

## **Investigation of gaseous emissions and ash deposition in a pilot-scale PF combustor co-firing cereal co-product biomass with coal**

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The UK government enacted the Renewable Obligation (RO) on 1<sup>st</sup> April 2002 (and effective until 31<sup>st</sup> March 2027) to reduce CO<sub>2</sub> emissions via encouraging the growth of renewable energy sources such as biomass, wind, solar, geothermal and hydrogen for electricity generation. Recent studies in United States and Europe have demonstrated that for electric utilities producers, co-firing biomass with coal is among the less expensive alternatives for CO<sub>2</sub> emission reduction. However, the combustion of biomass can lead to gaseous emissions and ash deposition problems that can cause enhanced corrosion and/or loss in efficiency of the power plant. Also, co-firing of coal with a share of biomass higher than 10 % is still challenging and requires careful biomass selection.

This study presents the results of investigations into the gaseous emissions and ash deposition characteristics from combustion of Cereal Co-product mixed with coal (in high share,  $\geq 20$  %, wt) in a 100 kW<sub>th</sub> pulverised fuel combustor. Combustion gas emission samples for CO<sub>2</sub>, O<sub>2</sub>, H<sub>2</sub>O, SO<sub>2</sub>, CO, NO, NO<sub>2</sub>, N<sub>2</sub>O, HCl, HF, were obtained on-line by a high resolution multi-component Fourier Transform Infra-Red gas analyser. Ash deposit samples were collected from the flue gas using three air-cooled probes that simulate heat exchanger tubes with surface temperatures of 500, 600 and 700 °C. The deposits formed were analysed using SEM/EDX and XRD techniques to assess their corrosion potential.

### **Key words**

Biomass, Co-firing, Emissions, Ash Deposition, Pulverised Fuel Combustion