



ENERGY-INTENSIVE INDUSTRIES ECOSYSTEM: CARBON CAPTURE AND STORAGE TECHNOLOGY

DEFINITION

Carbon capture and storage (henceforward CCS) is a set of technologies aimed at capturing, transporting and permanently storing CO₂ that would otherwise be emitted into the atmosphere. CCS plays a vital role in reducing emissions from various energy-industries such as steel, cement, chemicals and refining, and there are more and more examples appearing of such companies turning to this technology to reduce their contribution to global warming. This method has been acknowledged as a necessary component of Europe's climate strategy by EU authorities, who recognise the challenges of transitioning the continent's most polluting industries to complete emission reduction by 2050.

SME SIGNIFICANCE

The data on CCS are unreliable and incomplete, in part because of rapid developments in the industry, the shortage of market intelligence and the lack of a uniform definition of what activities are part of the value chain. Most of the available information focuses on the activity of large emitters, which are generally too large to be classified as SMEs, and on large energy firms that are active in the technology development infrastructure roll-out. The information below is therefore, a very rough estimate, focusing on a narrow definition of the value chain.



NUMBER OF SMEs IN THE EU27 VALUE CHAIN

ca. 50

SHARE OF SMEs OVER TOTAL

35%

ADDED VALUE OF SMEs OVER TOTAL

5%

CCS EU VALUE CHAIN



PHASE 1

CARBON CAPTURE

- European companies are engaged in developing and implementing technologies to capture CO₂ from industrial processes and power generation.
- Technologies such as post-combustion capture, where CO₂ is removed from flue gases, are prevalent in the EU.



PHASE 2

TRANSPORT OF THE CARBON TO STORAGE SITES TO STORAGE SITES

- Once captured, CO₂ needs to be transported to storage sites or utilisation facilities. European firms play a significant role in developing infrastructure to transport CO₂ via pipelines or ships. This is largely done by big (energy) firms such as Equinor in Norway.



PHASE 3

CARBON STORAGE AND, OPTIONALLY, CARBON UTILISATION TO STORAGE SITES

- European entities are at the forefront of geological storage solutions, where carbon is injected into underground geological formations and active in developing and utilising captured carbon in industrial processes such as cement making.

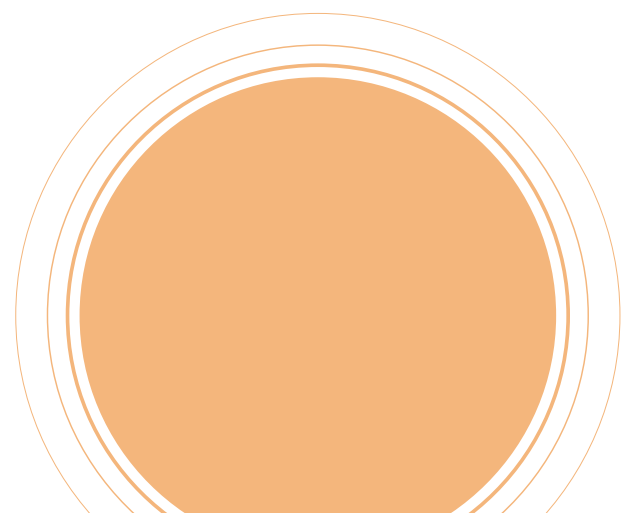
STRENGTHS AND VULNERABILITIES

EU STRENGTHS

- The industry is in **full expansion** and the EU is poised to remain a world leader. According to one estimate, fully 1.4 million people will be employed in the value chain by 2040, a significant number of which is expected to be in Europe.
- **Many projects** to develop the CSUS industry are currently underway in Europe.
- **Start-up activities** are relatively strong in the EU, as well as research capabilities, indicating a possible strong position once the industry matures.

EU VULNERABILITIES

- Most of the sites for the storage of carbon are close to the North Sea in the North-West of the EU. This puts a brake on the development of the industry in other parts of Europe. Especially for smaller emitters, the **transportation costs across long distances** are a barrier to participating in carbon capture and storage schemes.
- The industry is very nascent and it remains **unclear whether the targets are realistic**, what technology will prevail and what policies work best. The projects are typically in a pilot or early stage of development.
- The **USA** are the global leader, and its position is likely to become stronger thanks to very generous government interventions (see below).



EXAMPLES OF POLICY MEASURES INTRODUCED TO ENHANCE OPEN STRATEGIC AUTONOMY

EU


- The **Innovation Fund** has increasingly incorporated CCUS projects, starting from four of the seven projects in its initial call in November 2021 to seven out of 17 projects by mid-2022. By November 2023, the fund's commitment expanded, dedicating EUR 4.8 billion to drive cleantech innovation, highlighting the escalating focus on decarbonisation technologies.
- Horizon Europe is another key pillar of support at the EU level. This includes **Horizon Europe Cluster 5**, which bolsters CO₂ capture technology development and integration into various industry sectors, and Cluster 4, which addresses CCUS within the scope of industrial ecosystems and circularity.

MEMBERS STATES

- **France:** The French government has introduced a CCUS strategy to implement CCUS technologies across key industrial areas. This initiative involves a support scheme using Contracts for Difference to facilitate decarbonisation projects, with the first competitive tender anticipated in early 2024. The strategy also prioritises diversifying CO₂ storage solutions to boost national sovereignty and industrial competitiveness, with preliminary exploration and injection tests set to commence soon. Furthermore, the government is promoting the adoption of CCUS technology through awareness campaigns and is establishing partnerships with European nations to secure industrial markets, with a particular focus on CO₂ valorisation for sectors such as aviation and maritime.
- **Germany:** It is developing a strategy to support CCUS for large emitters where abatement is hard to achieve. This would entail the rapid development of a robust legal and financial framework to facilitate the adoption of CCUS technologies, cross-border collaboration, infrastructure development innovation and research support.

EXTRA-EU

- **USA:** The government provides significant support for the CCUS. Key elements include:
 - **Funding for R&D:** The Department of Energy (DOE) has allocated USD 131 million for R&D projects and an additional USD 110 million for projects that capture and store carbon dioxide from industrial and power generation sources.
 - **Demonstration and Deployment Programs:** The DOE's Office of Clean Energy Demonstrations oversees the Carbon Capture Demonstration Projects Program, which has been endowed with USD 2.5 billion to support the demonstration and deployment of carbon management technologies. These projects aim to showcase new technologies in real-world settings and reduce costs through technological advancements and economies of scale.
 - **Tax Credits:** The US government offers financial incentives such as the 45Q tax credit, which provides a fixed payment per ton of captured carbon dioxide that is sequestered or utilised. This credit has been significantly enhanced under the Inflation Reduction Act, increasing its value and making it more accessible, in particular to SMEs.
- **UK** has launched a strategic initiative to develop CCUS clusters across the country to establish a world-leading CCUS industry in the UK by the mid-2020s. The cluster sequencing process is designed to ensure the development of CCUS in a coordinated way that aligns with industrial and regional growth strategies.



POLICY RECOMMENDATIONS TO MAXIMISE SME OPPORTUNITIES AND REDUCE RISKS IN OPEN STRATEGIC AUTONOMY

Supplement large-scale storage sites close to the North Sea with **smaller, modular sites dispersed across Europe**. Smaller sites have the added advantage of allowing more SMEs to be active.

Establishing a regulatory framework that supports the development of CO₂ transport and storage infrastructure, along with viable business models, is critically important. The EU Industrial Carbon Management Strategy needs to be fleshed out, especially because the CCS market would probably entail the export of CO₂ from the EU producers with few facilities towards EU member states with excess storage facilities. Smaller businesses typically operate with limited resources and tighter budgets, making them more vulnerable to uncertainties and changes in the regulatory landscape.

More targeted investments are also needed. Even if SMEs are not directly involved in their development, such investments will open up opportunities for start-ups and smaller companies.

The **Innovation Fund**, as well as other support schemes, are major catalysers to developing the market and, in particular, making the transition from science to a commercially viable business plan. At the same time, participating in these support schemes is time-consuming and requires specific expertise that reportedly represents a major barrier for smaller firms to participate. Any measures to make these sources of financing more accessible to SMEs are welcome in this respect.

Finally, there is a need to develop **market intelligence**. The EU could conduct a mapping exercise of companies active in the industry, broadly defined, following the lead of the UK, which developed this in 2021. This would make it easier to set the right policies and to foster closer collaboration within the ecosystem, in particular when it comes to SMEs, whose role is currently not very visible and may be understated.

Data sources:

https://setis.ec.europa.eu/carbon-capture-utilisation-and-storage-european-union-0_en
<https://www.oxfordenergy.org/wpcms/wp-content/uploads/2023/10/Carbon-Capture-Usage-and-Storage-the-new-driver-of-the-EU-Decarbonization-Plan.pdf#:~:text=URL%3A%20https%3A%2F%2Fwww.oxfordenergy.org%2Fwpcms%2Fwp>
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