CARBON BURNOUT – COAL FINENESS EFFECTS

OBJECTIVES

It is generally accepted that improvements in coal particle size distribution are beneficial to carbon burnout, and considerable emphasis is placed on the optimisation and maintenance of coal pulverising equipment at utility power plant. The modelling of carbon burnout has been the subject of a number of recent and ongoing projects, some of which have received the financial support of the DTI, and significant technical advances have been made. However, there is an absence of available plant data to demonstrate the effect of coal particle size distribution on carbon in ash, which would allow the validation of this aspect of CFD and engineering models of burnout. This project seeks to address the shortfall.

The overall aim of the project is to establish good quality plant data to demonstrate the effect of changing coal fineness in a controlled way. Specific objectives are:

- to obtain full scale plant data on the impact of coal particle size on carbon in dust and NO_X formation
- to obtain data on the impact of coal particle size and coal quality on carbon in dust and NO_X formation by means of combustion trials on a 1 MWth single burner combustion test facility
- to provide coal and flyash samples for detailed laboratory testing and analysis, to establish whether there are differences in the nature of the flyashes arising as a result of the extent of grinding
- to analyse the data arising with the engineering model being developed under the auspices of the 'Improvement in Combustion Efficiency in Utility Boilers – DTI Project No. 139' and thereby to validate its ability to predict the effects of coal size distribution
- to undertake CFD modelling of the plant tests to establish the validity of this modelling approach (building upon the work undertaken previously in the earlier DTI sponsored project)

SUMMARY

The main activity will be full-scale plant testing, where the coal particle size distribution will be adjusted by changes to the pulverising equipment classifiers. The plant testing will be supported by laboratory scale studies of the coals fired and flyashes arising, along with mathematical modelling utilising the results of these studies.

Kingsnorth Power Station – site used for full-scale plant trials

Combustion tests will also be undertaken with a range of PF fineness levels on a single burner 1 MWth combustion test facility. This will provide data on the influence of coal particle size with perfect fuel and air distribution.

As far as is practicable the coal quality for the test facility and plant trials will be the same.

COST

The total cost of the project is £256 753 with a contribution of £98 877 from the DTI, with the balance of funding being provided by the project participants

DURATION

2 years – February 2001 to January 2003

CONTRACTOR

PowerGen UK plc
Power Technology Centre
Ratcliffe-on-Soar
Nottingham
NG11 0EE

In collaboration with

Mitsui Babcock
Imperial College of Science, Technology and Medicine
TXU Europe Power

Further information on the Cleaner Coal Technology Programme, and copies of publications, can be obtained from:
Nicholas Aluko, Location 1142, Department of Trade and Industry,
1 Victoria Street, London SW1H 0ET
Tel: +44 (0) 20 7215 6261
Fax: +44 (0) 20 7215 2674
E-mail: Cleaner.Coal@dti.gsi.gov.uk
Web: www.dti.gov.uk/cct/

dti
Department of Trade and Industry

OCTOBER 2001

DTI/Pub URN 01/1180

CLEANER COAL TECHNOLOGY PROGRAMME

Project Profile 307