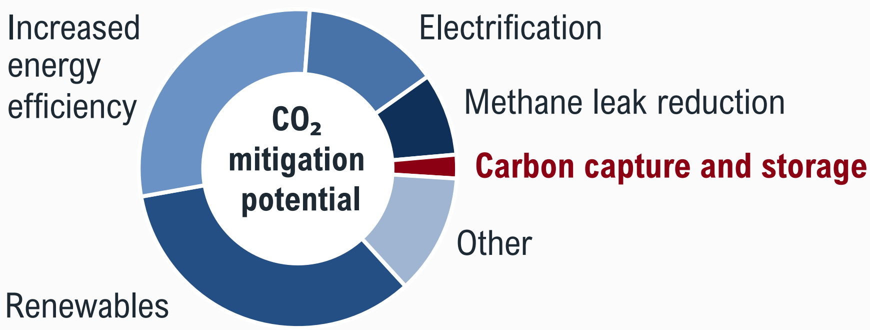
Carbon Capture and Storage

An Unproven Technology That Cannot Meet Global CO_2 Mitigation Needs



According to the IPCC, CCS will account for an average of 2.4% of CO_2 mitigation by 2030, even if implemented at its full, planned potential.[1]

Renewables, efficiency, electrification, and reducing fugitive methane emissions can address over 80% of the world's decarbonisation needs by 2030, according to the IEA and IPCC.[2]

COP28 goals for "emissions-free" fuels made possible by carbon capture and storage are unrealistic.

CCS is only capable of addressing a small fraction of the CO_2 mitigation required.

Clarification of Key Terms

Carbon capture refers to the extraction of CO_2, in general. Captured CO_2 may be from specific emissions sources or the atmosphere, using processes that can be technological or biological/nature-based. It only refers to CO_2 and does not include other significant greenhouse gases such as methane (CH_4). Carbon capture by itself has no climate benefit. The main use of carbon capture to date has been for enhanced oil recovery (EOR), in which captured CO_2 is pumped into oil and gas reservoirs to increase the extraction of fossil fuels.

Point-source capture (PSC) uses technology fitted to a specified large emissions source, such as an industrial facility, to extract CO_2 from a chemical process stream. The capture rate varies but is always less than 100%.[3]

Carbon dioxide removal (CDR) technologies claim a net, direct removal of carbon dioxide from the atmosphere. The IPCC defines CDR as "[a]nthropogenic activities removing CO_2 from the atmosphere and durably storing it in geological, terrestrial, or ocean reservoirs, or in products." While "durably" is not explicitly defined, it should refer to a minimum of hundreds or thousands of years of storage.[4]

Carbon capture and storage (CCS) includes the capture and processing of CO_2 to required purity followed by compression, transportation and storage underground in geologic reservoirs. The stored CO_2 should be monitored for hundreds to thousands of years to ensure it does not escape.[4]

Carbon capture and utilisation (CCU), like CCS, includes post-capture processing of CO_2, compression, and transportation. Rather than being stored, it is used to produce products such as synthetic fuels. This is usually done without leading to long-term CO_2 storage, causing delayed emissions. Depending on the lifecycle of the products produced, some or all of the utilized CO_2 is subsequently released back into the atmosphere, negating the climate benefit.

Carbon management CCS /CCU and CDR are often conflated, with the fossil fuel industry and lobbyists working to blur the lines between these crucially different concepts, grouping them under the single term of "carbon management."[5]

[1] Intergovernmental Panel on Climate Change. AR6 Synthesis Report, Section 4.5 and Figure 4.4. March 2023.

[2] International Energy Agency. Net Zero Roadmap: A Global Pathway to Keep the 1.5°C Goal in Reach. September 2023. See also: Intergovernmental Panel on Climate Change. AR6 Synthesis Report, Section 4.5 and Figure 4.4. March 2023.

[3] Claimed capture rates are >95% of emissions, which is far higher than achieved rates from years of projects to date (~30-80%). IEEFA. Blue Hydrogen: Not Clean, Not Low Carbon, Not a Solution. Figure 5. September 2023.

[4] Ensuring sufficient "permanence" or "durability" of CO_2 storage is essential for both CCS and CDR to have any climate benefits. To counterbalance residual emissions, storage should last as long as emissions stay in the atmosphere. "Multiple centuries" has been suggested as a minimum for a removal to be considered permanent (e.g. by the EU Commission and Carbon Market Watch)

[5] e.g. Occidental Petroleum muddled the source, use and final storing place for the carbon it is "managing," conflating CCS/CCU and CDR; its explicit intention is to continue to produce oil and gas.