

Operational optimization of post-combustion CO₂ capture processes considering part-load performance

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It is mostly assumed that the post-combustion CO₂ capture system operates at the full working load of the power plant. This study gives a systematic framework for the evaluation of the part-load performance of a combined-cycle power plant with amine-based CO₂ capture process, which provides conceptual insights about how the capture plant should be operated at part-load. As the gas turbine load is reduced, the performance of MEA capture process is investigated and sensitivity of a few key design parameters were evaluated, in order to find operational strategy for minimizing regeneration energy and improving process efficiency. An economic impact of the capture process is assessed with reflecting discontinuous nature in operating conditions of a power plant. The case study shows the effect of different part-load cases on the integrated power plant with CO₂ capture plant and provides the most appropriate operating strategies with the aid of multi-period modeling. Acknowledgement: This work was supported by the "Energy Efficiency & Resources Programs" of the KETEP grant funded by the Ministry of Trade, Industry and Energy of the Korean government (No. 20122010200071).