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## TECHNO-ECONOMICAL EVALUATION OF POST- AND PRE- COMBUSTION CARBON DIOXIDE CAPTURE METHODS APPLIED FOR AN IGCC POWER GENERATION PLANT

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### Abstract

Global warming is happening due to increasing level of carbon dioxide and other greenhouse gases into the atmosphere. In order to reduce this rising level of CO<sub>2</sub> emitted by human activities, carbon capture and storage technologies are being developed. The present paper investigates and compares, from a techno-economical point of view, two of the most used conceptual methods (post- and pre- combustion) for CO<sub>2</sub> capture generated from the fossil fuel power generation sector. For post-combustion capture technology, the paper evaluates several aqueous solutions of various alkanolamine such as monoethanolamine, diethanolamine and methyldiethanolamine. For pre-combustion capture technology, the paper assesses some of physical solvents such as Rectisol® and Selexol®. Another aspect of this work deals with the analysis and comparison, in term of solvent loading and overall energy consumption (power consumption, heating agent consumption and cooling agent consumption) the performance of these physical and chemical solvents that are used for post- and pre- combustion. As an illustrative example, the case of an Integrated Gasification Combined Cycle coal mixed with biomass (sawdust) -fired power plant that generates 350 – 450 MW net electricity with and without capture is presented in detail for the best method and also for the best solvent used. Another aspect of the present paper is concentrated on the capital cost estimation and on CO<sub>2</sub> captured and avoided costs in the case of previously mentioned IGCC power plant.

*Key words:* carbon capture and storage (CCS), IGCC with and without CCS, post-combustion capture, pre-combustion capture

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