THE DEVELOPMENT OF THE GREATER DETROIT RESOURCE RECOVERY PROJECT

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Discussion by

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It seems that this paper was meant to be only what its title implies—namely a brief history of the development of the Detroit project, along with a sketchy description of the plant and its operation.

It is disappointing to find virtually no engineering information that might assist others in the design of such plants, and little information that might allow an astute reader to assess the likelihood that this plant will operate as advertised.

Following are a few specific points that I hope the authors can address in their closure:

(a) Some $438 million will be spend on this plant that will process some 850,000 tons per year. In other words, some $515 will be invested to handle each annual ton of refuse. A good rule-of-thumb has been that the annual cash required to service the debt and operate such plants amounts to about 30% of invested capital, so one can figure that it will cost some $150 per ton to handle the waste, not including landfill costs. How does this figure compare with the City's projections of cost per ton?

(b) What specific measures is the City considering to separate unprocessible or troublesome wastes prior to delivering waste to the facility?

(c) Why are only two boilers permitted to operate at any given time? Why is there but one turbine generator?

(d) The paper states that some 4000 tons of waste can be stored in the storage area which appears to have an area of about 40,000 ft^2. My experience says that the waste will have to be piled to a height of at least 20 ft in order to store 4000 tons in this area. What storage height is actually contemplated? Has anyone succeeded in storing and retrieving waste at this height?

(e) Each line is said to be capable of processing 100 tons per hour, but no mention is made of secondary shredders to process the trommel oversize. Are such secondaries contemplated? If so, how many tons per hour of trommel oversize will they process? With what horsepower are they equipped?

(f) The pickers are isolated in pressurized booths, and they pick using mechanical pickers and closed-circuit TV. Are the booths capable of handling overpressures in the range of 3 psi? Are explosive vapor detectors installed in this plant? If so, where? The pickers are to pick from a "slow-moving" conveyor. How slow is slow? Through what burden depth are they expected to spot troublesome material?

(g) No energy prices are given, thus making it fruitless to speculate on the probable net cost of processing the waste.

It will be interesting to compare actual operations of this plant with the projections of this paper.

Discussion by

Kenneth L. Woodruff
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My comment on this paper relates to the technology selection for the project. It is noted that there were two finalists selected out of three proposals. One finalist offered mass burn, the other refuse-derived fuel. Why was the mass burn proposal recognized as offering the more proven technology? We have heard this over and over, but it is not really true, especially at the time this selection was being made.

I find it significant that someone who claims mass burn to be more proven can state that the RDF Facility had the advantage of providing "greater flexibility." I heartily agree with this comment. I have recently been involved with a project proposal where a mass burn facility is said to be more flexible than an RDF facility, since it will burn everything. That is the primary problem with mass burn and the crux of the matter when it comes to concerns over air emissions, ash residue, etc.

I certainly look forward to the successful completion and operation of the Greater Detroit Project.

AUTHORS' REPLY

To Anthony Nollet

Mr. Nollet points out, correctly, that the paper is a general description of the Detroit project and its development, and as such does not delve very deeply into the design aspects of the facility. That would be another paper, and we agree it would be of interest. Mr. Nollet's specific points and questions are addressed below, numbered as in his remarks.

(a) The tipping fee is based on a formula that takes into account debt service, an operating fee, certain pass-through expenses, and credits for revenues from steam and electricity sales, ferrous metal sales, and private hauler tipping fees. The City's tipping fee, net of its share of revenues, was estimated at the time of financing to range from about $40 to $60 per ton in the first year of operation, depending on assumptions made regarding steam sales, tonnage processed, private hauler fees, and inflation. This also includes landfill costs.

(b) Since 70% of the waste will be from City collections, primarily from residences within the City, it will be possible for certain items such as bulky wastes to be separately collected and not delivered to the waste-to-energy facility. Additionally, two transfer stations will continue to be operated in the City, and troublesome items may be removed at those locations. The City is currently studying specific measures and programs to be implemented within the collection and transfer system, to facilitate waste-to-energy operations.

(c) The limitation that only two boilers will operate at any given time is a condition of the Project's air permit; it would certainly be preferable from an operational standpoint to have greater flexibility in this regard. The choice of a single turbine-generator is a design choice of C–E in its proposal to the City; this would appear to be an economic decision, reflecting the fact that the primary energy product is steam, and not electricity.

Revenues from steam sales, for example, are projected to be 2.5 to 3 times those from electricity sales.

(d) The reviewer correctly points out that the storage will involve relatively high piles of refuse, which we anticipate to be in the range of 15–20 ft or so. This is not seen to be a serious problem, despite limited experience.

(e) The discussion of secondary shredders was inadvertently omitted from the published paper. Roughly 50% of the input waste is conveyed from the primary separator (trommel) to the secondary shredder, which is a hammermill-type shredder of approximately 300 hp.

(f) As stated in the paper, the picking stations are enclosed and under positive pressure. The primary shredder enclosure should withstand 3 psi, which would afford protection near the picking area from shredder explosion. (The picking station booth itself, as far as we know, would not be designed for 3 psi.) There will be vapor detectors in the general area of the picking stations; we do not yet know the precise locations. The "slow-moving" conveyor's speed will range from 10 to 40 ft per minute. It should be stopped before any handpicking. The burden depth is expected to be about 1.5 ft.

(g) The steam price is established by contract to have a base price of $5 per thousand pounds of steam, and to escalate from June 1981 at a rate 2% above the Consumer Price Index (e.g., if the CPI changes by 5% per year, the steam price will change by 7% per year). In the first year of operation, the contract steam price on this basis should be $8 to $9 per thousand pounds. Approximately 2.5 million pounds of steam

will be produced and sold, based on processing 850,000 tons of refuse. (There is an additional steam price component which is designed to reimburse the Authority for the cost of the steam line.) The electricity price is based on an avoided cost concept tied to a specific Detroit Edison plant. The estimated electricity price in the first year of operation is roughly 3.6 cents/kWh. Electricity production (net for sale) is projected to be 221,275 MWh per year in turbine repair years (including year one of operation), and 227,800 MWh in other years. The City receives approximately 85% of the steam and electricity revenues.

To Kenneth L. Woodruff

Mr. Woodruff asks why the mass burn proposal was considered, at the time of proposal evaluation, to offer the more proven technology. The time frame was the late 1970s, and the specific alternatives were the Martin System, offered at the time by UOP, Inc. versus the C-E system based in part on the operation at Madison, Wisconsin. The mass burn technology was viewed as more proven based on the extent and experience of existing plants worldwide employing similar technology burning refuse. The City chose the RDF approach, nonetheless, for reasons summarized in the paper.