A REVIEW OF THE CHANGES IN RISK SHARING IN THE FINANCING, CONSTRUCTION AND OPERATION OF SOLID WASTE RESOURCE RECOVERY FACILITIES

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ABSTRACT

Ten years ago, the sharing of financial risk among the various parties involved in a solid waste resource recovery facility received approximately the same level of attention as would the construction of any major public works project. However, largely as a result of the technical difficulties encountered during the last decade, the sharing of financial risk is becoming almost as important a consideration as the type of technology to be employed and the level of the tipping fee to be paid. This paper will deal with the changes in the financial arrangements which have occurred during the last ten years with reference to the financing of specific resource recovery facilities during this time period.

INTRODUCTION

During the last ten years, we have witnessed the technical and financial growing pains suffered by a still fledgling industry — resource recovery from solid waste. Like any relatively new industry attempting to master new techniques and adopt older techniques on a much larger scale, problems have been encountered and difficulties have been experienced. Hopefully, the difficulties experienced as a result of decisions made in the 1970’s will not be repeated in the 1980’s. This learning experience is taking place not only on the part of the facilities, but also on the part of: (1) those government officials responsible for solid waste disposal in their respective areas; (2) equipment manufacturers, system vendors, contractors and plant operators concerned with the construction and operation of the facilities; (3) energy customers who are asked to make long term commitments to purchase the steam and/or electricity produced by the facilities; (4) investment bankers involved in the financing of the facilities; (5) attorneys responsible for reviewing and rendering an opinion on such legal considerations as construction and operating contracts, energy contracts, governmental permits and approvals, and financing documents; and (6) investors concerned with the safety and security of their investment. The lessons learned by engineers, regarding the need for sound technical and design methods developed by experienced technical and design practitioners, have been paralleled by the lessons learned by others concerning the impact which economic and institutional matters can have upon the overall feasibility of a resource recovery project. The end result has been a significant change in the allocation of financial risk among the various participants in a resource recovery project and an increase in the cost of assuming that financial risk. Such change is evident in reviewing and comparing the manner in which the financial risk was distributed for certain of those projects financed during the early and mid-1970’s with the manner in which risk is being allocated for projects being financed today. This paper will examine the
financing arrangements of specific projects in order to demonstrate how the industry has changed.

NASHVILLE THERMAL TRANSFER CORPORATION

The initial financing of the Nashville Thermal Transfer Corporation ("Thermal") solid waste resource recovery facility in Nashville, Tennessee was completed with the sale of $16,500,000 of First Mortgage Bonds (the "Bonds") on June 1, 1972. The total estimated construction cost was $13,717,000 and the plant (the "System") was to consist of two 360 ton (326.5 x 10^3 kg) per day mass-burning incinerators, with each incinerator capable of generating 108,000 lb (48.99 x 10^3 kg) of steam per hour, and the installation of two 7,000 ton (24.62 x 10^3 kW) per hour centrifugal chillers. Heating and cooling services were to be provided to approximately thirty customers in downtown Nashville.

The Bonds are direct obligations of Thermal, payable from and secured by a pledge of the net revenues derived from the operation of the System and by a first mortgage lien on the System. Thermal has no taxing power. Neither the Metropolitan Government of Nashville and Davidson County ("METRO") nor the State of Tennessee (the "State") were liable on the Bonds and the Bonds were not a debt of METRO or of the State. METRO's Department of Public Works is responsible for the collection and disposal of solid waste in Nashville and Davidson County. METRO does not pay a "tipping fee" for solid waste disposal per se. Rather, METRO makes a supplemental annual payment to Thermal which at the time of the financing in 1972, by METRO ordinance, was not to exceed $150,000 per year.

When METRO prepared the initial feasibility studies of Thermal during the period 1969-1971, such studies indicated that the operating revenues from energy sales alone would be sufficient to pay operating and maintenance expenses as well as the annual debt service payment and therefore no tipping fee would be required. METRO did agree, however, to make the aforementioned annual supplemental payment of $150,000 to Thermal in order to pay for the cost of constructing a bridge on METRO property which was required for solid waste delivery vehicles to gain access from the street to the solid waste storage pit at the plant. Thus, although METRO made a payment to Thermal which in effect represented a tipping fee, nevertheless the METRO payment was intended to cover the cost of part of the infrastructure required to gain access to the plant rather than to pay the cost of constructing the plant or operating the solid waste processing equipment. At the time of the initial financing in 1972, it was still assumed that Thermal would be self-supporting on only those revenues derived from energy sales.

Such expectations resulted in initial contractual arrangements in which the only means to obtain the additional funds necessary to pay for either increased construction costs and/or increased operating and maintenance expenses was to increase the service rates being charged the heating and cooling customers. The Bond indenture requires that Thermal "shall impose, prescribe and collect rates, fees or charges for steam, chilled water and all other services . . . and shall revise such rates, fees or charges from time to time whenever necessary so that the System shall always be and remain self-sustaining". In order to assure that the rates could be adjusted as required, all of the energy customers' contracts included the provision that the rates could be increased to whatever level was necessary to meet the requirements of the Bond indenture.

Furthermore, the responsibility of constructing the System rested with Thermal's general manager, a local Architect/Engineer (the "A/E") and contractors selected by competitive bidding rather than with a full-system vendor who would be willing to design, construct and operate the plant. As a result, there was no single entity who guaranteed to construct the entire System for a guaranteed fixed construction price; nor was there a fixed annual operating and maintenance expense; nor were there any guaranteed levels of performance for either solid waste disposal or steam production.

The primary fiscal responsibility, from a strictly legal and contractual view, fell upon Thermal itself, the heating and cooling customers, and the investors who purchased the Bonds. However, since Thermal had neither assets nor taxing capability, the real risk rested with the customers and the investors. It should be noted that while the legal and contractual fiscal responsibility rested with the aforementioned parties, as a practical matter both METRO and the State were anxious for the Project to succeed and meet its debt service obligations because the failure to do so could have a negative impact with the investment com-
Thermal was finally able to collect past due decision was handed down in Thermal's favor and. litigation continued until 1980 before a final court tract with Thermal be rescinded. This particular declared invalid, or in the alternative, that its con­ tion suit in tern. In July 1975, one customer filed a civil ac­ be required and Thermal could ill-afford to raise revenues from this customer.

rate increases implemented by Thermal be de­ of the risk for the financial well-being of the Sys­ have to help assume certain of the financial risk. In order to meet these higher operating costs, Thermal implemented rate increases in both February and May, 1975, which resulted in a total increase over the original rates of approximately 115 percent. The energy customers were begin­ ning to feel the effect of having assumed so much of the risk for the financial well-being of the Sys­ tem. In July 1975, one customer filed a civil ac­ tion suit in a local state court asking that the two rate increases implemented by Thermal be de­ clared invalid, or in the alternative, that its con­ tract with Thermal be rescinded. This particular litigation continued until 1980 before a final court decision was handed down in Thermal’s favor and Thermal was finally able to collect past due revenues from this customer.

It also became apparent in 1975 that before the System would operate properly, several million dollars worth of repairs and modifications would be required and Thermal could ill-afford to raise its rates again to the level which would be re­ quired to make the debt service payments associ­ ated with such repairs. If Thermal were to remain in operation, an additional party or parties would have to help assume certain of the financial risk. Help arrived from METRO, the State and three of the largest banks in Nashville.

In December 1975, METRO agreed to make an additional annual payment of up to $1,350,000, as may be required. Such payment was in addition to the $150,000 per year which METRO had pre­ viously committed to make, resulting in a total an­ nual payment by METRO of up to $1,500,000. Following this commitment by METRO in May 1976, Thermal placed approximately $2,300,000 of junior lien bonds with three Nashville Banks and, in September 1976, Thermal obtained a loan from the State of approximately $5,700,000. The repairs to the System were completed during 1976.

Upon undertaking the repairs to the System, Thermal was able to hold the rates constant from May 1975 to December 1, 1979, at which time a 10 percent rate increase was implemented. Thus, we see a situation where the financial risk became less burdensome on the energy customers and became more disseminated as METRO and the State became more active partners by assuming a greater level of financial responsibility.

It is probably safe to say that it would be near impossible to finance a resource recovery project today with the same lack of financial commit­ ment and the lack of a "deep pocket" which ex­ isted at the time when Thermal was originally financed in 1972. There were no guarantees of either construction costs, operating and mainte­ nance expenses, performance standards or oper­ ating revenues. There was no single party responsi­ ble for guaranteeing that the Project be built or operated within budget. There was a dual responsi­ bility between Thermal and the A/E during the construction period which often resulted in confu­ sion and a breakdown in communication. The Bond holders came close to experiencing default on the Bonds and it was only the financial commit­ ment by METRO and the dedicated effort by Thermal’s Board of Directors, management and employees which prevented default from occurring.

AKRON, OHIO

Four and one-half years after Thermal was financed, the City of Akron (the "City") finalized the terms and conditions required to finance a 1000 ton (907 X 10³ kg) per day Recycle Energy System (the "RES") by arranging for the Ohio Water Development Authority (the "Authority") to issue, in December 1976, $46,000,000 of State of Ohio Recycle Energy Revenue Bonds (the "Bonds") while simultaneously the City and Summit County each issued $5,000,000 in City Notes and County Notes. This resulted in a total of $56,000,000 being made available to: pay con­ construction costs, estimated to be approximately $37,000,000; pay accrued interest on the Bonds; provide monies for deposit into the required re­ serve funds; and pay certain other costs and ex­ penses incurred during the issuance of the Bonds.

The City is ultimately responsible for acquiring, constructing and operating the RES and as origin­ ally conceived, the RES was to incinerate the refuse derived fuel in order to generate and provide steam to approximately 245 customers located in the cen-
tral business district of Akron. The RES was also to provide steam to Akron City Hospital, the University of Akron and B. F. Goodrich. Operating revenues were to be derived from the sale of steam, from the charging of tipping fees for solid waste disposal and from the sale of recovered materials.

All operating and maintenance expenses and the annual debt service payment were to be made from the operating revenues. Neither the general resources nor the full faith and credit of the Authority, the State or any political subdivision thereof are pledged for the payment of principal or interest on the Bonds and no taxing powers of the State of Ohio or any political subdivision, the County or the City are pledged to the repayment of the Bonds.

As in Nashville, the principal financial risk fell upon the investors in the Bonds and the customers of the RES. The customers were particularly vulnerable as the financing documents included a rate covenant whereby the City agreed to establish rates and charges for solid waste disposal and for the sale of steam which would be sufficient to pay all operating and maintenance expenses and maintain an annual debt service coverage ratio equal to at least 150 percent of the annual debt service on the Bonds. The City’s contracts with the energy customers included the provision that the steam rates would be adjusted as necessary to ensure the fulfillment of the Bond covenants.

Also similar to Nashville, the RES was to be designed by a local A/E. At the time of the financing, approximately 81 percent of the total estimated direct construction costs had been bid and contracts had been awarded. However, there was no single party which contracted that the RES would be constructed for a guaranteed amount and within a specific construction schedule. There was no party which guaranteed that a certain level of performance would be realized for both the volume of solid waste processed and the quantity of steam produced. There was no party which guaranteed that annual operating and maintenance expenses would not exceed a predetermined budget amount.

The Akron financing did include one significant change from Nashville by making provision for the hiring of a firm which would act as Project Supervisor during construction of the RES and which would also operate the RES for five years following its completion. During the construction period, the responsibilities of the Project Supervisor were to include: (a) review plans and specifications and advise the City as to their completeness and appropriateness; (b) provide an analysis of the projected operating efficiency and reliability of the RES and advise the City as to any desirable or necessary equipment or process flow changes or modifications so as to increase operating efficiency and reliability; (c) monitor the efforts of the A/E with respect to coordination of on-site construction activities; (d) review control schedules delineating equipment procurement patterns.

Following construction of the RES, the responsibilities of the Project Supervisor were to include the following: (a) conduct the start-up and shakedown of the RES in conjunction with the A/E; (b) operate and maintain the RES; and (c) develop the operating and maintenance budget for the RES in consultation with, and subject to, the approval of the Director of Public Service.

The Project Supervisor was to be reimbursed for its reasonable expenses. In addition, the Project Supervisor was to be paid for his efforts during the construction period a fee of $360,000 in installments plus an incentive fee of $36,000 if the RES was completed within 30 months at a cost not in excess of the in-ground bid cost plus $1,000,000. During the operating period, the Project Supervisor was to receive an annual fee of $150,000 plus one-half of the annual gross revenues attributable to ferrous recoveries in excess of an as yet undetermined figure.

However, the Project Supervisor provided no guarantees concerning either the level of solid waste disposal, or the level of steam production or the operating costs, and the Project Supervisor assumed no direct or indirect liability for the repayment of the Bonds. Furthermore, due largely to the fact that the project supervisor was hired at the last moment after most of the design of the RES had been completed, there was no clear delineation of certain responsibilities during the construction period between the Project Supervisor and the A/E. With the advantage of hindsight, the City may have been better served if it had been clearly understood by all concerned at the time of the financing which of the two aforementioned parties had the authority to make ultimate decisions concerning all aspects of design and construction during the construction period and also which of the two parties had ultimate responsibility to ensure that the RES would operate as designed.

Construction of the RES proceeded fairly close to schedule and by the summer of 1979, the time originally scheduled for the commence-
Current debt service payment was being paid from the debt service reserve fund and the RES was still able to operate at only 50-60 percent of the design capacity.

It became evident that significant changes in the design of the RES would be required including the removal of the air classifiers and the replacement of all of the pneumatic conveying equipment. Confronted with technical and financial difficulties, City officials began trying to obtain assistance to avert default on the Bonds. A series of meetings were held with federal and state officials including representatives of the United States Department of Energy (the “DOE”). The meetings with DOE centered largely on the availability of funds from DOE’s Price Support Loan Program. Discussions were also held with several private companies concerning the possibility of their providing those funds necessary to complete the capital improvements to the RES in exchange for either the opportunity to operate the RES or the opportunity to utilize significant tax advantages associated with taking an equity position in the plant.

For a period of approximately nine months to one year, the City actively sought to find an additional partner in the RES, a partner who would participate in the financial risk and future potential benefits, a partner who could provide the additional funds necessary to make the capital improvements to the plant. Finally, in late May 1981, the City reached an understanding with a private firm which agreed to undertake the required repairs to the RES and to operate the RES once the repairs had been completed. Such understanding was achieved only several days before the Bonds would have gone into default.

The proposed modifications to the RES are projected to require approximately 18 months to complete and commercial operation of the RES is currently scheduled to commence in January, 1983. In order to finance the cost of undertaking the proposed repairs, the City and the Authority have agreed to make available to the RES an additional $8,500,000 and $16,500,000, respectively. This total of $25,000,000 will be used to pay for the capital cost of the repairs to the System, pay the operating costs while the repairs are being made and make the required debt service payments through January 1983. While the System is being repaired, steam service will be provided to the steam customers in the central business district by means of burning natural gas in the boilers. No solid waste is scheduled to be processed until start-up and shakedown commences in October 1982.

As part of the overall plan for undertaking the repairs, the City negotiated a contract in June 1981 with the new Project Supervisor which included terms and conditions far different than those included in the previous contract of 1976. Included as part of the new contract, the Project Supervisor has agreed to the following: (1) to undertake the engineering and architectural design of the modifications; (2) to construct the modifications, including all procurement, inspection, installation and commissioning of all equipment, the supply of all necessary materials and the performance of all labor, all for a fixed contract amount; (3) to operate the plant during the interim period of July 1981 and January 1983 for a fixed contract amount; and (4) to undertake and complete a performance test by December 31, 1982 consisting of processing a minimum of 24,000 tons of waste during a 30 day period. Furthermore, the City and Project Supervisor are in the process of negotiating a contract for the operation of the RES which is scheduled to commence in January, 1983 and all discussions to date indicate that the operating contract will also include provision that the cost of operating the RES will be performed for a fixed contract amount.

It should be noted that the City is paying more for the guaranteed construction cost and operating costs and for the performance standards than if the City were to continue to operate the RES itself since the new Project Supervisor justifiably requires compensation for assuming a higher level of risk than had originally been assumed by the first Project Supervisor. However, the City has also
gained an additional partner in the System who is assuming a portion of the financial risk and has sufficient incentive to make every effort to assure that the System operates as planned. In order to dissipate a share of the financial risk by obtaining guaranteed construction and operating costs and by obtaining guaranteed levels of performance, public entities will have to expect to pay the higher costs associated with private industry assuming that risk.

DELAWARE RECLAMATION PROJECT

By December 1979, equipment vendors, government representatives and investors were beginning to appreciate the levels of risk involved in solid waste resource recovery as the industry began receiving reports of the problems being experienced at such first generation facilities as Nashville, Bridgeport, Connecticut, Milwaukee, and others. As it became evident that the successful operation of a project would require the type of commitment and deep pocket of money demonstrated by Wheelabrator-Frye at its Saugus, Massachusetts facility, a considerable reassessment of financial risk was undertaken by those entities responsible for solid waste disposal in their communities and the investment community as well. It became apparent that a community could opt for either a projected low tipping fee (such as $0.10/ton initially in Nashville and $3.50 per ton in Akron) and the assumption of all the financial risk or a higher tipping fee ($13.00-$15.00/ton at Saugus) and the avoidance of a major portion of the financial risk. It is also important to note that the low initial fees in Nashville and Akron were also partially due to a lack of understanding of the total costs associated with operating an energy from solid waste facility.

Benefiting from the experiences of others, in December 1979 the Delaware Solid Waste Authority (the “Authority”) issued approximately $58,000,000 of Resource Recovery Revenue Bonds (the “Bonds”) to pay the cost of constructing a solid waste processing facility, a sewage sludge processing facility, a transfer station and two landfills (the “Project”). The Authority made several significant changes in this particular Project with regard to the sharing of financial risk.

First, rather than hiring an A/E to design the Project and have another entity operate the Project, the Authority entered into a contract with a private firm (the “Project Operator”) in which the Project Operator agreed to design, construct and operate the solid waste processing facility and to design, operate and supervise construction of the sewage sludge processing facility. In effect, there was a single party responsible for all phases of the Project which should help minimize the confusion which often takes place when more than one party is involved in projects of this nature.

Second, the Project Operator agreed to design the solid waste and sewage sludge facilities, construct the solid waste facility, supervise construction of the sewage sludge facility and startup and shakedown both facilities all for a firm fixed construction cost.

Third, the Project Operator agreed that it will operate and maintain the facilities throughout the commercial operation period for 20 years from the date of acceptance of the facilities at the capacities, efficiencies and product quality levels which will serve as the basis of acceptance of the facilities.

Fourth, upon completion of construction of the two facilities, the Project Operator is required, for purposes of acceptance, to demonstrate that the Project can process a nominal 1,000 tons ($907 \times 10^3$ kg) per day of solid waste and nominal 350 wet tons per day of sewage sludge and can produce a number of products, including a refuse derived fuel (RDF), which meet certain specifications. In the event the Project Operator fails to complete work within the time required, liquidated damages in the amount of $6,000 per day are provided for a period not to exceed one year. If the Project Operator fails to meet the requirements for substantial compliance, the Authority has the right to reject the two facilities in which event the Authority is entitled to direct damages to a limit of $35,000,000.

Fifth, the Project Operator has agreed to operate the Project for the first two years for a specified maximum target operation and maintenance cost. After the initial two-year period, the formula for the target operation and maintenance cost will be renegotiated at the end of every two years based on the actual results of the previous two years. Those actual expenses that are greater than the target operation and maintenance cost but less than 125 percent of such cost, will be shared 50/50 by the Authority and the Project Operator. Expenditures in excess of the 125 percent figures are not required to be paid by the Authority. If the actual operation and maintenance cost is less than the
target for such cost, the savings will be shared 50/50 by the Authority and the Project Operator.

Sixth, after acceptance of the facilities, the Project Operator is obligated to pay to the Authority an annual minimum product revenue guarantee of $1,435,000 (subject to adjustments) for the sale of recovered materials. Such materials include light and heavy ferrous metal, mixed color glass, non-ferrous metal, humus and RDF. The Project Operator is responsible for developing a market for the recovered materials but it is the responsibility of the Authority to find a market for the RDF.

The Authority has developed a project where a third party from private industry has become an active participant and has assumed a significant share of the financial risk. The reallocation of this risk has not come inexpensively as the Authority is required to pay an operating fee during the first two years equal to 10 percent of the target operation and maintenance cost and after the first two years equal to 12 percent of the target operation and maintenance cost. The construction costs may also be higher than if the Authority had followed the more traditional A/E route. However, in exchange for the higher costs the Authority has obtained the following: a firm fixed construction cost; a guaranteed level of operating efficiency and capacity; payment of damages if the Project does not operate as planned; a fixed operating and maintenance cost; and a guaranteed level of payment for recovered materials.

The higher cost of the Project and the cost associated with the various guarantees must be borne by the users of the Project as the Bonds are payable solely from and secured by the revenues of the Authority and the Bonds are not general obligations of the Authority, the State of Delaware or any political subdivision thereof. The revenues are to be derived from: solid waste tipping fees from public and private carters; payments by the City of Wilmington for sewage sludge disposal; and the minimum guaranteed payment by the Project Operator for recovered materials. The Authority has made a covenant to adopt and revise fee schedules and user charges to provide revenues sufficient to pay operating and maintenance expenses and pay the debt service on the Bonds. However, the Authority has made a serious attempt to place a ceiling on the costs and level of financial exposure which the Project’s users must incur.

SUMMARY

As a brief review of the history of the financing of resource recovery projects since 1972 indicates, significant changes have been made in the distribution and allocation of financial risk. It is very unlikely that a Project patterned after Nashville, where the investors and energy customers initially assumed all the risk, could be financed today. We have seen the City of Akron change its approach to contractual provisions with its Project Supervisors during the last five years. A review of other recently financed projects such as Pinellas County, Florida and Pittsfield, Massachusetts indicate that investors and government officials are looking for and demanding an allocation of risk. In fact, the concern on the part of investors has reached the point where several projects are investigating and seeking to purchase insurance for the bonds which will guarantee the payment of principal and interest on the bonds regardless of the technical operation of the system.

Such risk sharing may cost more initially, but until such time as more operating experience has been obtained, technological improvements have been made and a better track record has been developed, energy customers, solid waste haulers, local and state governments and investors may be best served if they pay a price which will provide the following:

1. A single party responsible for the design, construction and operation of a project.
2. A guaranteed construction cost.
3. Guaranteed levels of solid waste disposal, energy production, operating efficiency, and recovery of recyclable resources and energy from the solid waste.
4. Guaranteed annual operating and maintenance costs.
5. Sufficient incentives on the part of the Plant Operator to help assure that the System operates as provided in the contract.

As the resource recovery industry moves into the second generation of plants, new and improved approaches will continue to be used in the technical operations of the plants as we learn from our past experiences. One can anticipate a similar continuation on the financial side of the picture. However, regardless of risk sharing, there is no substitute for beginning with a project which is technically and financially well founded.

KEY WORDS: Architect/Engineer, Economics, Financial