

OBJECTIVES

Specific objectives for this project are:

- To identify the limitations of ignition and flame stability when firing low volatile coal in existing Low NO_x axial swirl burner technology. To identify the requirements for burner design modifications to extend the lower limit of volatile matter content that can be fired down to 10% or lower.
- To correlate the fuel ignition stability to measurable fuel properties and develop existing fuel testing methods to provide enhanced fuel ignition/stability characterisation data.
- To demonstrate the combustion performance of a low volatile coal burner for wall fired furnaces by testing a full-scale burner design in a single burner test facility.

SUMMARY

Traditionally low volatile coals and anthracites have been utilised in arch fired furnaces (often referred to as 'downshot' firing) so as to overcome the inherent difficulties of achieving stable and efficient combustion which arise from the lack of volatile material in the coal to aid in the ignition, and the low reactivity of the remaining char. The downshot firing system is, however, of higher initial cost than a comparable wall fired system, and if it were possible to utilise low volatile coal in wall fired furnaces there are clear economic benefits both in retrofit applications and for new plant.

In addition, for new plant the development of wall firing systems for low volatile coals is a key step in being able to use this advanced supercritical boiler technology. Current downshot firing technology is not amenable to advanced supercritical boiler technology.



Yue Yang 350MWe Downset-Fired Unit in China

In Phase 1 of the project the key mechanisms for ignition and stabilisation of low volatile coal flames were identified. A conceptual burner design for firing coals down to 10% VM daf was outlined. In Phase 2 of the project the aim is to develop further a burner design specifically for firing of coals of lower volatile matter content down to ca. 10% daf. It will be necessary to determine more closely the limit of volatile matter on ignition and stability with existing Low NO_x Burner technology and investigate the actual/relative sensitivity of ignition/stability to variations in the key mechanism parameters identified in Phase 1. The burner design developed in the project will be tested at full-scale.

In parallel with the burner design development it is important to identify better means of determining the ignition and flame stability characteristics of coals. It is intended to investigate calculated physical parameters and fundamental coal characterisation data obtained by the extension of existing experimental methods/modelling techniques to derive an improved measure/prediction of the ignitability/stability of low volatile coals.

Further information on the Cleaner Fossil Fuels Programme, and copies of publications, can be obtained from:

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COST

The total cost of the project is £419 543 with a DTI contribution of £159 427 (38%)

DURATION

24 months – July 2002 to June 2004

CONTRACTOR

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COLLABORATORS

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