

Field experience in biomass cofiring on SCR catalyst technology

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An increasing number of thermal power plants are co-firing or even exclusively using renewable fuels such as wood chips, sewage sludge, agricultural residues or bio-oils. The Best Available Technology Reference Document for Large Combustion Plants, BREF-LCP, was updated in July 2017 and identifies Selective Catalytic Reduction of Nitrogen Oxides (SCR) as state-of-the-art technology to meet the most demanding NO_x emission limit requirements. Compared with pure coal (soft or hard) firing, special attention must be paid for biomass fuels with high contents of SCR poisons. However, in general the same NO_x limits can apply for coal or co-firing or biomass firing power plants and that requires operators to consider NO_x-lowering technology like SCR. Another aspect of the new BREF-LCPD is the mercury emission threshold.

Compared with coal, biomass fuels can have higher ash contents and different ash compositions. Especially catalyst poisons like alkaline (potassium, sodium), earth alkaline (calcium) and non-metals (phosphorous, halides) can be more prominent in biomass fuels. These can be deposited on the catalyst and lead to different catalyst deactivation mechanisms. The different mechanisms are explained with reference to biomass firing and the positioning of the SCR catalyst in the exhaust duct. Depending on the SCR catalyst position and therefore the temperature of the catalyst, the presence of sulphur in the exhaust gas can suppress the effects of catalyst poisoning. Johnson Matthey's field experience of power plants operating on mixed and pure biofuels are discussed and according catalyst management plans are presented. Furthermore, the recent advances of mercury oxidation on the Johnson Matthey SCR catalyst are described.