbon capture

The current proposals are only the first phase of carbon capture on the the Phillips 66 Limited site. Following further consultation, applications and approvals, we intend to install further carbon capture plants to prevent even more carbon from entering the atmosphere.

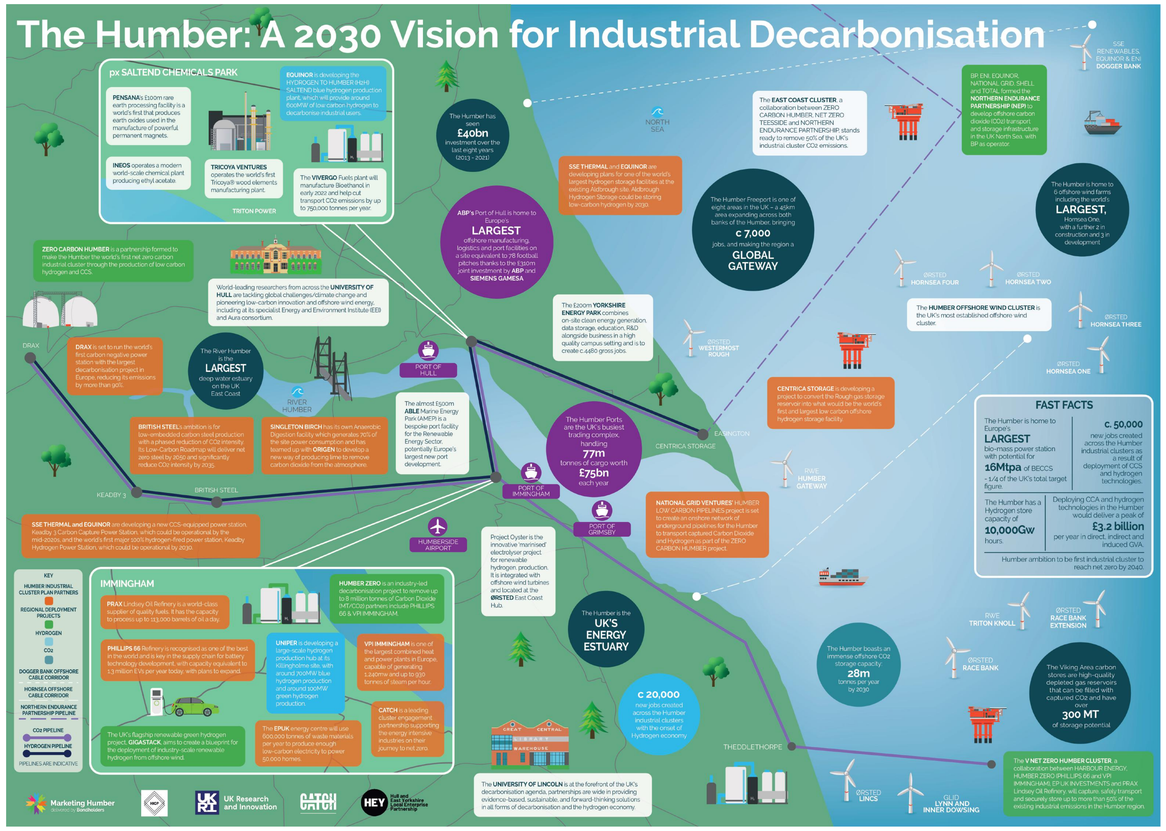
Hydrogen strategy

Hydrogen production is a major part of the future ambitions for Humber Zero. This will happen at a brand-new facility adjacent to the current VPI Immingham power station and will provide decarbonised electricity for industry and up to a million homes.

The Humber Industrial Cluster Plan

Humber Zero is part of the Humber Industrial Cluster, a consortium of the region's largest emitters of carbon, plus local authorities and other key stakeholders. Following a plan set out by UK Research and Innovation (UKRI), the Humber Industrial Cluster Plan sets out the optimal route to decarbonise areas with high concentrations of heavy industry by 2040.

The developments included within the Plan are promoted by some of the primary emitters in the area, including Phillips 66 Limited, VPI Immingham LLP, Prax Lindsey Oil Refinery, and EP UKI Investments as well as by local authorities. More information about the Plan can be found at www.humberindustrialclusterplan.org/.



Decarbonisation projects across the Humber

8. Next steps

Public consultation

Feedback gathered from this public consultation will be used to inform the development of our proposals where possible. The feedback will be summarised in a Consultation Report.

Thank you for taking the time to view our consultation materials. To find out more and have your questions answered by our project team, you can attend one of our in-person or digital events.

Planning applications

We will submit separate planning applications to the Local Planning Authority, North Lincolnshire Council, for the respective carbon capture plants and their associated works. Once the planning applications are submitted, consultees and members of the public will be able to read and comment on the proposals and supporting information (including the Consultation Report and Environmental Statement) on the Council's planning portal.

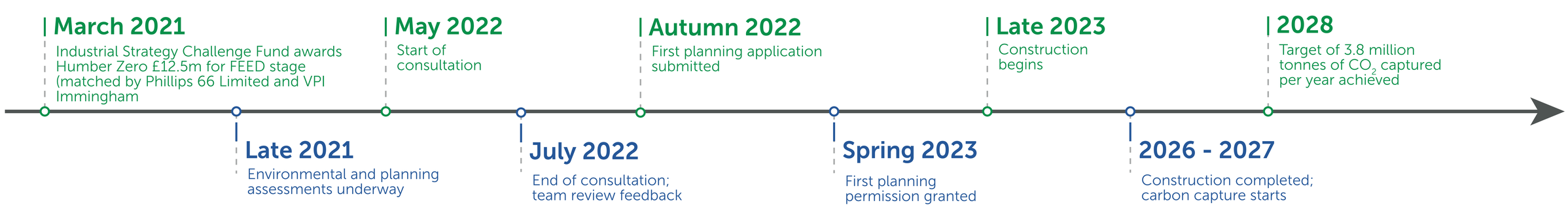
Venue	Date	Time
Ashbourne Hotel, Vicarage Lane, North Killingholme, DN40 3JL	Wednesday 8 June	3pm - 6pm
Immingham Civic Centre, Pelham Road, DN40 1QF	Saturday 11 June	11.30am - 2.30pm
South Killingholme Community Centre, Moat Lane, South Killingholme, DN40 3EU	Thursday 16 June	11am - 4pm
Online - visit humberzero.consultation.ai	Tuesday 21 June	10am - 11am
Online - visit humberzero.consultation.ai	Thursday 23 June	10am - 11am

You can respond to the consultation until **11.59pm on 7 July 2022**. You can do this using the channels below.

https://www.humberzero.co.uk/humber-zero-community-news/ | consultation@humberzero.co.uk | Freepost HUMBER ZERO CONSULTATION

Project first phase timeline

The indicative timeline below sets out Humber Zero's key project milestones. Please note that successful delivery of the project will depend on key funding decisions, as well as the necessary planning approvals.



Indicative timeline of key project milestones