THE APPLICATION OF A LOW TEMPERATURE SELECTIVE CATALYTIC REDUCTION SYSTEM FOR MUNICIPAL & HAZARDOUS WASTE COMBUSTORS

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Discussion by

Audience

The following questions were asked by the audience after the author's presentation.

A. Is there an ammonia slip requirement in Germany?
B. How much did the systems you described cost to build?
C. How much do the systems you described cost to operate?
D. What are the actual emissions from the systems you described?
E. What is the cost effectiveness ($/Mg of pollutant removed) of these systems?
F. What is the cost of competing alternatives in Germany?
G. We have heard that Germany has banned the landfilling of "carbon" in the future and has set different standards for landfills receiving waste with less than 2% carbon and those that receive less than 5% carbon. Can you provide us with a summary of the significant dates and what the requirements are for each of the two "carbon" level landfills?

AUTHORS' REPLY

A. There is no federal emission standard concerning ammonia slip in Germany. However, it is common practice by local permitting authorities to require the ammonia slip to be limited to 5 mg/m^3 (= 6.6 ppm).

B. The investment cost for a LTSCR system described (using the example of a 3.5 T/H hazardous waste incinerator) can be estimated to be approximately DM 2,200,000 -- based on German labor and equipment cost.

C. The pressure drop contributed by the LTSCR is approximately 250 mm H_2O (= 25 hPa). The stoichiometry of ammonia of NO_x is around 1.02. Since the lifetime of the catalyst must be expected to be in excess of 10 years (= 80,000 hours of operation) and the system has no moving parts, the maintenance cost can be eliminated.

D. The actual NO_x emissions from these systems range from 25 to 50 mg/m^3.

E. Given the numbers in Answer C and D, the cost effectiveness must be calculated individually for each specific site.

F. There is literally no cost competing alternative for NO_x removal alone. SNCR, if operated with removal efficiencies >80%, leads to significant problems caused by a substantial ammonia slip. Combination-SCR is the only real competing alternative, combining NO_x and PCDD/PCDF removal. Hence, about 90% of the MWCs and HWCs in Germany, Holland and Austria are equipped/retrofitted with SCRs.

G. On June 1, 1993 new legislation (TASI) went into effect regulating the disposal of municipal wastes of all kinds. TASI states that there are two classes of landfills. Class I receives only so called mineral wastes and Class II receives other wastes in a pretreated form. The wastes have to fulfill, with or without pretreatment, the "carbon" criteria as shown in the following Table:

Landfill Type	Class I	Class II
Carbon Content		
as LOI (Loss on Ignition)	≤3%	5%
as TOC (Total Organic Carbon)	≤1%	3%

(All units are percent by mass)

The TASI law went into effect for new landfills on June 1, 1993. Existing landfills have a grace period until June 1, 2002.

After June 1, 2002, no landfill will be allowed to operate without fulfilling the criteria as given in the above Table.