

Carbon Emission Pinch Analysis (CEPA) application to estimate CCS retrofit and compensatory renewable power generation in South Korea case

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South Korea has established a target to reduce carbon emissions by 30% till 2020. CO₂ Capture and Sequestration (CCS) is immediate solution to cut CO₂ emissions of power generation sector. In this work Carbon Emission Pinch Analysis technique has been used to estimate CCS retrofit. This technique also helped estimate compensatory power generation required from renewable sources, as power generation capacity of current power plants will be reduced with the application of CCS. To reduce CO₂ emissions from the year 2009 to 2020 by 30% of anticipated CO₂ emissions in 2020 (813MTCO₂), 20MT/y CO₂ limit applied and after using CEPA, 195TWh/y CCS retrofit and 29TWh/y compensatory power generation from renewable sources estimated. To envision tradeoff between Emission Limit (L) and required degree of Retrofit (R), sensitivity analysis for the emission limit, ranging from 5 to 25 MT/y and CO₂ Removal Ratio (RR) ranging from 0.85 to 0.95 also performed. In addition, sensitivity analysis carried out in regards of compensatory renewable power requirement with respect to parasitic Energy Loss (EL) ranging from 15% to 25%.