

TRIAL OF A PROTOTYPE CO₂ MEASUREMENT AND CAPTURE SYSTEM

LEAD ORGANISATION

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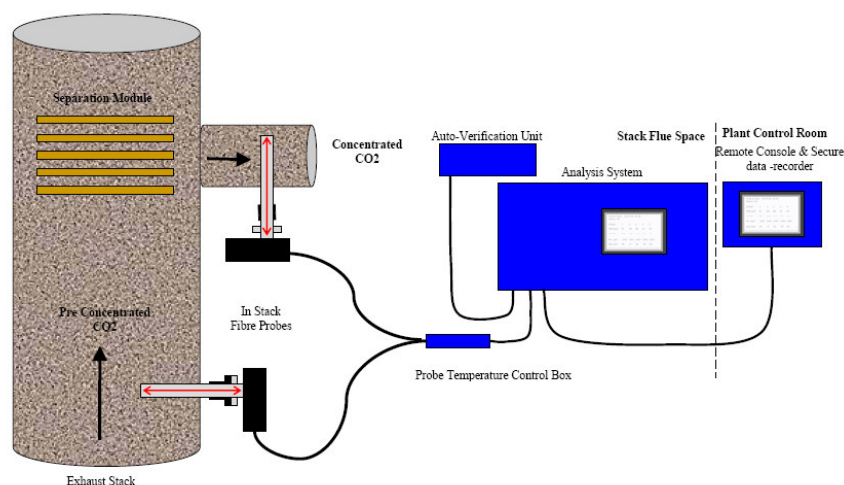
Clear Process
Clyde Bergemann

COST AND DURATION

The Carbon Trust contribution towards this project is £196,772. The project started in July 2007 and is due for completion in December 2008.

PROJECT REFERENCE NUMBER

064-003



Schematic of Cascade CO₂ gas sensor and clear process ceramic membrane CO₂ capture system

OBJECTIVES

The main objectives of this project are to:

- Capture CO₂ and measure in real-time the resultant concentrated gas from the exhaust flue(s) of a power station
- Explore potential routes for utilisation of the concentrated CO₂.

- Low maintenance equipment
- A scalable ceramic membrane CO₂ capture system that could be used in most coal-fired power stations.

The system is seen as an ideal way to capture CO₂ emitted with the exhaust gas.

SUMMARY

Novel quantum cascade laser (QCL) gas sensing and novel ceramic membrane gas filtration technologies will be developed and combined in one project. This will involve customising, integrating, testing and validating both technologies, and demonstrate the CO₂ sequestration/carbon capture potential during a live trial at a power station. The trial will be managed by Clyde Bergemann, a leading supplier of facilities and equipment for coal-fired power stations.

The potential benefits of the system include:

- Real-time, accurate and fast measurement of CO₂ in the exhaust gas
- No need for calibration
- Simple to use and install (a 'plug-and-play' device is envisaged in the longer term)

The QC laser gas sensor is in use in marine environments to measure SO_x and NO_x in ship exhaust stacks. Compared with currently available technologies (e.g. Fourier transform infrared (FTIR) spectroscopy testing and chemiluminescence), the gas sensor is more accurate, faster, more cost-effective and easier to install.

The ceramic membrane for separating and concentrating CO₂ from the exhaust gas has the potential to exceed the performance of amine and polymer-based membrane systems; it should be mechanically stronger, more compact and be able to deal with variable flow rates at higher temperatures and pressures.

These superior performance factors and the potential to be more economically viable, make the combination of the laser gas sensor and ceramic membrane systems a better option than other approaches.