

Simulation of pressurized oxy fuel combustion: A path way to efficient process design of USC power plant

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As one approach to capture and Sequester carbon dioxide, oxy-fuel combustion is used as promising technology. The main aim of this paper is to design and simulate an ultra-supercritical (USC) coal based power plant under oxy-fuel combustion system with CO<sub>2</sub> capture. The design concept is based on using pressurized oxy-fuel system to maximize the heat recovery and reduce the efficiency penalty due to compression and purification unit. The pressurized approach raises the heat recovery since the dew point increases at elevated pressure. gCCS simulator was used to simulate and analyze pressurized oxy-fuel combustion. The result indicates that the pressurized case efficiency increases by 2.72 % than atmospheric condition (base line case). There is a slight increase in flue gas heat recovery with further increase in combustor pressure even if the auxiliary power consumption increases rapidly. The purity of CO<sub>2</sub> also increases from 53.4 % to 94 % by volume after compression and purification.