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Autor(en) des Beitrags: Speth, K.; Murer, M.; Spliethoff, H.

Titel des Beitrags: Selective high temperature reduction of nox with ammonia in biomass incineration

Abstract:
A common process to reduce nitrogen oxides (NOx) is the selective non catalytic reduction (SNCR) with ammonia as reduction agent which is injected directly in the combustion chamber. This technology leads to an overall NOx reduction of 70 % if the injection takes place in temperature zones from 850 °C to 1050 °C with an excess air ratio of 1.2. Lower temperatures inhibit the reduction reactions and increase the ammonia slip, higher temperatures lead to an oxidation of the reduction agent which causes additional NOx. Further work needs to be done to improve the SNCR-Technology in order to provide a more temperature independent and efficient NOx control mechanism for real plants. The research approach is the combination of air staged combustion and ammonia injection. Experiments are carried out on an entrained flow reactor where the operation conditions can be easily controlled. Ammonia gas is injected directly in the primary zone under substoichiometric conditions, the mixture of the reduction agent and the flue gas can be influenced by using a carrier gas (N2) and different nozzle geometries. First results show that the overall reduction efficiency is increased as long as the excess air ratio in the primary zone is above 0.75. That indicates, that the oxidation of added ammonia is avoided even if the temperatures exceed 1050 °C due to the absence of oxygen. Therefore the selective high temperature reduction (SHTR) provides an alternative and robust NOx control mechanism, which combines both the advantages of air
staging and SNCR.

Stichworte:
biomass, combustion, NOx emission, ammonia

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