AIR POLLUTION CONTROL FOR SMALL RESOURCE RECOVERY FACILITIES

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Discussion by

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Mr. Henderson brings up a subject that is going to become increasingly more important with the passage of time. As noted by the author and in an article by Marjorie Clarke in the January 1988 issue of Waste Age magazine, several states have enacted stringent air pollution control requirements for incinerators that, in some cases, are applicable to units as small as 20 tons per day (TPD). Many other states are considering such requirements. Several studies have indicated that there is a greater market potential for small (less than 600 TPD) and perhaps even for what some people call micro plants (less than 200 TPD) than there is for the large plants (greater than 600 TPD). These new requirements for small plants can have a significant effect on their economic viability and when it would be prudent to construct them.

This paper presents a great deal of information on many details. Unfortunately, too much attention is sometimes spent on some details, such as SO_2. Although SO_2 requirements are usually included in BACT, the very low sulfur content in MSW makes compliance a trivial matter. The paper also does not seem to answer the basic question or come to any conclusion about what should have been the reason for writing the paper. This question is: "What is the financial impact of these requirements on small plants?" The author included a graph during his oral presentation that partially answered this question and I hope he will include it in the discussion volume.

One area where there should have been more attention to detail is the difference between spray dry (wet dry) scrubbers and dry lime injection (all dry) systems. We have found that spray dry systems do not economically scale down very well. This is why several manufacturers have developed the dry lime injection system. On an actual project, we received proposals from several manufacturers for a 50 TPD plant that showed a spray dry system would have a constructed cost of $1.2M, a dry lime injection system would cost $330K, and a packed tower scrubber would cost $220K. We would not normally recommend a packed tower scrubber due to potential problems with the demister, but this one manufacturer had several successful applications in states with stringent requirements. A BACT economic analysis showed that in terms of $/ton of pollutant removed over the life of the project, none of these options were justified. An economic analysis of the operation of the plant showed that it would still pay for itself with either of the last two options, but it could not pay for itself using the spray dry system.

Our conclusion is that the states must become more

realistic in setting BACT requirements for small and micro scale plants, and/or we must find more cost effective control techniques.

Discussion by

Floyd L. Mitchell
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We congratulate Mr. Henderson on his effort to define the concerns for air pollution control systems on smaller to middle size waste-to-energy facilities.

We offer the following comments based upon our very current activities in the marketplace. Because of the very rapid changes occurring in this market, our updated comments may themselves be outdated soon.

As a general comment, we see a tremendous "fad" or interest by public officials in recycling. This may have effects upon the sizing and requirements for air pollution control devices. Only time will answer this.

Within the past several months, we have seen particulate requirements decreased to 0.015 gr/dscf in New York. Newly proposed regulations are being offered in Pennsylvania. Along with these new requirements, we see conflicting requirements such as high temperatures for "dioxin control," while at the same time requiring tighter NO_x limits. It is apparent that any plant that reports environmental performance at new, lower levels, will be used by some as the new "attainable" standard. An example is the proposed 0.2 nanogram dioxin "target" in New York.

We would comment on an item in the paper concerning low flue gas temperatures. While it is desirable to lower temperatures for sorbent reactivity, gaseous heavy metals condensation, and efficiency, it is also important to remember that SO_2 and SO_3 condensation temperature is in the 240°F range. Therefore, the vendor/operator must balance the overall plant operation—not just one parameter.

We do disagree that additional labor is not required due to a scrubber addition. We feel additional operational and maintenance labor will be required. This may not be in extra manning, but will at least be in the form of overtime and contract labor. We feel that the ash removal system is the largest maintenance area on a scrubber.

We have the following comments on Table 3:

(a) Capital cost is high if a building is not included.

(b) Waste disposal costs, especially in the Northeast, are more likely to be in the $50 to $100 plus per ton range.

Discussion by

Marjorie L. Hart
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The paper discusses the environmental issues facing these plants and the technologies and costs for dealing with them.

The paper did not, however, mention NO_x, which is an issue not only in the California South Coast nonattainment area, but also in ozone nonattainment areas. More and more states are considering BACT requirements for NO_x on many types of combustors. One constraint has been the high cost of selective catalytic reduction (SCR) processes.

A substantially less expensive process has been demonstrated and commercialized in Europe. As described in Ref. [1], the process involves the injection of an aqueous solution of urea and/or other chemical enhancers into the flue gas stream at one or more locations. These chemicals are readily available and require no special safety precautions. They react with the flue gas to produce N_2, CO_2 and H_2O. NH_3 is also a byproduct of this reaction, but can be controlled to levels which eliminate the risks of ammonium sulfates and/or bisulfates in the preheater.

The process has been demonstrated for conventional fuels and municipal solid waste. NO_x reductions in the range of 50–75% have been obtained over a range of flue gas temperatures from 1000°F to 2100°F, providing wide flexibility to inject at one or more practical locations in existing boilers.

The costs of the process are estimated at about $1000/ton for 70% reduction at an existing 300 MW coal-fired unit in the U.S. operating 70% of the time. This is on the order of one third to one fifth the cost of SCR.

REFERENCE

[1]"Control of Nitrogen Oxides Emissions From Stationary Sources." American Power Conference, April 20, 1988. W. R. Epperly, Executive Vice President; R. G. Broderick, Vice President Engineering, Fuel Tech, Inc. and J. Peter-Hoblyn, Managing Director, Fuel Tech GmbH.

Discussion by

William O. Wiley
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The author has presented with clarity the flue gas emission control system choices faced by owners and

developers of small Resource Recovery Facilities (RRF). Our experience generally agrees with the findings presented, but we see a need for more work in this area.

Our experience agrees with the assessment that states are applying much stricter emission limitations than the current NSPS limits. We expect this trend to grow. We also agree, based on data currently available, that some type of dry scrubber with either a baghouse or ESP will best meet the evolving emission requirements.

The cost example given for a slurry scrubber-baghouse combination for a 200 tpd facility illustrates that this type of control system will make the APC the single most expensive component in the process system line. This will have a significant impact on project economics for small RRF's.

Mention is made of an all-dry system and some brief comparisons given. We believe that additional analysis is needed in this area to thoroughly consider the all-dry system for application to small RRF's. The all-dry system offers operating advantages compared to a slurry system (no slaking equipment or reactor caking) at a lower initial cost, but at some sacrifice in acid gas removal efficiency. The question is: Will the resulting removal efficiency be sufficient to satisfy the evolving requirements? Our experience with this type of system has not been trouble free, but has been generally satisfactory. We believe that bag material and type selection is important and that by replacement can be a significant operating expense.

Some vendors indicate that an all dry system with the flue gas temperature controlled to the, say 275-300°F range, will provide removal efficiencies very close to those attained with a slurry system but with the advantages mentioned. The author's comments would be appreciated.

Again, the author is to be congratulated on his paper covering such a timely subject.