



GHGT-10

Towards large scale CCS

Trina Dreher^a, Craig Dugan^{a *}, Trent Harkin^b, Barry Hooper^b

^a Process Group, 5 Hobbs Court, Rowville, Vic., 3178, Australia

^b Cooperative Research Centre for Greenhouse Gas Technologies (CO2CRC), The University of Melbourne, Vic., 3010, Australia

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Abstract

In order to reduce CO₂ emissions on a global scale large pilot and demonstration projects that trial new technologies, designs, or construction techniques applicable to full scale plants need to be undertaken. Process Group has designed and built several pilot scale capture plants including one located at the Hazelwood Power Station, which is the largest capture plant on a coal fired power station in Australia. This paper discusses some of the lessons from these pilot plants and presents a new retrofit post-combustion study that investigates carbon capture from a 500MW power station (nominally 3.7 million tpa CO₂) using three solvents with and without heat integration into the steam cycle. Data pertaining to processing 25% of the flue gas from a 500MW power station (nominally 0.9 million tpa CO₂) is also presented.

The study found <5% difference between existing solvent processes in terms of overall plant CAPEX and <15% difference in OPEX and that for the end user the most advantageous way to design a capture plant is to ensure that it functions with a wide range of solvents and can be easily adapted for future technology advances. The cost of capture for a 500 MW brown coal power station with non-optimised heat integration was determined to be in the range AUD\$53-63/t CO₂ avoided, which incorporated an improvement of approximately \$8-13/t due to the non-optimised heat integration. The heat integration resulted in modest (5%) energy and cooling duty savings however, with further optimisation performed specific to the given power station and capture plant it is expected that the cost of capture could be further reduced to at or below AUD\$50/t CO₂ avoided. In situations where cooling water is used exclusively for a full scale capture facility the cooling water usage increased by 85-95%. However, when enhanced heat integration is incorporated this increase is expected to be limited to 75-80% for all technologies analysed.

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