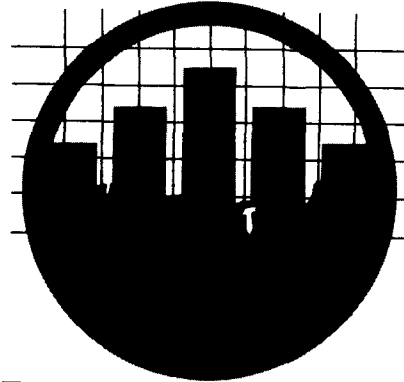


SW-567

# Resource Recovery Planning . . .



## AN OVERVIEW OF THE IMPLEMENTATION PROCESS

POSTER - MANAGEMENT GRADUATE

REFERENCE SHEET - SW-567

->\*\*\* DO NOT REMOVE \*\*\*<-

*Reprinted, with permission, by the Office of Solid Waste, U.S. Environmental Protection Agency, from the publication of the same title by National League of Cities, United States Conference of Mayors, Washington, D.C.*

Preparation of this report was supported in part by the Office of Solid Waste Management Programs, United States Environmental Protection Agency, under Grant No. 802037. Any opinions, findings, conclusions or recommendations expressed herein are those of the National League of Cities and the United States Conference of Mayors and do not necessarily reflect the views of the Environmental Protection Agency.

## INTRODUCTION

Resource recovery increasingly is becoming a major concern of city officials. Cities that undertake effective resource recovery programs can benefit in two ways. First, the volume of solid waste can be significantly reduced, thus prolonging the life of existing landfill sites. Second, resource recovery can produce revenues that will offset, at least in part, refuse collection and disposal costs. However, no city should undertake resource recovery activities with the expectation that a profit will be made.

A third factor may also bear consideration. There is an increasing appreciation of the fact that the nation's resources are finite. City officials may well wish to begin considering resource recovery in anticipation that the recycling of consumed materials may become national policy. This factor could become even more important if the energy shortage becomes more acute and costs again escalate rapidly.

Successful implementation and management of resource recovery facilities is a difficult and complex venture for city officials. This report outlining the critical components of the implementation process has been developed to assist the chief executive of the city.

The guide is designed to cover the issues of mixed waste recovery: large scale, capital investment projects that require precision planning and analysis of the financial, technical, and administrative considerations.

Experience has shown that the cities that have been successful in designing and operating resource recovery plants have based their decisions on a comprehensive system and project management approach, resulting in a resource recovery system compatible with community needs.

The issues discussed in this report provide a framework for approaching the major questions and problems related to mixed waste recovery plants. The discussion of these major issues will assist the local official in preparing and mobilizing the investigation of the local resource recovery opportunities.

This report, which was jointly authored for the National League of Cities and the United States Conference of Mayors by Peter Heidenreich, Department of Public Works, Metropolitan Government of Nashville and Davidson County, and Robert A. Lowe, United States Environmental Protection Agency, is based on an eight-part series entitled: Resource Recovery Plant Implementation: Guides for Municipal Officials, prepared by the Office of Solid Waste Management Programs, U.S. Environmental Protection Agency. That series details more thoroughly the issues discussed in this document, and offers further direction for solving specific problems.

The League and the Conference are deeply appreciative of the support provided by the Office of Solid Waste Management Programs, U.S. Environmental Protection Agency, and for the valuable assistance provided by those in OSWMP responsible for guiding this project. Particular gratitude is due Robert A. Colona, Director, and Nancy Dunne, Program Analyst, Systems Management Division.

## CONTENTS

	Page
Introduction . . . . .	iii
General Management Considerations . . . . .	1
Staff and Study . . . . .	5
Analysis and Selection . . . . .	11
Implementation . . . . .	17
Conclusions and References . . . . .	21

## GENERAL MANAGEMENT CONSIDERATIONS

Vigorous, personal leadership is absolutely essential for the success of a resource recovery investigation. The magnitude of the project requires the coordination and management of people and technologies, as well as a vast amount of business and political common sense. Outlined below are the critical issues regarding a realistic, professional approach toward implementation of a resource recovery facility.

### ROLE OF THE CHIEF EXECUTIVE

More than any other single person, the chief executive of the community must support, supervise, and direct the resource recovery effort. Skill in developing a decision-making atmosphere and policy will set the tone and style of the implementation process. He or she must be prepared to mobilize the people and machinery within the local government, attract the support and assistance of the private sector, and remain active and visible throughout the life of the project.

The executive's ability to negotiate and compromise the major issues during the implementation process, and keep the project on course and on schedule is critical to its success.

### COMMUNITY GOAL SETTING

A mixed waste recovery plant will have an important role in a community. Acquiring the proper facility requires identifying and setting priorities on the solid waste and resource recovery goals for a particular community. Goal concerns for a resource recovery system should include but are not limited to:

- cost
- health and safety
- land use
- system life and dependability
- acceptable community risks

Goal setting focuses attention on specific opportunities for resource recovery and eliminates wasted time considering unsuitable proposals.

## PROJECT MANAGEMENT

There is a temptation on the part of municipal officials to choose an outside consulting firm and allow it a great deal of freedom in determining the city's resource recovery posture. Although consultants are essential in the development of the project, the municipality and not the consultant must manage the project. The chief executive and the local government team must decide on major objectives, control consultants and other external assistance, manage conflicts of interest, and make the final selection of options. The city must be prepared to assign appropriate manpower and money for project planning, analysis, and control.

## PROJECT MANAGER

Next to the chief executive, the position of the project manager is critical for the development and success of the project. Experience has shown that whether the manager is selected from existing staff, or newly hired, it requires his or her full time attention.

In addition to the obvious leadership qualities expected of the project manager, the post must have sufficient authority to control task force activities. It may not be necessary to place an engineer in this slot; a competent individual with a diversified, business background may prove to be more valuable.

## UNKNOWNNS AND UNCERTAINTIES

Any undertaking the size of a resource recovery project naturally includes many unknowns and uncertainties. Major areas of uncertainty in resource recovery that require attention include:

- waste stream quantity and composition
- facility technology (construction and operation costs)
- markets for recovered products

Investing in a project where uncertainties exist requires assumption of risk. Success in dealing with these uncertainties is dependent upon a professional risk management approach. The management of risk should include the following steps:

1. Identification — What are the risks? What is the probability of the undesirable situation occurring? and, What are the consequences associated with them?
2. Reduction — The chance that something will go wrong (or the amount the city will have to pay) can be reduced in two ways:
  - (a) By choosing the most reliable alternative.
  - (b) By assigning responsibility for specific situations to other project participants (e. g. system vendors). Private companies will assume risks (liabilities), but only for aspects of the project over which they exercise control and only if the potential profit is commensurate with the amount of risk taken.



3. Acceptance — Assume only those risks that are appropriate in nature and acceptable in magnitude.

Whenever risk is mentioned, it usually makes newspaper headlines, and public officials have difficulty in justifying support of a project involving risk. But this need not be the case because, although it is not usually recognized, there is risk in many city activities. For example, when a city builds a parking garage, there is risk that business will move and projected receipts will not be sufficient to pay the bonded debt.

#### PUBLIC INFORMATION

A factual, honest dialogue with the citizens of a community is vital for public support. Caution must be exercised to encourage expectations that are realistic with regard to the cost and capabilities of the facility. A resource recovery system requires a large amount of money and must be reviewed in terms of its long term economic impact. In addition, landfills will always be required for unprocessable waste and emergency alternatives.

Periodic reporting through the established media, as well as public hearings and open meetings, provide the interested citizen with information to evaluate the impact of the system on the environment.

## STAFF AND STUDY

Thorough investigation of local solid waste capabilities and resource recovery requirements and alternatives requires the cooperation of individuals representing various offices within and outside of the city government. Including these people in the decision making process can be accomplished by the creation of a working group or task force. The effectiveness of this group depends on the leadership of the chief executive of the city, as well as on the experience and ability of the project manager.

## PARTICIPATION

The designated project manager should be the director of the task force. The size of the task force should be held to a minimum to promote efficiency; however, it is essential that key city departments — such as legal, planning, finance, pollution control, and public works — be represented. Further, regional and state agencies concerned with solid waste management and regulations and concerned community interest groups should either be represented on the task force or serve on an advisory committee to the task force. Community groups that might appropriately be represented include environmentalists, private waste haulers, potential users of recovered products, and the chamber of commerce.

The above types of constituencies bring many perspectives to the investigation process to prevent subsequent delays and mistakes. It is during the early phase of the assignment that the task force has its greatest flexibility, and it is important to invite as many inputs as possible.

## SCHEDULING

Successful resource recovery implementation requires three to five years from conception to the first day of operation. The task force should develop a reasonable timetable for the study activities, along with a reliable reporting mechanism. The project manager must be rigid and serious about maintaining these controls. Allocating sufficient time for completion of each study issue is vital, but care must be taken to avoid unnecessary delays.

## AUTHORITY

The mandate of the task force requires it be given sufficient authority to execute its duty. This should include prerogative of:

- making policy recommendations
- hiring consultants
- preparing requests for proposals in cooperation with the responsible purchasing agency
- negotiating and signing contracts or review and advisory responsibility

## RESOURCES

A common mistake in resource recovery investigation is to devote too little time and allocate insufficient funds for the task force to carry out its responsibilities. A resource recovery project could well be the largest public works effort in the city, and it is essential that cities spend money to obtain the information and advice that is necessary to make sound decisions.

There should be every effort to obtain the most qualified and experienced administrative, legal, engineering, and financial consulting assistance available. A relatively

small investment at this point in the venture can save many times that amount in the long run. Delays incurred after project start-up will cost thousands of dollars every day.

## STUDY

The major issues that must be researched by the task force and its staff are described below.

Solid waste capabilities: The present and projected quantity and composition of the local solid waste stream must be documented. This information will help determine plant size and function. All solid waste activities should be reviewed, especially the collection and disposal procedures and costs.

One vital area often overlooked is the issue of waste control. The city must determine whether it has the capability to direct the necessary amount of waste to the proposed facility. If it does not have the capability, the city must take steps to obtain the waste through interlocal agreements, or other mechanisms.

Market analysis: No resource recovery system can survive without selling its recovered products. Sale of products is dependent upon:

- (a) the existence of a customer that is capable of purchasing the product at a satisfactory price, and
- (b) the ability of the facility to produce a product at a price that meets the customer's requirements.

A detailed market study is essential to determine if waste based products have significant value in the community. This study should include data on:

- product specifications
- quantities required
- prices
- guarantees for delivery
- transportation costs

Financial capabilities: There are a variety of capital financial options available to a municipality, including revenue, general obligation, and pollution control revenue bonds, and equity financing.

The task force should identify the options that are available, the special provisions or restrictions concerning each option, the alternative institutional and legal arrangements, and the cost of financing.

Sound financial judgement is one of the most important considerations for the project, and a financial expert should be included on the task force at the outset to evaluate the feasibility of the proposed project financing. The financial advisor, in addition to helping choose a particular financing mechanism, may also assist the local government in preparing a bond offering.

Legal barriers: Separate attention must be given to legal factors that may prevent or assist a municipality in adequately planning, financing, procuring, or operating a resource recovery facility. For example, a city may need, but not have, the authority to enter into long term, multi-dimensional contracts required for implementing a system. The laws governing the wide range of activities a city will become involved in should be identified and reviewed before entering into contracts.

Organizational capabilities: A major resource recovery system may go beyond the administrative capabilities of existing departments within the local government. Civil service restrictions, hiring limitations, and lack of budget

flexibility may prevent the municipality from adequately responding to project demands. It may be necessary to reorganize existing structure or create a new arrangement to insure that control, reporting, and personnel activities will be considered during the implementation and operation phases of the project.

Environmental standards: The standards for pollution control and environmental impact should be identified as soon as possible with the assistance of the local and state health departments. These regulations may serve as legal and technical constraints in the development of a system, and they must be met and enforced to guarantee continued operation of the facility.

Technology survey: Obtaining direct and specific information on different resource recovery technologies is a critical responsibility of the task force. The city may solicit data by directly contacting private firms of their choice with appropriate expertise in the resource recovery field. A more sweeping approach is to issue a general request for qualifications and proposals from interested system designers, engineers, and consultants. Their response should include the following information:

1. Technology — system processes, hardware, final products, markets, environmental impact, and experience.
2. Economics — capital, operating, and maintenance costs and potential revenues.
3. Management — available institutional arrangements.

The task force should be cautious not to imply that this request for conceptual proposals is a contract proposal, and insist that only available technologies are reviewed.

After elimination of responses that do not match the city's goals and constraints, site visits to existing facilities are recommended. These visits should include visual inspection of the physical plant and interviews with the solid waste delivery personnel and facility managers, operators, and maintenance personnel.

## CONSULTANTS

Outside assistance through a variety of advisors, including management, legal, financial and engineering consultants, should be utilized whenever the task force lacks the time or expertise to perform certain functions.

There are four rules of thumb to follow when considering consultant assistance:

- Outline the specific situation that must be re-searched and define precisely the scope and detail of the project.
- Avoid potential conflicts of interest by avoiding the use of consultants who have a financial interest in the recommendations to be made or by making consultants ineligible for follow-up work.
- Select the appropriate consultant for the task: be certain that the expertise and experience of the consulting firm is appropriate for the task assignment.
- Monitor the progress of the consultant periodically and ascertain that the prescribed information is being collected.

Experienced consultants are a vital component of the task force responsibilities, and with the professional guidance of the city officials will make a large contribution toward the success of the resource recovery facility.

## ANALYSIS AND SELECTION

The research and analysis conducted by the task force should be directed toward making decisions and taking action. Choosing the proper combination of options, by blending the best judgement of the task force members, will result in the development of a specific implementation plan for resource recovery. The major decision points and decision guidelines in this plan are discussed below.

### SITE SELECTION

Choosing the appropriate location is important and should be considered early. The following site data must be reviewed:

- cost
- accessibility by waste delivery traffic
- proximity to waste generators and to customers for recovered products
- public acceptance

The sale of certain products recovered from solid waste, such as steam, may require the processing facility to be located adjacent to the product consumer. The facility may also require large quantities of energy, water, or other utilities and services that will influence site selection.

Siting a facility may require the modification of the existing zoning regulations. The possibility of future expansion must also be taken into account.

### TECHNOLOGY CHOICE

The task force study procedure will identify suitable technologies for the community's solid waste system. When



reviewing and comparing these technology options in anticipation of final selection, the following items should be examined.

Stage of Development of Technology:

- Size — have previous plants operated at the size and scale of the facility proposed in the community?
- Performance — how long and how well have similar facilities operated, and under what conditions (hours per day and days per week)?

Markets: If the task force study proves that waste based products are saleable within the community, long term arrangements are required with the purchaser. The needs and constraints of the product producer and buyer must be taken into account, and a contract must be established that defines the commodity exchange conditions and guarantees, as well as who is responsible for them. It is also wise to develop contingency plans and penalties if, in fact, the contract should be violated.

Costs: The value of cost estimates depend on the amount of engineering and related effort that goes into them. Obviously, an estimate based on a final design with major equipment items ordered is a more reliable predictor of eventual actual costs than is an estimate based only on a preliminary process flow diagram. Care must also be taken to assure that cost comparisons are based on comparable systems (i. e. , similar size and processing steps).

Risk: No technology decision can be made without some degree of uncertainty, but risks can be reduced and controlled through a professional risk management approach, as described in Section II.

## ECONOMICS

It may be wise to analyze the overall economic impact of several resource recovery options on both the community and the government. The economic survey should include the following considerations:

- Opportunity costs — will the multimillion dollar investment for a particular resource recovery facility be the wisest expenditure of community funds, or are there other long term alternatives more worthy of the effort and money.
- Break even point — will the system theoretically generate enough revenue and benefits over the life of the project to offset the capital, financing, operating, and maintenance costs.
- Comparative economics — the selection of a resource recovery system should be justified by comparing its costs and benefits with alternative systems.

## CONTRACT REQUIREMENTS

As decisions are made concerning each of these functional areas, the task force must keep in mind that each judgment and agreement will eventually have to be consolidated and recorded in a legal document.

This contract will be vital to the overall acquisition process, for it must be comprehensive and must communicate the requirements and obligations of both parties. Finalizing contracts of this nature may require long periods of negotiation.

## FINANCING

The city's goals and requirements for the project may have a great deal to do with selecting a financing mechanism. For example, if the city wants the project revenues (dump fees and product revenues) to cover all project costs, then revenue bond (project) financing may be desired.

Conversely, the particular financing mechanism that is selected will have an important bearing on the major features of the project. For example, if revenue bond financing is selected, the supply of waste and the sale of products will have to be guaranteed by contracts; and the quality of these contracts will determine the financeability of the project. Therefore, it is essential that the city's goals, the financing mechanism, and the major project features be considered jointly as early as possible. An investment banker or financial advisor should be consulted for this purpose. Too many cities delay consideration of the project's financeability, and it costs them dearly.

## PROCUREMENT STRATEGY

The procurement package will include a variety of services that must be acquired:

- design services
- construction services
- construction supervision
- equipment and materials
- shakedown services
- facility management and operation services

There are three basic procurement approaches to choose from. The service element responsibilities are assigned differently in each approach.

Architectural and engineering: The city retains an engineer to design a facility and hires a contractor to construct the facility. This approach usually places most of the risk associated with the project on the city.

Turn-key: The city selects a system contractor to design and construct the system. Once the facility is operational and accepted by the city, ownership is turned over to the city, which then becomes responsible for day to day operation. Project risks are shared in this situation.

Full service: The city purchases a service from a "systems contractor" who for a fee per ton finances, builds, and operates a facility to provide the service in accordance with a long term contract. Of the three options, the full service approach places the least risk on the city.

The approach options discussed here provide city officials with varying degrees of investment and control in a resource recovery system. Final choice will depend on available financing, operational capabilities, and the amount of risk the city is willing and able to assume, and the expected cost of each approach.

#### PRECISE SCHEDULING

The task force must anticipate and allow sufficient time for each activity. City officials should make themselves aware of the time required by other communities for various project stages, such as preparation of a request for proposals or negotiation of interlocal agreements.

## IMPLEMENTATION

Once the general resource recovery plan has been developed and approved, the appropriate services must be obtained to carry out the plan. Guidelines and techniques for procuring the services of a consulting engineer or systems contractor, and negotiating a sound contract are discussed below.

### CONSULTING ENGINEER

Should the task force choose the traditional architectural and engineering approach for acquiring a resource recovery facility, it will most likely have to hire a consulting engineer. It must be kept in mind that resource recovery is a specialized field that requires close examination of the applicant's credentials. The engineer should have experience in solid waste activities and especially in the proposed technology.

After selection of a designer and contractor, an operating manual should be developed. This document outlines a management framework for plant operations and helps determine who will be responsible for the various activities during start-up and normal operations.

### SYSTEMS CONTRACTORS

If the task force decides to implement a turn-key or full service approach for acquiring a resource recovery system, it will probably prepare and issue a request for proposal (RFP).

The RFP details technical specifications and management requirements of the system. This document is the culmination of the study and analysis performed by the task force.

General rules to follow for RFP preparation include:

- Technology — The RFP need not be exact concerning system equipment, but it must be specific concerning local constraints and the expected performance of the system.
- Organization — Nontechnical factors must be included in an RFP so the bidders understand what is expected of them and so that the task force can adequately compare bid packages. Proposed business arrangements between the municipality and the contractor must be well defined in the RFP.
- Proposals — The actual format and design of the proposals requested by the task force should be clearly defined. The exact information desired should be asked for in such a way that comparison and evaluation of the different proposals is simplified.
- Qualifications — Care must be taken to examine the financial and technical capabilities of the bidders. The city should establish minimum standards of experience and reliability to protect itself against contracting with a bidder who is unable to fulfill its obligation.

#### PROPOSAL EVALUATIONS

The more comprehensive and precise the RFP, the more comparable the proposals. The more comparable the proposals, the easier it is to evaluate and select finalists with whom to negotiate.

## CONTRACT NEGOTIATION

Even if the city issues the best RFP possible, experience indicates that many important issues will still be unresolved. Contract negotiations are required to reach agreement. Cities should consider negotiating with two or more companies either sequentially or concurrently to keep the companies in a competitive situation.

## START-UP

Complex systems will require a period of time to get the plant in working order. Ample time and money must be budgeted to allow for delays in construction completion and technical problems during early plant operation. Caution must be exercised so that commitments for waste delivery and product sales are not jeopardized by start-up complications.

## CONCLUSIONS AND REFERENCES

Completion of a resource recovery system is the culmination of a long and sometimes tedious effort by many municipal employees and private citizens.

This guide summarizes and highlights this complex venture, and it is strongly recommended that each issue mentioned here be thoroughly researched in light of local community constraints and characteristics.

A more complete and exhaustive analysis has been prepared by the Environmental Protection Agency in the eight part series entitled Resource Recovery Plant Implementation: Guides for Municipal Officials upon which this report is based. This series is suggested reading for all officials interested in resource recovery and can be obtained from the Office of Solid Waste Management, United States Environmental Protection Agency, Washington, D. C. The parts of the series are:

1. Planning and Overview (SW-157.1)
2. Technologies (SW-157.2)
3. Markets (SW-157.3)
4. Financing (SW-157.4)
5. Procurement (SW-157.5)
6. Accounting Format (SW-157.6)
7. Risks and Contracts (SW-157.7)
8. Further Assistance (SW-157.8)

μσ1408  
SW-567