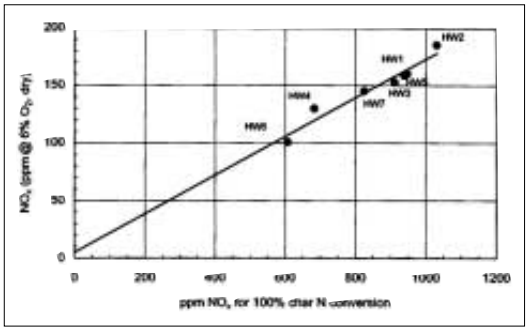
UK Collaboration with Netherlands and Australian NO_X Reduction Research Using Overfire Air Staging

OBJECTIVES

Recent collaboration between KEMA, Imperial College and Hemweg power station shows that under the deep air staging achievable with a combination of low NO_x burners and furnace air staging, NO_x from combustion of the nitrogen in the char, can account for all the exit NO_x with a high degree of accuracy. This work extends previous high temperature wire mesh (HTWM) studies at ICSTM, including two previous DTI projects, examining the relationship between NO_x from aerodynamically air staged low NO_x burners, principally Mitsui Babcock MkIII, and char nitrogen. With aerodynamic air staging alone, however, higher apparent char N conversions and additional NO_x contributions from thermal and possibly other sources were observed and data from a number of different plants had to be used to cover a similar range of coals.

The trends observed in the Hemweg/HTWM data yield very important fundamental information for NO_x reduction technologies which could not be obtained by laboratory scale tests alone. DTI funding for the UK components in the project is being requested to allow he KEMA/Hemweg/ICSTM collaboration to be continued so that additional coals and blends can be tested to extend and to give higher reliance to the trends observed above. The main objectives of the project are:

- to test coal samples collected by the overseas collaborators at Imperial College using the established HTWM test for char N content. Selected coals will be also be tested for char reactivity
- to maximise the information exchange with overseas research programmes ICSTM staff will make two visits to the Netherlands and a single visit to Australia
- to disseminate information to UK industry participating in the steering committee through six monthly meetings and reports. Results will also be presented at appropriate Coal Research Forum meetings and in the scientific literature, which should ensure a high coverage for relevant UK industries



Correlation between measured NO_x emissions and 100% char nitrogen conversion (M. Rozendaal, 'Impact of Coal Quality on NO_x Emissions from Power Plants', PhD thesis, Technische Universiteit Delft, 1999)

SUMMARY

The work proposed provides a basis for the application of a new standard test that is pertinent to pulverised coal combustion. There may also be scope for links with ongoing projects currently being supported by the DTI Cleaner Coal Programme and their follow-on phases – for example the development of a burner for the wall firing of low volatile coals and the collaborative burnout project.

The proposed research addresses the research and development priority areas identified by the Foresight Task Force including the impact of coal quality on turndown, burnout and NO_x formation and the acquisition of data on and modelling of combustion performance of coals. NO_x reduction through the integration of boiler and burners and development of improved and novel processes plus low NO_x burners will also be addressed.

COST

The total cost to project is £235 874 with a contribution of £29 423 from the DTI

DURATION

2 years – January 2001 to December 2002

CONTRACTOR

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In collaboration with

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