

# THE CCUS HUB PLAYBOOK

A guide for regulators, industrial  
emitters and hub developers

## THE ROLE OF CCUS HUBS



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### WHAT IS A CCUS HUB?

A CCUS hub takes carbon dioxide from several emitting sources, such as heavy industries and power, and then transports and stores it using common infrastructure. A CCUS hub can be more complex to establish than a CCUS value chain on a single point source, managed by one company; but CCUS hubs bring many benefits, including lower unit costs, reduced risk and the ability to standardize and scale up quickly. For emitters, the hub offering opens up CCUS as a decarbonization option without them

having to take responsibility for building pipelines and drilling storage wells and without long-term liability for the stored carbon dioxide.

Most CCUS hubs will be based around industrial clusters, where emission sources are close together, as in Net Zero Teesside, Rotterdam or China Northwest. But some will be geographically scattered, collecting emissions sources by pipeline or ship, as in Northern Lights in Norway.

### WHAT ARE THE ADVANTAGES AND DISADVANTAGES OF A CCUS HUB OVER A SINGLE PROJECT?

- ✓ **Faster scale up.** CCUS must expand rapidly to play a role in reaching climate goals. At present, the average large-scale CCUS project captures and stores around 1 Mt of carbon dioxide per year. Early CCUS hubs are aiming to capture around 5-10 Mt a year or more by 2030 and expect exponential growth. Future hubs are likely to be even larger.
- ✓ **Lower costs and investment risks.** Collective transport and storage infrastructure bring economies of scale in construction and operations, specifically in compression, dehydration, pipeline and storage. At the same time, shared lessons and standardization will bring down the costs of carbon capture and reduce risk. In the early stages of appraising potential new storage sites for hubs, sharing costs and risks make it simpler to get started in areas that have not been developed.
- ✓ **More government support.** A hub can decarbonize an entire industrial region, saving jobs and attracting clean new industries. With such social and economic benefits, on top of its contribution to meeting climate goals, a hub is much more likely than an individual project to gain government support. Efforts to create hubs in the UK, for example, have ensured that the government develops policy incentives for emitters and operators. The Norwegian and

Dutch governments worked to change European regulations on the cross-border export of carbon dioxide, and both Northern Lights and Porthos attracted large-scale EU funding. The Northern Lights JV has gained support from standard setter Verra and emitting industries to take a new look at carbon accounting for CCUS. The four CCUS projects that received support from the EU Innovation Fund in 2021 are all connected to a hub.

- ✗ **Complexity.** This is the main disadvantage – and the reason we have set up this platform. A CCUS hub is a multi-stakeholder undertaking, which magnifies the need for careful communication and alignment between partners. Decisions on commercial relations, risk management and long-term investments must all be agreed between emitters, operators and government – who are all acting with different drivers and timescales. Countries that are pioneering hubs, such as the UK, Norway and the Netherlands, are building on years of frustrating attempts to get large-scale CCUS off the ground. They have learned lessons from these failures and are now applying them to make CCUS hubs a reality.

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## WHAT CONDITIONS HAVE DRIVEN HUB DEVELOPMENT SO FAR?

Three conditions have come together to enable the development of the three most advanced CCUS hubs around the North Sea in Europe.

**1. Confidence that storage capacity exists**, due to previous work on CCUS and the involvement of companies with subsurface and transportation experience.

- Northern Lights/Longship in Norway built on [lessons learnt](#) from over 20 years of experience storing carbon dioxide under the North Sea.
- Net Zero Teesside in the UK built on the White Rose project which focused on the Endurance reservoir that is now being used by the hub's transport & storage operator, Northern Endurance Partnership.
- Porthos in the Netherlands is based on the ROAD project in the Port of Rotterdam, and carbon dioxide suppliers Shell and ExxonMobil have engaged their upstream subsurface engineers to build confidence in storage capacity.

**2. National and regional support** to incentivize and build confidence for the large, high risk capital investments initially required.

- In Northern Lights/Longship, the Norwegian government has committed to national political objectives for CCUS and, in the first phase, is subsidizing 80% of investment costs for both emitters and transport and storage infrastructure.
- In Net Zero Teesside, both regional and national authorities are politically committed to supporting the region and its industry base through the energy transition.
- In Porthos, the Port of Rotterdam wants to position itself as a clean industrial hub and national authorities are committed to industrial decarbonization.

**3. Understanding of the CCUS hub value**

**proposition** by a group of stakeholders involved in knowledge building and lobbying – smoothing the pathway and creating a broader ecosystem.

- Knowledgeable ministers have driven support at the top of the house. In Norway, governments and industry learned how they needed to work together from [failed attempts](#) to start CCUS facilities in the 1990s.
- Industry associations have brought things together at lower levels – such as the Energy Technologies Institute (ETI) and the Carbon Capture and Storage Association (CCSA) in the case of Net Zero Teesside.
- Cross-national engagement between ministers and policy makers from Norway, the UK and the Netherlands who talk frequently to exchange information, provide support and explore how a potential network of linked projects can be created to reduce costs and risks.

In **North America**, CCUS ecosystems have also developed in areas such as the US Gulf Coast and Alberta, where the Quest CCS facility has operated for over six years. In the US, CCUS evolved initially in relation to enhanced oil recovery projects but is increasingly being seen as part of low carbon business transformation.

- Multi-stakeholder coalitions have been responsible for developing and shepherding the 45Q carbon storage tax credit legislation through the US Federal Government legislative process and building knowledge among policy-makers.
- Knowledge sharing by groups of emitters and potential hub developers, including OGCI, has been crucial to get state-level support and regulations in place and to help industrial emitters understand the options.