Philanthropy Briefs

CARBON MANAGEMENT

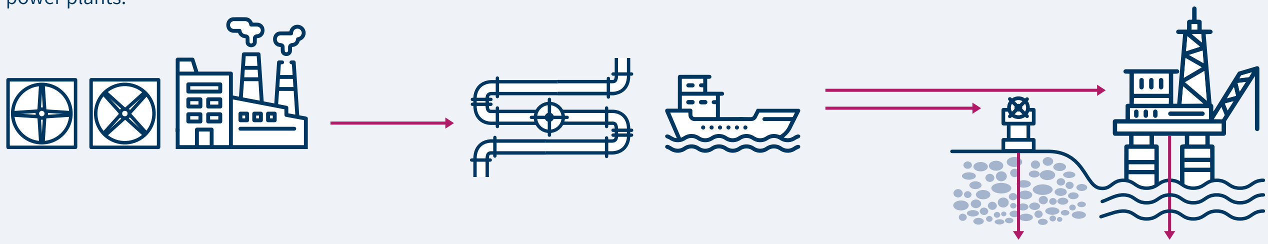
Carbon Capture and Storage (CCS)

a series by **Active** Philanthropy

WHAT IS IT ABOUT?

Carbon Capture and Storage (CCS) is a type of carbon management. It encompasses a set of technologies that store CO_2 underground after capturing it from the source, preventing its release into the atmosphere. CCS typically involves three steps:

1. **Capture** of CO_2 at large point sources such as industrial facilities (e.g. cement, steel, chemicals, waste incineration) or power plants.
2. **Transport** of compressed CO_2, typically by pipeline or ship.
3. **Storage** of CO_2 in geological formations:
   a. Onshore **b.** Offshore



Adapted from IEA 2024

For storage, most CCS projects use the conventional method of injecting CO_2 into depleted oil and gas fields or saline aquifers, where carbon is physically trapped beneath an impermeable rock layer.[1] An alternative storage method is carbon mineralisation, whereby carbon is injected into rocks such as basalt, where it chemically reacts with the minerals in the rock. This way, carbon is permanently sequestered in the form of solid carbonates.[2] While carbon mineralisation occurs naturally over long geological timescales, it can be accelerated to a matter of years under controlled conditions.[3]

WHY IS CCS IMPORTANT FOR OUR CLIMATE?

Most credible climate scenarios that limit warming to well below 2 °C include a large-scale deployment of CCS to manage emissions from "hard to abate" sectors. In some industrial activities, CO_2 emissions are difficult to eliminate, either because emissions are intrinsic to the process and/or because low-carbon alternatives are not available at scale. This includes concrete production and parts of the chemical industry. At the same time, demand for these industries is expected to grow due to global urbanisation and population growth. CCS is therefore often touted as a way to capture and store those emissions that are considered **unavoidable**.

In practice, however, CCS has fallen short of its expectations.[4] To date, only few individual CCS projects have proven that they can capture and store carbon at a million-tonne scale. Moreover, a large share of existing projects serves the purpose of extracting oil from hard-to-reach deposits, which leads to more emissions (so called "enhanced oil recovery").[5]

Against this backdrop CCS should be applied selectively and under clear conditions. It is at this juncture where philanthropy can actively influence the responsible development of CCS.

[1] Gidden et al. 2025, [2] Riedl et al. 2023, [3] Snæbjörnsdóttir et al. 2017, [4] IEA 2024, [5] Zero Carbon Analytics 2024

WHAT FUNDERS CAN DO

Support clear boundaries for CCS:

Philanthropy can help to ensure that CCS is used consciously. Recent studies found that geological storage potential for CO_2 is much smaller than previously estimated, once social and environmental concerns are considered. This underscores the need to use storage wisely and perceive it as a "common good".[6] Funders can support this by backing research and policy work to inform clear eligibility criteria for CCS. Legal precedents, such as Germany ruling out using CCS on coal-fired power plants, illustrate how such boundaries can become legally binding.

Reduce the risk of CCS being misused for fossil interests:

Philanthropy can help protect the climate integrity of CCS. One way is supporting early-stage pilots of carbon mineralisation, as this way of storing carbon is incompatible with enhanced oil recovery and offers secure carbon sequestration. Another option is supporting watchdog and research organisations that monitor fossil fuel lobbying around CCS. InfluenceMap, for instance, tracks fossil fuel lobbying and exposes where CCS is used in public discourse to justify continued fossil fuel use.

There are many different strategies to engage in climate philanthropy. See our Spotlight on Climate Funding Strategies to learn more.

3 FAST FACTS

82.5 %

of existing CCS capacity is used for enhanced oil recovery, which involves pumping CO_2 into wells to extract less accessible oil.[7]

50 million tonnes

the total mass of CO_2 that is stored via CCS today,[8] equivalent to the annual tailpipe emissions of 11 million passenger cars.[9]

1 year

the period it takes at the Carbfix demonstration site in Iceland for injected carbon to mineralise into solid carbonates.[10]

THINGS TO CONSIDER WHEN FOCUSING ON CCS

Scrutinise the climate value of CCS projects:

Two questions can help funders assess the climate benefit for CCS projects.

Firstly, where does the CO_2 originate? The most widely accepted use cases involve emissions from hard-to-abate industrial processes. Another category is CO_2 from biological sources, such as bioenergy. When captured and permanently stored, this can result in carbon removal (BECCS). CCS applied to fossil fuel power generation, by contrast, risks prolonging dependence on fossil infrastructure and does little to address associated air pollution.[11]

Secondly, what happens to the captured CO_2? While permanent geological storage can support climate objectives, uses such as enhanced oil recovery, which stimulate additional fossil fuel extraction, undermine them.

CCS needs to be integrated in holistic funding approaches:

CCS remains unproven at scale, creating risks of technological lock-in and delayed mitigation. At the same time, geological storage is a finite resource that is likely to be required for carbon removal over the long term. For funders, this points to embedding CCS support within broader strategies that also reduce demand for building materials through material efficiency and sufficiency, rather than relying on business-as-usual practices that add CCS as an after-engineering measure.

Link to bibliography

[6] Gidden et al. 2025, [7] Zero Carbon Analytics 2024, [8] IEA 2025, [9] US EPA 2023, [10] Snæbjörnsdóttir et al. 2017, [11] Project Drawdown 2025