

# Integrated Waste Management: The Crisis Solution

COMMUNITIES ACROSS THE NATION ARE NOW facing a municipal solid waste (MSW) management dilemma further complicated by rising tipping fees, diminishing landfill capacity, and the NIMBY (not in my backyard) syndrome. Yet increasing numbers of municipalities are finding workable solutions through sound planning and integrated waste management program development.

## The components

No single management approach can effectively deal with each community's MSW (i.e., household, commercial, and yard waste) disposal demands. The key to an effective solution is individually tailoring a MSW management scheme that integrates complementary methods to meet local needs. This approach usually includes waste reduction/reuse, recycling, waste-to-energy, and landfilling.

*Waste reduction/reuse* involves minimizing the use of excess materials such as packaging, and substituting biodegradable elements or alternative processes for undesirable materials (i.e., toxics) in the manufacture of consumer goods.

Small-scale reduction efforts already underway include the banning of certain plastic products from landfills on Long Island. Composting food and yard wastes (i.e., the decomposition of organic wastes) by individual homeowners also is considered a reduction activity.

For reduction on a full-scale level to be effective, industry must make significant manufacturing and marketing changes, however, and consumers must alter their buying and consuming habits. Strong government policy enforcing such actions also is required.

*Recycling*, or the recovery of materials from the MSW

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stream, is gaining widespread support as a primary waste management option. Aluminum, glass, metal, paper, and some plastics all can be successfully recycled, provided long-term markets are available. In many communities, commercial composting is considered an active component of the recycling program.

About 10% of the MSW stream in the U.S. currently is recycled. EPA is targeting a national rate of 25% by 1992.

*Waste-to-energy* involves the conversion of MSW to energy through combustion, which not only reduces the weight and volume of MSW (by 70% and 90% respectively), but also generates energy in the form of steam or electricity.

More than 100 waste-to-energy facilities now operate in the U.S., handling approximately 10% of the total MSW stream. According to the EPA, more than 200 additional facilities are now under construction or being planned.

*Landfilling* has not diminished as a management option despite the emergence of other alternatives. In many areas of the U.S., particularly rural locations, landfills offer the most economical solution.

Landfills also are necessary for wastes that cannot be recycled or burned and for the ash residue generated by waste-to-energy plants.

Today's landfills are a vast improvement from an environmental impact standpoint over early landfills. Operating permits requiring state-of-the-art engineering designs and management practices at all new facilities are helping to ensure adequate surface and groundwater protection.

While the methods used to solve MSW management problems may be similar, the degree and approach with which they are used vary considerably. No two integrated MSW management programs are exactly alike because municipalities needs are dictated by such factors as demographic trends, the political environment, available land resources, etc. What follows are five examples of management programs currently operating.



1 Essex County, NJ  
2 Dade County, FL  
3 Babylon, NY

4 Indianapolis/Marion County, IN  
5 Spokane County, WA



## Essex County, New Jersey

With passage of New Jersey's Solid Waste Management Act of 1970, Essex County and the other 21 solid waste districts are required to develop waste management plans that include recycling, waste-to-energy, and a state-approved landfill to handle non-recyclables and ash residue from waste-to-energy plants. Following passage of the state's mandatory recycling law on April 20, 1987, all solid waste districts are required to achieve a minimum recycling level of 25% within two years of the program's initiation.

Essex County currently recycles about 15% of its total MSW stream, with the remainder being transported out-of-state through transfer stations, according to Martin Lund, director of the Solid Waste Management Division of the county Department of Planning and Economic Development.

Essex County's MSW management plan should be in-place by the end of 1990, according to Lund. The plan calls for 25% of MSW to be recycled, 60% to be burned at the waste-to-energy facility, and 15% to be landfilled as by-pass or non-processible materials. These percent-

	Current 1988	Projected 1990
Recycling	15% (does not include composting)	25%
Waste-to-Energy		60%
Landfill	85% (mixed MSW)	15% (by-pass & non- processibles only)

ages, expressed on a weight basis, do not include composting data.

The Solid Waste Management Division, in cooperation with state officials, is developing a household hazardous waste collection program. The program will likely involve designated collection days at centrally-located sites to maximize participation. The program is expected to be in-place by mid-1989.

Essex County's recycling plan has been totally updated to meet the requirements of New Jersey's mandatory source separation law. Under the updated plan now in its final draft form, municipalities must provide mandatory curbside collection services to their residents. Each municipality must recycle, at a minimum, three materials, which could include aluminum, glass, tin, newsprint, corrugated, and office paper.

"Curbside collection service is currently provided to 90 percent of the county's residents," according to Paul Petto, county recycling coordinator. Commercial recycling opportunities also are available, with private, intermediate processing centers emerging as part of municipal programs. Markets for recyclables also are developing. Glass materials are marketed to a number of locations, while newsprint is handled by Zozarro Brothers of Clifton and corrugated is processed by Paper Recycling Corporation of Newark.

"It's the only one of this type in the state," says Martin Lund, referring to the County's regional leaf composting facility. The facility, located on a fully-permitted, 25 acre site, uses Rutgers composting process and state-of-the-art leaf turning equipment to produce a usable product in 12 months. The final product is used in landscaping on municipal lands and residential properties. Thirteen of the County's 22 municipalities use the facility; the remainder have their own permitted, composting sites. "The net effect of the program on participating municipalities is that it has saved them approximately \$1 million in avoided costs of disposal during this past year," states Lund, referring to leaves that would otherwise have been hauled out-of-state via the transfer stations.

A 2,277 tpd waste-to-energy facility, that represents a cooperative effort between Essex County, the Port Authority of New York and New Jersey, and American Ref-Fuel is now under construction. Developing the waste-to-energy project "was really a team effort," explains Bill Glover, vice president of asset management for American Ref-Fuel.

In addition to the three-part cooperation necessary to finalize the project's contract requirements, constant interaction with key state agencies was required. An open dialogue with the New Jersey's Department of Environmental Protection, Board of Public Utilities, and Department of Community Affairs was maintained for more than two years. This secured all necessary facility operating permits and regulatory compliance obligations.

According to Richard Cronin, resource recovery manager with the Port Authority, the facility has "been through the entire litigation package," but is still ahead of established construction schedules. The facility start-up is expected by mid-1990. The facility will process MSW

from all 22 municipalities in Essex County and may accept a limited amount from outside the county as well.

The facility will use Deutsche Babcock European mass-burn technology to generate some 65 megawatts of electricity. Public Service Electricity & Gas will buy 45 megawatts and the remainder will be consumed internally.

The facility is located within a non-attainment zone for clean air, requiring the purchase of air credits covering a two mile radius of the plant. It is estimated that \$850,000 will be spent to secure the air credits for volatile organic chemicals and particulates. Air pollution control equipment at the plant will include dry scrubbers and electrostatic precipitators.

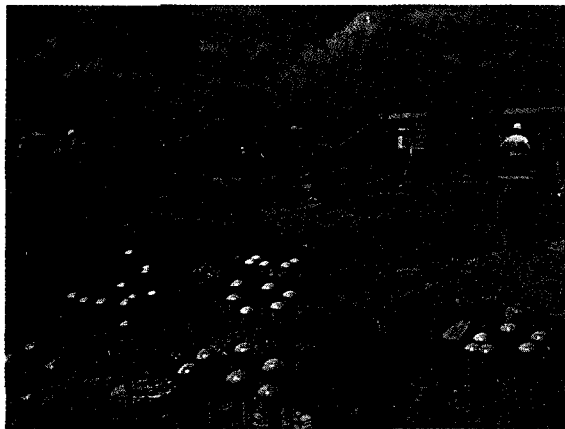
The total cost of the facility is estimated at \$300 million, including financing and construction costs. Capital cost of the plant alone is \$250 million. Tipping fees during the first year of operation are projected at \$65 to \$70 per ton, including \$22 for hauling and disposing of ash residue.

Two transfer stations have been operating since the County landfill closed in August 1987 and will serve as the interim waste disposal method until the waste-to-energy facility opens. The two are located in Newark and owned and operated by Waste Management of New Jersey and Solid Waste Transfer and Recycling, Inc., respectively.

The transfer stations handle an estimated 2,650 tons of wastes each day, excluding leaves and recyclables. Wastes processed at the transfer stations are disposed in Pennsylvania landfills for \$102.86 per ton for household MSW, and \$110.56 per ton for demolition wastes, bulk wastes, vegetation, animal and food processing wastes, and dry industrial wastes.

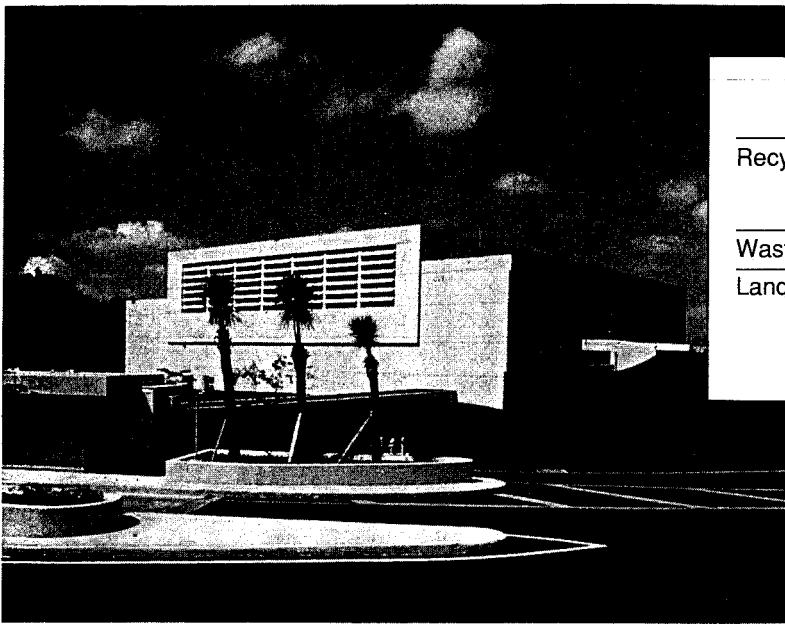
In preparing for the start-up of its waste-to-energy plant, Essex County secured a seven-year contract with Easton Waste Company to dispose of ash in a landfill near Buffalo, New York. The contract begins in 1990 when the plant opens.

Discussions are now underway with Essex, Bergen, and Hudson Counties, and the Hackensack Meadowlands Development Commission (HMDC) to determine whether HMDC, which overlaps geographically with Hudson County will offer its existing landfill as an ash disposal site. In return, Hudson County would be allowed to dispose of its MSW at the other Counties' waste-to-energy plants now being developed.



**Construction of Essex County's future 2,277 tpd waste-to-energy plant.**

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	Current 1988	Projected 1994
Recycling	15%	30% (includes 10% composting)
Waste-to-Energy	30%	35%
Landfill	70% (mixed MSW)	25% (mixed MSW, by-pass & non- processibles)

## Dade County, Florida

Dade County's MSW management program is designed to meet its long-term disposal demands head-on before they ever become a problem. "The County is not in a crisis situation like many other counties," says Jeanmarie Massa, information officer with the Metropolitan Dade County Public Works Department.

Dade County's MSW system is comprised of a waste-to-energy facility, a shredding facility, a MSW landfill, a buy-back recycling center, and three automated transfer stations. The system serves the 26 municipalities within Dade County, including Miami Beach. Annual operating budget for the integrated system is \$72 million.

Current recycling efforts in Dade County affect less than one percent of the MSW stream; 30% is processed at the waste-to-energy facility and the remainder is landfilled. By 1994, as mandated by the 1988 Solid Waste Act, 30% will be recycled (including almost 10% composting), 35% will go to waste-to-energy, and 35% will be landfilled. Plans are underway to build a 800 tpd, non-combustion solid waste composting plant by the end of 1989.

The County has intensified its recycling efforts through planning new facilities and education programs. In addition, State grant assistance is currently being sought to help finance new projects. In December, 1988, Trade-In Sam's Goodwill Recycling Center opened as a voluntary buy-back center for newspapers, glass, aluminum, and plastics. Scrap metal may be accepted in early 1989. More than 1,600 tons of recyclable materials are expected to be processed by the center annually. "We hope to save the County \$102,000 in transfer and tipping fees in one year," explains Peter Roberts of Goodwill Industries of South Florida.

Goodwill Industries' project costs \$120,000 to initiate;

the County contributed \$40,000 and the Florida Business and Industry Recycling Program (BIRP) added \$35,000. Annual operating costs are estimated at \$70,000. Materials received at the buy-back center are processed and marketed: aluminum is flattened by a Can Pack 200 and sold to Container Recovery Corp.; cardboard is transported to Simco, a local paper company; glass is separated, crushed, stored and then sold to Owens-Illinois Glass Container Inc.; and plastics are divided into HDPE and PET, and then sold to Midwest Plastics and Wellman Plastics, respectively.

A voluntary office recycling program operating in the County currently recycles 275 tons of white paper annually.

During 1986 the County solicited bids for a non-combustion resource recovery and composting facility. Agripost of Pompano Beach, Florida, was awarded the 20-year contract to build and operate an 800-tpd plant. The 320,000 sq.ft. facility is to begin operating in late 1989. The project is privately-financed, with total project expenses estimated at \$25 million.

MSW delivered to the facility will pass through primary and secondary shredders, be inoculated and aerated for 21 days, then shredded again, screened, and marketed as a soil conditioner. All revenues from sales of the conditioner will go to Agripost. The County will pay \$244 per ton tipping fee.

Dade County purchased a 3,000 tpd refuse-derived fuel (RDF) facility, originally built by Parsons & Whittemore in 1983, and transferred operating and maintenance responsibility to Montenay Power Corporation in 1985. The facility was financed through the sale of bonds amounting to \$137.3 million. The plant was subsequently equipped with two 38.5 megawatt turbine generators to convert steam into electricity to sell Florida Power and Light.

Originally equipped with two-field electrostatic precipitators (ESPs), the facility was recently upgraded with a three-field ESPs system by Flakt. Latest test results indicate the plant is well within air quality compliance limits for particulates.

Montenay is currently refurbishing or replacing other

components, including installing new boilers, demolishing the wet processing system, that experienced significant odor, emissions, and equipment deterioration problems, and adding a new front-end separation system designed by Heil Equipment. The total cost of upgrading the facility is \$45 million.

When the reconstruction is complete, the facility will be able to process 920,000 tons of solid wastes annually.

Markets have been developed for ferrous metals and aluminum. "We're educating the metal industry on what kind of metals are coming out of a plant," says Charlie Strong with Montenay Power Corporation.

In addition to ferrous metals and aluminum, glass and grit also are separated out. Montenay hopes to separate out even more materials in the future, according to Strong. "On down the road, we're determined to get rid of everything we do here. Our objective is maximum front-end recycling." That may include marketing separated plastics, for which a market is now available, and the developing markets for shredded tires.

The County operates a MSW shredding and landfill facility in the southern part of the county. A new disposal cell with a 80 mil Gundle liner was opened in 1988. Three Williams 680 shredders shred MSW which is used as cover at the landfill. The facility processes approximately 15,000 tons of MSW each week.

A second landfill operates in the northern part of the County. Brown & Caldwell of Walnut Creek, California, are currently designing a new disposal cell and a closure plan for another cell nearing capacity. The new cell also will have a 80 mil Gundle liner along with a leachate collection system. Only materials such as tree limbs and bulky wastes are accepted at the landfill.

Montenay sells ash residue generated by the waste-to-energy facility to Lone Star Cement, which uses it as an aggregate for construction projects. The price received for the ash is about \$2.50 per ton. Ash not sold is disposed in an ash landfill located at the facility site. The ash landfill is lined with a 30 mil polyvinyl chloride (PVC) liner and has a leachate collection system.

	Current 1988	Projected 1991
Reduction	2%	4%
Recycling	8%	23% (includes 10% composting)
Waste-to-Energy		63%
Landfill	90%	10% ( by-pass)

its MSW stream management within the next four years. The town now diverts approximately 2% of the MSW stream through reduction practices, recycles 8%, and landfills the remainder.

With Babylon's waste-to-energy facility coming on-line in January, 1989, waste management practices should change considerably. Evan Liblit, Commissioner of Environmental Control, N.Y. Department of Environmental Control, projects that Babylon will reduce its MSW stream 4% through education and legislative action, recycle 18%, compost 5%, burn 63% at its waste-to-energy facility, and by-pass 10% to landfills by 1991.

The Solid Waste Management Plan calls for Babylon to reduce 8% of its waste stream by 1997. This will be ac-

## Babylon, New York

In response to the MSW disposal crisis on Long Island, Babylon is forging ahead with its own management program as recommended under the New York State Solid Waste Management Plan. MSW disposal currently commands 58% of the town's budget.

Babylon (population 212,000) plans to drastically alter

completed primarily through public education and legislative activity. In 1988, two Suffolk County (the county in which Babylon is located) bills were introduced that encourage reduction goals. Suffolk County Bill #1869, the plastics ban, would ban the use of polystyrene and polyethylene terephthalate (PET) packaging effective July 1, 1989. The bill is being strongly contested by the manufacturing and plastic industries. "Less than half of one percent of the County's waste stream will be affected," says James Faraldi, a lobbyist for the plastic industry. No action has been taken on this bill.

The Suffolk County Battery Refund Deposit Bill, however, was approved in 1988. The bill mandates a \$5 deposit on all automotive batteries sold after July 1, 1990, in an attempt to minimize the quantity of metals in waste-to-energy facility ash by diverting potential sources from the plant.

Additional reduction efforts include the periodic collection of household hazardous wastes. Two collection days were held in 1988 and four are scheduled for 1989. \$40,000 has been budgeted for the 1989 program.

Babylon began a pilot recycling program in the fall of 1988, in which 2,500 Babylon households received a 20-gallon bucket for aluminum and glass collection. These materials were then separated at a central recycling center. An estimated 50% to 60% of these residents in the program participated.

In February, 1989, the program will become mandatory for all 62,000 Babylon households. Plans call for a drop-off area at the recycling center, an aggressive public education program, and clusters of Kotrac recycling igloos situated around town.

Babylon also has a mandatory curb-side newspaper collection program that netted \$150,000 profit in 1988. 1989 expectations are not as high, however, due to a saturated newspaper market, according to Jeff Morosoff, executive assistant to the town supervisor. Babylon Source Separation Inc. is responsible for day-to-day management of the recycling program.

Preliminary plans are now being developed for a regional yard wastes composting facility that would serve Babylon, Oyster Bay, and Huntington. The short-term goal is to compost 5% of each town's MSW stream by 1991.

On December 8, 1988, Babylon's 750 tpd mass-burn waste-to-energy facility successfully completed its first test burn. "It is the flagship of the town's integrated waste system," says Liblit, "giving (the) town a guaranteed place for the waste to go."

Initial planning efforts date back to the early 1970s, when Babylon was part of the Multi-Town project, a failed regional resource recovery project. Procurement of the current facility began in January, 1984. Ogden Martin was

selected as the preferred contractor following a competitive bid selection process.

The Town of Babylon Industrial Development Agency (TOBIDA) leases out the facility to Ogden Martin, which designed, built, and now operates the plant. The total cost of the facility was more than \$129 million, including financing and construction fees; the capital cost is \$82 million. Babylon secured \$14 million in state grant funds for the waste-to-energy project.

By contract agreement, Babylon supplies 225,000 tons of solid wastes to the facility annually. The plant uses two 375-tpd boilers and has a third boiler in reserve. The facility produces 17 megawatts of electricity, 14 of which are sold to Long Island Lighting Company, with the remainder designated for internal use. The plant's air pollution control system incorporates dry scrubbers and fabric filters. Ferrous metals are separated from ash residue after combustion.

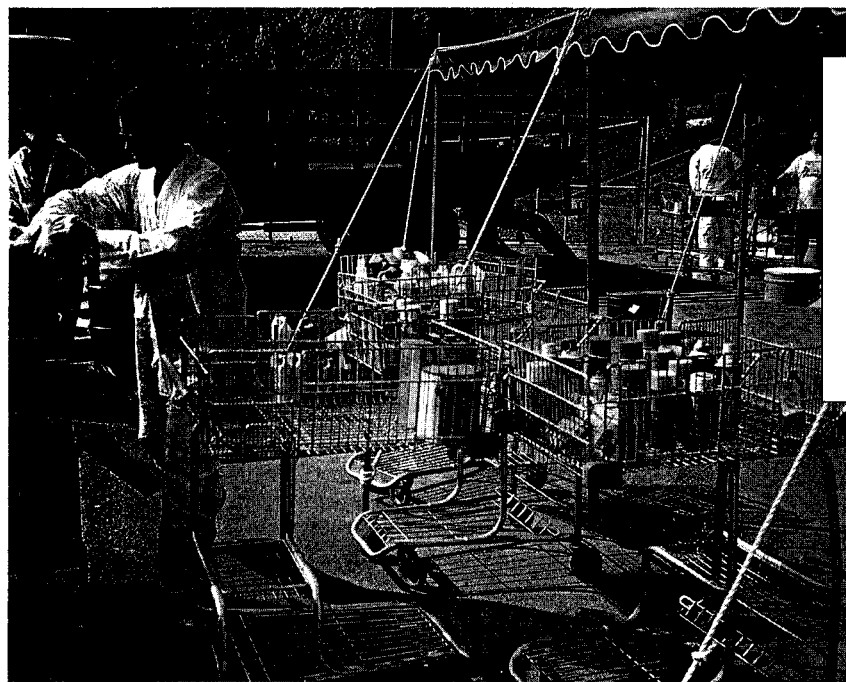
With a zero discharge system, the Babylon facility ensures that no process waters enter the sewer or surrounding environment; instead, process waters are continuously filtered and reused to operate the facility. This frequently is particularly important in light of growing environmental concerns over Long Island's shallow water table.

Approval of Section 27-0704 of the Environmental Conservation Law by New York in 1983 means landfilling on Long Island is prohibited beyond 1990, except for by-pass wastes as part of a resource recovery project. Thanks to strong political leadership and foresight, Babylon is better equipped to meet this strict timetable than most of its Long Island neighbors.

A by-pass landfill is planned at the north end of the existing landfill, which is adjacent to the waste-to-energy facility. The site will be designed with a 60 mil HDPE liner and leachate collection. A permit application is being prepared.

Ash from the waste-to-energy plant is being disposed temporarily in a dedicated cell, designed by Cashen Associates at a cost of \$1.6 million on top of the MSW landfill. A 13-acre permanent ash landfill is in the permitting process and is expected to open in 1989. This landfill will have a double composite liner system, and leachate collection, detection, and drainage developed by Geoservices Inc. The long-term facility is expected to cost \$18 million.

Tipping fees paid by Babylon residents have gone up twice in the past year to cover additional construction costs of the waste-to-energy facility and costs of implementing the recycling programs. The tipping fee now paid at the waste-to-energy facility and by-pass landfill is \$78 per ton; \$48 goes to waste-to-energy and \$30 goes to recycling and other activities.



## City of Indianapolis/ Marion County, Indiana

Waste management practices in Marion County, where Indianapolis is located, are the result of proactive initiatives by the private sector and municipal officials. Sarah Guss, solid waste planning engineer with the Indianapolis Public Works Department, explains, "We didn't wait until there was a crisis situation, we've done everything on our own." In a state that has no comprehensive solid waste management plan, such foresight is remarkable.

Current solid waste management practices in the County breakdown as 15% to 20% recycling, 70% to 80% waste-to-energy, and 5% to 10% landfilling. "In the future we hope to increase the amount recycled throughout the County, but no specific target rate has been set," Guss says.

Indianapolis currently sponsors two to four "tox-away" days during the year to allow citizens to dispose of their household hazardous wastes in an environmentally-sound manner. According to Guss, tox-away days usually are held in May and September to help ensure "nice weather or else people won't show up. We try to recycle as much as we can," Guss explains. This means primarily paints and motor oil. Paint thinners and varnishes can be reused as supplemental fuels, and remaining materials can be burned in a hazardous waste incinerator or disposed of in a hazardous waste landfill. Promotional efforts such as distributing brochures, public speaking engagements, and school visits precede the events.

Indianapolis is now considering developing a long-term household hazardous waste management program, which would likely include a permanent structure located in Marion County.

County recycling efforts are spearheaded by the Indi-

	Current 1988	Projected 1990
Recycling	20% (does not include composting)	20%
Waste-to-Energy	70%	70%
Landfill	10% (by-pass & non- processibles only)	10% (by-pass & non- processibles only)

anapolis Clean City Committee (ICCC). The ICCC's primary function is to raise money for recycling efforts on behalf of the Department of Public Works. The ICCC is currently investigating the potential for partnerships that would team the city up with local, private recyclers.

Eight buy-back centers now operate in Marion County, processing newspaper, glass, and aluminum. These centers are the result of a cooperative agreement between ICCC and ALCOA. Plans call for developing 12 more buy-back centers by the end of 1989. Accepting plastic materials and bi-metal cans at these facilities is being seriously considered. Local markets include ALCOA for aluminum and Indianapolis Recycled Fiber for newspaper and glass. Community participation in the recycling effort is strictly voluntary. As Guss explains, "we haven't needed to establish recycling goals since there is plenty of capacity between the waste-to-energy plant and landfill." Recycling rates, as determined by a 1985 study completed by the Department of Public Works, were estimated at 16% of the County's MSW stream. Since then, additional efforts have resulted in approximately 20% of the MSW stream being recycled.

Indianapolis recently established the Marion County Recycling Commission. A primary focus of the commission has been to assess a pilot program for leaf composting. Such a program would be undertaken in park areas and could commence during 1990. Leaves currently are burned at the waste-to-energy plant.

Commercial operation of a 2,362 tpd mass-burn, waste-to-energy facility began December 1, 1988. Ogden Martin Systems, Inc. owns and operates the plant, which generates 500,000 pounds of steam per hour for sale to Indiana Power and Light. The plant has three boilers, with additional space built into the design for a fourth to meet future demands. Capital cost of the facility was \$84 million, including the dry scrubber and fabric filter air pollution control system. Tipping fees during the first three years are locked-in at \$18 per ton.

Indianapolis has designated two 15-acre sites located in Southport and Belmont, for disposal of ash residue generated by the waste-to-energy plant. Development of the first cell, which has approximately one year of capacity, cost \$800,000. Waste Management Inc. transports the ash and operates the sites.

## Spokane County, Washington

In 1984 a state law mandating waste management was passed. The preferred management methods outlined in the state plan included: waste reduction, recycling, waste-to-energy, and landfilling. A regional solid waste management program was developed for the City and County of Spokane, and all the incorporated cities within the County. This plan was adopted in 1984 and is now in the development stage.

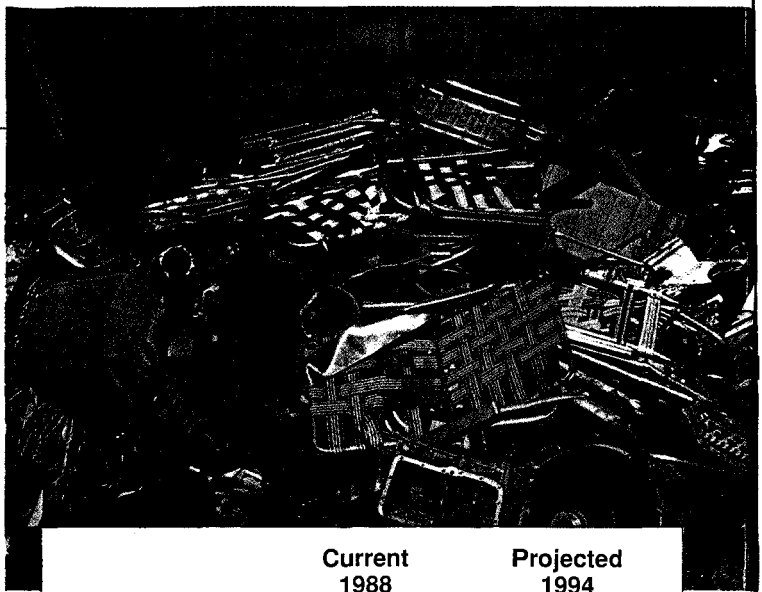
Current waste management practices in Spokane County consist of recycling 20% of the MSW stream and landfilling the remainder, according to David Birks, executive director of the Spokane Regional Solid Waste Disposal Project. The goal is to recycle between 26% and 33% (including reduction and composting efforts) and landfill 67% by 1990. When the County's waste-to-energy facility begins operating in mid-1991, the management breakdown will be: 33% recycling, 55% waste-to-energy, 10 to 12% landfilling. By 2010, it is projected that 39% to 46% will be recycled, 42% to 51% will be processed at the waste-to-energy plant, and 10% to 12% will be landfilled.

A five-pronged program has been developed: 1) public education; 2) incentives (e.g., lotteries, variable can rates); 3) yard wastes composting, with demonstration "how to" programs staged at various locations; 4) a program intended to keep household hazardous wastes out of the MSW stream; and 5) lobbying efforts on federal, state, and local levels.

"Waste reduction is extremely difficult to implement on a local level," states Birks. He maintains that for reduction and reuse efforts to be truly successful, legislative support at the federal, state, and regional levels is necessary. "Spokane's program is designed to encourage the other levels of government to make the necessary changes, as well as to implement those activities on the local level that we have control over," adds Birk.

Sixteen private companies currently provide recycling services in the County. They have a combined annual operating budget of around \$3.5 million and have invested an estimated \$5 million in capital improvements over the past three years. Public sector involvement with these companies is being considered, and plans to develop two transfer stations for recyclables and a drop-off center at the waste-to-energy facility site are underway.

The County has developed its own eight-pronged program for recycling that includes: 1) making recycling convenient; 2) identifying and correcting zoning standards that may hinder recycling efforts; 3) developing secondary materials markets; 4) developing transfer stations to handle recycled materials; 5) implementing office paper recycling programs at Spokane's City Hall and Courthouse; 6) encouraging source separation efforts by haul-



	Current 1988	Projected 1994
Recycling	20% (includes composting)	33% (includes composting)
Waste-to-Energy		55%
Landfill	80% (mixed MSW)	12% (by-pass & non- processibles only)

ers; 7) developing a central processing center to help ensure a mass market for less profitable materials; and 8) making curbside and leaf collection mandatory.

The County's philosophy toward recycling is that maximum flexibility should be maintained in face of market demands, and aggressive voluntary recycling efforts should be promoted rather than mandatory programs. The projected annual operating budget for the County's recycling program is \$50,000.

An 800 tons per day (tpd) waste-to-energy plant is being developed by Wheelabrator Environmental Systems, and is scheduled to open in mid-1991. "From the very beginning we have taken a very conservative approach in sizing the plant," states Birks. This was done to ensure ample opportunity for reaching recycling goals and to guard against excess capacity should population growth projections fall short. If additional capacity is needed in the future, the facility design incorporates space for a third boiler.

Capital cost of the facility is \$100 million and the projected tipping fee during the first year of operations is \$55 per ton, including the disposal costs associated with ash residue.

A 200-acre landfill is being developed to accommodate the ash from the waste-to-energy plant and any by-pass or non-processible wastes generated. The environmental impact of three prospective sites currently is being assessed. Total costs of the County's integrated program will exceed \$140 million, including a \$60 million grant from the state.