

Optimizing Partial Capture Mode of Flexible Operation for Post-combustion CO₂ Capture Plant

Zaman Muhammad, *
KAIST
(jayhlee@kaist.ac.kr*)

Adding a post-combustion CO₂ capture plant to a power plant comes with an energy penalty as significant amounts of steam must be used to strip off the absorbed CO₂ and regenerate the solvent. This leads to a significant decrease in the power output of the plant, typically by ~ 30 %. One option to mitigate the adverse effect of power plant output loss is to operate the CO₂ capture plant in flexible modes in response to the varying electricity market price and the overall profit can be improved while meeting the peak electricity demand. This can be done by reducing the capture level. As electricity demand and therefore price tend to vary over time, such measures can be useful in meeting peak electricity demands and improving the overall profit. The objective of this work is to simulate and optimize the CO₂ capture level reduction mode of flexible operation and evaluate the benefits when compared to the inflexible operation mode. The equilibrium based model for complete absorption/regeneration system has been used and its optimizations were performed in gPROMS interface.