3

DEVELOPING A WASTE MANAGEMENT PROGRAM: FACTORS TO CONSIDER

No matter which waste management approach, or combination of approaches, a community decides to adopt, a variety of data must be collected and analyzed before the program can be implemented. The community's goals and the scope of the program must be set. The community must also understand its current and future waste generation profile in order to plan and finance an efficient and economical program.

Reliable information will allow the community to accurately budget for program needs, make it possible to design appropriately sized program facilities, and allow the community to better assess the program's success after it is implemented.

This chapter discusses techniques for applying all of the accepted options for preventing the generation of municipal waste or properly managing the materials that are generated.

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3 ❖ HIGHLIGHTS

Determining goals is the first step—source reduction should always be included.
(p. 3-4)

Communities should begin planning for new or continuing source reduction and waste management programs by first discussing the goals it is trying to achieve. A key goal should be source reduction which will eliminate the need to manage community waste. There are also many other valid goals; these include complying with state and federal law, protecting the environment, providing local business and job opportunities, and saving resources. By defining goals, the community can better determine the type of program it wants.

Characterizing the community's waste is a crucial step.
(p. 3-4 — 3-5)

Developing a successful waste management program requires accurate up-to-date information about the community's waste profile—what types of waste are generated, in what quantities, and how much of it can realistically be prevented through source reduction and collected for recycling.

The type of waste management program being considered will help determine the degree of detail needed in the waste characterization study. Source reduction and landfill projects require only gross waste volume from estimates. Recycling and waste-to-energy projects require accurate predictions of waste quantities and composition.

Several methods for characterizing waste are available.
(p. 3-5 — 3-9)

Modelling Techniques: Modelling techniques use generic waste generation rates and other information. They are inexpensive but provide only a general idea of waste volumes and types. Three aspects of modelling techniques are described in this chapter: generic weight generation data, generation rates for recyclables, and landfill volume estimates.

Physical Separation Techniques: Physical techniques are more accurate than modelling techniques, but are also more expensive and time-consuming. Such techniques sample the community's waste stream to develop a waste profile. Three sampling techniques are discussed in this chapter: quartering, block, and grid.

Direct Measurement Techniques: If done correctly, pilot studies can provide accurate volume estimates. Some communities are also weighing and characterizing the actual waste stream as it is collected. Bar code monitoring is another technique that provides highly accurate estimates of recyclable materials; such systems, however, are costly.

Estimating the amount of waste generation that can be prevented through source reduction or recycling is essential.
(p. 3-9 — 3-10)

It is unrealistic to assume that a community can completely prevent waste generation or recycle all the waste in its program. Even when waste characterization studies yield highly accurate information, some further estimate must be made of the actual percentage of material that the community can expect to collect. A variety of factors must be considered:

- Does your community have public or private collection?
- Does your community have businesses or industries that use private collection?
- Are there large numbers of residents who recycle on their own? Are there bottle deposit laws?
- Are there local ordinances (allowing residential burning, etc.) that may impact volumes?

❖❖

The U.S. Supreme Court struck down a local flow control ordinance in May 1994.

(p. 3-10)

In May 1994, the U.S. Supreme Court struck down a local flow control ordinance that required all solid wastes to be processed at a designated transfer station before being sent out of the municipality. In *C&A Carbone, Inc. v. Town of Clarkstown*, the Court found that the flow control ordinance violated the Commerce Clause of the Constitution because it deprived competitors, including out-of-state businesses, of access to the local waste processing market.

The flow control debate has caused many cities to use alternative financing methods.

(p. 3-10)

As a result of the continuing debate over the use of flow control, many cities are using alternative methods to finance programs. Methods include the following:

- municipal collection in which the city can set tipping fees at publicly owned or financed facilities at noncompetitive prices
- taxes (property, income, sale of goods or services)
- user fees or surcharges.

Estimating future waste generation is also crucial.

(p. 3-11)

Some waste management alternatives, such as waste-to-energy, rely on a steady supply of material over long periods of time, up to 20 years or more. The two most important trends to investigate are population and public policy changes. Legislatively mandated recycling and composting programs can reduce waste volumes significantly. Caution is essential in sizing facilities—an oversized facility can bring economic disaster. Waste composition changes are also important.

Consider the following factors when organizing a waste management program.

(p. 3-14 — 3-16)

Establishing a waste management program is a lengthy and complex process; the following considerations are crucial to long-term success.

- formulating and following a well-devised and comprehensive plan
- basing decisions on sound economic analysis
- keeping public participation rates high over a number of years requires an ongoing education and publicity plan
- acquiring and maintaining political support should be an ongoing effort
- many waste management projects take from five to ten years to implement. The ultimate key to success is the will to persevere—the thousands of successful programs underway nationwide attest to this.

3 DEVELOPING A WASTE MANAGEMENT PROGRAM: FACTORS TO CONSIDER

DEVELOPING THE NECESSARY INFORMATION BASE

Identify Goals and Scope of the Program

Defining goals early facilitates later decision making.

Every community should begin planning for new or continuing source reduction and waste management programs by first discussing the goals it is trying to achieve. A key goal should be source reduction which will eliminate the need to manage community waste. There are also many other valid goals; these include complying with state and federal law, protecting the environment, providing local business and job opportunities, and saving resources. By defining goals, the community can better determine the type of program it wants.

For example, if a community is interested only in the economic benefits of a recycling program, it may choose to recycle only the most cost-effective items, such as aluminum. Items that are more costly to collect or have low market prices such as plastic may be excluded from the program. On the other hand, if a community's goal is to preserve landfill space and conserve resources, the community may decide to strongly support source reduction and to collect a larger variety of items, even if collecting some materials results in higher unit costs. Defining community goals up front will make later decisions about program scope and degree of economic commitment easier.

Once goals are determined, the scope of the intended program must be defined. Will the program be community wide? Will a regional approach cover all sectors, including residential, commercial, and industrial sectors? By answering these questions, the proposed program will be put into focus. Defining program scope will help develop program organization and ensure waste characterization analyses are useful and cost effective.

Characterize Quantity and Composition of Material

Successful program planning depends on reliable information about quantities, types, and how much material can be captured.

The cornerstone of successful planning for a waste management program is reliable information about the quantity and type of material being generated and how much of that material collection program managers can expect to prevent or capture. Without a good idea of the quantities that can be expected, decisions about equipment and space needs, facilities, markets, and personnel cannot be reliably made. This also identifies large weight and volume waste items to target for source reduction and recycling programs and gives baseline data for assessing whether goals were achieved.

Depending on the size of the program and the resources available to the community, there are a variety of waste characterization techniques that can be used. First, there are modelling techniques that apply generic waste generation rates and other community features to predict the waste quantities and types. These techniques are inexpensive and can provide a general idea of the quantities and types of waste expected for a program just starting up.

To plan successfully, know your community's waste stream:

- *types of waste*
- *amounts of each*
- *"capturable" quantities.*

More accurate in describing the waste stream, but also more expensive and time consuming to implement, are the physical separation techniques. These techniques sample the community waste stream itself, using statistically significant sampling techniques to determine a community waste generation profile. Depending on community goals, both have a place in developing an effective waste management program. Some form of waste characterization estimate is crucial to program success, because later decisions will be based on this information.

The waste management option being considered will help determine the degree of detail needed from the waste characterization study. For a landfill project, only gross waste volume estimates are needed to help determine space needs. This is also true of estimating yard waste volumes for a windrow composting program. For these types of management strategies, generic and historically based waste generation rates may provide acceptable accuracy.

For other alternatives accurate predictions of waste volumes and composition are crucial to long-term program success. Accurate characterization will allow certain waste to be targeted for source reduction efforts. Many facets of a recycling program, including the size of a material recovery facility, the volume of recyclable material to be sold, and equipment and personnel requirements for collection are dependent on accurate characterization of the waste stream. For a waste-to-energy project, both sizing the facility and calculating the quantity of energy that the facility will generate are based on characterizing waste volume and type. In the long term, the quantity of waste available for the facility will be affected by other options, including source reduction, recycling and composting. Inaccuracies in waste characterization studies for these alternatives can severely and negatively impact the economic viability of the program.

When determining which composition technique to use, the costs of gathering the necessary data should be compared with the limits of precision needed to make reliable estimates. Future community trends, such as population growth, must also be considered in developing a waste characterization profile.

MODELLING TECHNIQUES

Generic Weight Generation Data

For residential waste, the multiplier is usually pounds of waste generated per person per day. This can be estimated from previous records if the population and weight of refuse are known. If not, a weighing program may be necessary to determine if refuse weights can be obtained for a known population. Typical figures for the United States are 2.5 to 3.5 pounds / person / day for residential waste. More recent USEPA projections suggest that Americans generate 4 pounds / person / day with the generation rate expected to increase (see Table 3-1). Once the multiplier is developed, population projections can be used to project tonnages. However, projections of waste volume using average rates should not be used for planning specific facilities.

Recent USEPA projections suggest that Americans generate 4 pounds/person/day (see Table 3-1).

The trend in the per capita generation rate is not clear: Table 3-1 predicts that the rate is increasing at about 5 percent per year, while other projections indicate no increase. Many communities are making significant efforts at waste reduction. Unless there is information to the contrary, it is best to assume no change in the generation rate and to develop future projections based on population projections alone.

Table 3-1

Projected Per Capita Generation of Municipal Solid Waste by Material, 1980-2000* (in pounds per person per day—generation before materials or energy recovery)

Material	1980	1990	1993	2000
Paper and paperboard	1.32	1.60	1.65	1.77
Glass	0.36	0.29	0.29	0.28
Metals	0.35	0.36	0.36	0.38
Plastics	0.19	0.39	0.43	0.47
Rubber and leather	0.10	0.13	0.13	0.15
Textiles	0.06	0.13	0.11	0.10
Wood	0.16	0.27	0.29	0.32
Other	0.07	0.07	0.07	0.07
Total nonfood products	2.62	3.23	3.34	3.54
Food scraps	0.32	0.29	0.29	0.28
Yard trimmings	0.66	0.77	0.70	0.44
Miscellaneous inorganic wastes	0.05	0.06	0.06	0.07
Total MSW generated	3.65	4.35	4.39	4.32

**Details may not add to totals due to rounding.*

Source: USEPA. *Characterization of Municipal Solid Waste in the United States: 1994 Update*

Generation Rates For Specific Waste Types

Generation rates used must correspond to the community.

For specific waste types a general estimate of the tonnage available can be obtained by multiplying the local community population by a generic generation rate (see Table 3-2). Care must be taken to determine that the generic rate is applicable to the community. If available, use composition data from a study of a community located in the same region as the target community. Even when using generic data, unique local features, such as a community being located in a tourist area with many restaurants and bars and a higher seasonal population, should be taken into account. Seasonal variations in waste generation and the contribution of commercial and institutional facilities should also be considered.

Table 3-2

Recyclable Household Waste

Recyclable Household Wastes (pounds per person per year)

	Urban	Rural
Newspaper	75–125	50
Metal	60–75	50–75
Appliances	20–25	20–25
Clear glass	40–60	40
Colored glass	25–40	25
Plastic containers	6	6
Motor oil	1/2 Gallon	1/2 Gallon
Food scraps & yard trimmings	100–250	100–250
Leaves	Unknown	Unknown

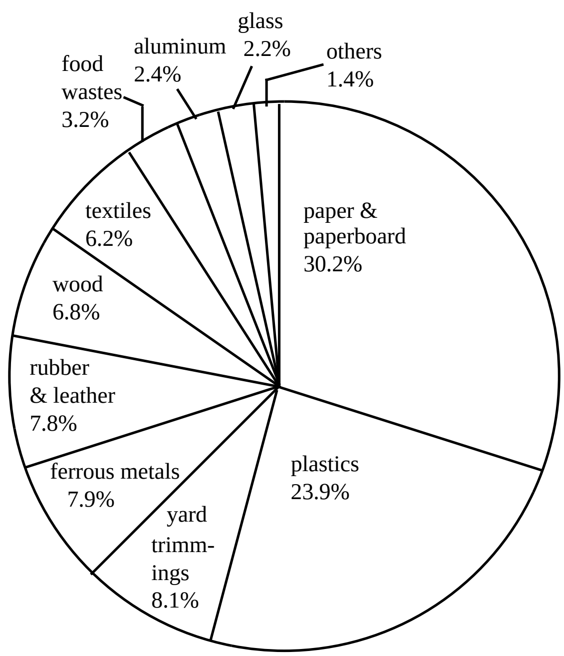
Reindl, J. "Source Separation Recycling" (unpublished, 1983)

Getting accurate estimates requires knowledge of local and regional conditions.

Where the community is served by a landfill with a scale, generic waste composition data can be applied to determine the amounts of recyclables available (see Figure 3-1). This estimate too must be carefully scrutinized to take into account local conditions. For small- or medium-sized communities, where a percent or two of difference either way is not important, using actual weight data and multiplying by percentage data may provide a good initial estimate. With this method as well, special regional characteristics should be noted and taken into account to help fit the estimate to local conditions. For this method, it is important to know the types of waste accepted at the landfill. If the landfill accepts special large-volume wastes, such as power plant ash or foundry sand, the accuracy of weight-based estimates may be questionable, since the waste profile of the landfill will not reflect the generic averages.

Figure 3-1

Landfill Volume of Materials in MSW, 1993 (in percent of total)



Source: USEPA. *Characterization of Municipal Solid Waste in the United States: 1994 Update*

Landfill Volume Estimates

For landfills lacking a scale, only rough estimates can be obtained by counting trucks arriving at the landfill and estimating the volume in each truck.

For a community with a landfill that lacks a scale, a very rough estimate of the total volume of waste generated can be obtained by counting the number of trucks arriving at the landfill and multiplying the number by an estimate of the volume in each truck. This figure can then be multiplied by composition data to further estimate the expected quantity of various waste types, if necessary. The uncertainty inherent in this technique is great, because of the heterogeneous nature of municipal solid waste. Also, to take into account the variability of the waste stream throughout the year, the volume analysis would have to be performed a number of times during the year to improve its reliability. For specific projects, this approach would not provide an acceptable degree of accuracy.

PHYSICAL TECHNIQUES

Sampling Techniques

Sampling techniques use statistical methods to predict total waste stream quantity and composition by analyzing small volumes.

Sampling techniques use statistical methods to predict total waste stream quantity and composition by analyzing small volumes. Each technique attempts to obtain a representative, random sample of the waste stream. For full-scale characterization, the physical techniques should be performed at least four times over the course of a year, to take into account seasonal variation. Likewise, for each sampling point, care should be taken to ensure that results are not skewed by seasonal events. For example, the week after Christmas, the percentage of paper from wrapping is much higher than normal.

For accurate estimates, sample four times in a year, avoiding "seasonal events" like Christmas.

- **Quartering technique:** This technique can be used to sample a truck load or a group of truck loads of waste. When sampling a community, it is useful to choose a group of refuse trucks from various neighborhoods. By sampling a representative grouping of trucks, the community as a whole can be characterized better.

  For each truck, unload an agreed upon quantity of waste in a cleared area at the disposal site or transfer station. Mix the various collections of waste thoroughly with a front end loader. Rake the sample into quarters and mix again thoroughly. Continue quartering the sample and mixing until a representative sample weighing greater than 200 pounds is generated. The sample should then be weighed and separated into its components. Each recyclable category should be weighed and compared with the total.
- **Block technique:** The block technique can be used instead of the quartering technique when mixing a group of samples might be difficult. Using this technique, the load samples of refuse are dumped in a clear area, but rather than mixing the loads, the sampling team chooses what it deems to be a representative sample from the loads. The representative sample is then separated and characterized. The accuracy of this technique is highly dependent on the ability of the sampling team to define a representative sample.
- **Grid technique:** In this technique, the floor of a transfer station or a cleared area of a landfill is divided into equal size squares, with each square assigned a number and letter code for identification. Waste is unloaded onto the grid and mixed with approximately equal quantities of waste placed in each square. Waste characteristics are then determined for a set number of grid squares and compared with the weight or volume of the entire load.

DIRECT MEASUREMENT TECHNIQUES

A pilot study can provide information about the type and volume of material generated in the community.

Conducting a pilot study can provide information concerning the type and volume of material generated in the community. Different collection methods can be tested to determine comparative participation and generation rates. Data collected from the pilot may provide an accurate estimate of the volume of material expected from a community-wide program if care is taken to design the program to represent the demographics of the community and to publicize the program in the target neighborhood.

Increasingly, communities are also developing methods of weighing and characterizing the actual waste stream collected from a community. A number of American communities with volume-based fee systems now use bar-

Several communities with volume-based fee systems use bar-code monitoring to determine the weight and type of materials collected from each generator.

code monitoring to determine the weight and type of materials collected from each generator in the community for billing purposes. The city of Seattle is experimenting with the bar-code system and hopes to initiate a weight-based charge system for its waste management program. Other programs, including St. Louis Park, Minnesota, and Fitchburg, Wisconsin, are using the bar-code system to determine the types of materials collected and participation rates. In recycling programs bar-code systems yield highly accurate waste characterization information, but have been criticized for being costly, slow to implement, and unnecessary (see Table 3-3). If more large communities move to weight-based charging systems, bar-code monitoring may become a more accepted method for determining waste characterization.

Table 3-3
Advantages and Disadvantages of Bar-Code Monitoring

Advantages	Disadvantages
• Provides more reliable participation figures than route auditing with hand counters. • Can be cost efficient, over the long term. • Helps increase participation when used with reward system; can also be used with penalty system. • Enables targeting of nonparticipants for education and promotion programs. • Gauges effectiveness of advertising. • Allows crews to enter additional information, such as types of materials. • Allows managers to keep better track of crews. • Makes efficient routing easier.	• Capital costs can be significant. • Implementation is often difficult. • Can increase collection time. • Possible resistance from crews because of increased hassle, reduced freedom. • Possible resistance from customers because of “Big Brother is watching me” perception.

Source: T. Watson

ESTIMATING THE PERCENTAGE OF MATERIAL THAT MUST BE MANAGED

It would be unrealistic to assume a community can capture or prevent all the waste in its program. This is especially true for recycling. Even when waste characterization studies yield highly accurate information, some further estimate must be made of the actual percentage of material that the community can expect to collect. A variety of factors must be considered.

Legal Control Over Waste Materials

Private collection and other factors affect amounts of recyclables.

For communities that have public collection, control of waste materials may not be a problem. However, many communities are served by private haulers who usually control the waste after it is collected. Even in communities with public pickup, businesses and institutions may be served by private haulers. Some of these businesses, such as restaurants and food stores, may produce large volumes of high-quality recyclables or combustibles that the community may want to capture for its program (see Table 3-4). Unless legal control can be obtained over a certain waste type, it should not be included in the community’s plans.

The U.S. Supreme Court struck down a local flow control ordinance, which required all waste to be sent to a designated facility.

Many cities are using alternative methods of financing as a result of the flow control controversy.

Some private haulers are happy to use a local community facility because using a local facility reduces transport costs or means the hauler does not have to find acceptable markets for the recoverable materials. However, many hauling companies around the country are now offering waste processing services to customers and are constructing recycling centers and compost sites of their own. Or, a community considering a recycling or waste-to-energy program may already have a nonprofit or private recycling operation in its area. If the community attempts to take over the waste stream, the viability of the existing public and private programs may be jeopardized. Exploring cooperative arrangements with existing recycling programs is recommended.

On May 16, 1994, the U.S. Supreme Court struck down a local flow control ordinance that required all solid wastes to be processed at a designated transfer station before being sent out of the municipality. In *C&A Carbone, Inc. v. Town of Clarkstown*, the Court found that the flow control ordinance violated the Commerce Clause of the Constitution because it deprived competitors, including out-of-state businesses, of access to the local waste processing market.

As a result of the continuing debate over the use of flow control, a number of cities have opted for alternative methods to finance their solid waste systems. Methods include municipal collection in which the city can set tipping fees at publicly owned or financed facilities at a noncompetitive price and thereby subsidize other municipal solid waste programs and services, taxes (property, income, sale of goods or services), and user fees or surcharges.

In considering alternative financing mechanisms, local governments should carefully weigh options against the adequacy of revenue in terms of revenue-raising potential and consistency and in terms of reliability over time, equity, political feasibility, administrative ease, and impact on innovation.

Table 3-4

Recyclable Material in the Commercial Waste Stream (by type of business, in percent)

Waste component	Retail trade	Restaurant	Office	School	Gov't
Paper	41.5	36.6	64.2	47.8	53.8
Newspaper	2.9	2.5	3.6	3.3	6.7
Corrugated	22.0	15.6	11.5	11.6	8.4
High grade white	1.4	0.0	0.6	6.3	7.2
Mixed recyclable	10.3	4.4	29.0	21.6	25.0
Nonrecyclable	4.9	14.1	9.5	5.0	6.5
Plastic	12.0	13.7	4.3	5.1	3.5
PET (1)	0.1	0.0	0.1	0.1	0.1
HDPE (2)	0.0	0.1	0.0	0.0	0.0
Other	11.9	3.6	4.2	5.0	3.4
Glass	2.5	5.9	3.9	3.2	2.7
Container	2.3	5.9	2.9	1.0	2.4
Nonrecyclable glass	0.2	0.1	1.0	2.2	0.3
Metal	20.5	4.9	2.9	5.8	9.8
Aluminum cans	0.2	0.5	0.5	0.8	0.5
Tin/steel cans	0.2	3.8	0.2	0.2	0.4
Other ferrous	19.5	0.4	2.2	3.7	8.6
Other non-ferrous	0.6	0.2	0.0	1.1	0.3
Organics	18.8	36.6	10.8	35.0	23.2
Food waste	8.1	36.0	3.0	14.0	32.0
Yard debris and wood	10.7	0.6	7.8	21.0	20.0
Other	4.7	2.3	13.9	3.1	7.0
Totals	100.0	100.0	100.0	100.0	100.0

Source: Washington State Department of Ecology. *Best Management Practices for Solid Waste: Recycling and Waste Stream Survey*, 1987

Personal Waste Management

To determine volumes, consider carefully the impact of personal source reduction and recycling.

For some recyclables, especially aluminum cans, personal recycling may significantly reduce the volume available to the community program. A state beverage container deposit law will also reduce available volumes of aluminum, glass, and perhaps plastic. For other recyclables, such as newsprint, personal recycling may not be a factor.

As costs rise, many rural residents may manage wastes using burn barrels. Some residents may choose to not pick up grass clippings or other yard waste. Local ordinances may influence these practices.

In determining program volumes, therefore, the impact of personal source reduction and recycling on the quantity of materials economically available to the community should be considered. Because price paid to individuals for recyclables can impact personal recycling to a significant degree, some prediction of market conditions for recyclables should be made in making this determination.

ESTIMATING FUTURE WASTE GENERATION

Accurate estimates of population trends and future public policy decisions are crucial.

As alternatives for managing or preventing waste are investigated, it is important to make an attempt to accurately predict future trends in community waste generation. While this may be difficult, it is crucial to long-term program viability. Some alternatives, such as constructing a waste-to-energy facility, are financed based on a 20-year facility life. A drastic drop in waste delivered to a facility of this type could have severe economic consequences for the community that owns it.

The two most important trends that should be investigated are population and public policy changes. Population trends are usually monitored carefully. Some realistic prediction of the rate at which the community population is changing should be made.

Public policy shifts can quickly change the quantity and type of waste materials available to support a given option. For example, constructing a landfill or waste-to-energy facility without considering the possible impact of a trend toward legislatively mandated source reduction, recycling and composting programs could be risky. If there is great uncertainty, conservatism in sizing the facility is warranted. Facilities can usually be expanded. Oversizing a waste-to-energy facility, on the other hand, can be an economic disaster.

Changes in the composition of the waste stream should also be noted. Estimates developed by Franklin and Associates for the USEPA predict growth in plastics packaging and a decline in glass packaging between the years 1995 and 2010 (see Table 3-5). While generic estimates are difficult to apply locally, these predictions should be considered when planning the program.

Statewide waste composition projections can also assist future planning. Table 3-6 sets forth recycling projections for the state of New Jersey through the year 1995. New Jersey communities can use this information to set goals and perform planning to keep pace with statewide waste management efforts.

Gauging Program Participation and Effectiveness

Evaluating effectiveness is crucial, especially in states with source reduction and recycling mandates.

Determining waste prevention rates participation rates, diversion percentages, waste energy values, and other program parameters over the long term is necessary to properly evaluate program progress. Some states now require communities to meet specified percentages for source reduction and recycling. Reliably calculating these parameters is difficult, however.

Defining which materials to count in the calculation can present a major problem. Some states include junked autos and yard trimmings in waste diverted for recycling. Others do not. The first step in developing a procedure

Table 3-5

Projections of Materials Generated* in the Municipal Waste Stream, 1993 and 2000
(In thousands of tons and percent of total generation)

	Thousands of Tons		% of Total Generation	
Materials	1993	2000	1993	2000
Paper and Paperboard	77,840	89,340	37.6%	41.0%
Glass	13,670	14,020	6.6%	6.4%
Metals				
Ferrous	12,930	14,220	6.2%	6.5%
Aluminum	2,970	3,425	1.4%	1.6%
Other Nonferrous	1,240	1,395	0.6%	0.6%
Total Metals	*17,140*	*19,040*	*8.3%*	*8.7%*
Plastics	19,300	22,490	9.3%	10.3%
Rubber and Leather	6,220	7,610	3.0%	3.5%
Textiles	6,130	6,200	3.0%	2.8%
Wood	13,690	16,010	6.6%	7.4%
Other	3,300	3,540	1.6%	1.6%
Total Materials in Products	*157,290*	*178,250*	*76.0%*	*81.9%*
Other Wastes				
Food Wastes	13,800	14,000	6.7%	6.4%
Yard Trimmings	32,800	22,200**	15.9%	10.2%
Miscellaneous Inorganic Wastes	3,050	3,300	1.5%	1.5%
Total Other Wastes	49,650	39,500	24.0%	18.1%
Total MSW Generated	*206,940*	*217,750*	*100.0%*	*100.0%*

*Generation before materials recovery or combustion
**This scenario assumes a 32.3% reduction of yard trimmings.
Details may not add to totals due to rounding.

Source: USEPA, *Characterization of Municipal Solid Waste in the United States: 1994 Update*

Table 3-6 New Jersey Statewide Recycling Projections: Five-Year Rate (in thousands of tons/year)

			Current Status			Projected '95 Goal		1995 Residue	
Materials	Total % Waste Stream[1]	Total 1990 Generation[2]	Rate (%)[3]	Tonnage[4]	Total 1995 Generation[5]	Rate (%)[6]	Tonnage[7]	Tonnage[8]	% Total[9]
Yard waste	10%	1,420	49%	699	1,458	90%	1,312	146	3%
Food waste	5%	681	9%	63	700	10%	70	630	12%
Newspapers	5%	717	66%	472	737	85%	626	110	2%
Corrugated	6%	841	50%	417	864	85%	734	130	2%
Office paper	2%	359	59%	210	368	85%	313	55	1%
Other paper	10%	1,484	0%	0	1,525	20%	305	1,220	23%
Plastic containers	1%	169	1%	2	174	60%	104	69	1%
Other plastic packaging	1%	177	0%	0	182	25%	45	136	3%
Other plastic scrap	3%	457	0%	2	469	10%	47	422	8%
Glass containers[10]	3%	366	53%	193	376	90%	338	38	1%
Other glass	1%	79	0%	0	81	0%	0	81	2%
Aluminum cans[11]	0%	43	44%	19	44	90%	40	4	0%
Foils and closures	0%	22	0%	0	22	0%	0	22	0%
Other aluminum scrap[12]	0%	60	55%	33	62	80%	49	12	0%
Vehicular batteries	0%	40	93%	37	41	95%	39	2	0%
Other non-ferrous scrap	0%	55	60%	33	56	95%	54	3	0%
Tin and bi-metal cans	1%	122	18%	22	125	85%	106	19	0%
White goods and sheet iron	2%	340	62%	211	349	90%	314	35	1%
Junked autos[13]	4%	625	99%	619	642	99%	636	6	0%
Heavy iron	7%	1,037	100%	1033	1,071	99%	1,061	11	0%
Wood waste	9%	1,232	11%	133	1,265	75%	949	316	6%
Asphalt, concrete and masonry	16%	2,311	82%	1,884	2,374	90%	2,136	237	4%
Tires	1%	141	13%	18	145	30%	43	101	2%
Other municipal and vegetative	4%	631	4%	27	648	10%	65	583	11%
Other bulky and constructive demolition	7%	946	0%	0	972	10%	97	875	17%
Totals	100%	14,355	43%	6,128	14,750	64%	9,485	5,265	100%

Footnotes

(1) Calculated by dividing the 1991 generation tonnage for each material by the total tonnage figure of 14,355.

(2) Tonnages derived following the estimation of the percent of the waste stream made up by each material. These percentage estimates were taken from national figures prepared by Franklin Associates Ltd. from the report entitled "Export Markets for Post Consumer Secondary Materials," from values of the 18 waste characterization studies done by the New Jersey counties or from the values of four bulky waste analysis studies performed by New Jersey counties. These percentages were then multiplied by the municipal and/or bulky waste stream totals from the Baseline 1991 Generation Table. In some cases, tonnage estimates were obtained directly from industry sources.

(3) Current recycling rates, which represent documented activity for calendar year 1989, were calculated by dividing the reported tonnage figure by the total 1991 generation estimates of each material.

(4) Most current tonnages were actual documented figures from the 1989 Recycling Tonnage Grants Program. In a few cases, particularly with glass containers, the metals categories, and asphalt, concrete and masonry, numbers were received directly from industry sources documenting activity in 1989.

(5) 1995 generation estimates based exclusively on projected overall population of 4.7% by county from the New Jersey Department of Labor economic demographic model. No per capita change or source reduction assumed.

(6) Projected 1995 recycling percentages represent the goals or targets established by material from the Emergency Solid Waste Assessment Task Force and presented within their August 6, 1990, Final Report.

(7) Projected 1995 tonnage calculated by multiplying the estimated recycling percentage of the total 1995 generation figure by material.

(8) 1995 residue calculated by subtracting the projected 1995 recycling tonnage from the 1995 total generation figure by material.

(9) This column represents an estimate of the percentage of 1995 generation residue made up by each material. The calculation was derived by dividing the 1995 residue tonnage of each material by the total residue tonnage of 5,265.

(10) Glass containers figures derived primarily from the Glass Packaging Institute container generation estimates for 1989.

(11) Based on ALCOA generation estimate of 11 lbs. per capita per year.

(12) Based on NJ Auto and Metal Recycling Association generation estimate.

(13) Junked autos recycling rates are exclusive of shredder fluff.

Source: New Jersey Department of Environmental Protection for judging program progress is to develop program definitions and stick with them. Contact your state for guidance.

An overly broad definition of participation rates can result in cost inefficiency and lower-than-predicted volumes.

Participation rates should be carefully defined, because they can be misleading. For example, some recycling programs claim high participation rates, but some residents included in those rates contribute only one type of recyclable or participate infrequently. While high participation rate calculations are politically attractive, an overly broad definition of participation can result in cost inefficiency and lower-than-predicted volumes of material collected. A participation rate that counts regular participation in the entire collection program could provide a more accurate estimate for program assessment purposes.

Using defined parameters, a data collection system can be devised. For most communities, simply weighing waste loads at the landfill may not provide enough information. Simple data collection using log sheets or mechanical counters can be used if set-out rate, number of loads, and material weight are the only types of information wanted. Some communities use a computerized data collection system consisting of a hand-held computer and personal computer with spreadsheet software to collect more detailed program information. As stated earlier, pilots using bar coding and weighing waste from individual generators are in progress around the country.

The data collected can then be used to develop a profile consisting of participation rates, wastes types and volumes generated, quantities and percentages of compostables, recyclables and burnables actually captured, and other important information source reduction can be tracked. Cost efficiency of collection and processing and educational needs can also be assessed.

ORGANIZING A WASTE MANAGEMENT PROGRAM

The process of establishing a waste management program is lengthy and complex. As the process moves along and problems arise, it is easy to get bogged down in the everyday details of program implementation. Frequently, an immediate problem can take precedence and seemingly overshadow all other considerations. Although the need to break a complex problem into small, workable units is human nature, the "big picture" must always be kept in focus.

Successful organization focuses on the 5 "Ps":

- *Planning*
- *Price*
- *Publicity*
- *Politics*
- *Perseverence*

As a community moves toward program implementation, managers must constantly remind themselves to keep the overall program in perspective. By viewing the project as a whole, no individual element will be given too much or too little attention. Program momentum will be sustained at a slow, but steady, pace. Issues that can delay or derail a program will be recognized and dealt with. Public support will be fostered and confidence in the ability of the community to successfully implement a program will grow.

To keep a waste management program in its proper perspective, attention must be given to the five "Ps"; that is, planning, price, publicity, politics, and perseverance. By always remembering the five Ps, program developers will give their programs the greatest chance of succeeding. Conversely, if any one of the Ps is ignored or forgotten, the program has a great chance of failing. Each of these issues is discussed briefly below.

Planning

Although it may seem obvious that planning is needed to implement a successful program, in practice, the need to formulate and follow a well-devised and comprehensive plan is sometimes forgotten. A leaking landfill or other waste management problem may pressure a community to act quickly; hasty actions cause mistakes, which in turn result in delays and wasted resources. While all possible situations cannot be anticipated, many good models based on successful programs do exist, and program developers are encouraged to use them when possible to formulate their own programs.

For example, in waste-to-energy projects, a number of communities have run into trouble because financing expertise was not brought into the planning process early enough. After significant resources were committed to technical analysis, the capital markets were consulted only to reveal that the technical information compiled and recommendations made were inadequate to provide proper support to obtain capital financing. As a result, the technical analysis had to be redone, which added cost and delay to the project.

Planning is especially important because of the large number of actors involved with a waste management program.

Planning is especially important because of the potentially large number of actors in the waste management process. Political bodies, waste generators, waste haulers, regulatory agencies, construction contractors, plant operators, energy and material buyers, landfill site owners, and citizens must all be included for a program to be successful. Each group has the potential for delaying or derailing a project. By formulating and continually reviewing a project plan, program managers can minimize the chances that a major component of the program will be missed.

Price

Each management approach carries a price tag. Comparing costs and benefits before acting is essential to long-term success.

Decisions regarding the adoption of alternative strategies for managing waste must continually be based on sound economic analysis that considers the resources of the community and the anticipated environmental impacts and benefits. The community is usually willing to support higher cost waste management options as long as there is confidence that the program is well run, economically efficient, and environmentally sound. Each management approach carries a price tag. Comparing costs and benefits before action is essential to long-term success.

Publicity

Program support can erode quickly. Ongoing publicity efforts to maintain strong, positive public support are crucial.

Successfully implementing a waste management program can take a number of years and a commitment of community resources worth many millions of dollars. While the decision to pursue a certain option is often met with great fanfare, support for a program can erode quickly unless attention is given to keeping the program on the public agenda and maintaining strong and positive public support. A plan for informing the public about the program's progress should be developed and implemented as the program proceeds. Special effort should be made to generate public support before public bodies vote on program expenditures. The program must be seen by the public as something to be proud of, as an example of the progressiveness of the community and its commitment to a clean environment.

Politics

Political support is crucial to obtain financing and ensure the program gets the resources needed to construct facilities and operate them efficiently.

As with publicity, sustaining political support during the long and costly implementation process is vital to the program's ultimate success. When local government budgets are tight, a program may not survive the budget cutter's knife unless there is continuing, strong political support. Political support is often crucial to obtaining financing and ensuring that the program gets the resources needed to construct facilities and operate them efficiently. Political leaders should also be kept informed of the program's progress on a regular basis so that political support for the program grows as the decision-making body reaches the point of actually committing its public or private resources to implementing the long-term program. Newly elected political officials must also be educated concerning the community effort.

Perseverance

Finally, a community considering a waste management program must be prepared for the long term. Some projects can take five to ten years to implement. Such programs are complex, expensive, and often frustrating. A community choosing to implement a program must be willing to commit the necessary resources to see the program through. The ultimate key to success is the will to persevere until the program is in place; the thousands of successful programs underway nationwide attest to this.

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