EU Policy Factsheet

May 2024

Energy Transitions Commission

Scaling up Carbon Capture, Utilisation and Storage (CCUS) in the EU

Overview

- **CCUS remains a contentious issue in the EU, but this debate risks distraction. While CCUS will not be a substitute for significant reductions in fossil fuel use, it will be a vital but limited part of the transition to net-zero.**
- **With the release of the Industrial Carbon Management Plan, storage goals under the Net Zero Industry Act, and the adoption of the Carbon Removal Certification Framework, the EU is poised to accelerate investment in CCUS and associated infrastructure.**
- **Robust and solid policy support to the industry is required to ensure that CCUS solutions get off the ground in time to hit 2030, 2040 and 2050 targets.**
- **At the same time, CCUS must not be used to delay fossil fuel phase-out or to incentivise solutions where other low-carbon alternatives are available and cost-competitive.**

There is a vital but limited role for carbon capture and carbon removal in the EU's journey to net-zero.

CCUS has been a contentious issue, raising concerns about legitimising a far greater than optimal future role for fossil fuels and delayed climate action, or about the technical unfeasibility or inefficiency of CCUS solutions.

The ETC believes that CCUS will need to play a vital but limited role in the transition to a net-zero economy.[1] Low-carbon electricity, clean hydrogen and sustainable use of bioresources are likely to provide the majority of emissions reductions to 2050, seeing global fossil fuel demand fall rapidly. Globally, coal demand is expected to fall by 80–85% from 2022 levels, oil by 75–95%, and gas by 55–70%.[2] Alongside, both CCUS and carbon removals will be necessary for the EU to reach net-zero emissions by 2050.

- **CCUS** on emissions point sources of CO_2 will be required to:
  - Decarbonise those sectors where alternatives are technically limited (i.e. industrial processes which by their nature produce CO_2 such as cement).
  - Provide a low-cost decarbonisation solution in some sectors and geographies where CCUS is economically advantaged relative to other decarbonisation vectors locally.
- **CCUS** will also be required to deliver some of the carbon removals that are required in addition to rapid decarbonisation if global climate objectives are to be achieved:
  - These will be required to limit overshoot of the carbon budget, especially due to slower progress on emissions reductions between now and mid-century. Carbon removals will thereby help compensate for less than 100% CCUS capture rates and at very limited levels to offset any remaining unabated use of fossil fuels where alternatives / CCUS are not feasible. Engineered carbon removals can rely on similar technologies to CCUS and share transport and storage infrastructure.[3]

Storage should be prioritised, and utilisation must be done correctly.

Carbon captured from CCUS can be stored safely underground or used as feedstock in low-carbon industrial processes. In most cases, storing CO_2 is likely to be cheaper than using it. Utilisation will also play a part in the journey to net-zero. Very long-term utilisation, for example, where captured CO_2 is embedded in materials (e.g., cement), can result in the net reduction of emissions.

Short term utilisation may be necessary to decarbonise specific sectors: for example, use in synthetic fuels for long-distance aviation and shipping still leads to the release of CO_2 into the atmosphere. This can lead to net-zero emissions only when the CO_2 released was derived from capture from the atmosphere. Technical standards must be in place to ensure that this results in net-zero emissions.[4]

Even if CCUS only plays a limited role compared to other decarbonisation technologies, scaling capacity will be challenging.

In 2023, there were only 2.7 million tonnes of CO_2 per annum (Mtpa) of injection capacity available in Europe compared to the EU target of 50 $MtCO_2$ by 2030.[5] A key bottleneck for CCUS investments is the unavailability of operating CO_2 storage sites in Europe. In January 2023, the storage capacity put on the EU market was oversubscribed close to 20 times.[6] There is a need for a massive and urgent scale up of investment and deployment.

Beyond meeting stated targets, deployment of CCUS in the 2020s will be essential to demonstrating that projects at industrial scale can achieve the necessary capture rate (e.g. 90%+) at acceptable cost. The Commission highlights that the speed of deployment of CCUS is one of the key factors to enable the EU to reach a 90% reduction of emissions by 2040.[7]

The EU has sent a strong policy signal with the Net Zero Industry Act and the Industrial Carbon Management Strategy, and must continue to drive CCUS deployment.

The Net Zero Industry Act identifies CCUS as one of eight critical net-zero technologies for Europe to achieve its climate goals and sets an ambitious target for Europe to achieve 50 $MtCO_2$ of annual capture and storage capacity by 2030. The Industrial Carbon Management Plan commits the Commission to developing a supportive regulatory framework and exploring funding mechanisms for industrial carbon management projects.

Carbon pricing and novel funding mechanisms can make for stronger investment cases.

As the EU has committed to scaling up CCUS, now is the time to advance innovative and ambitious regulatory support to stimulate investment. Strengthening the EU Emissions Trading Scheme (ETS) will be critical to supporting the rollout of CCUS technologies in the EU, as at high enough CO_2 prices, the cost of capturing, transporting, and storing the CO_2 becomes cheaper than paying for ETS allowances.[8] The removal of free ETS allocations from heavy industry, coupled with the Carbon Border Adjustment Mechanism (CBAM), which applies carbon pricing to imports as protection against the loss of carbon-intensive industries to regions with less stringent regulatory regimes, could incentivise heavy industry to invest in CCUS technologies.

Some additional de-risking and policy support may also be required:

- The employment of carbon-contracts for difference[9] in Germany, for example, which guarantee a certain carbon price for low carbon projects, making CCUS projects more financially stable over time.
- Policy support can also benefit CCUS projects with the coordinated development of shared infrastructure, which bring together multiple CO_2 emitters/off-takers and at least one storage operator, through shared transportation.
- Cross-border coordination: policy is already helping to enable cross-border projects between European countries. In March 2024, Denmark and France signed a new arrangement removing a key international regulatory barrier, making it possible to transport and store CO_2.[10]

While carbon removals should be considered distinct from CCUS,[11] the recently adopted EU Carbon Removal Certification Framework sets the stage for further certification of carbon molecules to ensure that the source is sustainable. By certifying CCUS projects that permanently store captured CO_2 directly extracted from the air (e.g., through Direct Air Capture), the framework can incentivise this specific form of CCUS, triggering investment into carbon transport and storage infrastructure, and contribute to the EU's overall carbon removal goals. Over time, the EU should consider integrating a limited level of carbon removals in its ETS.[12]

The EU must address regulatory uncertainties to avoid deterring investors.

Providing enabling conditions for a carbon market: Policy must support the achievement of the prices needed for a functioning CCUS market through mechanisms such as carbon pricing and emission caps and creating demand for use. The Fuel EU Sustainable Aviation Fuel mandate, for example, creates long-term demand for synthetic fuels, the creation of which requires capturing and transporting CO_2 molecules.

Faster permitting: The current permitting process for CCUS projects can be lengthy and complex. Clearer regulations and standardised procedures across member states can expedite project development.

Regulation for public infrastructure: A comprehensive regulatory framework for CO_2 transportation infrastructure, including pipelines and storage sites, is lacking. This framework should address issues like liability, ownership, and access rights.

Safety standards and monitoring: Storage in geological formations can be permanent and safe if well-managed, as demonstrated by existing CCUS projects and natural CO_2 stores, but strong regulation will be essential to ensure that this is properly achieved. Regulations should clearly define liability for potential leakage and ensure adequate monitoring and verification of storage site.

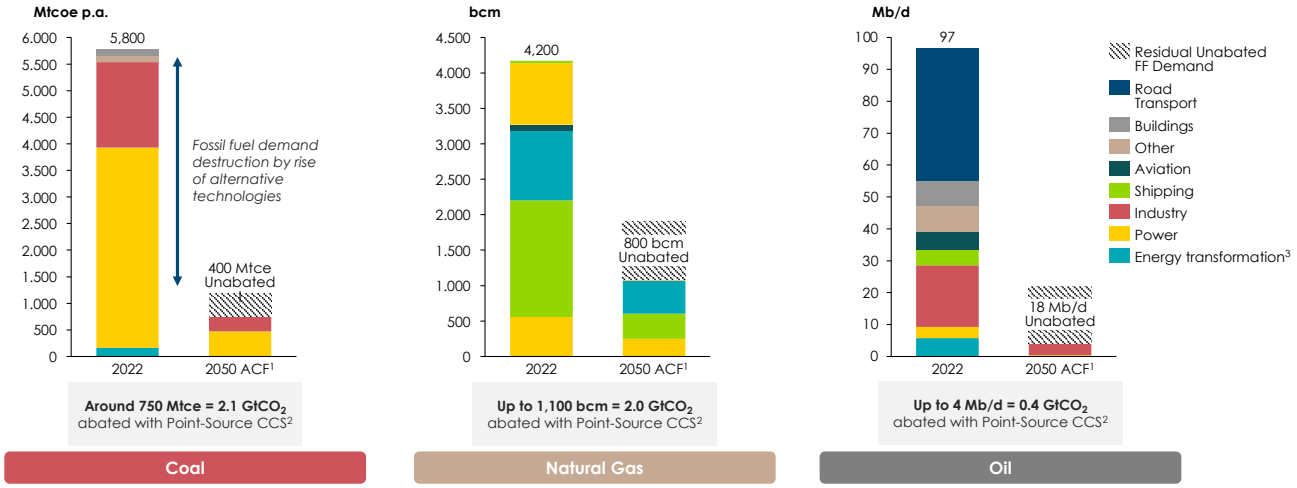
Transparency: Standardised monitoring, reporting, and verification protocols for CCUS projects are needed to ensure transparency and environmental integrity.

[1] See ETC (2022), *Carbon Capture, Utilisation and Storage in the Energy Transition: Vital but Limited for a summary of the ETC's position on key controversies surrounding CCUS.*
[2] ETC (2023), *Fossil fuels in transition.*
[3] There are three main categories of technically feasible carbon removals: 1) Natural Climate Solutions, which use natural photosynthesis processes to capture CO_2 from the air and store CO_2 in the biosphere either above or below ground, 2) Engineered solutions, and in particular direct air carbon capture and storage (DACCS), which uses direct air capture to remove CO_2 from the atmosphere and then stores the CO_2 in geological formations, and 3) Hybrid solutions which bridge natural and engineered approaches, such as Biomass with Carbon Removal and Storage (BiCRS), to use photosynthesis to capture the CO_2 but store it in a mineral rather than biochemical form. These include bioenergy with carbon capture and storage (BECCS) and Biochar.
[4] If the CO_2 released was originally derived from a biomass or DACCS, short-term use enables net-zero emissions activity. If the CO_2 is derived from fossil fuels, however, or a chemical reaction, short-term use improves "carbon efficiency" by using the same molecule twice but does not deliver a net-zero emissions result.
[5] IEA (2024), *CCUS data tracker*.
[6] European Commission (2023), *Net Zero Industry Act Staff Working Document.*
[7] European Commission (2024), *Impact Assessment: 2040 emission reduction targets.*
[8] Freshfields Bruckhaus Deringer (2023), *Carbon capture – the current state of play in the European Union.*
[9] BMWK Energiewende (2020), *What actually are carbon contracts for difference?*
[10] IEA (2024), *It is time for CCUS to deliver*.
[11] We consider these to be distinct because CCUS buries emitted carbon while carbon dioxide removals bury atmospheric carbon.
[12] ETC (2022), *Mind the Gap: How Carbon Dioxide Removals Must Complement Deep Decarbonisation to Keep 1.5°C Alive*, *Section 5*.

Key Exhibit

The ETC only sees a role for 4 $GtCO_2$ of point-source CCUS in 2050 – around 10% of current fossil fuel emissions

CCUS deployment per sector



Note: [1]ACF = Accelerated but Clearly Feasible, see upcoming report for full scenario definition. [2]Assuming a 90% capture rate. Discrepancies between the total carbon capture values here, and those shown in the report, are due to process emissions from calcination during cement production. [3]Energy transformation = energy consumed in processing raw fossil fuels into useable energy products, mostly to convert crude oil to refined oil products.
Source: Systemiq analysis for the ETC; *Scaling carbon capture and carbon removals does not mean business-as-usual for the fossil fuel industry* (ETC blog); Available at: https://www.energy-transitions.org/bitesize/carbon-capture-and-removals-not-business-as-usual-for-fossil-fuel-industry/

Read full report:

Carbon Capture, Utilisation and Storage in the Energy Transition: Vital but Limited

How Carbon Dioxide Removals Must Complement Deep Decarbonisation to Keep 1.5°C Alive