POST-COMBUSTION CAPTURE OF CARBON DIOXIDE

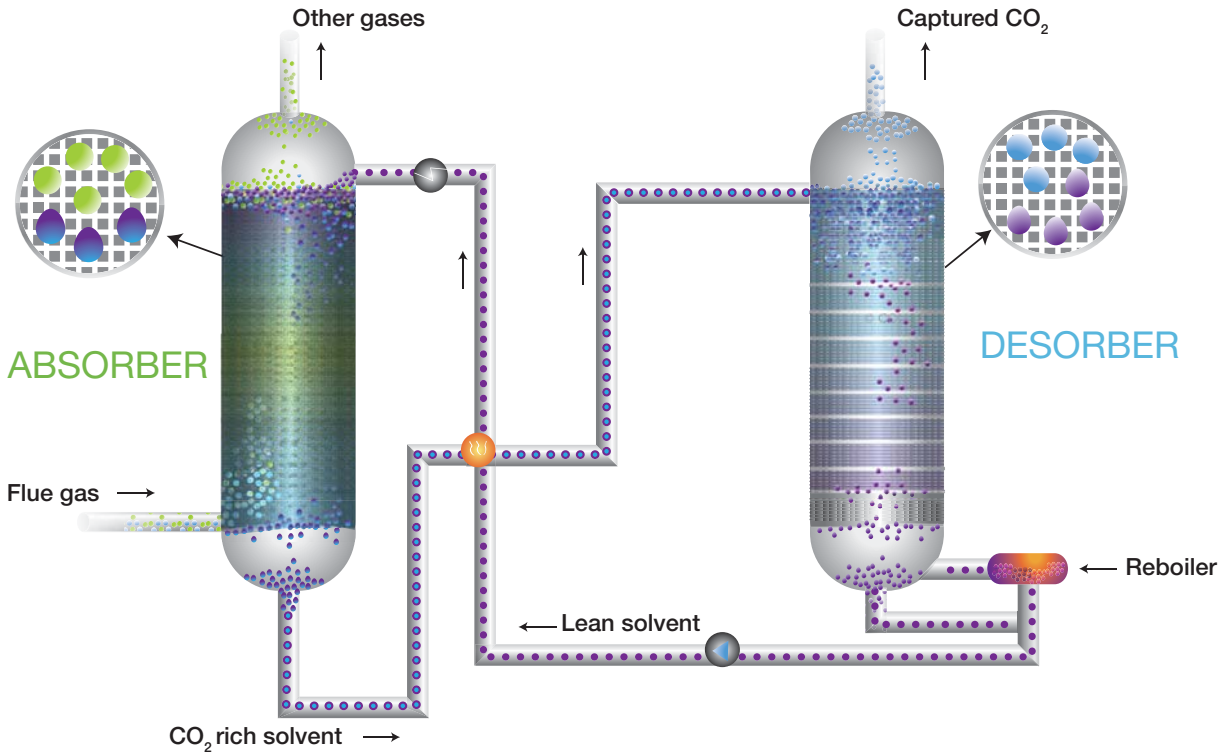
Solvent absorption

Solvent absorption is currently the preferred option for removing carbon dioxide (CO_2) from industrial waste gas and for purifying natural gas. It is the method used by the International Power Capture Plant at Hazelwood power station and involves passing the flue gas through liquid chemicals that absorb CO_2 and then release it at an elevated temperature in another vessel. The same chemical can be used over and over again to separate CO_2.

In post-combustion capture from power stations, the flue gas is at atmospheric pressure and contains mainly nitrogen, CO_2, oxygen and water. At Hazelwood Power Station the CO_2 makes up about 11 per cent of the flue gas.

The cooled flue gas comes into contact with the solvent in the **absorber** and the CO_2 is absorbed into the solvent at a temperature of between 40-60°C. The other gases leave the absorber column and the "rich" solvent containing the CO_2 is then pumped to another column (called a stripper or **desorber**) via a heat exchanger. The "rich" solvent is then heated to about 120°C, causing the CO_2 to be released from the solvent.

The CO_2 emerges at the top of the desorber where it is cooled to remove water. The water is returned to the desorber and the "lean" solvent pumped back to the absorber. On the way, the hot, lean solvent passes through a heat exchanger, where it exchanges heat with the rich solvent leaving the absorber column.



Solvent-based absorption CO_2 capture.

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The CO2CRC H3 Capture Project is conducting research into solvent absorption for CO_2 capture using the International Power Capture Plant at Hazelwood power station.

The project aims to:

- trial a number of solvents including a hot potassium carbonate-promoted solvent;
- reduce the energy consumption for solvent regeneration;
- assess the energy integration options for the power plant and capture processes;
- control or avoid solvent degradation and corrosion;
- understand the interaction between the solvent system and impurities present in the flue gas, including SOx and NOx; and
- review the technical and economic issues for commercial use of post combustion capture in existing and new Victorian brown coal power stations.

The International Power Capture Plant has been constructed by The Process Group and in the first phase is designed to capture 25 tonnes per day of CO_2 from flue gas.

The H3 project is part of the Latrobe Valley Post-combustion Capture Project and is supported by the Victorian Government, through their Energy Technology Innovation Strategy (ETIS) Brown Coal R&D funding.

CO2CRC is supported through the Australian Government's Cooperative Research Centre Program.