

# MINIMISING PARTICULATE EMISSIONS THROUGH THE APPLICATION OF NEURAL NETWORK AND MONITORING SYSTEMS

## OBJECTIVES

Close control of combustion conditions is a prerequisite of efficient operation of power generating plants and for meeting ever tightening emission compliance levels. Often conflicting requirements are placed on combustion systems in limiting individual species such as  $\text{NO}_x$  and particulate. Recognising this, the project aims to address the following:

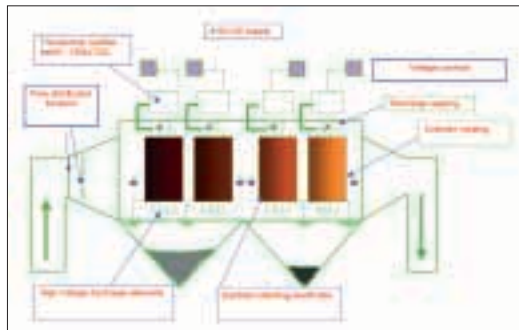
- plants retrofitted with low  $\text{NO}_x$  burner technologies often struggle to meet generator output requirements because of these conflicting needs
- plants fitted with flue gas desulphurisation (FGD) require that the amount of particulate entering the FGD process is minimised, in particular carbon
- the potential for significant impact on the costs of disposal of both flyash and FGD by-products
- conditioning of fluegases to improve the performance of electrostatic precipitators is in widespread use. Optimising dose rates for differing fuel and fluegas conditions is problematic
- continuous monitoring of particulate is now a requirement of black fossil-fuelled plant authorisations, but commonly used Opacity based monitors have shortcomings in terms of aggregate emissions which can lead to load shortfall and consequent inefficient use of plant
- a number of initiatives aimed at on-line monitoring of carbon in ash have met with varying levels of success. The proposed study would complement this work by potentially using such monitors or indeed using the indications from other systems

## SUMMARY

The three year project builds on and complements existing work to potentially provide a powerful comprehensive optimiser package to provide maximum collection rate for minimum inputs to the precipitator and assist in the optimisation of combustion. The project aims are met with the following programme:

- In year 1: to identify the extent of modification and adaptability of installed systems on selected power plants for application of technologies. Also establish the suitability of alternative monitoring systems and the potential for their use with optimiser packages
- In year 1/2/3: GNOCIS will be applied to dust abatement plant for combustion control and optimising particulate. GNOCIS is emissions a neural network based combustion optimisation that was jointly developed by Powergen and Southern Company Services with collaborative funding from DTI and EPRI
- In year 3: system reliability will be established at the nominated site(s)

The combination of UK instrument manufacturer, abatement equipment supplier, technology developer and end user will result in real market benefit to UK Industry capable of further exploitation.



Schematic of electrostatic precipitator



Construction of precipitators on a 500MWe generating unit

## COST

The total cost of the Project is £330 000 with a DTI contribution of £160 000

## DURATION

3 years – January 2002 to December 2004

## COLLABORATORS

Powergen UK plc  
Codel International  
Lodge Sturtevant  
TXU Europe Power

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