Municipalities and other public agencies are considering a solution to their solid waste disposal problem that includes the installation of solid waste processing facilities which can be identified as self-supporting by producing revenues. Facilities that are self-supporting can be financed by revenue bonds which are not supported by the public agency’s tax base as are general obligation bonds. This paper discusses the engineering evaluations and financial analyses that are covered in the feasibility reports used to finance solid waste facilities with revenue bonds.

INTRODUCTION

As solid waste becomes identified as a resource and usable fuel, the solid waste processing facilities can be considered as self-supporting through the generation of revenues obtained by receiving refuse for disposal, resource recovery and energy generation. This identification is necessary if construction of a facility is to be financed with revenue bonds.

DEVELOPING TRENDS IN SOLID WASTE DISPOSAL

Two recent events have been significant in increasing both the need for and the revenue potential of new solid waste processing facilities. The first is the more stringent environmental requirements for handling solid waste that have caused both sanitary landfills and operating incinerators to either make major changes or be shut down. The second is the large increase in the cost of fossil fuels used to generate steam. New solid waste processing facilities can be designed to meet environmental criteria and can support the added ownership cost of environmental equipment from revenues obtained from the sale of energy in the form of steam, electric or related products in those areas where a market for these products exists.

REVENUE BONDS

Revenue bonds are one of the two methods of long-term financing used by government entities who normally use either general obligation bonds or revenue bonds. The difference between these two types of bonds is generally identified with the security backing the bonds. General obligation bonds are normally backed by a pledge of the taxing base of the entity while revenue bonds are normally backed by a pledge of future revenues from the facility that is constructed with the proceeds of the revenue bond issue. The feasibility report, herein discussed, used to support revenue bond financing is, therefore, directed at evaluating the solid waste facility’s ability to operate through the period of financing and generate adequate revenues to pay operating and maintenance costs, debt service to retire the bonds and the debt service coverage required by the bond indenture.
FEASIBILITY REPORT

The feasibility analysis is normally summarized in a letter report attached to the Official Statement of the entity that is offering the bonds for sale. The report includes the results of the analyses that were undertaken and the engineer's estimate of moneys that are projected to be available to pay off the bonds. It should be pointed out that the feasibility report is primarily for the benefit of those interested in investing money by purchasing the bonds to finance the facility and should not be confused with the engineering studies undertaken to determine the type, size, location and other basic design and operating criteria of the solid waste processing facility.

The feasibility report for solid waste facilities is normally divided into five basic areas:

1. The engineering evaluation which is directed toward an evaluation of the facility's ability to perform its intended purpose through the period of the bond issue and to meet environmental requirements.

2. The fuel analysis which is directed toward a determination of the quantity, availability and characteristics of the solid waste to be delivered to the facility.

3. The cost analysis which is directed toward a determination of whether the cost of constructing and operating the facility has been reasonably estimated.

4. The income analysis which is directed at identifying the sources and amounts of income.

5. The amount of debt service coverage which is the general measure of financial feasibility.

ENGINEERING EVALUATION

Currently, a number of new types of solid waste processing equipment are being considered to process and obtain energy from solid waste. This equipment includes refuse burning furnaces designed to handle refuse as it is delivered to the facility, hydro-pulped refuse, dried-fluff or shredded fuel, powdered refuse fuel and pyrolysis installations. There are also a number of manufacturers, each of which appears to have selected a processing type of equipment for the market.

Some of the proposed methods of burning solid waste to generate steam have been proven successful through long periods of operation in countries outside the United States while others have yet to operate on a commercial level in any country. There are relatively few solid waste processing facilities within the United States which can currently be identified as having enough operating history behind them to identify successful commercial operation. This is due both to the limited number of installations and the different circumstances under which facilities in this country must operate when compared to foreign installations.

Therefore, the engineering evaluation must consider both the basic method of operation and whether the facility as designed will perform the intended function over the period that the facility must operate to repay the bonds. Consideration must also be given to the experience and ability of the equipment supplier to fabricate the proposed equipment. Equipment proven by successful operation in other locations under similar processing conditions is normally identified as a method of showing equipment reliability.

A steam generating solid waste fuel boiler is often connected to a steam-driven turbine driving an electric generator. If, as is generally the case, the amount of steam delivered to the turbine or electric generator is a measure of income to the facility to retire bonds, the engineering evaluation should include a heat balance and a determination of overall plant efficiency. This can be very important if the facility is required to supplement, by the burning of high-cost fossil fuel any deficiency it may have in its ability to deliver steam by burning solid waste.

The evaluation of the environmental requirements at the proposed site of the facility and a determination that equipment is being designed to meet these requirements is also undertaken as part of the engineering analysis. Because local environmental requirements have become more stringent since many of the existing refuse burning incinerators were originally designed. Many existing incinerators have been identified as environmentally unacceptable. The poor environmental quality of some existing incinerators has also caused some communities to look with disfavor on new solid waste facilities even though the technology is now available to design equipment that will meet local environmental requirements.

FUEL ANALYSIS

The fuel analysis is directed at determining the quantity, availability and characteristics of the solid waste to be delivered to the facility.
Contractual and scheduling arrangements for the delivery of solid waste to a disposal plant cannot be controlled as is done when fossil fuels are being purchased. The composition and quantity of solid waste is most often controlled by the local residents of the community without any consideration of what is needed or desired by the solid waste plant operator. The geographic location, commercial activity, time of year, weather and a multitude of other variables are all factors affecting the makeup of the solid waste and its delivery to the facility for disposal. These factors plus the basic delivery fees and contract arrangements must be evaluated as to the affects on the facility’s operation and income.

The availability of solid waste fuel needs to be evaluated on the basis of how the quantity received, Btu content and texture affects the delivery of energy from the facility.

The solid waste fuel delivery, storage and pre-burning process also need to receive careful review. If “front-end” resource recovery is to be included in the facility, consideration needs to be given to storage space and refuse handling to ensure that the furnace will not run short of processed fuel as well as having space available to store fuel during facility maintenance periods.

COST ANALYSIS

The cost analysis is directed at two basic areas - capital cost and operating and maintenance costs. Capital cost includes design, site development, equipment and construction cost. These costs should be reviewed for the purpose of determining if adequate funds are available in the bond issue to pay all the costs of completing the construction of the facilities including interest during construction, contingencies and owner's administrative costs. Government entities often utilize short-term note financing to obtain the funds necessary to begin initial project planning including the preparation of preliminary design and issuance of equipment specification prior to the time long-term revenue bonds are issued. The amount of these short-term notes outstanding and the extent that firm proposals or contracts have been obtained for major items of equipment should also be identified in the cost analysis. The importance of identifying the amount of the project cost which can be identified as being based on firm commitments have increased as prospective bond purchasers have seen construction costs escalate in recent years.

Annual operating and maintenance costs (O & M) are important because of the affect on net revenues. The design of the facility and its proposed method of operation are important considerations in determining O & M costs. Facilities of a new design concept can normally be expected to have higher maintenance costs due to the need to make field modifications when necessary to reflect the difference between design concept and actual operating conditions. Therefore, it is important that engineers with experience in plant operations assist in the cost analysis so that equipment that may be subject to such modifications can be identified for contingency purposes and the affect on operating costs can be estimated.

Projects designed for commercial operation are normally identified as a proven type design and, in fact, must be so identified in order to attract bond purchasers. Federal or state funds are generally available for research or experimental equipment but not for proven equipment. Government grants are often available for undertaking specialized test programs that are beneficial to the proposed facility if the programs are properly coordinated. The prospective investor is interested in a clear distinction between portions of the facility that are proven and portions that are experimental for the purpose of improving future performance.

An item closely related to operating costs is the management structure and the qualifications and experience of the personnel of the organization that will be responsible for the operation of the completed facility. It is frequently found that under the terms of the financing agreement, normally referred to as the bond indenture, the operating organization must agree to undertake certain periodic studies and have an independent engineering firm certify for expenditures over a set limit for the purpose of control. This control, plus annual audit reports, provides the investor additional assurance that the debt service on the bonds can be paid in a timely manner.

INCOME ANALYSIS

The income analysis of the proposed operation is generally considered the most important area of the feasibility study because it normally involves an analysis of arrangements with one or more out-
side entities who will provide the necessary revenues. The complexity of the income analysis can be seen by the many considerations which must be included. For a solid waste plant, this evaluation must include analysis of both the fuel (solid waste) delivery and the by-product sales arrangements.

If contract arrangements for delivery of energy from the facility include the delivery of assured minimums of power and energy or process steam, the need to supplement solid waste fuel with fossil fuels must be carefully evaluated. Also, if the revenue to be received for the delivery of energy is tied to the cost of other energy sources, the income analysis must include an evaluation of possible changes that could occur to this alternative energy source and the possible revenues can be evaluated.

Income from resource recovery may also be available from some facilities. Evaluation of this income potential requires investigation of the amounts of recoverable resources and then evaluation of the contracts or other arrangements for the sale of these recovered products.

DEBT SERVICE COVERAGE

The total income is projected on an annual basis in a pro forma operating statement showing the feasibility engineer’s estimate of the ability of this income to pay all O & M costs plus the debt service on the bonds. To the extent there is revenue remaining after paying all annual costs, this is identified as extra funds to provide debt service coverage. This is calculated by dividing the funds available for debt service by the actual debt service. General overall feasibility of the project is most often measured by the amount of debt service coverage.

SUMMARY AND CONCLUSIONS

During the period that the various analyses identified above are being undertaken, the engineer charged with the responsibility of making the feasibility analysis is normally required to provide input to the drafting of the bond indenture, official statement and possibility engineer can be very important as the terms of the contractual arrangements are often an important element of financial feasibility.

The total amount of the revenue bonds to be issued includes a number of items other than construction costs. These items include: interest to be paid during construction, moneys to establish special reserve funds, financing fees and other costs which may be required. The need for, size and affect of establishing various funds as well as the interest cost and term of the bond issue is normally obtained from the financial advisor employed by the owner of the proposed facility. Close contact and exchange of ideas between the engineer and the financial advisor is important in improving the conditions that affect the feasibility analysis and the interest rate on the bonds.

The feasibility report required for revenue bond financing can be identified as a general analysis of the details affecting design, construction operation and maintenance. The reliance that the investor places on the feasibility engineer’s analysis makes each detail important. The feasibility engineer must, therefore, fully understand the need to prepare a complete and objective analysis and employ such experts as may be required to produce an acceptable and complete report.

Key Words

Analysis of Solid Waste as a Fuel
Capital Cost Analysis
Debt Service Coverage
Financial Feasibility Report
Independent Consulting Engineer Evaluation
Operating Cost Analysis
Operating Income Analysis
Revenue Bonds