



Municipal Solid Waste in The United States: 2000 Facts and Figures Executive Summary

Generation



Source

Reduction



Disposal

Office of Solid Waste
and Emergency Response (5305W)
EPA530-S-02-001
www.epa.gov
June 2002

**MUNICIPAL SOLID WASTE
IN THE UNITED STATES: 2000 FACTS AND FIGURES**

EXECUTIVE SUMMARY

OVERVIEW

This report describes the national municipal solid waste (MSW) stream based on data collected for 1960 through 2000. The historical perspective is useful for establishing trends in types of MSW generated and in the ways it is managed. In this Executive Summary, we briefly describe the methodology used to characterize MSW in the United States and provide the latest facts and figures on MSW generation, recycling, and disposal.

In the United States, we generated approximately 231.9 million tons of MSW in 2000—an increase of 0.9 million tons from 1999.* This is an increase of only 0.3 percent from 1999 to 2000. Excluding composting, the amount of MSW recycled increased to 53.4 million tons, an increase of 3.3 million tons from 1999. This is a 6.6 percent increase in the tons recycled. The tons recovered for recycling (including composting) rose to 69.9 million tons in 2000, up from 64.8 million tons in 1999. The recovery rate for recycling (including composting) was 30.1 percent in 2000, up from 28.1 percent in 1999. (See Tables ES-1 and ES-2 and Figures ES-1 and ES-2.)

MSW generation in 2000 declined to 4.5 pounds per person per day.** The recycling rate in 2000 was 1.4 pounds per person per day. Discards after recycling declined to 3.2 pounds per person per day in 2000 (Table ES-3).

* Data shown for 1999 have been adjusted to reflect the latest revisions and, therefore, may differ slightly from the same measure reported previously. For example, tonnage of MSW generated in 1999 has been revised upward from 229.9 million tons to 231.0 million tons.

** The 2000 generation, recovery, and disposal per person values were calculated from 2000 Census data. For data years 1999 and earlier, population estimates based on 1990 Census data were used. Revised Census data for 1999 and earlier years were not available when this Executive Summary was prepared. The population data series revisions will be included in later editions of this report.

**Table ES-1
GENERATION, MATERIALS RECOVERY, COMPOSTING,
AND DISCARDS OF MUNICIPAL SOLID WASTE, 1960 - 2000
(In millions of tons)**

Millions of tons								
	1960	1970	1980	1990	1995	1998	1999	2000
Generation	88.1	121.1	151.6	205.2	211.4	223.4	231.0	231.9
Recovery for recycling	5.6	8.0	14.5	29.0	45.3	48.0	50.1	53.4
Recovery for composting*	Neg.	Neg.	Neg.	4.2	9.6	13.1	14.7	16.5
Total Materials Recovery	5.6	8.0	14.5	33.2	54.9	61.1	64.8	69.9
Discards after Recovery	82.5	113.0	137.1	172.0	156.5	162.3	166.2	162.0

* Composting of yard trimmings and food wastes. Does not include mixed MSW composting or backyard composting.

Details may not add to totals due to rounding.

Source: Franklin Associates, Ltd.

**Table ES-2
GENERATION, MATERIALS RECOVERY, COMPOSTING
AND DISCARDS OF MUNICIPAL SOLID WASTE, 1960 - 2000
(In pounds per person per day)**

Pounds per person per day								
	1960	1970	1980	1990	1995	1998	1999	2000
Generation	2.68	3.25	3.66	4.50	4.40	4.52	4.64	4.51
Recovery for recycling	0.17	0.22	0.35	0.64	0.94	0.97	1.01	1.04
Recovery for composting*	Neg.	Neg.	Neg.	0.09	0.20	0.27	0.30	0.32
Total Materials Recovery	0.17	0.22	0.35	0.73	1.14	1.24	1.31	1.36
Discards after Recovery	2.51	3.03	3.31	3.77	3.26	3.29	3.33	3.15
Population (millions)	179.979	203.984	227.255	249.907	263.168	270.561	272.691	281.422

* Composting of yard trimmings and food wastes. Does not include mixed MSW composting or backyard composting.

Details may not add to totals due to rounding.

The per capita discard rate may decline for 1999 and earlier years when revised Census population figures are obtained.

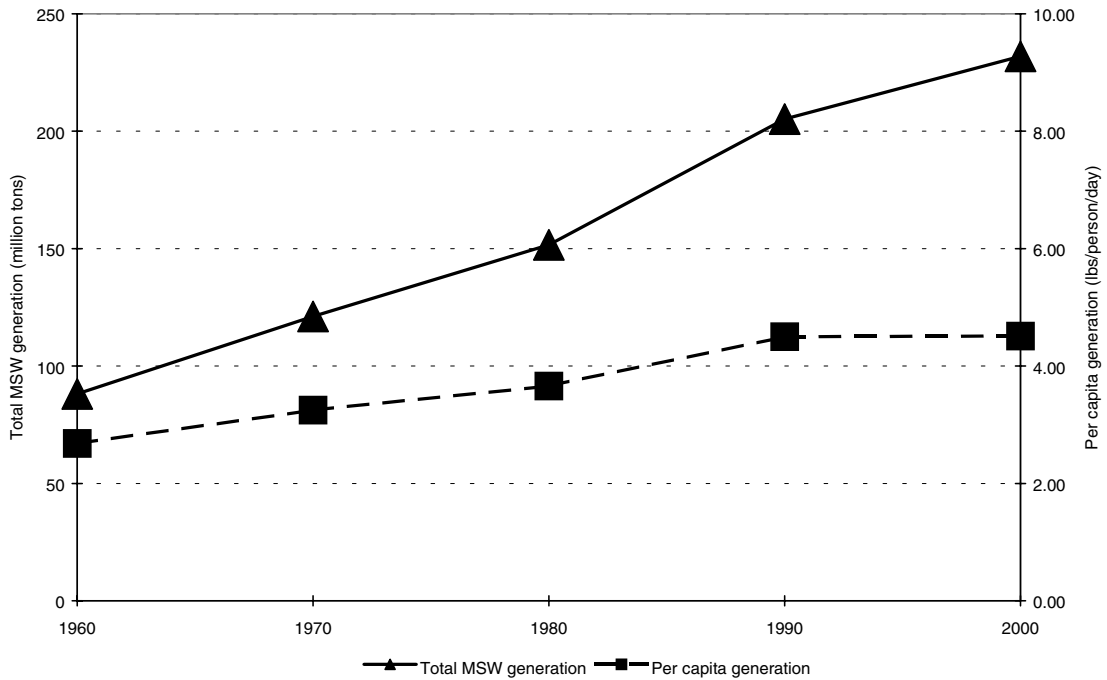
Source: Franklin Associates, Ltd.

**Table ES-3
GENERATION, MATERIALS RECOVERY, COMPOSTING,
AND DISCARDS OF MUNICIPAL SOLID WASTE, 1960 - 2000
(In percent of total generation)**

Percent of total generation								
	1960	1970	1980	1990	1995	1998	1999	2000
Generation	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Recovery for recycling	6.4%	6.6%	9.6%	14.2%	21.5%	21.5%	21.7%	23.0%
Recovery for composting*	Neg.	Neg.	Neg.	2.0%	4.5%	5.9%	6.4%	7.1%
Total Materials Recovery	6.4%	6.6%	9.6%	16.2%	26.0%	27.4%	28.1%	30.1%
Discards after Recovery	93.6%	93.4%	90.4%	83.8%	74.0%	72.6%	71.9%	69.9%

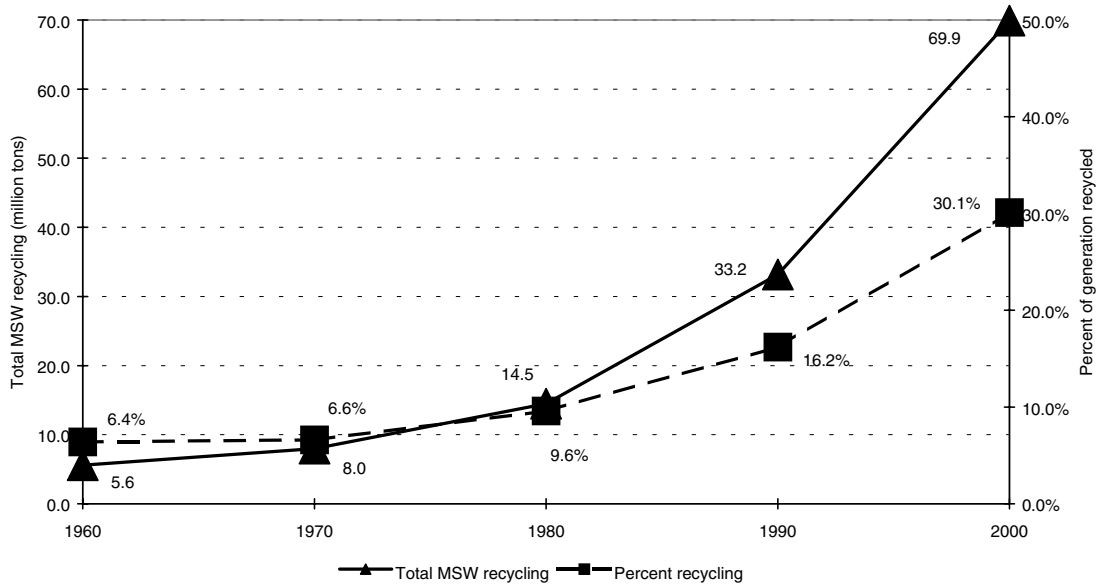
* Composting of yard trimmings and food scraps. Does not include mixed MSW composting or backyard composting.
 Details may not add to totals due to rounding.
 Source: Franklin Associates, Ltd.

Figure ES-1: MSW Generation Rates from 1960 to 2000



The state of the economy has a strong impact on consumption and waste generation. Waste generation continued to increase through the 1990s as economic growth continued to be strong. Between 1998 and 1999, paper and paperboard generation increased 4.9 percent. Total MSW generation increased only slightly between 1999 and 2000, and this can be attributed, to a great extent, to a decline in production of paper and paperboard of 1.7 percent.

Figure ES-2: MSW recycling rates from 1960 to 2000



(Paper industry production is very sensitive to economic factors, and 2000 was not a good year for the industry.) At the same time, recovery of products (including paper and paperboard) increased substantially in 2000, and therefore a recycling rate of 30.1 percent was achieved in spite of the slowdown in the economy. The paper and paperboard recovery, as a percent of generation, increased from 40.9 percent to 45.4 percent in 2000. The majority of the increase in recovery came from increased exports in 2000.

WHAT IS INCLUDED IN MUNICIPAL SOLID WASTE?

MSW—otherwise known as trash or garbage—consists of everyday items such as product packaging, grass clippings, furniture, clothing, bottles, food scraps, newspapers, appliances, and batteries. Not included are materials that also may be disposed in landfills, but are not generally considered MSW, such as construction and demolition debris, municipal wastewater treatment sludges, and non-hazardous industrial wastes.

MUNICIPAL SOLID WASTE IN PERSPECTIVE

Trends Over Time

Over the last few decades, the generation, recycling, and disposal of MSW have changed substantially (see Tables ES-1, ES-2, and ES-3 and Figures ES-1 and ES-2). MSW generation has continued to increase from 1960, when it was 88 million tons. The generation rate in 1960 was just 2.7 pounds per person per day; it grew to 3.7 pounds per person per day in 1980; reached 4.5 pounds per person per day in 1990; and it stabilized at 4.5 pounds per person per day in 2000 after increasing through the 1990s.

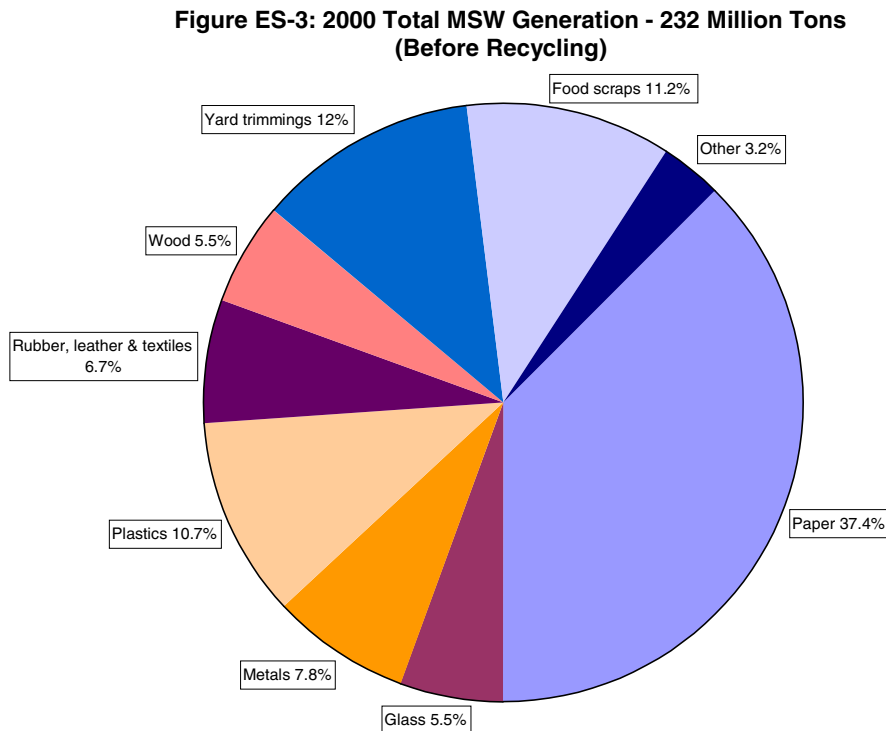
Over time, recycling rates have increased from 10 percent of MSW generated in 1980 to 16 percent in 1990, to 30 percent in 2000. Disposal has decreased from 90 percent of the amount generated in 1980 to 70 percent of MSW in 2000. This compares to 73 percent in 1999.

MUNICIPAL SOLID WASTE IN 2000

The U.S. Environmental Protection Agency (EPA) has two ways of analyzing the 231.9 million tons of MSW generated in 2000. The first is by **material** (paper and paperboard, yard trimmings, food scraps, plastics, metals, glass, wood, rubber, leather and textiles, and other); the second is by several major **product** categories. The product-based categories are containers and packaging; nondurable goods (e.g., newspapers) durable goods (e.g., appliances); food scraps; and other materials.

Materials in MSW

A breakdown, by weight, of the MSW **materials** generated in 2000 is provided in Figure ES-3. Paper and paperboard products made up the largest component of MSW generated (37 percent), and yard trimmings comprised the second-largest component (12 percent). Glass, metals, plastics, wood, and food scraps each constituted between 5 and 11 percent of the total MSW generated. Rubber, leather, and textiles combined made up about 7 percent of MSW, while other miscellaneous wastes made up approximately 3 percent of the MSW generated in 2000.



A portion of each material category in MSW was recycled or composted in 2000. The highest rates of recovery were achieved with yard trimmings, paper products, and metal products. About 57 percent (15.8 million tons) of yard trimmings were recovered for composting in 2000. This represents nearly a four-fold increase since 1990. About 45 percent (39.4 million tons) of paper and paperboard were recovered for recycling in 2000. Recycling these organic materials alone diverted nearly 24 percent of municipal solid waste from landfills and combustion facilities. In addition, about 6.4 million tons, or about 35 percent, of metals were

recovered for recycling. Recycling rates for all materials categories in 2000 are listed in Table ES-4.

Table ES-4
GENERATION AND RECOVERY OF MATERIALS IN MSW, 2000
(In millions of tons and percent of generation of each material)

	Weight Generated	Weight Recovered	Recovery as a Percent of Generation
Paper and paperboard	86.7	39.4	45.4%
Glass	12.8	2.9	23.0%
Metals			
Steel	13.5	4.6	34.0%
Aluminum	3.2	0.9	27.4%
Other nonferrous metals*	1.4	0.9	66.9%
<i>Total metals</i>	18.0	6.4	35.4%
Plastics	24.7	1.3	5.4%
Rubber and leather	6.4	0.8	12.2%
Textiles	9.4	1.3	13.5%
Wood	12.7	0.5	3.8%
Other materials	4.0	0.9	21.3%
<i>Total Materials in Products</i>	174.7	53.4	30.6%
Other wastes			
Food, other**	25.9	0.7	2.6%
Yard trimmings	27.7	15.8	56.9%
Miscellaneous inorganic wastes	3.5	Neg.	Neg.
<i>Total Other Wastes</i>	57.1	16.5	28.8%
<i>TOTAL MUNICIPAL SOLID WASTE</i>	231.9	69.9	30.1%

Includes waste from residential, commercial, and institutional sources.

* Includes lead from lead-acid batteries.

** Includes recovery of paper for composting.

Neg. = Less than 50,000 tons or 0.05 percent.

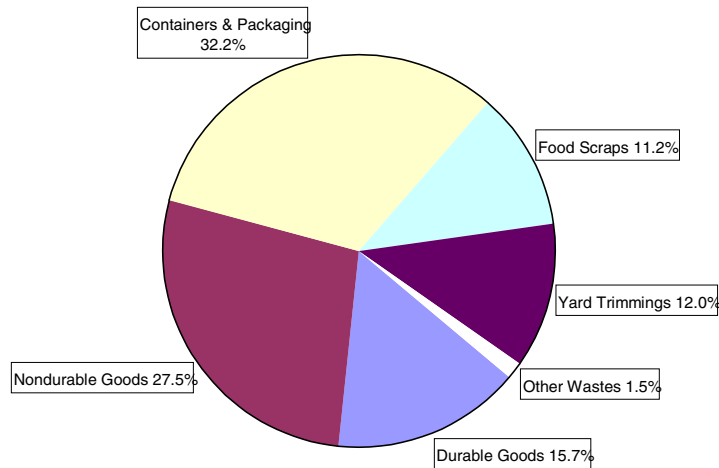
Source: Franklin Associates, Ltd.

Products in MSW

The breakdown, by weight, of **product categories** generated in 2000 is shown in Figure ES-4. Containers and packaging comprised the largest portion of products generated, at 32.2 percent (75 million tons) of total MSW generation. Nondurable goods were the second-largest

fraction, comprising 27.5 percent (64 million tons). The third-largest category of products is durable goods, which comprised 15.7 percent (36 million tons) of total MSW generation.

Figure ES-4: Products Generated in MSW - 2000
(Total Weight = 232 million tons)



The generation and recovery of the product categories in MSW in 2000 is shown in Table ES-5. This table shows that recovery of containers and packaging was the highest of the three product categories – almost 39 percent of containers and packaging generated in 2000 were recovered for recycling. About 55 percent of all aluminum cans were recovered (45 percent of all aluminum packaging, including foil), while 58 percent of steel packaging (mostly cans) was recovered. Paper and paperboard containers and packaging were recovered at a rate of 56 percent; corrugated containers accounted for most of that amount.

Approximately 26 percent of glass containers were recovered, while about 6 percent of wood packaging (mostly wood pallets removed from service) was recovered for recycling. About 9 percent of plastic containers and packaging were recovered, mostly soft drink, milk, and water bottles.

**Table ES-5
GENERATION AND RECOVERY OF PRODUCTS IN MSW
BY MATERIAL, 2000
(In millions of tons and percent of generation of each product)**

	Weight Generated	Weight Recovered	Recovery as a Percent of Generation
Durable Goods			
Steel	10.6	2.9	27.4%
Aluminum	1.0	Neg.	Neg.
Other non-ferrous metals*	1.4	0.9	64.3%
<i>Total metals</i>	13.0	3.8	29.2%
Glass	1.6	Neg.	Neg.
Plastics	7.5	0.3	4.0%
Rubber and leather	5.5	0.8	14.5%
Wood	4.8	Neg.	Neg.
Textiles	2.8	0.2	7.1%
Other materials	1.1	0.9	81.8%
<i>Total durable goods</i>	36.3	6.0	16.6%
Nondurable Goods			
Paper and paperboard	47.3	17.3	36.6%
Plastics	6.0	Neg.	Neg.
Rubber and leather	0.8	Neg.	Neg.
Textiles	6.4	1.0	15.6%
Other materials	3.2	Neg.	Neg.
<i>Total nondurable goods</i>	63.7	18.3	28.8%
Containers and Packaging			
Steel	2.9	1.7	58.6%
Aluminum	2.0	0.9	45.0%
<i>Total metals</i>	4.9	2.6	53.1%
Glass	11.2	2.9	25.9%
Paper and paperboard	39.4	22.1	56.1%
Plastics	11.2	1.0	8.9%
Wood	7.9	0.5	6.3%
Other materials	0.1	Neg.	Neg.
<i>Total containers and packaging</i>	74.7	29.1	38.9%
Other wastes			
Food, other**	25.9	0.7	2.6%
Yard trimmings	27.7	15.8	56.9%
Miscellaneous inorganic wastes	3.5	Neg.	Neg.
<i>Total Other Wastes</i>	57.1	16.5	28.8%
TOTAL MUNICIPAL SOLID WASTE	231.9	69.9	30.1%

Includes waste from residential, commercial, and institutional sources.

* Includes lead from lead-acid batteries.

** Includes recovery of paper for composting.

Details may not add to totals due to rounding.

Neg. = Less than 50,000 tons or 0.05 percent.

Source: Franklin Associates, Ltd.

Overall recovery of *nondurable goods* was 28.8 percent in 2000. Most of this recovery comes from paper products such as newspapers and high-grade office papers (e.g., white papers). Newspapers constituted the largest portion of this recovery, with 58 percent of newspapers generated being recovered for recycling. An estimated 54 percent of high-grade office papers and 32 percent of magazines were recovered in 2000. Each of these categories' recovery increased both in tonnage and percentage between 1999 and 2000.

Recovery percentages of other paper products in the nondurable goods category also increased between 1999 and 2000, with Standard (A) mail* recovered at an estimated 32 percent, directories at an estimated 18 percent, and other commercial printed products at an estimated 23 percent.

The nondurable goods category also includes clothing and other textile products—16 percent of these products were recovered for recycling or export in 2000.

Overall, *durable goods* were recovered at a rate of 16.6 percent in 2000. Nonferrous metals other than aluminum had one of the highest recovery rates, at 67 percent, due to the high rate of lead recovery from lead-acid batteries. Recovery of steel in all durable goods was 27.5 percent, with high rates of recovery from appliances and other miscellaneous durable goods. Twenty-six percent of rubber in tires was recovered for recycling. (Other tires were retreaded and shredded rubber tires were made into tire-derived fuel.)

One of the products with a very high recovery rate was lead-acid batteries, recovered at a rate of 96.4 percent in 2000. Other products with particularly high recovery rates were steel from major appliances (73.5 percent), corrugated boxes (70.7 percent), newspapers (58.2 percent), steel cans (57.2 percent), and aluminum cans (54.6 percent).

* Standard (A) mail was formerly called Third Class mail by the U.S. Postal Service.

RESIDENTIAL AND COMERCIAL SOURCES OF MSW

Sources of MSW, as characterized in this report, include both residential and commercial locations. We estimated residential waste (including waste from multi-family dwellings) to be 55 to 65 percent of total MSW generation. Commercial waste (including waste from schools, some industrial sites where packaging is generated, and businesses) constitutes between 35 and 45 percent of MSW. Local and regional factors, such as climate and level of commercial activity, contribute to these variations.

MANAGEMENT OF MSW

Overview

EPA's integrated waste management hierarchy includes the following three components, listed in order of preference:

- Source reduction (or waste prevention), including reuse of products and onsite, or backyard, composting of yard trimmings
- Recycling, including offsite, or community, composting.
- Disposal, including waste combustion (preferably with energy recovery) and landfilling.

Although EPA encourages the use of strategies that emphasize the top of the hierarchy whenever possible, all three components remain important within an integrated waste management system.

Source Reduction

When EPA established its waste management hierarchy in 1989, it emphasized the importance of *reducing* the amount of waste created, reusing whenever possible, and then recycling what is left. When municipal solid waste is reduced and reused, this is called “source reduction”—meaning the material never enters the waste stream. Instead it is managed at the source of generation.

Source reduction, also called waste prevention, includes the design, manufacture, purchase, or use of materials, such as products and packaging, to reduce their amount or toxicity before they enter the MSW management system. Examples of source reduction activities are:

- Designing products or packaging to reduce the quantity or the toxicity of the materials used, or to make them easy to reuse.
- Reusing existing products or packaging; for example, refillable bottles, reusable pallets, and reconditioned barrels and drums.
- Lengthening the lives of products such as tires as fewer need to be produced and therefore disposed of.
- Using packaging that reduces the amount of damage or spoilage to the product.
- Managing nonproduct organic wastes (e.g., food scraps, yard trimmings) through onsite composting or other alternatives to disposal (e.g., leaving grass clippings on the lawn).

As the nation has begun to realize the value of its resources, both financial and material, efforts to reduce waste generation have increased. EPA has been able to estimate source reduction for the nation based on economic and waste data. Table ES-6 shows that steady progress was made in waste prevention since 1990. In 2000, the United States prevented more than *55 million tons* of municipal solid waste from entering the waste stream since 1990.

Table ES-6
SOURCE REDUCTION OF
MUNICIPAL SOLID WASTE SINCE 1990
(In millions of tons)

Year	Million Tons Source Reduced
1992	0.6
1994	8.0
1995	21.4
1996	31.0
1997	31.8
1998	37.3
1999	42.8
2000	55.1

The waste prevention achieved to date comes from all parts of the waste stream. However, reducing the amount of yard trimmings is a particularly important source reduction success story. Table ES-7 shows that almost half of the waste prevented in 2000 came from organic waste materials, particularly yard trimmings. This is likely the result of many locally enacted bans on the disposal of yard trimmings from landfills around the country, as well as successful campaigns promoting onsite composting and the use of mulching lawn mowers.

Prevention of waste other than yard trimmings has been important as well. Containers and packaging represent approximately 28 percent of the materials source reduced in 2000, in addition to nondurable goods (e.g., newspapers, clothing) at 17 percent, durable goods (e.g., appliances, furniture, tires) at 10 percent, and other MSW (e.g., yard trimmings, food scraps) at 45 percent.

Table ES-7
SOURCE REDUCTION BY MAJOR MATERIAL CATEGORIES, 2000
(In millions of tons)

Waste Stream	Million Tons Source Reduced
Durable Goods (e.g., appliances, furniture)	5.4
Nondurable Goods (e.g., newspapers, clothing)	9.3
Containers & Packaging (e.g., bottles, boxes)	15.5
Other MSW (e.g., yard trimmings, food scraps)	25.0
Total Source Reduction (1990 baseline)	55.1

There are several materials for which disposal rates have increased. In particular, clothing and footwear show significant increased disposal rates, as do plastic containers. Part of the rise in plastics use can be attributed to the long-term trend of manufacturers substituting their glass packaging with plastic. However, not all of the increases are due to material substitution.

Much of the nation's increase in waste generation in the 1990s was due to the booming economy. Americans found themselves with additional dollars in their pockets after paying the mortgage or rent and their other expenses. As a result, we increasingly became a nation of consumers. The result was an increasing need for the disposal of municipal solid waste. However, the United States made progress in the area of waste reduction and reuse, as indicated

by the 55 million tons of source reduction in 2000. Had this source reduction not occurred, waste generation in 2000 would have risen from the actual level, 232 million tons, to 287 million tons. Source reduction avoided an increase of nearly 25 percent.

Recycling

- Recycling (including community composting) recovered 30.1 percent (69.9 million tons) of MSW in 2000.
- There were about 9,250 curbside recycling programs in the United States in 2000. This is slightly fewer than the 9,300 curbside recycling programs identified in 1999.
- About 3,800 yard trimmings composting programs were reported in 2000.

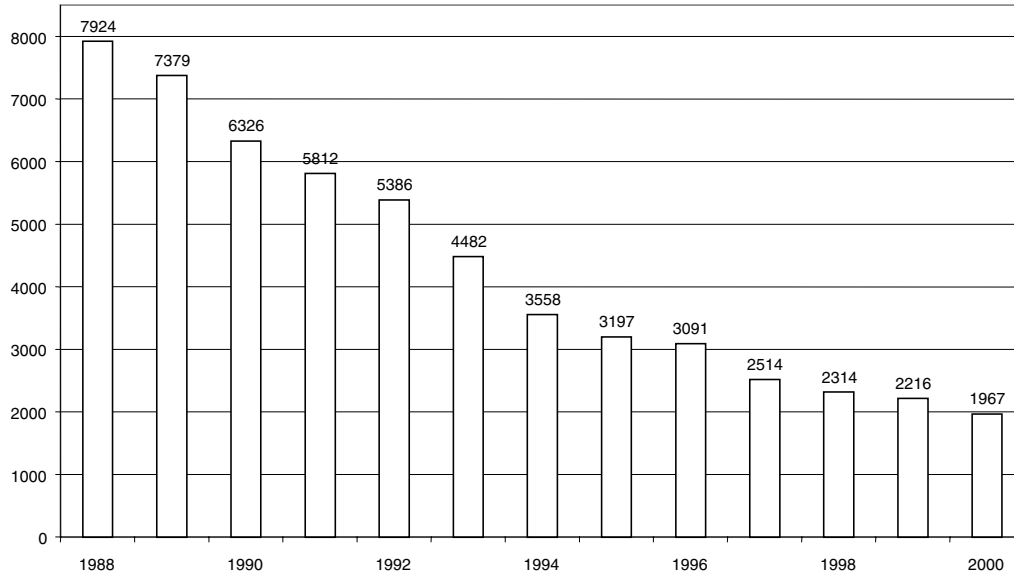
Disposal

An estimated 14.5 percent of MSW was combusted in 2000, slightly down from 14.7 percent in 1999. During 2000, about 55.3 percent of MSW was landfilled, down somewhat from 57.2 percent in 1999. As shown in Figure ES-5, the number of municipal solid waste landfills decreased substantially over the past 10 years, from nearly 8,000 in 1988 to 1,967 in 2000—while average landfill size increased. At the national level, capacity does not appear to be a problem, although regional dislocations sometimes occur.

- The percentage of MSW landfilled decreased slightly from 1999 to 2000. Over the long term, the tonnage of MSW landfilled in 1990 was 140.1 million tons, but decreased to 120.9 million tons in 1995. The tonnage increased to 132.1 million tons in 1999, then declined to 128.3 in 2000. The tonnage landfilled results from an interaction among generation, recycling, and combustion, which do not necessarily rise and fall at the same time.
- The net per capita discard rate (after recovery for recycling, including composting) was 3.15 pounds per person per day, down from 3.33 pounds per person per day in 1999* (Table ES-2).

* Note that the calculated per capita discard rate may decline for 1999 and earlier years when revised Census population figures are obtained.

Figure ES-5: Number of Landfills in the United States

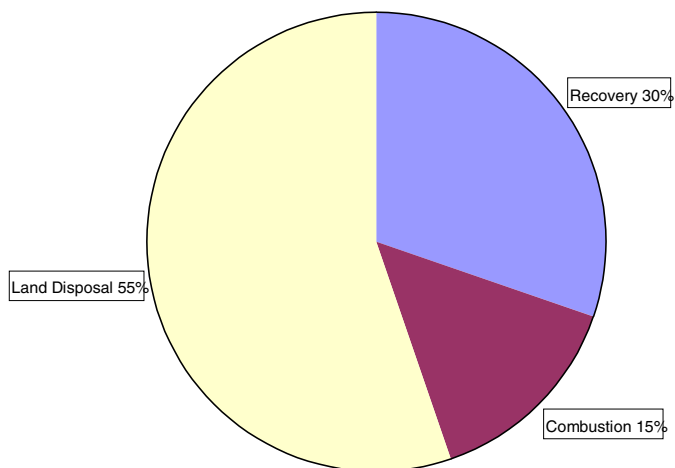


MSW recovered for recycling (including composting) and disposed of by combustion and landfilling in 2000 is shown in Figure ES-6. In 2000, 69.9 millions tons (30.1 percent) of MSW were recycled, 33.7 million tons (14.5 percent) were combusted, and 128.3 million tons (55.3 percent) were landfilled or otherwise disposed. (Relatively small amounts of this total undoubtedly were littered or illegally dumped rather than landfilled.)

PERSPECTIVE FOR THE NATION

As economic growth results in more products and materials being generated, there will be an increased need to invest in source reduction activities such as lightweighting of products and packaging, reuse of products, grasscycling, and backyard composting. Also important will be utilizing existing recycling and composting facilities, further developing this infrastructure, and buying recycled products, to conserve resources and minimize our dependence on disposal through combustion and landfilling.

Figure ES-6: Management of MSW in the United States - 2000



FOR FURTHER INFORMATION

This report and related additional data are available on the Internet at www.epa.gov/osw. Additional information on source reduction is available in *National Source Reduction Characterization Report for Municipal Solid Waste in the United States*, EPA530-R-99-034, November 1999.