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## Managing America's Garbage: Alternatives and Solutions By Lynn Scarlett

Out of sight, out of mind. That has been the predominant attitude of most Americans toward their trash. In many U.S. municipalities and counties garbage collection charges have historically been low--often below the real costs of collecting and disposing of the waste. "Garbage collection and disposal," as one Seattle authority put it, "has been a 'silent service.' A citizen puts garbage out (usually in unlimited amounts) and it disappears during the day for little cost or free (i.e., garbage is often paid for in one's property tax.)" As a result, the United States has become a throw-away society. Indeed, by 1988 some 3.5 pounds per day of trash per person was being generated, up from 2.7 pounds per day in 1960. The Environmental Protection Agency (EPA) estimates that Americans now toss out a grand sum of 150 million tons of solid waste annually compared to 81.7 million tons in 1960. Some 85 percent of this trash ends up in landfills. (1)

But landfills, like most resources, are not endlessly available. With 85 percent of the U.S. waste stream going to landfills, they have begun to fill to capacity. Just over the past 10 years more than half of the 18,500 landfills that existed in 1979 have closed. The EPA now forecasts that by the 1990s only 4,000 landfills will remain open. (2)

As landfill capacity has declined while waste continues to accumulate, costs of using the remaining dumps have skyrocketed. Nationwide since 1982 the average tipping fee--the amount trash haulers pay to unload garbage at disposal sites--has doubled from \$10.80 per ton to \$20.36 per ton. In some areas, particularly the Northeast, the situation is even more acute. There, the average tipping fee has climbed to \$40 per ton, with some cities paying over \$100 per ton to dispose of garbage. Some New Jersey municipalities, for example, now pay \$138 per ton to use out-of-state landfills.

Nor are extensive expansions of landfills anticipated. Many urban areas simply lack available land. In other areas where land does exist, public opposition--the not-in-my-backyard (NIMBY) syndrome--has prevented new landfills from opening. In one dramatic example, the City of Los Angeles faces the impending

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closure of its Lopez Canyon landfill. The City has approved funding to establish new dump sites, yet fierce political opposition has stalled all efforts to move forward with these plans. High costs have also undermined efforts by other cities to establish new landfills. Stringent environmental regulations on landfills that add to costs of constructing and operating them have increased the price tag of opening new disposal sites, further influencing policymakers to look elsewhere for ways of disposing of garbage.

### **Waste Disposal--What Are the Options?**

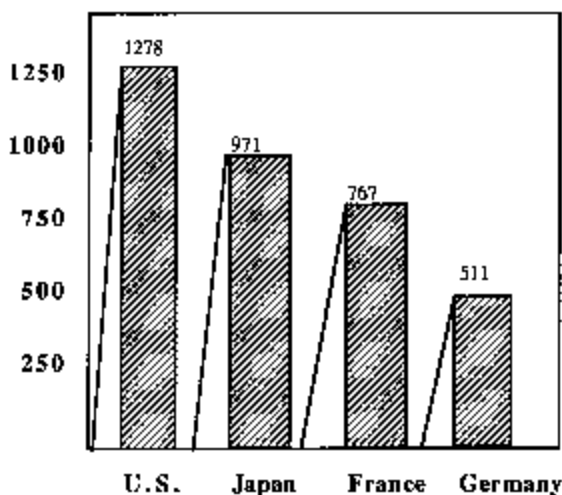
Urban policymakers--and citizens--face a growing challenge of figuring out what to do with their trash. Four basic options are available. Policymakers can:

- 1) initiate waste-reduction policies
- 2) develop recycling programs
- 3) build waste-to-energy facilities that burn trash
- 4) identify and construct additional landfill capacity

All four options offer some potential for mitigating the current solid waste disposal crisis.

Other industrialized nations already produce far less garbage per person than the United States, amply illustrating that it is possible, through altered habits, to generate less trash. For example, the Japanese produce only 76 percent of the amount of garbage generated per person in the United States. France produces only 60 percent of the amount of garbage we produce, and Germany produces only 40 percent as much waste per person.

**Table 1**  
**Annual Pounds of Waste Per Person By Country**



Experience with recycling suggests that it can reduce the amount of waste hauled to landfills by 25 percent with modest effort. How well recycling efforts work, however, depends significantly on the type of program implemented. To date, most programs recycle well under 20 percent of the waste stream in the communities in which they exist.

Experience with waste-to-energy facilities produces the most dramatic results. Up to 90 percent of the waste stream can be burned in these incinerators, leaving only the inert residue ashes to be disposed at landfills.

In conjunction with these efforts, the scarcity of landfill becomes a much less pressing problem, one that could be handled by expanding existing sites, as well as developing some new capacity.

As the National Solid Waste Management Association (NSWMA) has pointed out, these are not mutually exclusive strategies.(3) Indeed, the NSWMA has underlined that any long-term viable waste management effort will require policies to encourage all four strategies. But success also requires that waste management policies--whether designed to reduce waste, recycle, build waste-to-energy plants, or create new landfills--take into account individual behavior, economic considerations, and basic market realities.

Thus, a recycling policy must be considered in the context of an overall waste-management program. By itself, recycling is not the answer to resolving the waste disposal crisis that many municipalities and counties face. Furthermore, to identify recycling as a viable policy option is only the first step. The key to success lies in how such policies are designed: Are they mandatory or voluntary? Do they rely on economic incentives or enlightened citizen commitment? Are they part of an overall waste management program?

Policymakers must recognize that recycling is not an end in itself. A recycling program is not really successful unless it takes into account two key factors.

\* **First**, the goal should be to bring about a more efficient use of resources by transmitting to citizens information about the real costs of waste disposal. In this way, reductions in overall waste will accompany efforts to divert some waste away from disposal sites through recycling. This underscores the importance of voluntary models that use economic incentives--for example, charging for garbage collection based on volume of garbage--rather than mandatory plans or voluntary models that do not use price signals to encourage participation.

\* **Second**, recycling has not really occurred unless the reclaimed material is used to manufacture new products. Otherwise, the recyclables will merely end up in a disposal site after all. Today, many people assume, when they prepare their recyclables for the recycling center, that they will indeed be recycled.

However, in some cases, the market for recycled products such as newsprint is so depressed that many recyclables end up at a disposal site after all. Development of markets for recyclables is thus a key component of recycling efforts.

### **Recycling and Waste Reduction--The Current State of the Art**

Recycling is back in vogue. In the 70s, amidst environmentalist fervor, a handful of recycling centers cropped up across the country. However, by the mid-80s, with rapidly increasing tipping fees and landfill closures, recycling became more than a fad of ecologists: it took center stage on the policy agendas of those concerned with urban waste. Prior to 1980 only 140 communities nationwide had recycling programs. Only nine years later, over 1,000 jurisdictions had instituted curbside collection of recyclables. Moreover, some 10,000 recycling drop-off and buy-back centers had emerged, and 7,000 scrap processors were buying waste to reprocess. (4) A 1987 survey by the National Association of Counties revealed that fully one-third of all counties in the United States had at least some kind of recycling program. (5) By the late '80s, recycling had become a \$5 billion industry.

The EPA also began encouraging cities and counties to establish recycling programs, setting a goal of reducing waste by 25 percent through recycling. Just since 1986 at least ten states--including, for example, Rhode Island, New Jersey, Pennsylvania, Maryland, Florida, Oregon, and California -- have passed some form of mandatory recycling legislation. For example, in Florida, all counties must recycle at least 30 percent of their trash by 1994 or face state funding cut-offs. Pennsylvania communities with populations over 5,000 are required to put into place by 1997 mandatory recycling programs to reduce by 25 percent the amount of waste hauled to landfills.

Many of the mandatory programs have resulted from the assumption that mandates are necessary to bring about citizen participation in recycling. Yet these efforts often fail to consider the real costs of such programs. For example, as a result of Florida's recycling mandate, Citrus County, Florida has instituted such a mandatory program. Estimated costs of the plan are \$2 million, with expectations that sale of the recycled materials will bring in revenues of \$500,000 to offset costs. However, the County still has at least 20 years of landfill capacity remaining and tipping fees would have to increase significantly before recycling becomes cost effective.

The success of the various recycling programs in the United States varies widely and offers an opportunity to explore which policies work best. The results of a 1988 survey by the NWSMA of 15 municipal programs challenged the assumption that mandatory programs result in higher collection rates than voluntary programs. (6) Participation in the programs surveyed ranged between 25 percent and 98 percent, with no direct correlation found between mandatory programs and high participation rates. The same survey also found that highest participation levels occurred in programs with which it was simple and easy to comply. For example, programs that provided for curbside collection of recyclables on the same day as regular trash collection reached participation rates of 76 percent compared to participation rates of 41 percent when collection of recyclables occurred on different days. Furthermore, participation was much higher where recycling was limited to three or so categories of waste.

### **Seattle Recycling: A Voluntary Model That Works**

In 1988 the city of Seattle began implementing a recycling program that combines a number of features conducive to encouraging recycling, reducing overall waste generation, and constraining recycling collection costs. Moreover, it accomplishes these goals within a voluntary structure that widens rather than limits the choices of Seattle citizens.

Seattle came up with its recycling program as a result of a serious disposal site crisis that emerged in 1986. At that time, Seattle's existing sites were closed as a result of environmental problems. Forced to transport its garbage to the disposal site of a neighboring jurisdiction, the city suddenly faced dramatically increased tipping fees, up virtually overnight from \$11 per ton to \$31.50 per ton. Moreover, citizen opposition to a proposed incinerator project rendered even more acute its

solid waste disposal problem. In this context, the city needed to devise a policy to reduce its overall volume of garbage fairly quickly.

### Variable Can Collection Rates

The city already had in place several features in its garbage collection policy from which to build an innovative recycling program. In the 1970s, the city had begun using variable can rates in charging consumers for garbage collection. In other words, the city charged customers based on the number of garbage cans they put out for collection. The plan was designed to offer citizens an incentive to alter their habits and reduce waste generation. The program, as originally conceived, however, had not been effective largely because the base rate for garbage collection was low and the cost of putting out additional cans was insignificant.

Rather than abandon the price-signal concept when it embarked on its recycling program, the city instead strengthened the economic incentive feature of its garbage collection plan. In both 1986 and 1987 Seattle initiated two rate increases that ultimately raised the single can rate by 82 percent to \$13.55, with additional cans costing \$5 more apiece. Faced with these increases, citizens became much more aware of their garbage collection bill and began altering their buying habits by purchasing more recyclable containers, larger-volume food packages, and fewer packaged goods, with the result that per person waste generation began to decline. As a result, one official commented in 1988 that "the economic signal that can be sent through a variable can rate is being effectively heard in Seattle." Thus, prior to implementing its recycling program the city had already instituted a garbage collection policy that, through variable can rates, encouraged citizens to "conserve" on garbage generation and recycle voluntarily.

In 1988 the city further refined its rate charges to complement and reinforce its recycling program. The key feature of the new rates was the inclusion of a special low rate for customers who used only a special "mini-can" to dispose of all their nonrecyclables. The rate, 23 percent lower than the previous one-can rate, offers a significant incentive to citizens to reduce their overall waste generation and participate in the recycling program. Moreover, the mini-can rate offers an attractive alternative to the elderly and those living alone, who generate much less trash than other households. According to city officials, the mini-can rate would "give rate relief to citizens who are participating in the city curbside recycling and yard waste collection programs and no longer have enough garbage to fill a garbage can."

Further refining its rate structure to relate to real costs of garbage collection service, the city offers cheaper rates for curbside collection versus backyard service. In addition, customers can purchase special \$5 stickers for occasional extra bags of trash that they might, for example, generate after a party or during holiday seasons.

**Table 2**  
**Seattle Garbage Service Rate Schedule**  
**1989/1990**

Curbside/Alley Collection (monthly)		Backyard Collection (monthly)	
Mini	\$10.45	Mini	N.A.
1	\$13.55	1	\$16.35
2	\$22.55	2	\$27.20
3	\$31.55	3	\$38.05
4	\$40.55	4	\$48.90
		Stickers	\$5.00 each
		Curbside Yardwaste	\$2.00/month
		Zero Can Customers	\$5.65/month

Source: Mayor Charles Royer's Recommendation on Solid Waste, presented to Seattle City Council, Seattle, Washington, July 26, 1988.

Local authorities in some metropolitan areas have long argued that garbage is a basic service that must be equally accessible to all citizens. This argument has been used to oppose garbage collection fees and instead to argue for using general tax revenues to support garbage collection. However, tax-funded garbage collection fails to give those who use garbage collection service any information about the real costs of that service and gives customers no incentive to "economize" on the amount of waste they produce. Moreover, this argument fails to consider that it is possible to take into account the needs of low-income citizens in other ways. For example, the city of Seattle has acknowledged concern for its low-income residents by offering special low rates (50 percent discounts) for low-income families and for the elderly and the disabled with incomes less than 125 percent of the poverty level. (For example, if the poverty level was at \$10,000, all those earning \$12,500 would qualify for the special rate.)

### **One City--Two Private, Recycling Service Contractors**

In 1988, the city set in motion its recycling program. Rather than establish a municipal recycling collection service, the city decided to contract with private companies to collect, transport, sort, and market recyclables. To benefit from the cost-containing effects of competition, the city specified in its contract-bidding process that no contractor could serve more than one-half of the city. Moreover, having reviewed the variety of different systems for providing collection of recyclables, Seattle officials decided that it was unclear which of the many collection systems was superior. Consequently, they did not specify how the private recycling service must operate but rather allowed the bidder to design the system within certain performance parameters.

Ultimately, the city awarded contracts to two private bidders--one to Recycle Seattle to serve the south end of the city and one to Recycle America to serve the northern half of Seattle. Each operates with a different collection plan, though the two services share some common features. Both collect the same five materials--glass, newsprint, aluminum and tin cans, and mixed paper. Both operators do their own processing and marketing of the recycled materials, and both have extensive marketing programs to enlist citizen participation. Each operator is paid by the city approximately \$48 per ton for its services, though there are differences in the specific financial details spelled out in the two contracts, especially regarding income (or losses) resulting from any sale of the recyclables to users. Finally, both contractors distribute collection bins free of charge to all customers.

Apart from these similarities, significant differences distinguish the services offered by the two contractors. Recycle America, operating in the northern half of the city, receives a fixed rate of \$49.43 per ton of recycled goods collected, but specifies in its contract that it will receive a minimum of \$2.8 million over five years, a feature designed to reduce its risk in the event of low citizen participation. The price per ton received by Recycle America can escalate at the rate of the Consumer Price Index, but it absorbs all market risk related to selling the recyclables. In other words, if the market for these goods declines, it receives no additional compensation from the city to make up for lost income.

In contrast, Recycle Seattle, providing service in the southern part of Seattle, charges \$49.02 per ton to collect recyclables and specifies no minimum payment from the city. However, they do have an agreement with the city to share the risk relating to marketing the recycled materials. For example, if the value of recyclables goes up, the city's per/ton rate paid to Recycle Seattle goes down.

The two firms also offer different pick-up programs. In the north, Recycle America supplies customers with three containers into which they sort the recycled materials, which are then picked up on a weekly basis by special trucks with several compartments for the different materials. Recycle Seattle, on the other hand, provides one large, 90-gallon container into which the customer comingles all recycled items. The container is collected once per month into a standard, back-loading truck. The recycled materials are then sorted at a central facility by the firm.

## Participation Results

Both systems have generated citizen participation that has significantly exceeded original expectations. In the north, with 65,000 potential residential customers, Recycle America had signed up over 80 percent of eligible households in less than a year compared with projections of around 40 percent. Recycle Seattle had achieved a participation rate of 55 percent among its potential 82,000 customers. Though the participation rates are lower in the southern end of Seattle, city officials do not attribute this to poorer service or an inferior system. The southern half of the city differs demographically from the northern half, with significantly lower per-household income levels. Nationwide data shows that lower income groups traditionally participate less in recycling programs in part because there is a strong relationship between income levels and the amount of recyclables a household produces in its waste stream.

The combined total participation rate by the end of 1988 was 67 percent, with the result that over 3,100 tons per month of garbage was being diverted away from the landfill, for a grand total in 1988 of 23,946 tons. If the program remains on (or above) target, the city should actually save money as a result of recycling within five years. That is, by that time, the costs of the recycling program will be less than the the cost would have been to dispose of the same materials in landfills.

In a report on Seattle's recycling program, Timothy Croll and Diana Gale conclude that "both systems have been very successful." (7) They go on to comment that "the best thing a city could do is let [companies] compete against each other in a bidding or request-for-proposal process. In the solid waste business, strong competition among collection vendors appears to be more scarce than landfill space! It would be a mistake to specify one system to the exclusion of others. Specifying one system exclusively may eliminate some viable bidders." Croll and Gale conclude that "we feel that Seattle is saving hundreds of thousands of dollars a year because of the competition we had for the [recycling] contract."

Seattle's Mayor Charles Royer has also praised the program, noting in particular its flexible and voluntary nature. He noted that the program was "designed to give Seattle's consumers choice and control over the rates they will pay for garbage collection." Seattle's plan offers customers significant incentives to reduce their trash generation, and it offers a variety of alternatives regarding how they will dispose of that trash. Equally important, through use of competition among private service providers the city estimates that collection costs for its recycling program are much lower than they would have been under public or private monopoly service conditions.

## Variable (Per Can) Rates: A Brief Review

The per can charges used in Seattle are central to the program's success. Nor is Seattle's success unique. That variable charges can offer dramatic incentives for citizens to reduce waste and recycle is illustrated by the experience of several other U.S. communities. High Bridge, New Jersey, for example, recently stopped charging a flat fee for garbage pick-up and moved to a per bag rate system. Billing by the bag has resulted in a 25 percent reduction in residential trash--from 8.5 tons per day down to 6.3 tons per day. To reduce their trash bills, people have resorted to a variety of actions, including installing garbage disposals and garbage compactors, recycling, and composting. One citizen remarked of the new per can charges that, "I've been [recycling] for years, but many of my friends and neighbors said they couldn't be bothered. But now they bother because it's hitting them in the pocketbook."

The shortage of landfill has made other cities, including Woodstock, Illinois, Lansing, Michigan, and Perkasié, Pennsylvania turn to variable rates and they have experienced equally promising results. In Perkasié, the cost of waste disposal went from \$8 per ton in 1981 to \$58.95 per ton in 1987. The town implemented per bag charges as an incentive for citizens to reduce their waste generation. As a result, by 1988, 43 percent of the town's solid wastes were being recycled and the total amount of wastes and recyclables produced dropped 28.7 percent from the average totals collected in the previous three years. Despite both higher labor costs and tipping fees for garbage collection and disposal, the city broke even in the first year of implementing its program.

## Marketing Recyclables: The Role for Legislation

Advocates of mandatory recycling often operate under the assumption that collecting recyclables is an end in itself. Yet ultimately recycling is only a viable means of conserving landfill if the recycled materials are used to make new commercial products. Moreover, the costs of recycling must be weighed against other alternatives, such as continued disposal of some waste in landfill or through incineration.

Current recycling efforts face both economic and technical constraints. For example, markets are weak or highly volatile for some recycled materials. Some recycled materials eventually wear out, meaning that they cannot be continuously recycled. And some goods, made up of multiple materials, cannot be readily recycled since it is difficult or costly to separate out the different components.

Consider the markets for recyclables. At present, paper accounts for 86 percent of all recycling activity in the United States, with corrugated containers and newspapers alone accounting for 70 percent of the total materials recovered through recycling in the mid-1980s. Though newsprint accounts for much of U.S. recycling activity, its market is highly volatile. From 1983 to 1988 prices ranged anywhere from \$15 to \$85 per ton (see Table 3). More recently, prices have fallen from approximately \$50 per ton in early 1988 virtually to zero by 1989 in some markets, and haulers have had to pay paper processors to receive the recycled newsprint. United Paper Stock Company, for example, began charging new customers \$25 per ton in 1989 to accept recycled newsprint. In Minneapolis, the recycling firm, Supercycle, terminated its contracts with 32 cities to take newsprint. Within a brief 8-day period, the company had gone from selling 1,800 tons of recycled newsprint per month to paying \$5,000 per day to dispose of excess newsprint, much of it going to landfills at a cost of \$45 per ton.

Table 3  
Five-year Price History of Recyclables (per ton)  
1983-1988

Materials	Price	
	1983	1988
Paper	\$ 15	\$ 85
Aluminum	\$545	\$1,435
Tin Cans	\$ 30	\$ 40
Glass	\$ 50	\$ 80
Plastic	\$200	\$ 800
Yard Debris	No existing markets	

Though the paper market has been volatile, other markets are strong. The markets for glass and metals are fairly stable and the demand for recycled plastics is actually growing rapidly. Moreover, some industries face strong economic incentives to use recycled materials.

For aluminum can manufacturers, use of recycled aluminum reduces energy costs dramatically. It takes 20 times as much energy to refine bauxite as it does to reprocess recycled aluminum and reprocessing produces less waste. As a result, demand for recycled aluminum cans is high. Just during 1988, the United States reprocessed more than 40 billion cans, or 1.5 billion pounds of aluminum cans into new containers. From 1980 to 1987, fully 232 billion containers (9 billion pounds) of aluminum containers were recycled, with recycling collectors earning some \$600 million and saving manufacturers 95 percent of the energy that would have been required to make the same products from bauxite.

The glass and plastics markets are also strong, with some 12 million tons of glass now remelted annually. New York City has even begun recycling colored glass, using the material to produce a road surfacing mixture dubbed glassphalt. Long considered a bugaboo by recyclers, some recycled plastics are now in high demand by manufacturers. DuPont has developed additives to



mix with recycled plastics that result in quality resins that can be reused repeatedly, resulting in conservation of natural resources. The company is now recycling approximately 1 billion pounds of polymers and polymer feedstocks. Approximately 20 percent of all polyethylene terephthalate is now reprocessed into such diverse consumer items as carpet backing and clothing filler.

Increased awareness among policymakers that markets for recycled goods are a key feature of a successful recycling program have led to numerous legislative efforts to bolster these markets. In addition to direct recycling efforts, by 1988 some 24 states had implemented plans to augment the market for recyclables through special policies favoring procurement of goods made from recycled materials. However, Eugene Wingerter, chief executive officer of the National Solid Waste Management Association, has argued that dependence on federal and state grants and subsidized plans to create markets for recyclables puts recycling at the mercy of changing political fashions. He argues that if recycling is to survive and grow it must stand the test of the marketplace. What is warranted is a look at policies that have actually inhibited the use of recycled materials. For example, in the past, private-sector use of recycled goods was actually hindered by U.S. tax laws that favored manufacturing that utilized raw materials.

Policymakers would do better to remove these kinds of biases than to set up subsidies or regulations to encourage the use of recyclables. The dynamic changes in manufacturing processes and innovations make attempts by regulators to anticipate what products are recyclable potentially counterproductive. For example, Minneapolis and Suffolk County on Long Island have both outlawed the use of polystyrene plastic for food containers. In addition to bans on certain plastic and polystyrene packaging, other states have proposed taxes on nondegradable, nonrecyclable materials. Yet Dupont and Waste Management, Inc. have formed a major joint venture to reclaim plastics that could render regulations against such materials highly inappropriate. In general, such regulations could impose severe costs on manufacturers, inconvenience consumers, stifle innovation that would open up new opportunities for recycling, and in the end, have little impact on solid waste disposal.

### **Recycling--One Facet of Solid Waste Management**

While recycling can play an important role in reducing the amount of solid wastes that ends up in landfills, it is no panacea for the garbage crisis that confronts many U.S. urban areas. Combining recycling with variable rate charges for garbage collection offers a way of encouraging not only recycling but also overall reductions in waste by giving people an incentive to change their consumption habits. But, especially for large cities with little or no remaining landfill, these measures are at best only a partial solution to the solid waste problem.

Waste-to-energy plants can reduce the volume of refuse by up to 90 percent, leaving mainly inert ash residue and large used appliances and construction waste left for disposal. The waste-to-energy option, however, is currently facing keen opposition by people concerned about potential toxics and pollution from such plants. However, state-of-the-art plants now have pollution control systems that mitigate such problems. Moreover, studies of the ash residues from these plants show that they pose little danger to health. Residue levels of lead and cadmium, the two key potentially problematic components of the ash, are at least 20 and 100 times lower respectively than standards set by the EPA regarding acceptable levels. However, public perception of waste-to-energy plants remains negative.

Other industrialized countries rely far more on waste-to-energy facilities to burn refuse than does the United States. In West Germany, for example, one-third of its unrecycled wastes are incinerated and in Japan nearly 50 percent of such wastes are burned in waste-to-energy facilities. In the United States, only 6 percent of unrecycled waste is incinerated. Contrary to the contention of some critics, waste-to-energy plants are fully compatible with recycling. A report by the Institute of Resource Recovery noted that waste-to-energy incineration actually benefits from recycling, since removal of aluminum, ferrous metals, and glass before combustion actually enhances waste-to-energy plant performance and improves the properties of the remaining ash. Eventually this option will need much more serious consideration by U.S. urban jurisdictions if they are to cope with the refuse problems posed by their increasing mounds of trash and decreasing