dti

ASH RE-FIRING AND MINERAL ADDITION

Impact on Plant Performance and Ash Disposal

PROJECT PROFILE 343

CLEANER FOSSIL FUELS PROGRAMME – CLEANER COAL R&D PROGRAMME

OBJECTIVES

This proposal aims to provide coal-fired power stations with a simple, cost effective, means of improving combustion efficiency and reducing particulate emissions by re-firing ash and/or mineral addition to the coal. This project will:

- Generate guidelines and identify constraints for re-firing pulverised fuel ash (PFA) and mineral addition.
- Test ash re-firing at pilot scale and then at full scale.
- Test mineral addition using an Entrained Flow Reactor.
- Perform a techno-economic assessment of ash re-firing and mineral addition.

SUMMARY

One of the major losses of efficiency on coal fired power plant is due to the unburned carbon found in the pulverised fuel ash (PFA). This carbon-in-ash is lost energy and results in more fuel being burnt to achieve the required plant output, which increases all emissions. High carbon-in-ash can also adversely affect the efficiency of electrostatic precipitators (ESP's) due to the change in the resistivity of the ash, so increasing dust emissions. Preliminary studies carried out by Innogy have shown that the carbon contained in fly ash material is still sufficiently reactive and will burn off if fired at high temperature potentially reducing coal burn at a station by as much as 1%.

This project will yield guidelines for ash refiring with diverse fuels and ash types and will also quantify the impact on the operation of the power plant, in particular the safety aspects and the quality of the blend that is used. This will be achieved through first the pilot scale testing at Innogy's 500kw rig and

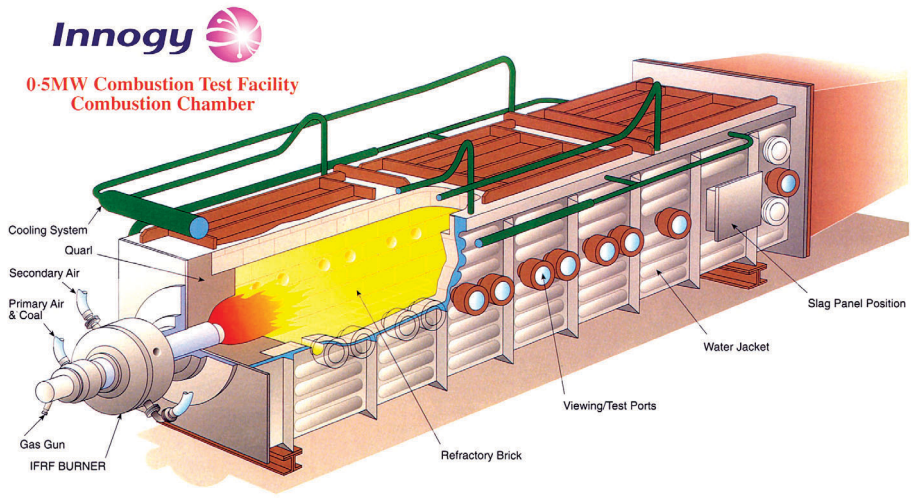

Figure 1. Innogy's 0.5MW Pilot Scale Test Facility

then the full scale testing of ash re-firing. An important aspect of ash re-firing is the nature of the ash. It is vital that ash characteristics do not change in a way that would affect the ability of ESP's to capture and collect the PFA effectively. It is also important that re-firing does not significantly affect the concentration and mobility of trace metals as this could greatly affect its utilisation. The lower the viscosity of the ash particles the more likely it will be that these particles will be retained within the boiler as boiler deposits. One way of increasing the 'stickiness' of ash particles, is to change the ash chemistry, which would not only enhance the proportion of bottom ash produced, but would also increase the chances of ash particle agglomeration, thus reducing the proportion of fine ash particles that enter the ESP's.

Testing on the pilot scale facility will concentrate on the likely impact on power plant operation with particular attention to safety and emissions. One aspect that will be closely studied is the possible affect that adding calcium may have on the fly ash.

COST

The total cost of this project is £328 500 with a DTI contribution of £154 000

DURATION

24 months – 1 April 2002 to 31 March 2004

CONTRACTOR

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