

CAPTURING CARBON DIOXIDE



Capturing carbon dioxide (CO₂) from a stationary source involves separating it from a gas stream to prevent the gas from being released to the atmosphere.

The main sources for CO₂ capture are natural gas processing, industrial processes, electricity generation and hydrogen production.

Natural gas production often involves separating naturally occurring CO₂ mixed with the gas in its natural state before the gas can be liquefied or piped.

Other industrial processes where CO₂ capture is applicable include fertiliser and ammonia production and cement manufacture. One of the largest sources

of CO₂ emissions in Australia is from electricity generation from fossil fuel sources such as coal and natural gas. The technology for capturing CO₂ from these sources is currently available, and research is underway to make the process more efficient and cost-effective.

There are three categories of CO₂ capture systems that could be used at power stations: post-combustion, pre-combustion and oxy-firing.

In **post-combustion capture** CO₂ is separated from the flue gas after fuel is burnt. This process can be added, or retro-fitted, to existing power stations, either coal or natural gas-fired.

During **pre-combustion capture** the fossil fuel is reacted with steam and oxygen, producing a synthetic gas

(syngas) which is made up of mostly carbon monoxide (CO), carbon dioxide and hydrogen (H₂). An additional reaction with water (known as a water gas shift) can be used to convert the residual carbon monoxide to CO₂ and additional hydrogen.

The CO₂ is removed and the hydrogen can then be burned in gas turbines to produce electricity.

Oxy-firing combustion capture involves the combustion of fuel (coal or gas) in pure oxygen or oxygen-enriched air. The process can produce about 75 per cent less flue gas than air-fueled combustion and the exhaust consists of between 80 and 90 per cent CO₂. The remaining gas is water vapour, which simplifies the CO₂ separation step. An air separation plant is required to produce pure oxygen for the process from air.

