

Carbon capture and sequestration (CCS) technologies

Carbon capture and storage (CCS) is a technology that can capture up to 90 per cent of CO₂ emissions produced from the use of fossil fuels in electricity generation and industrial processes, preventing the carbon dioxide from entering the atmosphere.

The CCS chain consists of three parts (see Figure 1.58):

- **Capturing the CO₂:** Capture technologies allow the separation of CO₂ from gases produced in electricity generation and industrial processes by one of three methods: pre-combustion capture, post-combustion capture and oxy-fuel combustion.

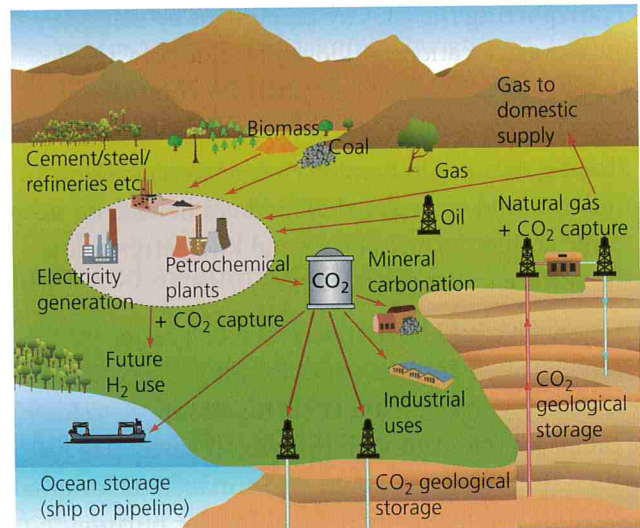


Figure 1.58 Possible CCS systems

Source: IPCC

Boundary Dam CCS plant

An example of CCS in action is at the 110-megawatt coal power and CCS plant in Saskatchewan, called Boundary Dam, built by the provincial utility SaskPower. It is a coal-fired power station complex that has been retrofitted to capture 90 per cent of its CO₂ output (approximately 1 million tonnes per year). The CO₂ will eventually be piped 66 km to the Weyburn Oil Unit and injected into an oil-bearing formation at 1,500 m depth. This will add pressure to the oil-bearing rock and so help push more oil out of the ground, a process called enhanced oil recovery (EOR). Until that is ready it will be injected into local salt formations. The capture process was started in October 2014 and CO₂ injection started in April 2015.

CCS imposes big costs and energy penalties: the Boundary Dam plant's CCS unit cost \$800 million to

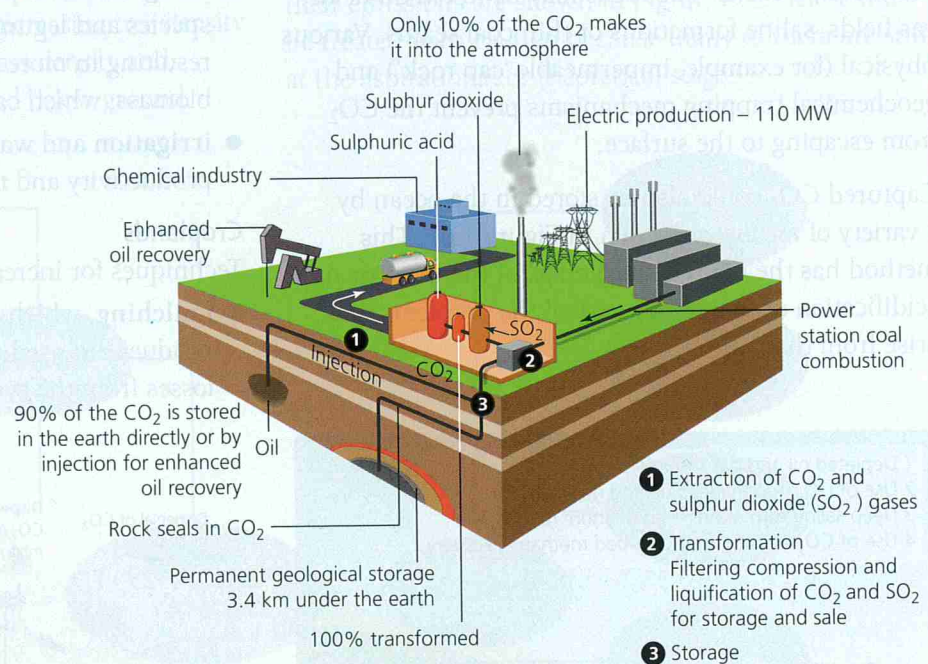


Figure 1.59 Carbon capture and storage at Boundary Dam power station, Canada

Source: SaskPower

build and consumes 21 per cent of the coal plant's power output in order to scrub out the carbon dioxide and compress it into a liquid for burial. It is hoped that this extra cost will be offset by the extra oil recovered from the Weyburn oil field.