Programme Area: Carbon Capture and Storage

Project: Next Gen Capture Tech Benchmarking and Performance Analysis

Title: One Page Summary

Abstract:

Deployment of CCS could provide up to 20% of the emission reduction required to stabilise atmospheric concentrations of greenhouse gases over the next 50 years. The reduction in harmful emissions could be greater than any other single energy technology, including nuclear and renewables. A key driver for CCS is cost of capture of CO2. The vision for the ETI's CCS Next Generation Capture Technologies focus area is that the ETI will have supported the development of a transformational capture technology to a stage where it is ready for incorporation into a full scale demonstration or first of a kind (FOAK) build by 2015, enabling such a plant to be complete and operational by 2020. To support selection of the most appropriate technology, the ETI commissioned a series of projects under its Flexible Research Programme to produce outline designs and technoeconomic assessments of power generation plant with different capture technologies.

Context:

This project provided ETI with an objective view of the techno-economic performance of a range of current and next generation CO2 capture technologies including pre and post combustion and oxyfuel CCS plant. The analysis that underpins these benchmarking studies was based on coal and gas fired power station designs typical of those found in the UK and considered parameters such as power station capital cost, efficiency and levelised cost of electricity (with and without CCS).

Programme: Carbon Capture and Storage

Project Name: CCS - Next Generation Capture Technologies: Benchmarking

Contractor/Consortium: Foster Wheeler Energy Limited

Context

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Project

The primary aim of the Benchmarking Project was to establish a set of techno-economic performance benchmarks, based on 'best available technology', against which the performance of potential 'Next Generation' technologies could be objectively measured. These benchmarks covered the three key capture technologies for power generation applications (pre-combustion, post-combustion (for coal and gas) and oxyfuel), based on a 'typical' UK application (greenfield site on the north east cost).

Key Project Findings

The key deliverables for the project were a comprehensive technical report and spreadsheet economic model. The results provide ETI members with a set of benchmark techno-economic performance measures for new build coal and gas power stations with all key capture types, for typical UK-based applications. The spreadsheet provides a tool to undertake sensitivity analyses on the effect of cost and operational assumptions made in this study.

Based on the assumptions made in the project, the Levelised Cost of Electricity (LCOE) varied from £48 – 60 per MWh; this increases to £66 – 97 per MWh with CCS. For each design, addition of CCS (with 90% capture) resulted in around 8 - 10 percentage points reduction in plant efficiency.

Further Information

Full information on the results of the project is available to ETI Members in the confidential technical report and spreadsheet economic model.