

Long Island's Solid Waste Perplexities

David J. Tonjes and R. L. Swanson

OTA **L**ANDFILLING, burying garbage, has been the most common method of disposing of solid wastes in the United States for the last forty years. However, the federal government is now encouraging a new approach to solid waste disposal, a hierarchical approach that places landfilling after reduction, recycling, and incineration with energy recovery.

Long Island's Special Problems

Koppelman 1978
NYSECL 27:0704
Neal and Schubel
For Long Island*, New York, the need to end landfilling is especially pressing. The Island's two counties, Nassau and Suffolk, draw drinking water from the groundwater that lies beneath their streets, houses, businesses, farms, and landfills. Recognizing that landfills, whether lined or not, are possible sources of aquifer contamination, New York State passed the Long Island Landfill Law in 1983. The law restricts landfilling to "process residues" (such as incinerator ash, compost screenings, or materials sorted from recyclables) in double-lined landfills sited outside deep recharge zones after December 17, 1990. Despite some legal challenges to this law, Long Islanders have been forced to seek alternative disposal means for the wastes they create.

Since the technologies of two of the possible alternatives, recycling and incineration, are more sophisticated and the engineering requirements more demanding than even the most modern landfilling

* For the purposes of this paper, Long Island is that area which stretches approximately 100 miles from the eastern border of New York City to Montauk and Orient Points, and lies between Long Island Sound and the Atlantic Ocean.

practices, facilities for recycling and incineration must be sized to the waste stream they will process if they are to operate economically and efficiently. That sizing requires that the characteristics and magnitude of that waste stream be better understood than they have been in the past.

Policy Considerations

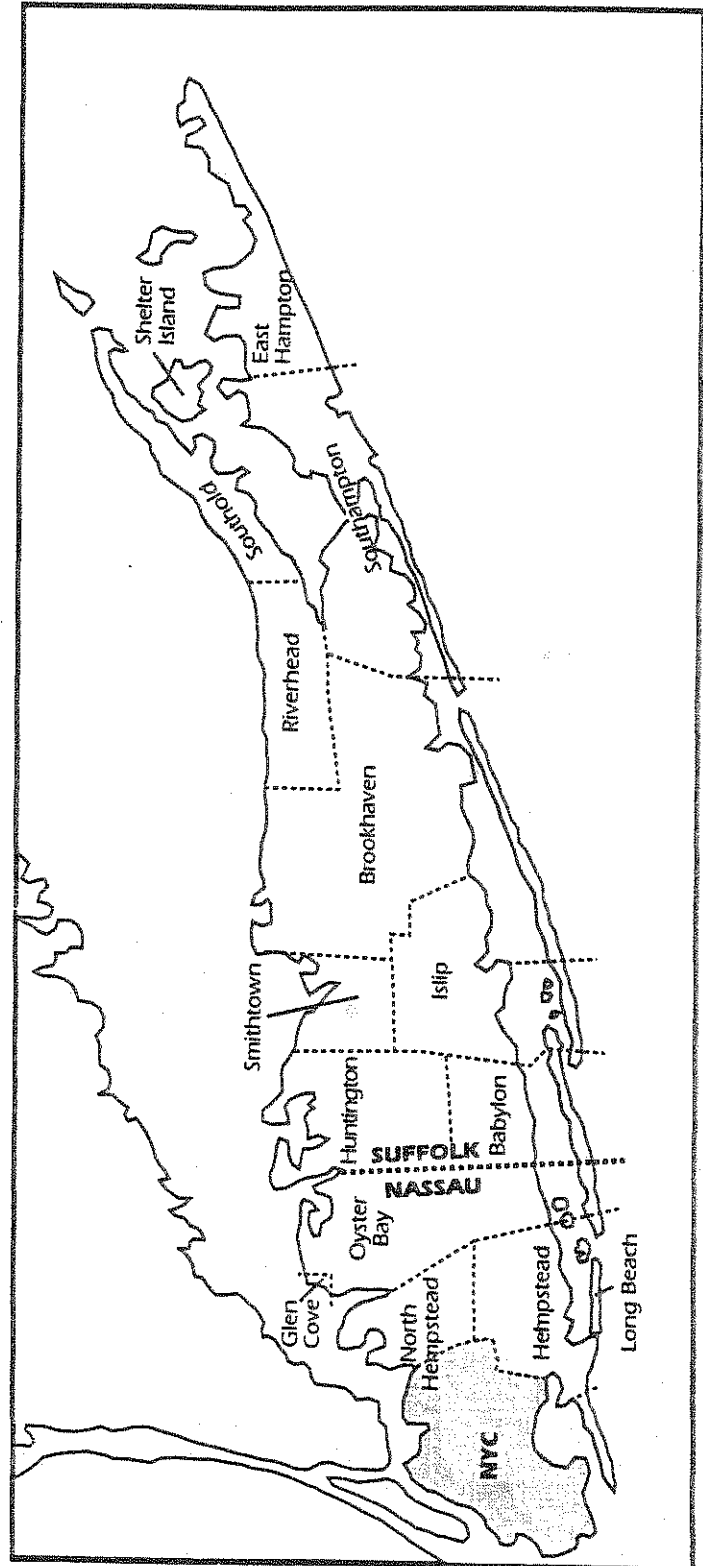
In *Facing America's Trash*, the Office of Technology Assessment (OTA) defines municipal solid waste as "the solid waste generated at residences, commercial establishments... and institutions... [Municipal solid waste] does not include construction and demolition debris or automobile scrap." A serious question facing those concerned with the amount of wastes generated on Long Island is — How should Long Island count its waste? Should a common definition of solid waste be agreed upon? Or should the pragmatic definition of solid waste as "the waste a municipality must handle at its facilities" be used? For example, in 1991 the sum of residential and commercial wastes, not including construction and demolition debris (C&D) or automobile scrap, was less than 500,000 tons in the town of Brookhaven. Nevertheless, the town processed over 900,000 tons of wastes in its landfill and recycling facilities that year (the additional tonnage included C&D debris, recyclers' residues, car shredder residues, sewage sludge incineration ash, and town of Hempstead solid waste incineration ash). To complicate matters further, the sum of residential and commercial wastes managed at the town of Brookhaven's facilities in 1992 fell to less than 400,000 tons, a decline of over 100,000 tons from 1991. This one-year change is attributed to higher tipping fees at the town facilities, lower out-of-state disposal fees, more aggressive commercial recycling ventures, and the recession. But which figure should planners use to size the town's facilities?

Heil

It has never been easy to measure the size of the waste stream, and historically nobody thought it necessary. Given the administrative complexity of the task, statistics have not always been available and those that were have often been conflicting. In order to aid in the region's overall planning, the University at Stony Brook's Waste Management Institute compiled available statistics to estimate the size of the waste stream in 1986 (before the Landfill Ban) and in 1991. The Institute also examined the means used at those times to manage the waste stream and made short-term projections to allow the Island to better prepare to manage its wastes in the near future.

Tonjes and Swanson

FIGURE 1
Long Island: Political Boundaries



The Subject of the Study

Long Island is one of the nation's Metropolitan Statistical Areas. Although this designation makes the region sound unified, it is actually a collection of two counties, 15 towns and cities, and over 200 other major taxing authorities. The 15 municipalities (towns and cities) have the primary authority for waste management planning and the disposal of wastes. Long Island, for the purposes of this paper (See Figure 1), stretches approximately 100 miles from the eastern border of New York City to Montauk and Orient Points and lies between Long Island Sound and the Atlantic Ocean. The environment can be described as varying from urbanized suburbia in the west to suburbanized farmland in the east. The population of the area was 2,609,325 according to the 1990 US Census, and the densities vary from over 17,000 people/mi² (in Long Beach) to slightly more than 200 people/mi² (on Shelter Island).

Koppelman 1993

Long Island Lighting Company

Long Island Almanac

The Design of the Study

The aim of the study undertaken by the Waste Management Institute was to enumerate the methods of solid waste generation on Long Island for 1986 and 1991. Residential waste was differentiated from other sources. Statistics were calculated for the various means of disposal, including the recycling of different materials, incineration, landfilling, and the movement of wastes off Long Island.

Past Efforts and Resource Availability

The New York State regulatory agency in charge of solid waste, the Department of Environmental Conservation (NYSDEC), did not have good data on solid wastes readily available when this study began. However, several independent studies related to wastes have been conducted over the past decade, using determinations of the Long Island waste stream in the course of their work. Several of these were consulted and their findings tabulated, including annual reports by the New York State Legislative Commission on Water Resource Needs of Long Island, the *Long Island Ash Management Study*, two reports by the local daily newspaper, *Newsday*, and a special report by the New York Public Interest Research Group (NYPIRG).

Trunzo and DiNapoli 1986, 1988, 1992
Long Island Regional Planning Board
Bush

The 1988 *Newsday* and 1991 NYPIRG reports were consonant with some of the Institute's goals, combining some statistics on waste generation rates with descriptions of disposal processes. However, the

Romalewski

1988 *Newsday* study was no longer current, and its data had never been examined closely; the NYPIRG report, due to that group's anti-incinerator stance and generally antagonistic relationship with local governments, had not been well-received by municipal planners. Although local waste managers viewed the editorial portion of the NYPIRG report with distaste, they made few changes to the factual waste stream descriptions; the municipalities' own descriptions of their waste streams of 1986 did vary from the reports collected by *Newsday* in 1987.

Going to the Source

The Institute began its study by sending questionnaires to the officials in charge of waste disposal in the Island's 15 municipalities. The response to the surveys was poor, so the researchers telephoned the officials who had not answered. Some still did not respond to the requests, claiming insufficient time or resources. (In those cases, the reports and studies already mentioned were the only sources of information.) Officials in some municipalities, however, were much more forthcoming; indeed, several were unstinting in their donations of time, effort, and data. In all, 31 individuals provided information. The descriptions and waste stream characteristics culled from the questionnaires, interviews, and earlier studies were forwarded to the municipalities for factual review at several different stages.

Contradictory Assessments

The term solid waste was never unambiguously defined by the waste disposal officials. For example, some municipalities included construction and demolition debris (C&D) in the waste stream, some did not, and some included it in their waste stream calculations when they were landfilling, but ceased including it when they stopped landfilling. Sometimes C&D was only counted in the waste stream when it was recycled — since that would help a municipality comply with the New York State mandate of achieving 50 percent recycling and source reduction of the waste stream by 1997, an important solid waste management goal on Long Island. Other municipalities only count as solid waste generated in the municipality those wastes which are disposed of through municipal facilities. Some municipalities were not counting wastes carefully in 1986 either because they lacked the necessary technology, or they felt tracking which wastes went where was unimportant, or their disposal systems were not designed to

measure tonnages. (For example, many municipalities which allowed home owners to discard their own rubbish charged not by weight but by per-vehicle load.)

Another problem was that the most commonly used measure of solid waste generation was the "ton per day." Translating this figure to an annual total, however, was exceedingly difficult. Some authorities used the ton per day as a measure of collection; therefore, if garbage was collected five days a week, the daily figure could be multiplied by 260 to reach an annual total. This means of measurement was complicated since some disposal sites were open one day a week (as with most Municipal Recovery Facilities), others, six days a week (as with most landfills), and still others, seven days a week (as with most incinerators). This meant that the tons collected per day did not match the tonnages disposed of per day. Inaccuracies were multiplied when the estimates of waste generation were based upon the ton-per-day formulation and then were listed as convenient round numbers. If, for example, 94 tons per day of collected wastes (24,000 annual tons) were reported as a round number (100 tons a day), the annual figures would change greatly depending upon the disposal method. Those 24,000 annual tons would be reported as 31,200 annual tons if landfilled (6 days a week \times 52 = 312 days at 100 tons a day) or 36,500 annual tons if incinerated (365 days a year at 100 tons a day).

Many of the figures generated by earlier studies were based upon such estimates and, therefore, had a high degree of uncertainty and unreliability. In addition, it was sometimes obvious that some segment of the waste stream was not being included in a municipality's count. In such cases, the researchers developed broad criteria to deal with the missing wastes (such as those in Huntington, Islip, and Oyster Bay, where it is generally assumed that commercially generated wastes are approximately equal to residentially generated wastes, or those in North Hempstead, where consultants' estimates were used to revise waste stream figures that rapidly shrank as disposal fees soared).

Raw Data Conversions

Once they assembled figures on waste stream generation, the Institute researchers computed means and standard deviations for the years under study. Those figures were checked against a "mass balance," i.e. wastes disposed in the region added to known amounts of wastes leaving the area. The total waste generated in the mass balance was equal to the sum of:

- wastes incinerated on Long Island
- wastes landfilled
- wastes counted as recycled
- wastes determined to have been shipped off Long Island.

This last amount, tons of waste shipped off Long Island, was the most difficult to determine. The figures given represent the sum of the differences, for all of the municipalities, between wastes disposed of in each municipality and the best estimate of each municipality's waste generation—minus the excess disposal capacities found in some of the municipalities.

For example, in 1991 the towns of Huntington and Oyster Bay were estimated each to have generated within their boundaries approximately 200,000 tons more solid waste than were handled at their municipal facilities; conversely, the town of Hempstead incinerated 250,000 tons of non-Hempstead wastes in 1991. The net of these two situations is an estimated 150,000 tons transported off Long Island. These balances were combined for all 15 municipalities. This complicated format, which lends itself to inaccuracies and does not have the same precision employed in the generation of means and standard deviations, was necessary because not all sources of information used the same format. (See Note 1 for a full explanation of the assumptions used in this calculation.) Per capita waste generation rates were determined using population data from the Long Island Lighting Company (which adjusted US Census data based on electrical connections and disconnections to account for population changes between censuses). The researchers forecast disposal rates for 1992 and 1993 based upon changes in the means of waste disposal expected because of legal requirements and municipal plans.*

Long Island's Waste Generation

Table 1 lists the calculated means and associated standard deviations for each of the municipalities for the two counties, and for Long Island as a whole for 1986. Table 2 does the same for 1991. The results from the mass balance considerations are displayed in Table 3 (1986) and Table 4 (1991).

The statistical analysis suggests that 2,870,851 tons \pm 205,511 tons of solid waste were generated on Long Island in 1986, and that in 1991 the wastes generated totaled 3,268,170 tons \pm 138,921 tons.

* Data are being collected in 1994 to assess the accuracy of these forecasts; no results are available at this time.

The mass balance calculations suggest the 1986 waste stream was 3,000,000 tons, and the 1991 waste stream was 3,500,000 tons. As mentioned earlier, because no consistent reporting format was used in the various sources of information, there is no way to make these two calculations consonant with one another. The mass balance calculation for 1986 lies within one standard deviation of the statistically derived mean of that year; that the mass balance calculation for 1991 lies just outside one standard deviation of the 1991 statistical mean might be attributed to the reluctance of municipalities to lay claim to wastes disposed of outside the municipal disposal systems. Population data are given in Table 5; per capita generation rates for 1986 and 1991 are given in Tables 6 and 7, respectively.

TABLE 1
1986 Waste Generation (in Tons)

<i><u>Municipality</u></i>	<i><u>Mean</u></i>	<i><u>Standard Deviation</u></i>
Glen Cove	23,125	2,559
Hempstead	818,180	146,314
Long Beach	25,707	6,791
North Hempstead	263,550	63,655
Oyster Bay	<u>253,073</u>	<u>35,400</u>
Nassau County Total	1,383,635	163,601
Babylon	227,175	36,589
Brookhaven	412,133	100,760
East Hampton	19,633	1,113
Huntington	249,271	51,806
Islip	339,433	14,114
Riverhead	27,200	1,697
Shelter Island	3,953	848
Smithtown	122,753	30,892
Southampton	55,200	8,176
Southold	<u>30,465</u>	<u>7,996</u>
Suffolk County Total	1,487,216	124,378
Long Island Total	2,870,851	205,511

TABLE 2
1991 Waste Generation (in Tons)

<u>Municipality</u>	<u>Mean</u>	<u>Standard Deviation</u>
Glen Cove	22,819	181
Hempstead	788,241	9,156
Long Beach	24,738	93
North Hempstead	275,729	45,860
Oyster Bay	<u>394,390</u>	<u>103,526</u>
Nassau County Total	1,505,917	113,628
Babylon	311,410	17,553
Brookhaven	496,223	25,399
East Hampton	38,555	1,046
Huntington	253,172	54,977
Islip	391,160	47,800
Riverhead	38,933	471
Shelter Island	4,178	765
Smithtown	118,561	7,921
Southampton	64,000	7,071
Southold	<u>46,061</u>	<u>3,545</u>
Suffolk County Total	1,762,253	79,923
Long Island Total	3,268,170	138,921

Long Island's Methods of Waste Disposal

Despite the wide variation in data presented in the various reports, changes in waste disposal methods over the five-year period were possible to document. In 1986, 12 landfills were in operation on Long Island, two incinerator facilities (one to merely reduce the volume of wastes prior to landfilling) were in use, one full-scale and two pilot recycling programs had been created, and some wastes (from Hempstead and Oyster Bay) were shipped off Long Island for disposal. Table 3 lists the tonnages associated with each method of disposal for the two counties and Long Island as a whole. In 1991, the number of landfills had shrunk to nine (two of which were not used for

TABLE 3
1986 Waste Generation, by Mass Balance Method (Tons)

<u>Incinerated</u>	<u>Recycled</u>	<u>Transported</u>	<u>Landfilled</u>	<u>Total</u>
<u>Nassau County</u>				
75,000	0	400,000	1,050,000	1,525,000
<u>Suffolk County</u>				
100,000*	25,000	0	1,350,000*	1,475,000
<u>Long Island</u>				
175,000	25,000	400,000	2,400,000	3,000,000

* 100,000 tpy of Huntington's wastes assumed to have been incinerated, then landfilled—only counted under "incinerated"

the disposal of raw solid wastes), five waste-to-energy incinerators were in operation, all 15 municipalities had mandatory residential recycling programs in place, and at least some of the solid waste from at least seven of the ten westernmost municipalities (Glen Cove, Long Beach, and Hempstead were the possible exceptions) were being shipped to disposal sites outside of the respective municipalities (in most cases, sites off Long Island). Table 4 lists the disposition of wastes generated on Long Island for 1991.

TABLE 4
1991 Waste Generation, by Mass Balance Method (Tons)

<u>Incinerated</u>	<u>Recycled</u>	<u>Transported*</u>	<u>Landfilled</u>	<u>Total</u>
<u>Nassau County</u>				
1,000,000	300,000	350,000	0	1,650,000
<u>Suffolk County</u>				
350,000	375,000	275,000	850,000	1,850,000
<u>Long Island</u>				
1,350,000	675,000	625,000	850,000	3,500,000

* "Transported" could also mean recycled, because of the lack of information regarding Long Island's commercial carting community; this material was not disposed in a Long Island municipal venue.

Per Capita Waste Generation

Daily per-capita generation rates were calculated using population data from Table 5. (See Tables 6 and 7.) A cursory examination of the data reveals a surprising trend: an apparent increase as one moves from the more urbanized western municipalities with high population densities (such as Long Beach, with a 1991 waste generation rate of 4.03 lbs/person/day) to the eastern municipalities (such as East Hampton, with a 1991 waste generation rate of 10.75 lbs/person/day). These data are displayed in Figure 2 (1986 and 1991). A graphic depiction of the data is offered in Figure 3. It plots the daily per capita generation rate in 1991 against the distance from the western boundary of Nassau County (the east-west midpoint of each municipality was plotted on a line extending

TABLE 5
Population Data

<i>Municipality</i>	<i>1986</i>	<i>1991</i>
Glen Cove	25,429	24,125
Hempstead	728,274	725,402
Long Beach	34,167	33,636
North Hempstead	217,261	211,659
Oyster Bay	<u>304,310</u>	<u>292,204</u>
Nassau County	1,309,441	1,287,026
Babylon	207,514	202,619
Brookhaven	394,610	410,066
East Hampton	15,511	16,197
Huntington	202,883	191,016
Islip	302,416	299,903
Riverhead	21,760	23,109
Shelter Island	2,368	2,261
Smithtown	118,103	112,977
Southampton	47,642	45,415
Southold	<u>20,545</u>	<u>19,831</u>
Suffolk County	1,333,352	1,323,394
Long Island	2,642,793	2,610,420

along the "spine" of Long Island) and reveals that the trend seemingly is broken by Southampton. However, a recent publication suggests that if C&D totals were to be added to the town's waste stream (something neighboring towns seem to include in their waste stream compilations), Southampton's per capita generation rate could rise by several pounds per person per day and more nearly match the trend exhibited in Figure 3.

Town of Southampton

Indeed, one explanation for these figures is that the eastern municipalities are simply counting more categories of materials, and are, therefore, giving the impression that more wastes are produced there. That the eastern towns use landfills to dispose of their wastes, while western municipalities do not, may be a factor in this bookkeeping

TABLE 6
1986 Per Capita Waste Generation
(lbs/person/day, 365-day year)

<i>Municipality</i>	<i>Statistical Analysis</i>	<i>Mass Balance</i>
Glen Cove	4.98	
Hempstead	6.16	
Long Beach	4.12	
North Hempstead	6.65	
Oyster Bay	4.56	
Nassau County	5.79	6.38
Babylon	6.00	
Brookhaven	5.72	
East Hampton	6.94	
Huntington	6.78	
Islip	6.15	
Riverhead	6.85	
Shelter Island	9.15	
Smithtown	5.70	
Southampton	6.35	
Southold	8.13	
Suffolk County	6.11	6.06
Long Island	5.95	6.22

TABLE 7
1991 Per Capita Waste Generation
(lbs/person/day, 365-day year)

<i><u>Municipality</u></i>	<i><u>Statistical Analysis</u></i>	<i><u>Mass Balance</u></i>
Glen Cove	5.18	
Hempstead	5.95	
Long Beach	4.03	
North Hempstead	7.14	
Oyster Bay	7.40	
Nassau County	6.41	7.02
Babylon	8.42	
Brookhaven	6.63	
East Hampton	10.75	
Huntington	7.26	
Islip	7.15	
Riverhead	8.99	
Shelter Island	10.13	
Smithtown	5.75	
Southampton	5.15	
Southold	10.08	
Suffolk County	7.30	7.66
Long Island	6.86	7.35

Summer-time population adjustment: East Hampton = 30,000 in summer; Riverhead = 2,500 more; Southampton = "tripled"; Southold = 25,031 year-round, weighted for summertime population; Shelter Island was unable to provide such an estimate.

decision. Landfills can be used to dispose of wastes indiscriminately, while the use of incinerators or trucking for disposal naturally inclines an operator to be careful about what is accepted. Another factor affecting the trend could be the increased generation of yard waste on eastern Long Island stemming from larger lot sizes. Additionally, increased transportation costs for East End carters wishing to transport wastes off Long Island could result in more wastes being disposed of (and counted) locally. The large differences between the neighboring towns of Huntington and Smithtown, and East Hampton and

Southampton remain confusing; the paired municipalities are demographically similar, are similarly developed, and shared the same means of disposal at the time of these measurements. The differences in waste generation rates are especially striking since all of Long Island is generally perceived as a homogeneous suburban area by outside observers.

More Wastes with Time

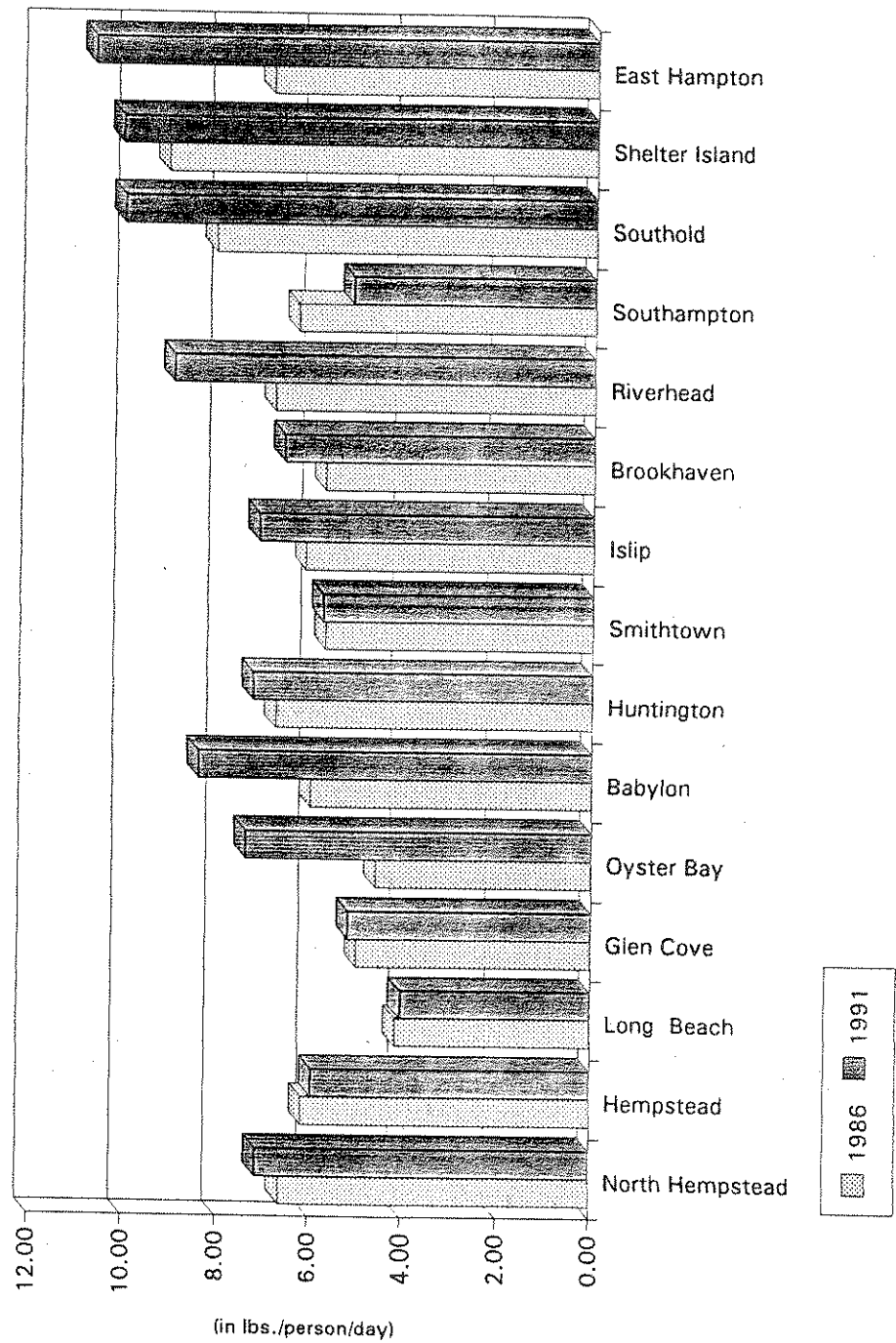
All measures show an increasing Long Island waste stream over the five-year period, whether considered as a gross tonnage or a per capita rate. Although New York State is now committed to waste reduction as the highest priority in waste management, this policy has not had a noticeable effect on Long Island, as indicated by the data. Of course, some of this "increase" may only be due to better counting methods for solid wastes, or revised categories of solid waste that lead to higher tonnages. The uncertainty factors involved in measuring solid waste, mentioned earlier, make any blanket statement open to valid criticism; this is true even though the standard deviations computed for 1991 are (mostly) smaller than those computed for 1986 (this decrease may simply be attributable to the different sources calling on the same resources for waste stream figures, thus leading to more precision—although not necessarily more accuracy). Nonetheless, Long Island's solid waste generation rate is at least 3,250,000 tons per year (tpy) and may be 3,500,000 tpy. This is in comparison with a generation rate of 3,000,000 tpy in 1986.

The Shift in the Means of Disposal

Although there are good reasons to be concerned about the accuracy of the waste generation rates, the validity of the massive shift in the means of waste disposal for the two counties over the five-year period cannot be disputed.

For example, in 1986 the municipalities in Nassau County disposed of approximately 1,050,000 tpy by landfilling; in 1991 there were no active landfills in the county. Incineration has essentially replaced landfilling as the disposal choice in the county (an estimated 1,000,000 tpy in 1991 in Nassau County)—although a large amount of solid waste is transported off Long Island for landfilling. The disposal methods now have been divided into approximately one-half incineration, one-

FIGURE 2
Long Island Per Capita Waste Generation: 1986 and 1991



quarter recycling and one-quarter off-Long Island transportation. Recycling in Nassau County increased tremendously, from one small pilot program in North Hempstead, to its large role in 1991 waste handling.

With the exceptions of a pilot recycling program in East Hampton, a nascent curbside recycling program in Islip, and the incineration of some wastes in Huntington for volume reduction, all Suffolk County solid waste was landfilled in 1986. By 1991, landfilling had declined as a disposal method. Indeed, since the new Huntington/Smithtown incinerator (which operated for a month officially in 1991) was not included in the compilations of waste stream disposal methods, the decline in landfilling documented in Tables 3 and 4 is understated by some 300,000 tpy. In addition, the Inter-Municipal Agreement between the towns of Brookhaven and Hempstead (the "ash-for-trash" agreement where Hempstead will incinerate 200,000 tpy of Brookhaven's wastes in exchange for landfill capacity for some 230,000 tpy of ash produced at the Hempstead Energy Recovery Facility) should reduce an additional 200,000 tpy from the landfilling calculations. These recent changes make incineration the most widely used disposal choice available on Long Island. Ignoring the complex Babylon-North Hempstead Inter-Municipal Agreement (because the details are not clear as to exactly how North Hempstead's wastes will be partitioned among Babylon's disposal facilities), and Shelter Island's small off-Long Island shipping arrangement, a projection for Suffolk County 1992 disposal methods was made (assuming recycling rates and other variables remained constant, and remembering that the "transported" category included private carter recycling). (See Table 8.) A similar projection was unnecessary for less volatile Nassau County.

TABLE 8
1992 Suffolk County Mass Balance, in Tons
(Projected from 1991 Data and Municipal Plans)

<i>Total</i>	<i>Incinerated</i>	<i>Recycled</i>	<i>Transported</i>	<i>Landfilled</i>
1,825,000	650,000	350,000	475,000	350,000

Table 9 offers a summary of combined data sets for the various disposal methods for the entire Island. (See Note 2 for a description of the assumptions involved.) The data clearly illustrate the radical changes in Long Island's waste disposal methods. The former reliance on cheap landfills has now changed to:

- a predominant use of incineration
- a doubled need for off-Long Island disposal sites
- a rapidly expanding recycling commitment
- an ever-shrinking use of landfills.

Table 9
Mass Balance, in Tons

<u>Total</u>	<u>Incinerated</u>	<u>Recycled</u>	<u>Transported</u>	<u>Landfilled</u>
1986				
3,000,000	175,000	25,000	400,000	2,400,000
1991				
3,500,000	1,350,000	675,000	625,000	850,000
1992 (projected)				
3,500,000	1,650,000	675,000	825,000	350,000

In 1993 the city of Glen Cove began incinerating its solid waste, while Brookhaven, East Hampton, Riverhead, and Southampton took major steps towards solid waste composting, and, if recent court decisions and state regulatory rulings stand, all landfills, save Southampton's, may soon be closed to raw solid waste. The projected amounts and methods of waste disposal for Long Island under such a scenario (minus the unknown amount of solid waste composting to occur in the future) are given in Table 10. Four different waste generation rates are presented to account for the uncertainty of the exact amount of waste generated on Long Island; the middle two seem to be most appropriate to consider.

It is true that the full extent of commercial recycling is not reflected in the data collected for this report. This is due to the dearth of information available on the activities of private carters as they manage almost all of Long Island's "commercial" wastes (that is, almost all wastes not generated at single family houses). It is not likely, however, that counting commercial recycling accurately and expanding municipal recycling programs will be enough to eliminate Long Island's need to continue to ship solid waste to disposal sites off Long Island in the near future.

Table 10
1993 Long Island Mass Balance (projected)

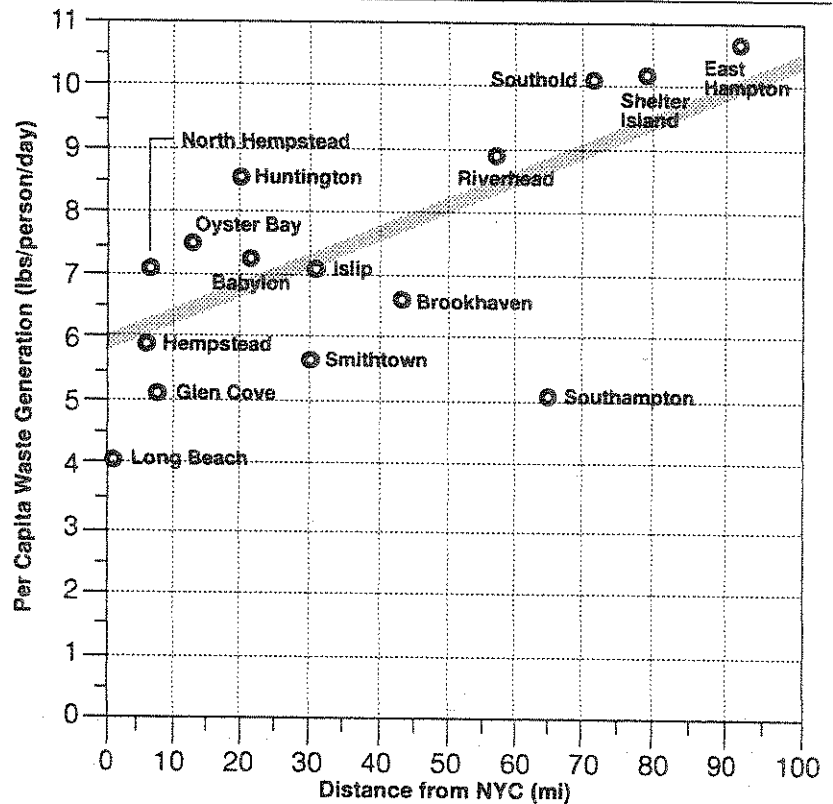
<i>Total</i>	<i>Incinerated</i>	<i>Recycled/Transported</i>	<i>Landfilled</i>
3,000,000	1,700,000	1,250,000	50,000
3,250,000	1,700,000	1,500,000	50,000
3,500,000	1,700,000	1,750,000	50,000
3,750,000	1,700,000	2,000,000	50,000

The Role of the Commercial Carter

To broaden this discussion, it should be noted that in the early part of 1992, few commercial wastes generated west of the five East End towns were being disposed of on Long Island—an amount of wastes estimated to be 1.5 million tpy. This was due to favorable disposal prices out-of-state and increases in local tipping fees (and certainly some diversion of wastes through recycling by commercial operators). For the most part, local governments have been and still are unconcerned with the practices of local carters as they deal with the commercial waste stream, as long as no laws are being flouted. As waste disposal has become more expensive, and therefore business opportunities more lucrative, as new markets for recyclable materials have appeared and disappeared, as incinerators and lined landfills have been constructed (and now need to be paid off), as private disposal facilities have sprung up, and as out-of-state (or merely off-Long Island) disposal venues have become either comparatively (or actually) cheaper with passing time, garbage has ebbed and flowed across the landscape as garbage entrepreneurs have sought the greatest possible profit. While some may applaud their initiative, and others may see in this situation a solution to immediate waste disposal problems on Long Island, this “float” of garbage has made it impossible, on top of the other complications mentioned, to say with certainty exactly how much is being thrown out on Long Island, and where it is all going. Of the 1.25 million to 2 million tons of solid waste generated on Long Island which was projected not to be able to be incinerated or landfilled in 1993, only 650,000 tons are accounted for by recycling, assuming the 1991 rate (a 15 - 20 percent rate, well short of the 42 - 52 percent expected of the region by 1997 by state planners). Currently, Long Island commercial carters and municipalities have access to cheap, alternative disposal sites for wastes which are not

managed through Long Island disposal options. This situation raises the questions, will those sites remain available? And what is the potential for recycling, as presently undertaken on Long Island, to manage a portion of the wastes that cannot find such disposal venues?

FIGURE 3
Per Capita Waste Generation/Distance From NYC



Note: Linear regression of this graph yields a regression equation:

$$W_t = 0.05 \text{ lbs/person/day/mi. (D)} + 5.7 \text{ lbs/person/day}$$

where W_t = lbs/person/day and D = distance in miles from the western edge of Nassau County. The correlation coefficient (r) is 0.70 (when Southampton data is included). The correlation coefficient (r) is 0.85 (when Southampton data is excluded).

Alternatives to Recycling

Although it appears that within the next several years solid waste composting will become a disposal option for at least some of Long Island's wastes, that technology has a spotty record of success in this country to date, especially for large-scale facilities. It may not be prudent to depend upon experimental technology which requires at least

several years for siting and construction to appear in the near future on Long Island, and to provide disposal capacity for the region's solid waste. Waste reduction efforts, chiefly "Don't Bag It" programs, have achieved notice among solid waste planners; however, yard wastes have been cheaply and effectively composted by municipalities on Long Island, and such facilities are considered town success stories. Creating capacity at the windrow compost sites already present on the Island will not free space for more recalcitrant portions of the MSW stream.

A New Look to Garbage Woes

Even though Long Island's solid waste planners no longer must find local landfills for raw garbage, they now face more formidable challenges: finding markets for collected recyclables (especially as the slumbering giant represented by New York City awakens to compete for the already limited recyclables market); battling inter-state garbage shipment bans; and finding acceptable, affordable disposal locations for incineration ash. Solid waste on Long Island has changed from being a low-profile issue involving the immediate neighborhoods of disposal facilities (the so-called "NIMBY" issues) to being a major fiscal centerpiece in a cost- and tax-conscious environment. (The quality of life issues that have always pervaded the field of solid waste disposal have intensified in today's climate of ecological sensitivity, economic uncertainty, and scrutiny of risks associated with contaminants of air and groundwater.)

There can be no doubt that much of the unrecycled wastes disposed of at municipal facilities can theoretically be recycled. The problems associated with these wastes are: what will be the cost and effort to remove these materials from their current collection flow? Who will separate them from the waste stream? Will it be the municipalities, in efforts such as the innovative Babylon "dirty MRF" (materials recovery facilities—where recyclables are separated from unsorted wastes), or the waste producer, through more intensive source separation campaigns? Will these materials find markets? And, if so, will taxpayers be willing to continue to subsidize still-struggling recycled- and secondary-materials markets? If the commercial carters' recycling efforts are accurately accounted for, will the sum of these materials make a large difference in the mass balance of "recycled-transported" wastes? If commercial recycling efforts do turn out to be significant, can these wastes be counted on to be continued to be recycled, given the volatility of recycling markets, and the economic pragmatism that drives carters' recycling?

Many Long Islanders appear caught between the environmental, NIMBY, and regulatory realities that have determined that continued landfilling and new incinerators are not appropriate on Long Island, and the wishful thought that bearing down a little harder on recycling and waste reduction will make the remainder of the region's wastes disappear. Although it is not clear exactly how much waste would have to be swept up in such expanded efforts, an additional 750,000 tpy to 1,000,000 tpy would appear to be a minimal estimate. Since those sums are greater than the amounts currently being recycled by Long Island municipalities, Long Island probably will continue to "depend on the kindness of strangers" for disposal of its solid waste for the indefinite future.

Officials of Long Island, and other municipalities facing similar solid waste management difficulties, should consider:

- 1) adopting a rational, accepted definition of solid waste whether in terms of what must be disposed, or in terms of agreed-upon waste stream constituents
- 2) enumerating the extent of the activities of the commercial carting community
- 3) admitting and publicizing the inadequacy of present-day Long Island disposal capacity for its solid waste
- 4) encouraging waste reduction and recycling initiatives despite the doubts about the possibility of their absorbing the excess wastes being generated. Although these are not economic panaceas, there do not appear to be any cheap, on-Long Island disposal options in the 1990s.

Resource or Trash?

Many of the problems discussed in this paper are problems not only of technique but also of philosophy. There is a difference between those who view waste as a resource and those who do not. And that difference affects policy decisions.

Many communities now consider MSW a resource, which like all resources requires management if it is to be properly exploited. Yet the first element of many waste management plans, waste reduction, calls for the elimination of as much of this resource as possible. Only then is the remaining material to be exploited: through reuse, recycling, and

energy recovery. The dross will be disposed of through landfilling, much as tailings from a mine would be.

Many local waste managers, however, view MSW differently. For them this material is something which must be disposed of, or at least removed from the curbside and made to disappear. This material is a waste; if some value can be recovered, it will only be through the infusion of money and labor. From this point of view, incineration with energy recovery is simply a volume reduction effort with electrical generation merely a frugal side benefit, and recycling is no more than an expensive assuagement of residents' environmental consciences.

Are these disparate views of MSW compatible at all? Can federal, state, or county governments converse in any meaningful way with the localities that actually handle MSW?

Many regulatory entities use a concept called "avoided disposal costs" to justify local concerns about the economics of federal and state MSW management hierarchies. Calculations of avoided costs require that the unspent costs of disposing of a material that is recycled, reused, or waste reduced be considered whenever an accounting is made. This is a strange way to change wastes into a resource. Indeed, avoided costs make landfill space the resource which should be conserved. Nonetheless, this formulation, which is similar to a consumer considering savings from greater gasoline mileage when buying a car, cannot be ignored.

On the other hand, the waste manager's view tends to ignore the potential value in the waste stream. The energy contained within MSW is a resource, although not competitive in value with those of fossil fuels, for example. Aluminum, steel, glass, and paper fiber are all materials that have a myriad of uses in our society, and it is hard for any rational observer to countenance a single-use of materials that are in demand. However, the expense of preparing these materials for market is greater, sometimes many times greater, than simply beginning again with virgin materials.

Federal and state hierarchies have waste avoidance as the primary objective of their management plans, and, whether recycling can be made economical or not, this is just and proper. On the other hand, as long as simple accounting methods show that the amount of money spent on collecting and processing recyclables is greater than the amount realized when these materials are sold, it is going to be difficult for cash-strapped municipalities to emphasize recycling, the second element of the hierarchy. It is imperative that some means of "leveling the playing field" for recyclables and virgin materials be found. Although it does not seem likely that our society will want for any raw material in the foreseeable future, it also cannot be wise for us to discard millions of tons of these materials without attempting to recover what we

pried from the earth. Some means of making policy and good environmental practices more compatible with good business practices must be found in order to reconcile the contradictions in MSW management.

Notes

¹Assumptions used in the generation of the mass balance generation rates:

1) All tonnages reported by disposal type were rounded to the nearest 25,000 tpy.

2) For 1986

- a) all wastes disposed of at the Glen Cove incinerator were assumed to originate in Nassau County;
- b) the amount of wastes disposed of at the town of Hempstead landfill was assumed to be 750,000 tpy, and 200,000 tpy was shipped off-Island (Long Beach is subsumed in this total);
- c) only 300,000 tpy of the wastes landfilled in North Hempstead originated in Nassau County;
- d) Oyster Bay shipped 200,000 tpy off-Island; the remainder of its waste stream was assumed to have been "hidden" in other Nassau County disposal totals;
- e) the only recycling on Long Island was in Islip (approximately 10 percent of the waste stream);
- f) all of Suffolk County's wastes were otherwise landfilled in the county.

3) For 1991

- a) recycling totals were correctly reported;
- b) all incinerated wastes were generated within the respective counties, and the incinerators had an 80 percent operational efficiency;
- c) 250,000 tpy of "transported" wastes from the commercial operations in Oyster Bay, North Hempstead, Huntington, and Islip were absorbed into the excess incinerator capacity at Long Beach and Hempstead; for ease of bookkeeping, all non-residential wastes from North Hempstead and Oyster Bay were so assigned; this meant all the commercial "transported" wastes in Huntington and Islip were assumed to have been disposed of off-Island;

- d) 200,000 tpy of Huntington's transported residential wastes were assigned to Smithtown's landfill.

²Assumptions include:

- 1) counting Brookhaven's 1992 wastes to Hempstead under incineration, and assuming those wastes displace some other 200,000 tpy of Long Island-generated wastes into the off-Long Island transported category;
- 2) neglecting any effects of the Babylon-North Hempstead deal;
- 3) all other factors for 1991 remaining constant, such as recycling and overall waste generation rates.

Acknowledgments

The authors wish to express their appreciation to Marci Bortman for her keen eye and meticulous editing skills. In addition, the report and this paper would not have been possible without the assistance of the following Long Island municipal officials:

Leonard Antonelli, Tony Bullock, Jim Bunchuck, Rand Burgner, Diane Carpenter, Peter Daly, Lou D'Ambrosio, Patricia Del Col, Joe Fabrizio, Monique Gablanz, Elizabeth Gallagher, Tim Gallagher, Brian Gilbride, Scott Harris, James Hartnett, James Heil, Bob Mangan, Tim McBride, William McGrane, Audrey McNulty-Gallo, Tom Melitto, Dave Paoelli, Robert Raab, Sandy Reeves, Robert Reichert, Huson Sherman, Jeffrey Simes, Patty Soito, Fran Springer, John Trent, and Andrew Wolke.

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