

Carbon Dioxide Capture Processes: Modeling, Simulations and Sensitivity Analysis

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The main greenhouse gas, CO₂ emissions are due to burning of fossil fuels, and power production in particular accounts for roughly 40 percent of the total CO₂ emissions, the main contributor of which is the coal based power generation. According to the International Energy Agency's roadmap, 20 percent of the total CO₂ emissions should be removed by CCS by year 2050.

Various technologies, for separation of CO₂ from flue gas or fuel gas of power plants including physical absorption, chemical absorption, adsorption, and membrane separation are employed. In post-combustion capture, since the concentration of CO₂ is less, chemical solvent is required.

The main objective of this project is to relate steady-state sensitivity analysis with operability and control of the process to find the optimal design, operating conditions and control strategies. This design should be able to work at its optimal operating point in the presence of disturbances; this last item is to be verified through closed-loop dynamic simulations, when the model is ready. Also the effect of solvents and other process configurations will be investigated. In this poster, the base case design, steady state simulation and sensitivity analysis are presented.