

Carbon capture and storage (CCS)

Capture

Solvents: CO₂ is absorbed in a liquid. It is removed in concentrated form by changing the temperature or pressure of the liquid.

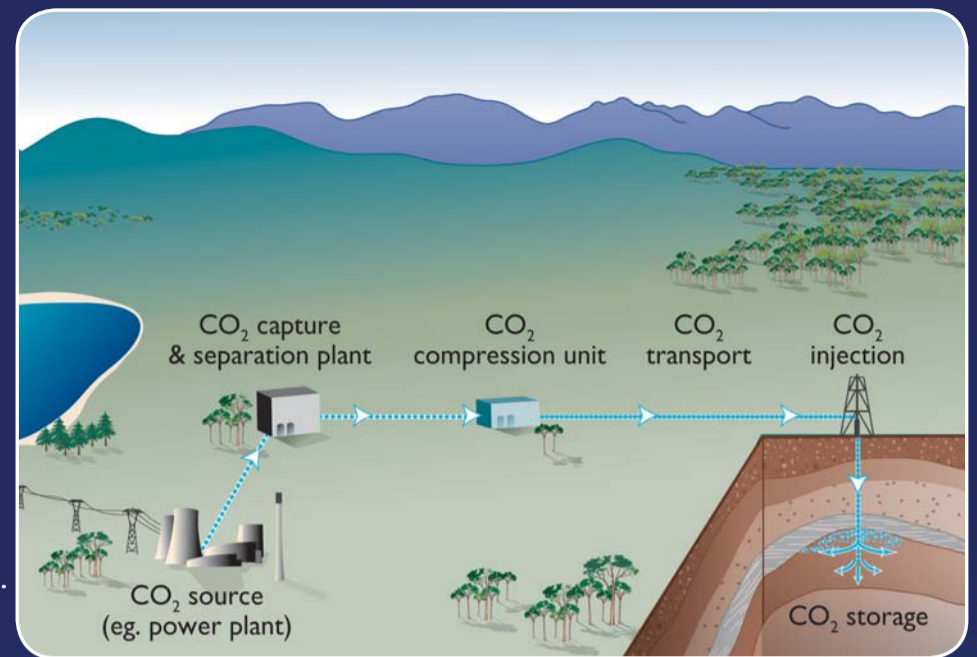
Adsorbents: The CO₂ is captured by a porous solid material and separated in concentrated form through pressure or temperature changes.

Membranes: CO₂ can selectively pass through gas separation membranes to be extracted from the flue gas.

Membrane/solvent: A membrane separates flue gas from liquid solvent. CO₂ is absorbed by the solvent via pores in the membrane.

Low temperature – cryogenics: Flue gas under high pressure is cooled to sub-zero temperatures so only CO₂ condenses and is then separated.

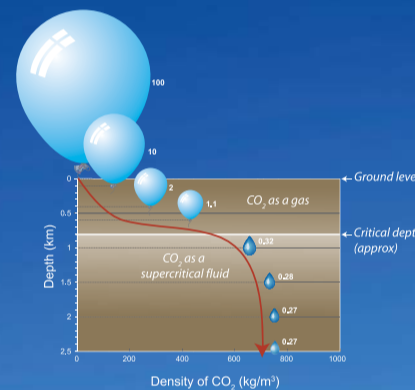
Low temperature – hydrates: Chilled water is passed through cooling flue gas. Given the right temperature and pressure, CO₂ and water freeze together to form ice-like crystals with the CO₂ trapped inside (hydrates). The hydrates are removed and the CO₂ released by heating the hydrates.



Storage

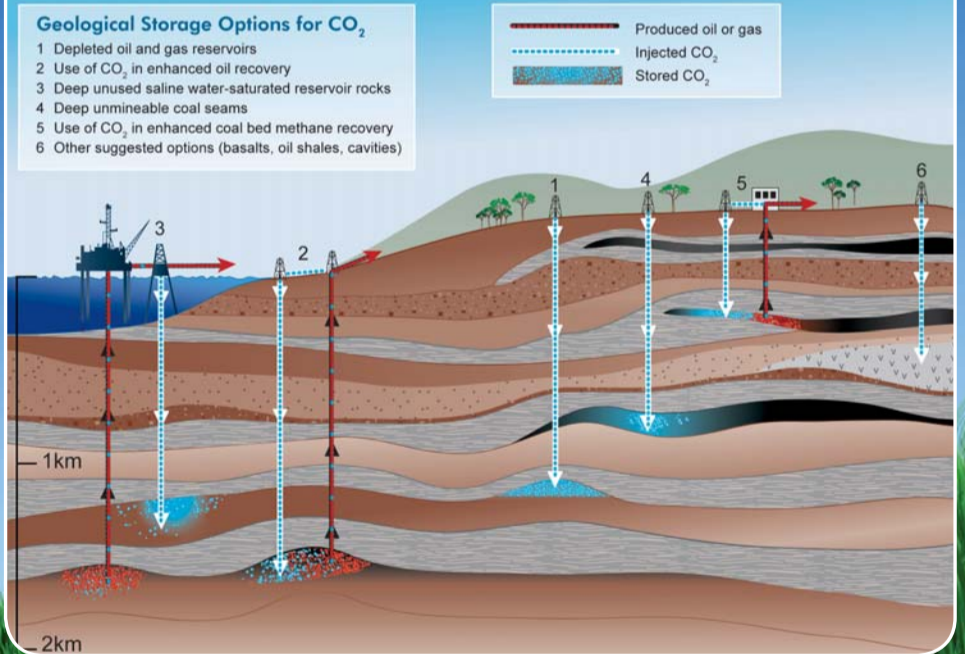
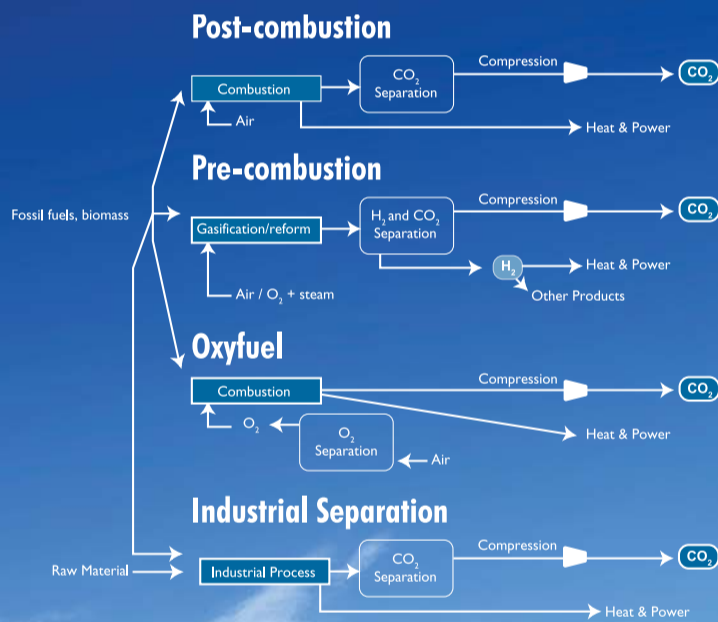
Characteristics of suitable storage sites:

- Deep underground rock formations with good permeability (to allow fluid flow) and porosity (fluid storage space in the rock)
- Cap rock and/or faults or folds to trap the CO₂.



CO₂ is injected under pressure as a supercritical fluid, which takes up less space and diffuses well in storage rocks.

Injection sites are monitored for: subsurface migration of CO₂; injection well integrity; and environmental impact.



Geosequestration or carbon capture and storage (CCS), involves capturing carbon dioxide that would otherwise be emitted to the atmosphere, compressing it, transporting it to a suitable site, and injecting it into deep geological formations where it will be trapped

for thousands or millions of years.

Geosequestration enables the combustion of fossil fuels, such as in the generation of electricity or for industrial processes, without significant emissions of greenhouse gases to the atmosphere.

CCS can also be used to capture carbon dioxide emitted from a range of other industrial processes such as the manufacture of cement and some fertilisers, in purifying natural gas, and in conversion of gas or coal to liquids.