Economic and environmental impact of CO_2 capture

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Reducing the CO2 emissions of industrial plants is seen as an important objective for the protection of the environment. However, this must be weighed against the cost of CO2 removal which is a competing objective affecting the sustainability of the plant. Hence, there will be a compromise between these two objectives.In this study we perform multi-objective optimization to identify solutions which satisfy both objectives. We calculate the cost of CO2 capture based on current technologies combining the different capital and operating costs. This is possible using rate-based models of the capture process which are simulated to give the rates of absorption and energy consumption. Optimization is carried out using different constraints placed on the CO2 emissions which allows the generation of multiple solutions with different costs and different levels of emissions. In this way we determine how the cost per ton of CO2 captured varies as the removal efficiency varies. Acknowledgements :This research was supported by the International Research & Development Program of the National Research Foundation of Korea (NRF) funded by the Ministry of Science, ICT & Future Planning of Korea (Grant number: 2011-0031290)