

FUNDAMENTALS OF OPTIMISED CAPTURE USING SOLIDS (FOCUS)

EPSRC

Pioneering research and skills

“FOCUS” is a China-UK collaborative research project, jointly funded (£644,440) by the EPSRC (EP/1010939/1) and the National Science Foundation of China (NSFC). The University of Edinburgh (UoE) and North China Electric Power University (NCEPU), Beijing will share their expertise in adsorption, power plant engineering, and circulating fluidised beds to investigate novel rapid temperature swing adsorption processes for carbon capture. The project runs from Jan 2011 to Dec 2013.



NSFC



AIMS

Diagram in the background is of the Positron Emission Particle Tracking Results

1 .
Build upon the research excellence in CCS technologies at both institutions.

2 .
Develop at NCEPU different types of silicas and novel amine-functionalised adsorbents as materials for CO₂ capture.

3 .
Reduce the energy requirement for post-combustion CO₂ capture by 25-50% compared to amine-scrubbing technology.

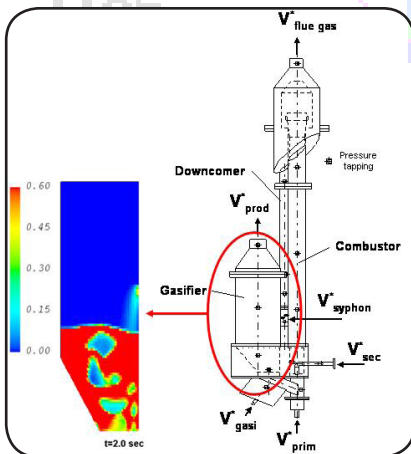
7 .
Develop a novel process based on Circulating Fluidised Bed technology using amine-functionalised adsorbents.

8 .
Advance the understanding of particle flows in CFBs using the Positron Emission Particle Tracking facility in Birmingham, UK.

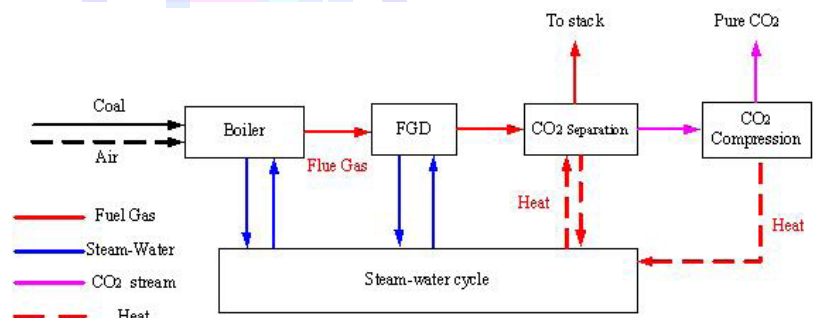
4 .
Combine experimental and multi-scale modelling approaches to obtain reliable models for the carbon capture process.

6 .
Predict the performance of novel carbon capture processes and optimise the integration in coal-fired power stations.

5 .
Use experimental results to form the basis for testing computational fluid dynamic models developed at NCEPU and the UoE.



Fast circulating fluidised bed – with detail of CFD simulation of bubbling bed (Zhang & Brandani)



Schematic diagram of a coal-fired power plant with post-combustion capture

PEOPLE

At the University of Edinburgh:

- Prof. Stefano Brandani: fundamentals of adsorption processes
- Prof. Jon Gibbins: integration of capture units in power stations
- Dr Xianfeng Fan: multiphase flow, fluidisation and particle tracking
- Dr Hyungwoong Ahn: adsorption and separation processes
- Dr Hannah Chalmers: technical and economic aspects of CO₂ capture
- Dr Mathieu Lucquiaud: design of power cycle and steam turbines
- Dr Daniel Friedrich: simulation and parameter estimation of adsorption processes



At the National Thermal Power Engineering & Technology Research Center at NCEPU, Beijing:

- Prof. Kai Zhang: experimentation, simulation and scale-up of multiphase systems
- Prof Honggang Chen: surface modification of inorganic powder materials
- Dr Gang Xu: fundamentals of energy cascade utilisation
- Dr Yang Teng: preparation and characterisation of adsorbing materials
- Dr Jian Chang: experiment and simulation of gas-solid fluidisation

