



Hybrid Process for Post-Combustion CO₂ Capture

Opportunity

Research is active on the patent pending technology titled, "Method for the Separation of a Gaseous Component Using a Solvent-Membrane Capture Process." This technology is available for licensing and/or further collaborative research from the U.S. Department of Energy's National Energy Technology Laboratory.

Overview

Managing CO₂ emissions is a major technical challenge associated with the use of fossil fuels. Post-combustion capture of CO₂ from large-scale emission sources has not been widely implemented due to high energy and capital costs. The energy cost of a conventional CO₂ capture process using amine-based solvents, can account for over 50 percent of the total cost associated with CO₂ capture. Significant reductions in energy and capital costs are needed in order to meet acceptable performance criteria before carbon capture and storage can be widely deployed.

The current invention describes a hybrid process for post-combustion CO₂ capture using a solvent-based absorption/high pressure stripping gas step coupled with selective CO₂ membrane separation. The method is unique in that the solvent-based absorption/stripping process uses thermal compression to efficiently increase the concentration and partial pressure of CO₂ in the gas mixture, allowing for more efficient membrane separation. The hybrid process integrates the most efficient aspects of each method resulting in a reduction of the parasitic energy demand of the post-combustion CO₂ capture process.

Significance

- Process reduces energy consumption, footprint, and capital costs
- Reduces the need for mechanical compression of the mixed flue gas stream
- Reduces the amount of membrane area required for CO₂ separation
- Process is compatible with a range of stripping gases, solvents, and membrane systems
- Deployment of this process will make CO₂ capture more economical

Applications

- Capture of CO₂ from fossil fuel-derived flue gas streams
- Other applications where CO₂ separation and capture is desired

Patent Details

U.S. provisional patent application number 61/914,981 was filed December 12, 2013

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