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OXY-FUEL COMBUSTION PROJECT

- $400,000 funding for *'Accelerating the deployment of oxy-fuel combustion technology for Victorian brown coal'*; submitted by the Department of Chemical Engineering, **Monash University**. Project participants include **Shanghai Boiler Works**; **Energy Australia**; **GDF Suez Australian Energy; Chubu University**, Japan and **Shanghai Jiao Tong University** (University of Electric Power), China.

This project is a continuation of earlier BCIA-funded research (via ANLEC R&D) and is expected to accelerate the deployment of oxy-fuel combustion for Victorian brown coal; thereby improving power generation efficiency and significantly reducing CO2 capture costs. Oxy-firing technology is a process for the combustion of coal in a mixture of high-purity oxygen and recirculated flue gas. Through prior removal of nitrogen and the optimisation of boiler operating parameters, oxy-fuel combustion testing has delivered up to 95 per cent CO2 purity in flue gases which can be sequestered or utilised with minimal treatment.

The initial research project proved a range of outcomes including the stable and faster combustion of Victorian brown coal in a pilot-scale oxy-fuel fired furnace, production of high purity CO2 (up to 80 per cent) in flue gases and led to a greater understanding of the distinct slagging /fouling propensities of Victorian brown coal in oxy-fuel mode. The current research project will investigate technical issues related to oxy-fuel combustion of externally dried Victorian brown coal under supercritical and ultra-supercritical conditions. The project will undertake long-term ash exposure experiments and will also develop advanced modelling tools for the prediction of lignite ash slagging/fouling and water tube corrosion propensities in an industrial oxy-firing boiler.

The research program encompasses laboratory-scale experiments, pilot-scale tests in a 3MW air/oxy-firing facility built by Shanghai Boiler Works and computational fluid dynamic modelling. Techno-economic evaluation has previously indicated oxy-firing of Victorian brown coal can deliver a similar or lower levelised cost of electricity compared with existing post combustion capture processes. Integration with pre-drying of brown coal and super-critical steam conditions can significantly improve net efficiency and minimise the energy penalty of the plant air-separation unit and CO2 compression. This project recognises ash-related slagging/fouling and water tube corrosion propensities under optimised oxy-firing mode are critical issues which could hinder advancement of this technology through process scale-up to demonstration mode.