STARTUP AND OPERATIONS OF
THE MID-CONNECTICUT RESOURCE
RECOVERY PROJECT

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Discussion by

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The author presents the mid-Connecticut facility and its technology in a very organized and readable fashion. Each subcomponent of the resource recovery facility, including the MSW receiving and storage area, process equipment, air pollution control equipment, and the boilers are individually described. However, the title of the paper implies that start-up and operations of the facility are detailed. For example, details on facility shakedown, equipment modifications, operations, and associated costs are some areas which are of great value to municipal officials as well as design and consulting engineers.

Addressing some specific points in the paper, the author states that only 11.8% by weight of the incoming feedstock to the processing facility forms the residue stream. The author could enhance the informational quality of the paper by providing a mass balance detailing a material flow of the system. Typically, depending on the incoming waste composition, the residue stream from a RDF facility is much higher and includes metallic, glass, and other nonorganic fractions of the incoming wastestream.

Some pertinent technical information appears to be missing from the paper. For example, the nominal size of the RDF generated through the two-stage shredding process is not provided. Also, the effectiveness of the ferrous metal air classifier is not discussed by the author. The author states that aluminum does not plug the boiler grates. Is that due to minimal aluminum quantities in the incoming feedstock because of local recycling programs? In conclusion, I believe the paper could have been much more informative had it included additional operations data as implied by the title.

Discussion by

Don Kominski
Heil Engineered Systems
Milwaukee, Wisconsin

The paper is entitled “Startup & Operations of the Mid-Connecticut Resource Recovery Project.” It provides a good overview of how the Mid-Connecticut project is designed and constructed. Unfortunately, this background information occupies most of the paper whereas the actual startup and operations experience occupies only a small portion. Most of the ASME audience is familiar with the C.E. concept; therefore, a more thorough discussion of actual system and performance versus design would benefit the technical reader.
For instance, improvements were made to the flail mills but not mentioned. Changes required to enhance the secondary shredder/air sweep system would be of interest. Most everyone realizes the difficulty of metering RDF into a boiler with a live-bottom metering bin containing augers. What unique features or modifications resulted in a good experience at this facility? Were the vibratory feeders between the metering bins and boiler found to be necessary or desireable?

Some confusion exists regarding the capacity of the processing lines. The author rates them at a nominal capacity of 100 tons/hr, whereas they averaged 88.9 tons/hr during the 3 day capacity test. These figures would be of greater value if we knew the RDF particle size during testing or currently being successfully fired in the boilers.

Actual ferrous recovery of ≈80% with the double drum magnetic separation system deserves some explanation. Can it be improved and how?

The author states that aluminum plugging of grates has not been experienced at Mid-Connecticut. An explanation of this achievement would be helpful.

It appears boiler emissions were well within Connecticut standards. If not beyond the scope of this paper, it would be interesting to know how these results compare with published results of other waste to energy facilities.

Overall, the paper was well organized and informative. The technical success of this facility is important to the industry and C.E. should be congratulated for their efforts.

Discussion by

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The author presented an excellent factual description of the Mid-Connecticut processing, electrical power generation, and pollution control facilities. The waste processing system, in particular, is described in substantial detail. It is also to the author's credit that he described, in some detail, the boiler corrosion problems that were encountered. Almost all of the existing RDF facilities have, at one time or another, experienced similar waterwell corrosion problems, albeit not as sudden, or catastrophic as was noted at the Mid-Connecticut facility. The fix that was developed by Combustion Engineering was the result of an extensive materials surveillance and testing program, coupled with cold flow and combustion kinetics modeling, and competent engineering judgement.

I was surprised to note the author's comment that "aluminum plugging problems experienced with virtually all other RDF grates have not been experienced at Mid-Connecticut." In early 1989, Combustion Engineering mentioned to the writer that extensive plugging of the grate had occurred. It was my opinion at the time, and still is, that some hand sorting of the aluminum product should be performed. Although hand sorting can be an expensive labor cost, most other RDF facilities have opted for this technique. It has been found that the increased labor and marketing costs are almost entirely offset by the increased revenue. For example, assuming a 2000 TPD plant and a waste stream containing half of 1% aluminum, yields 100 TPD of aluminum. Assuming an 80% recovery and a price range of $700–$1000/ton yields a revenue stream of $56,000–$80,000 a day.

Another unique distinction of the Mid-Connecticut facility is the yield of RDF per pound of MSW processed averages 0.838 lb of RDF per pound of MSW processed, whereas most RDF systems deliver, on average, 0.6–0.7 lb of RDF/lb of MSW.

In summary, I would like to again complement the author on an excellent paper.

AUTHOR'S REPLY

The comments submitted on my paper are appreciated. Since each discussion touched on many of the same points, I am submitting one response which will address those areas of expressed interest as well as requests for additional comments or clarification.

First, with respect to the costs associated with the start-up, modifications, etc., these were borne totally by C-E and there was no financial impact on the CRRA or participating communities. The uniqueness of the project in that it was a retrofit, incorporated dual-fuel burning capability, split operational responsibilities, etc. would make a presentation of detailed costs quite meaningless. For further information of the numerous efforts involved in this first application of new technology, I recommend obtaining the proceedings of the June 1989 GRCDA Conference held in Hartford, Connecticut where this information was comprehensively present by C-E.

The 11.8% by weight residue stream reported is correct and typical for C-E plants. The technology offers flexibility to obtain maximum Btu content or residue quantity (for potential composting) as desired by the communities served. Further, adjustments can be made to accommodate waste compositional changes which occur, such as seasonal variations.
With respect to RDF nominal sizing, we typically size to 90% minus 4 in. which is, we believe, appropriate for the combustors provided.

Ferrous metal recovery was, in fact, below C-E’s original anticipated recovery rate and contained a higher tramp content than expected. CRRRA is presently initiating a program to improve the ferrous metal product. Some improvements in metal removal efficiency has been achieved in the Detroit and Honolulu facilities where we have attained 85+% recovery. The cost/benefit ratio to achieve further increases in performance appears marginal.

Aluminum plugging has not been a problem on any of our grates. Melts pass between the keys directly into siftings removal hoppers where rugged augers remove the aluminum and siftings from the system. Early augers were, however, replaced with more robust designs to improve reliability and availability. While Mid-Connecticut did not include provisions for aluminum recovery, C-E is offering an aluminum recovery module for recycling needs when requested for future plants.

The following table will provide greater insight to the actual performance at Mid-Connecticut versus what C-E guaranteed:

<table>
<thead>
<tr>
<th>Item</th>
<th>Facility Guarantee</th>
<th>Facility Performance Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Facility Capacity</td>
<td>12,000 Tons Per week</td>
<td>12,568 Tons</td>
</tr>
<tr>
<td>2. Facility Combustible Loss (Process &amp; Power Block)</td>
<td>9.0%</td>
<td>6.7%</td>
</tr>
<tr>
<td>3. Process Line Capacity</td>
<td>1,260 Tons per 16 Hour Day for 3 Consecutive Days</td>
<td>Line 100 - 1,412 TPD Line 200 - 1,433 TPD</td>
</tr>
<tr>
<td>4. Ferrous Metal Recovery</td>
<td>90% Line 100 - 80.3 Line 200 - 81.9</td>
<td></td>
</tr>
<tr>
<td>5. Steam Generator Thermal Efficiency</td>
<td>75.03% on 100% RDF at 231,000 Lbs/Hr</td>
<td>77.05% Average (3 Units)</td>
</tr>
</tbody>
</table>

Certain modifications made at Mid-Connecticut were undertaken on proprietary equipment, hence, will remain unpublicized. Metering bins, considering the difficult nature of the fuel, have worked well and have further improved as operating experience is obtained. The vibrating pans also have provided their intended service, eliminating clumping and delivery of an acceptably uniform feed to the boilers.

The waste processing lines are rated at a nominal 100 TPH and on occasion run at 120 TPH. The average rate over days is lower due to periodic line interruptions which occur due to jams, picking of bulky waste, etc.

C-E, i.e., ABB Resource Recovery Systems, is very pleased with the excellent emission levels achieved with its technology. We do not, however, believe it is our purview to provide comparisons with other technologies.

Lastly, I will comment on the observation that most RDF systems recover 0.6-0.7 lb of RDF per pound of MSW whereas Mid-Connecticut reports recovery of an average of 0.838. We suspect the reviewer is comparing RDF prepared for burning on a supplemental basis in existing fossil fired units. First generation RDF systems reduced recovery to obtain cleaner fuels for this purpose. Today this is not required, and especially so when dedicated boilers are included.

I would like to thank the reviewers for their comments and trust that the above provides the clarification they are looking for.