RESOURCES RECOVERY FROM MUNICIPAL SOLID WASTE: THE AMES SYSTEM EXPERIENCE WITH ECONOMICS AND OPERATION

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The complete compilation of production figures and all costs over a period of three years for this Resource Recovery Waste-to-Power plant is a new resource, invaluable to those attempting to project the economics of plants of this type.

In order to make proper use of this information, however, one must be careful to take into account special circumstances and factors which would lead to misleading conclusions.

Some points which must be considered are these:

1. This system has been designed for about 450 tons per day, but has been operated at little over one-third of capacity because only the City of Ames delivers refuse to it, although more was expected from elsewhere. Operation with more than one shift would greatly improve the revenues generated without correspondingly increasing the capital and even labor costs.

2. The hourly costs of operation are realistic for the single line which runs at about 25 tons/hr, requiring 60 to 70 kWh/ton processed. This includes all of the power used, including that for storage as well as lighting and so forth. It is interesting to note that the power used for direct processing is only half the total power requirements. By comparison, the Bridgeport Resource Recovery Facility would use 70 to 90 kWh/ton, not much more, to produce a powdered product.

3. The production figures show the remarkably consistent properties of the MSW, and the amount of RDF produced per ton of MSW over the three years. It should not be overlooked that the Ames NSW is not typical of USA averages, and especially not of Urban Waste, which have been found to have much higher moisture and ash content. For this reason, the properties of the RDF should not be extrapolated to other locations.

4. The downtime has been about 12 percent of operating hours, according to the data presented. This is reasonably in line with the assumption that a plant of this sort can operate 20 hr out of 24. It would seem that there is considerable room for improvement in equipment design and configuration to reduce this rate of down time.

5. The amount of maintenance required appears to be hidden within the category “contractual costs.” The authors perhaps could clarify this, since they are equal to the total labor costs for operation of the plant.
6. The fact that the plant is a single-line plant without redundancies results in somewhat more expensive maintenance, perhaps, due to the duress: the authors perhaps could comment on this aspect. On the other hand, the economics of the plant, if it had to support the capital cost of two lines would have been disastrous, rather than merely marginal.

7. The need for better instrumentation, especially weigh-scales, is indicated. The measurement by bulk is certainly subject to wide error, and the boiler heat balance method is, to say the least, difficult when the fuel moisture varies as much as an undried RDF does. By comparison, the Bridgeport fuel is paid for by boiler heat balance with high precision because of the minimal effect of dry RDF on boiler efficiency and operating conditions.

Those who believe in Resource Recovery and Waste-into-Energy are grateful to all the people who stuck to their guns and made the Ames System come through as a success. Part of this success is due to the operating staff who preferred to make it work rather than stand around and blame vendors and designers. Another contribution was the dry, clean refuse contributed by the people of Ames, which made RDF which could be burned, and which would respond to the disc screen. The people of Ames who were willing to carry the losses on their taxes rather than through tipping fees made their contribution. Finally, the economics have been saved by the high cost of coal.

AUTHORS' REPLY

The following comments are in response to the specific points raised in the discussion by Floyd Hasselriis.

1. The original system design process rate was 50 tons/hr; but in practice the process rate is 35 tons/hr; the design rate is not achieved on a steady basis because of material handling difficulties. Average process rates higher than 35 tons/hr result in material spilling from conveyor belts and pluggage in the pneumatic transport line to the RDF storage bin.

The facility serves Story County, Iowa (population 65,000) which includes the city of Ames. Additional refuse from outside the county could be solicited but would require increased process time; cleanup and maintenance activities would have to be rescheduled and start a second or third shift basis. At present a maintenance delay can usually be corrected before operation begins the next day; because the facility only has a single flow line it is important to minimize long down-time.

2. One of the causes of high unit electrical energy consumption is the use of electric heating (resistance heaters); their effect is seen in the increased indirect consumption during the winter season compared to spring and fall.

3. The refuse processed by the Ames facility contains a lot of paper which is generated by Iowa State University and the State Department of Transportation. This would account for some of the low moisture and ash content of the waste stream as compared to the national "averages".

4. The nominal run time of six hours leaves time for daily maintenance and cleaning as well as down-time that occurs. Preventative maintenance is extremely important on a single line system such as this. The authors feel that attempting to operate more than 10 hr/day is unrealistic for this type of system.

5. The contractual cost category includes non-routine maintenance charges such as RDF bin storage floor resurfacing and air lock feeder replacement. Rental charges for vehicles including the tipping floor endloader and process reject hauling trucks are also included.

6. Preventative maintenance activities take place when the system is shut down at the end of the processing day. Repair maintenance takes place on an as needed basis to get the system operating again. A multiple line system would have the advantage of less pressure to get the system operational after a failure since other line(s) would be processing. The authors agree the invested cost for a multiple process line system would have been excessive for a plant of this capacity (200 tons per day).

7. The authors agree that better instrumentation is needed particularly from a cost-effectiveness standpoint. This would apply to material weighing systems, incorporating belt conveyors, as well as automated moisture analysis; both of these measurements would be very desirable in the Ames system.

CLOSING COMMENTS

As the discussion indicated, the people associated with this system have made it a success. Problems have been identified and should and are continuing to be solved.

The cost of solid waste disposal is carried by the entire county populace and amounts to a net cost per person of approximately $10/year. As has been mentioned, this is a system whose economics are improving with rising fuel costs.