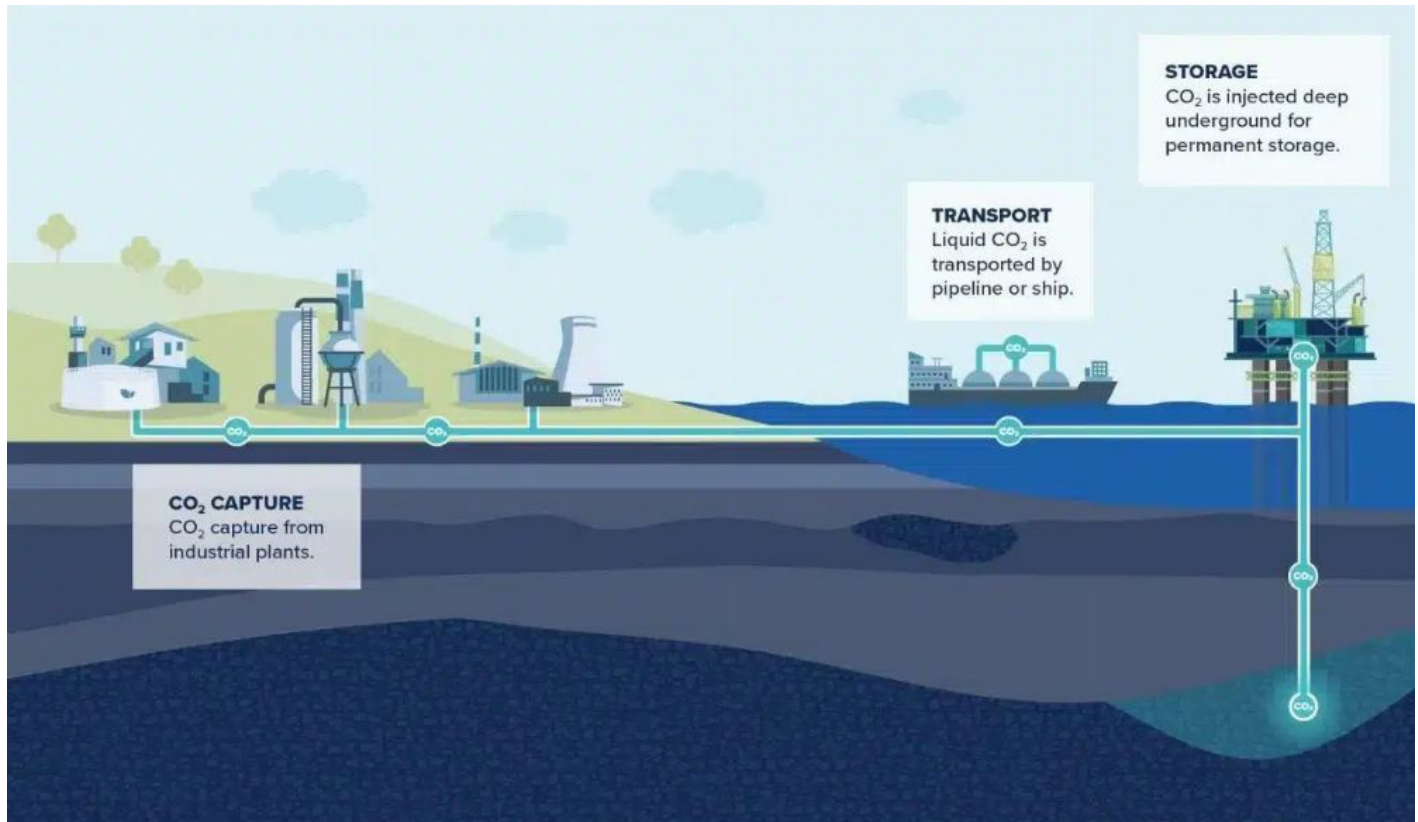


What is Carbon Capture and Storage (CCS)?

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About is Carbon Capture and Storage (CCS)

- CCS refers to a host of different technologies that capture CO₂ emissions from large point sources like refineries or power plants and trap them beneath the Earth.
- Notably, CCS is different from carbon dioxide removal (CDR), where CO₂ is removed from the atmosphere.
- It's a three-step process, involving: capturing the carbon dioxide produced by power generation or industrial activity, such as steel or cement making; transporting it; and then storing it deep underground.
- CCS involves three different techniques of capturing carbon, including post-combustion, pre-combustion, and oxyfuel combustion.
 - In post-combustion, CO₂ is removed after the fossil fuel has been burnt. By using a chemical solvent, CO₂ is separated from the exhaust or 'flue' gases and then captured.
 - Pre-combustion involves removing CO₂ before burning the fossil fuel. "First, the fossil fuel is partially burned in a 'gasifier' to form synthetic gas. CO₂ can be captured from this relatively pure exhaust stream. The method also generates hydrogen, which is separated and can be used as fuel.
 - In oxyfuel combustion, the fossil fuel is burnt with almost pure oxygen, which produces CO₂ and water vapour. The water is condensed through cooling, and CO₂ is separated and captured.

- Out of the three methods, oxyfuel combustion is the most efficient, but the oxygen burning process needs a lot of energy.
 - After capture, CO₂ is compressed into a liquid state and transported to suitable storage sites.
 - Possible storage sites for carbon emissions include saline aquifers or depleted oil and gas reservoirs.
 - There are also only a few operational CCS projects across the world, even though the technology has been pushed for decades.
 - According to the International Energy Agency (IEA), there were 40 operational CCS projects in 2023, which captured more than 45 metric tonnes (Mt) of CO₂ annually.
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Q1) What is syngas?

Syngas, also called a synthesis gas, is a mix of molecules containing hydrogen, methane, carbon monoxide, carbon dioxide, water vapours, as well as other hydrocarbons and condensable compounds. It is a main product of gasification and majority product of high temperature pyrolysis carried on any biomass, residues and waste. When produced in pyrolysis, it is created by the vaporisation of volatile compounds from the raw material thanks to the heat, which induces a set of complex reactions.

Source: [Warming up to climate change: What is carbon capture and can it help save the planet?](#)

Source: <https://vajiramandravi.com/current-affairs/ccs-prelims/>

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