EPA
United States
Environmental Protection
Agency

Municipal Solid Waste Generation, Recycling, and Disposal in the United States: Facts and Figures for 2007

The U.S. Environmental Protection Agency (EPA) has collected and reported data on the generation and disposal of waste in the United States for more than 30 years. We use this information to measure the success of waste reduction and recycling programs across the country. This fact sheet summarizes information contained in our full report, *Municipal Solid Waste in the United States: 2007 Facts and Figures*.

In 2007, Americans generated about 254 million tons of trash and recycled and composted 85 million tons of this material, equivalent to a 33.4 percent recycling rate (see Figure 1 and Figure 2). On average, we recycled and composted 1.5 pounds of our individual waste generation of 4.6 pounds per person per day.

Figure 1. MSW Generation Rates, 1960 to 2007

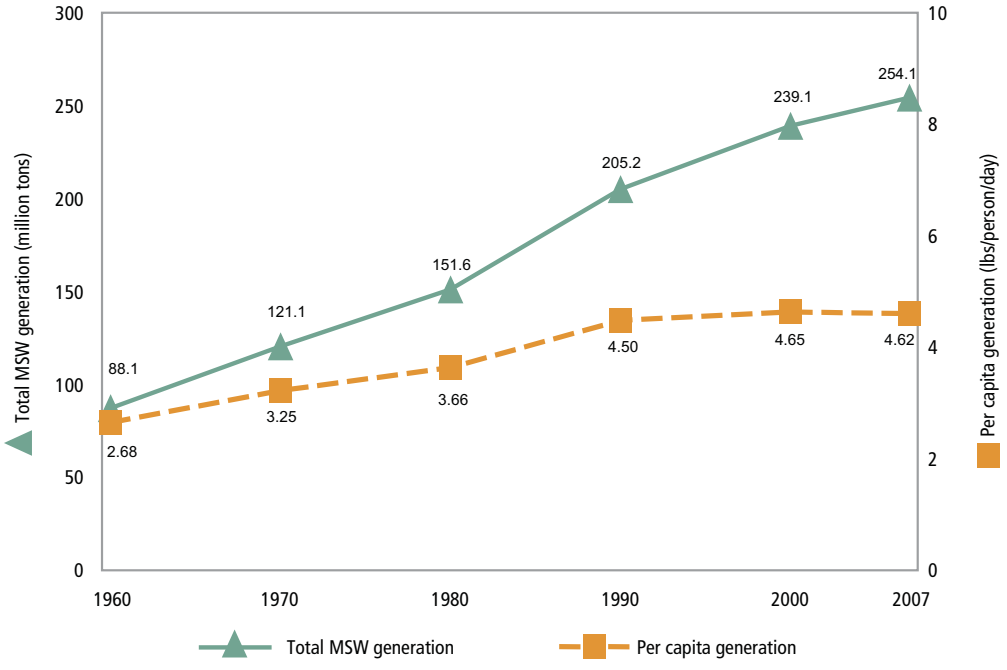
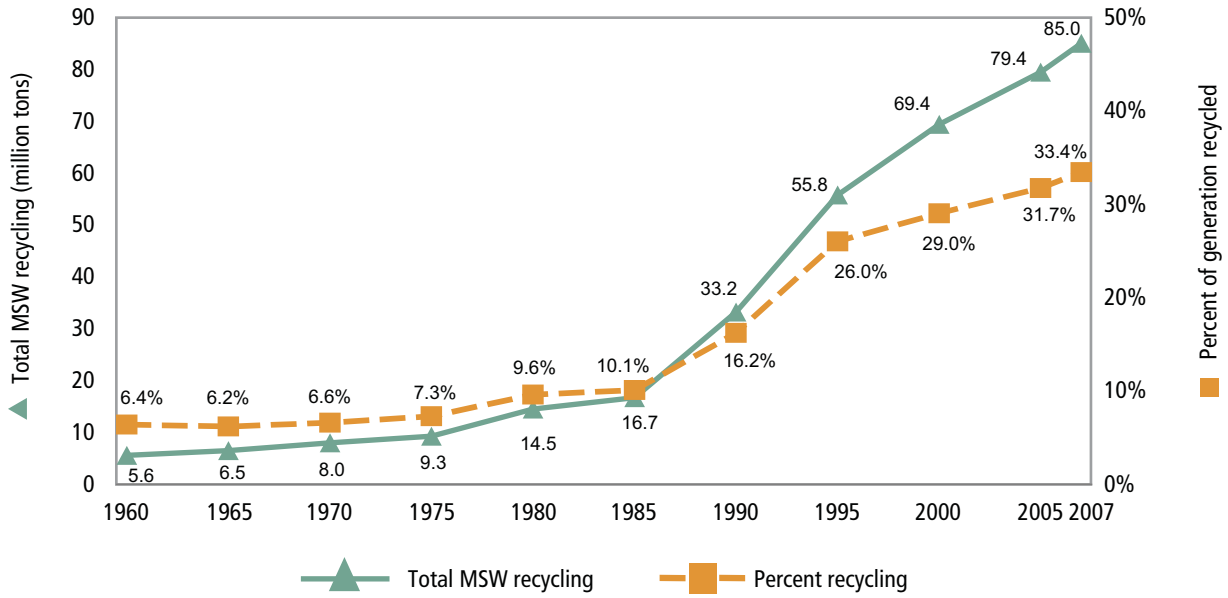


Figure 2. MSW Recycling Rates, 1960 to 2007



Trends in Municipal Solid Waste in 2007

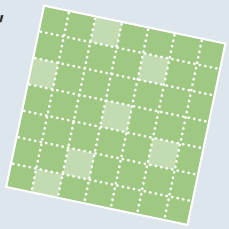
Our trash, or municipal solid waste (MSW), is made up of the things we commonly use and then throw away. These materials range from packaging, food scraps, and grass clippings, to old sofas, computers, tires, and refrigerators. MSW does not include industrial, hazardous, or construction waste.

In 2007, Americans recovered 63 million tons (excluding composting) through recycling. This is 1.9 million tons more than in 2006. Composting recovered almost 22 million tons of waste. We combusted 32 million tons for energy recovery (about 13 percent). Subtracting out what we recycled and composted, we combusted (with energy recovery) or discarded just over 3 pounds per person per day.

In 2007, paper and paperboard recovery rose to over 54 percent (45 million tons), and 64 percent of yard trimmings were recovered (see Figure 3). Metals were recycled at a rate of almost 35 percent (see Table 1). By recycling 7 million tons of metals (which includes aluminum, steel, and mixed metals), we eliminated greenhouse gas (GHG) emissions totaling close to 25 million metric tons of carbon dioxide equivalent ($MMTCO_2E$). This is equivalent to removing more than 4.5 million cars from the road for one year.*

About 137 million tons of MSW (54 percent) was discarded in landfills in 2007 (see Figure 4).

Over the last few decades, the generation, recycling, composting, and disposal of MSW have changed substantially. While solid waste generation has increased, from 3.66 to 4.62 pounds per person per day between 1980 and 2007, the recycling rate has also increased—from less than 10 percent of MSW generated in 1980 to over 33 percent in 2007. Disposal of waste to a landfill has decreased from 89 percent of the amount generated in 1980 to 54 percent of MSW in 2007.



* All benefit calculations in this fact sheet are derived from EPA's WAste Reduction Model (WARM).

Figure 3. Recycling Rates of Selected Products, 2007

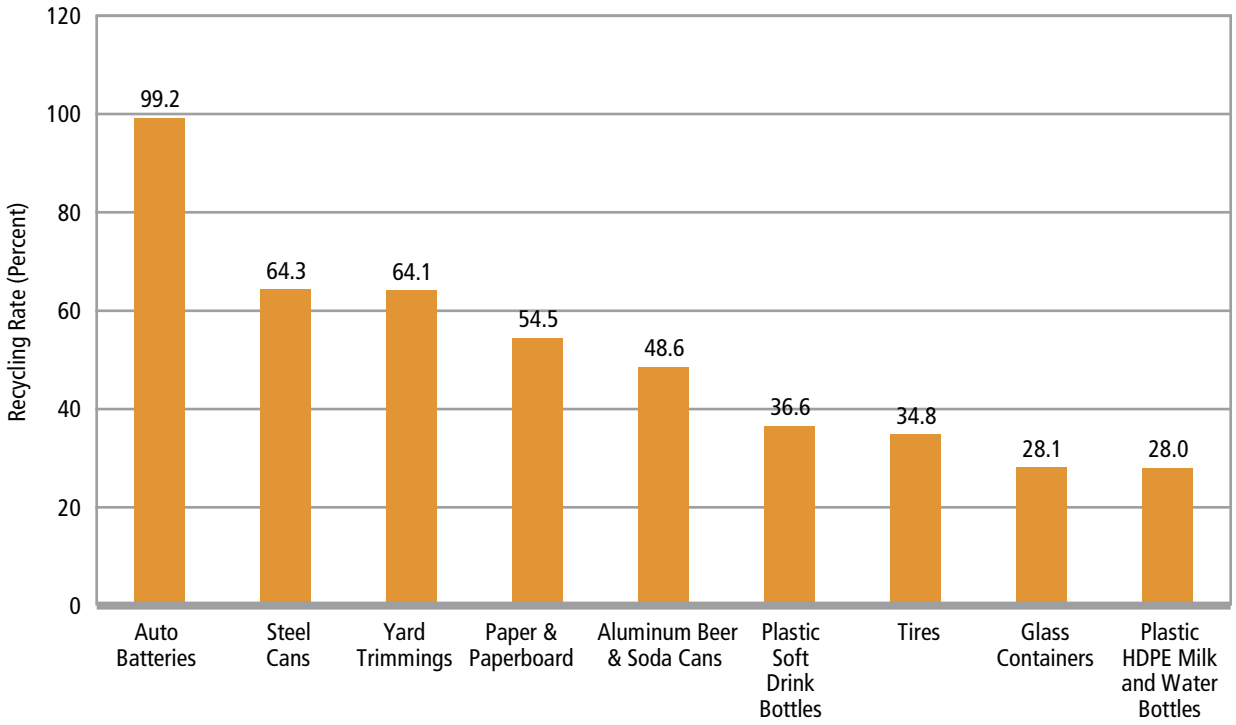
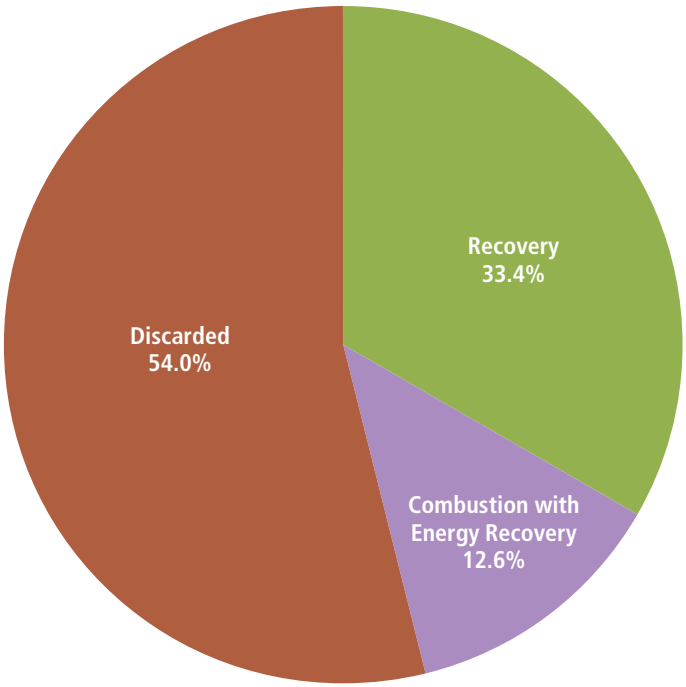


Figure 4. Management of MSW in the United States, 2007



Sources of MSW

We estimated residential waste (including waste from apartment houses) to be 55 to 65 percent of total MSW generation. Waste from commercial and institutional locations, such as schools, hospitals, and businesses, amounted to 35 to 45 percent.

Nationally, we recycled and composted 85 million tons of municipal solid waste. This provides an annual benefit of 193 million metric tons of carbon dioxide equivalent emissions reduced, comparable to the annual GHG emissions from more than 35 million passenger vehicles.

Analyzing MSW

We analyze waste by material, such as paper and paperboard, yard trimmings, food scraps, and plastics, and by major product categories, which include durable goods (such as furniture), nondurable goods (such as paper or clothing), containers and packaging (such as milk cartons and plastic wrap), and other materials (such as food scraps).

Materials in MSW

Total MSW generation in 2007 was 254 million tons. Organic materials continue to be the largest component of MSW. Paper and paperboard account for 33 percent, with yard trimmings and food scraps accounting for 25 percent. Plastics comprise 12 percent; metals make up 8 percent; and rubber, leather, and textiles account for almost 8 percent. Wood follows at around 6 percent and glass at 5 percent. Other miscellaneous wastes make up approximately 3 percent of the MSW generated in 2007 (see Figure 5).

Figure 5. Total MSW Generation (by material), 2007
254 Million Tons (before recycling)

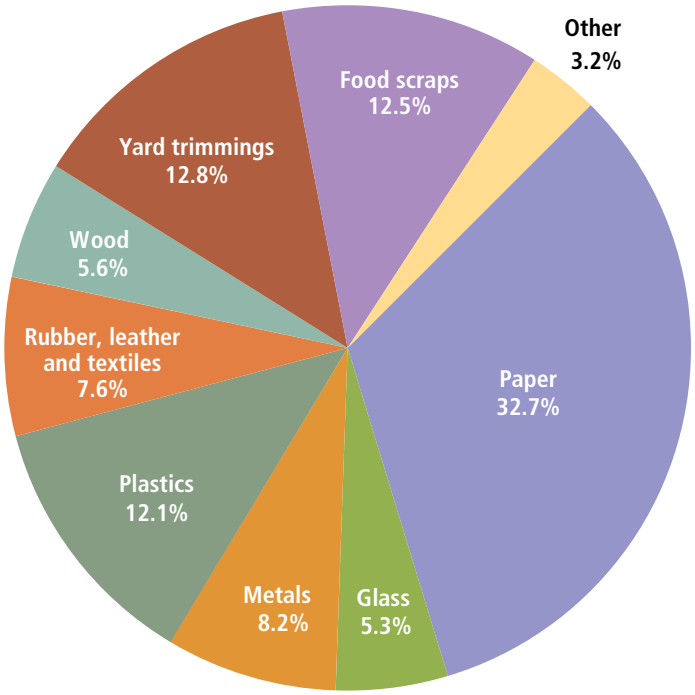


Table 1. Generation and Recovery of Materials in MSW, 2007*
(in millons of tons and percent of generation of each material)

Material	Weight Generated	Weight Recovered	Recovery as Percent of Generation
Paper and paperboard	83.0	45.2	54.5%
Glass	13.6	3.22	23.7%
Metals			
Steel	15.6	5.28	33.8%
Aluminum	3.35	0.73	21.8%
Other nonferrous metals†	1.76	1.22	69.3%
Total metals	**20.8**	**7.23**	**34.8%**
Plastics	30.7	2.09	6.8%
Rubber and leather	7.48	1.10	14.7%
Textiles	11.9	1.90	15.9%
Wood	14.2	1.32	9.3%
Other materials	4.43	1.16	26.2%
Total materials in products	**186.1**	**63.3**	**34.0%**
Other wastes			
Food, other‡	31.7	0.81	2.6%
Yard trimmings	32.6	20.9	64.1%
Miscellaneous inorganic wastes	3.75	Negligible	Negligible
Total other wastes	**68.0**	**21.7**	**31.9%**
Total municipal solid waste	**254.1**	**85.0**	**33.4%**

* Includes waste from residential, commercial, and institutional sources.

† Includes lead from lead-acid batteries.

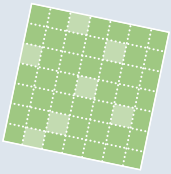
‡ Includes recovery of other MSW organics for composting.

Details might not add to totals due to rounding.

Negligible = Less than 5,000 tons or 0.05 percent.

Significant amounts of material from each category were recycled or composted in 2007. The highest recovery rates were achieved in yard trimmings, paper and paperboard, and metals. About 21 million tons of yard trimmings were composted, representing a five-fold increase since 1990. We recycled more than half the paper and paperboard we generated. Recycling these organic materials alone kept 26 percent of MSW out of landfills and combustion facilities. Recycling amounts and rates (recovery as a percent of generation) for all materials in 2007 are listed in Table 1.

Recycling and composting 85 million tons of MSW saved 1.3 quadrillion Btu of energy, the equivalent of more than 10.7 billion gallons of gasoline.



Products in MSW

The breakdown, by weight, of waste generated in 2007 by product category is shown in Figure 6. Containers and packaging made up the largest portion of MSW generated: 31 percent, or 78 million tons. The second largest portion came from nondurable goods, which amounted to about 25 percent, or 62 million tons. Yard trimmings make up the third largest segment, accounting for 13 percent, or almost 33 million tons.

The generation and recovery of materials in the product categories, by weight and recovery as a percent of generation, are shown in Table 2. This table shows that the recovery of containers and packaging was the highest of the four product categories, with about 43 percent of the generated materials recycled. Steel, paper products, and aluminum were the most recycled materials by percentage in this category. More than 64 percent of steel packaging (mostly cans) was recycled. Sixty-two percent of paper and paperboard containers and packaging was recycled, including 74 percent of all corrugated boxes. The recycling rate for aluminum packaging was 39 percent, including almost 49 percent of aluminum beverage cans.

Figure 6. Total MSW Generation (by category), 2007
254 million tons (before recycling)

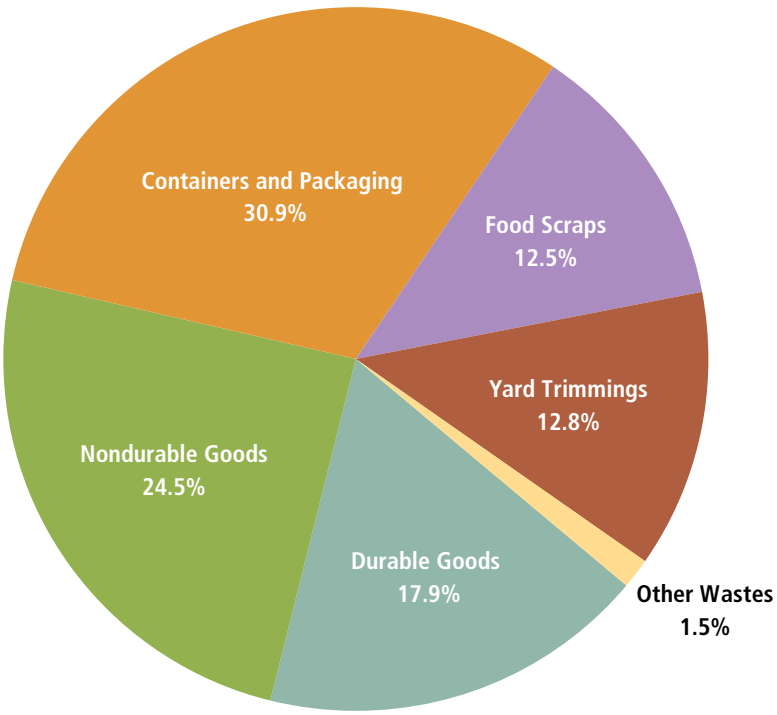


Table 2. Generation and Recovery of Products in MSW, 2007* (in millons of tons and percent of generation of each product)

Products	Weight Generated	Weight Recovered	Recovery as Percent of Generation
Durable goods			
Steel	13.0	3.55	27.3%
Aluminum	1.26	Negligible	Negligible
Other non-ferrous metals†	1.76	1.22	69.3%
Glass	2.11	Negligible	Negligible
Plastics	10.4	0.50	4.8%
Rubber and leather	6.48	1.10	17.0%
Wood	5.63	Negligible	Negligible
Textiles	3.33	0.46	13.8%
Other materials	1.41	1.16	82.3%
Total durable goods	**45.4**	**7.99**	**17.6%**
Nondurable goods			
Paper and paperboard	43.1	20.3	47.1%
Plastics	6.68	Negligible	Negligible
Rubber and leather	0.97	Negligible	Negligible
Textiles	8.34	1.44	17.3%
Other materials	3.15	Negligible	Negligible
Total nondurable goods	**62.2**	**21.8**	**35.0%**
Containers and packaging			
Steel	2.68	1.73	64.6%
Aluminum	1.87	0.73	39.0%
Glass	11.5	3.22	28.1%
Paper and paperboard	39.9	24.9	62.4%
Plastics	13.6	1.59	11.7%
Wood	8.54	1.32	15.5%
Other materials	0.31	Negligible	Negligible
Total containers and packaging	**78.4**	**33.5**	**42.7%**
Other wastes			
Food, other‡	31.7	0.81	2.6%
Yard trimmings	32.6	20.9	64.1%
Miscellaneous inorganic wastes	3.75	Negligible	Negligible
Total other wastes	68.0	21.7	31.9%
Total municipal solid waste	**254.1**	**85.0**	**33.4%**

* Includes waste from residential, commercial, and institutional sources.
† Includes lead from lead-acid batteries.
‡ Includes recovery of other MSW organics for composting.
Details might not add to totals due to rounding.
Negligible = less than 5,000 tons or 0.05 percent.

Table 3. Generation, Materials Recovery, Composting, Combustion With Energy Recovery, and Discards of MSW, 1960 to 2007 (in million of tons)

Activity	1960	1970	1980	1990	2000	2004	2005	2006	2007
Generation	88.1	121.1	151.6	205.2	239.1	249.8	250.4	254.2	254.1
Recovery for recycling	5.6	8.0	14.5	29.0	52.9	57.5	58.8	61.4	63.3
Recovery for composting*	Negligible	Negligible	Negligible	4.2	16.5	20.5	20.6	20.8	21.7
Total materials recovery	5.6	8.0	14.5	33.2	69.4	78.0	79.4	82.2	85.0
Combustion with energy recovery†	0.0	0.4	2.7	29.7	33.7	31.5	31.6	31.9	31.9
Discards to landfill, other disposal‡	82.5	112.7	134.4	142.3	136.0	140.3	139.4	140.1	137.2

* Composting of yard trimmings, food scraps, and other MSW organic material. Does not include backyard composting.

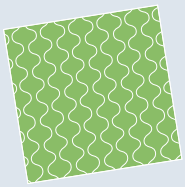
† Includes combustion of MSW in mass burn or refuse-derived fuel form, and combustion with energy recovery of source separated materials in MSW (e.g., wood pallets, tire-derived fuel).

‡ Discards after recovery minus combustion with energy recovery. Discards include combustion without energy recovery.

Details might not add to totals due to rounding.

Around 28 percent of glass containers were recycled, while about 16 percent of wood packaging—mostly wood pallets—was recovered. Almost 12 percent of plastic containers and packaging was recycled, mostly from soft drink, milk, and water bottles. Plastic bottles were the most recycled plastic products. PET soft drink and water bottles were recovered at 37 percent. Recovery of HDPE milk and water bottles was estimated at about 28 percent (see the full 2007 MSW report).

Every ton of mixed paper recycled can save the energy equivalent of 185 gallons of gasoline.



Overall recovery of nondurable goods was 35 percent in 2007. Nondurable goods generally last less than three years. Paper products, such as newspapers and high-grade office papers were the most recycled nondurable goods. Newspapers alone were recycled at a rate of nearly 78 percent. Approximately 72 percent of high-grade office papers and 40 percent of magazines were recovered. Forty percent of unwanted mail, 26 percent of books, and 20 percent of telephone directories were recovered for recycling in 2007 (see the full MSW report). Clothing and other textile products are included in the nondurable goods category. These products were recovered for recycling at a rate of 17 percent.

Overall, almost 18 percent of durable goods were recovered in 2007. Nonferrous metals other than aluminum had one of the highest recovery rates—around 69 percent—due to the high rate of lead recovery from lead-acid batteries. With a 99 percent recycling rate, lead-acid batteries continue to be one of the

most recovered products. Recovery of steel in all durable goods was 27 percent, with high rates of recovery from appliances and other miscellaneous items.

Measured by percentage of generation, products with the highest recovery rates in 2007 were lead-acid batteries (99 percent), newspapers (78 percent), corrugated boxes (74 percent), office-type papers (72 percent), major appliances (67 percent), steel packaging (65 percent), yard trimmings (64 percent), commercial printing papers (57 percent), aluminum cans (49 percent), standard mail (40 percent), magazines (40 percent), paper bags and sacks (37 percent), and PET soft drink bottles (37 percent) (see full 2007 MSW report).

Recycling and Composting Collection Programs**

- Approximately 8,660 curbside recycling programs exist nationwide, down from 8,875 in 2002.
- About 3,510 community composting programs are operational, an increase from 3,227 in 2002.

Table 4. Generation, Materials Recovery, Composting, Combustion With Energy Recovery, and Discards of MSW, 1960 to 2007 (in pounds per person per day)

Activity	1960	1970	1980	1990	2000	2004	2005	2006	2007
Generation	2.68	3.25	3.66	4.50	4.65	4.66	4.63	4.65	4.62
Recovery for recycling	0.17	0.22	0.35	0.64	1.03	1.07	1.09	1.12	1.15
Recovery for composting*	Negligible	Negligible	Negligible	0.09	0.32	0.38	0.38	0.38	0.39
Total Materials Recovery	0.17	0.22	0.35	0.73	1.35	1.45	1.47	1.50	1.54
Combustion with energy recovery†	0.00	0.01	0.07	0.65	0.66	0.59	0.58	0.58	0.58
Discards to landfill, other disposal‡	2.51	3.02	3.24	3.12	2.64	2.62	2.58	2.57	2.50
Population (millions)	179.979	203.984	227.255	249.907	281.422	293.660	296.410	299.398	301.621

* Composting of yard trimmings, food scraps, and other MSW organic material. Does not include backyard composting.

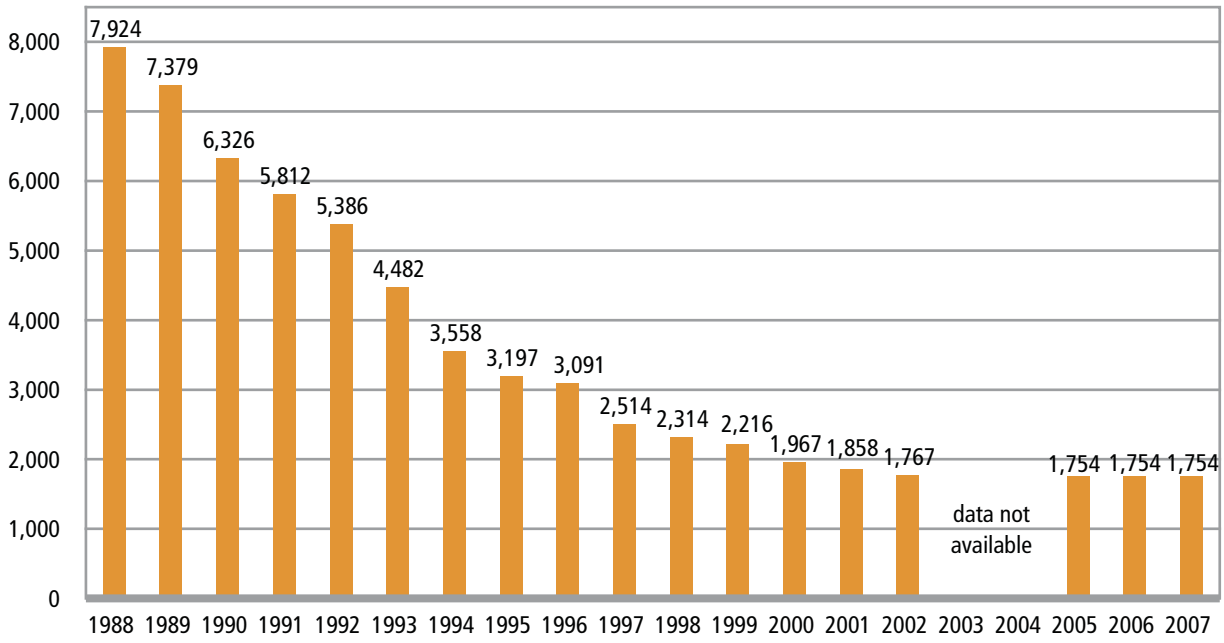
† Includes combustion of MSW in mass burn or refuse-derived fuel form, and combustion with energy recovery of source separated materials in MSW (e.g., wood pallets, tire-derived fuel).

‡ Discards after recovery minus combustion with energy recovery. Discards include combustion without energy recovery.

Details might not add to totals due to rounding.

** Source: For 2002 data: *BioCycle* 2006.
For 2007 data: EPA, *Municipal Solid Waste in the United States: 2007 Facts and Figures.*

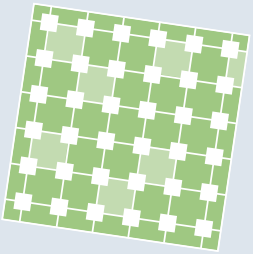
Figure 7. Number of Landfills in the United States, 1988 to 2007



Disposing of MSW

While the number of U.S. landfills has steadily declined over the years, the average landfill size has increased. At the national level, landfill capacity appears to be sufficient, although it is limited in some areas.

Recycling just 1 ton of aluminum cans conserves more than 207 million Btu, the equivalent of 36 barrels of oil, or 1,665 gallons of gasoline.



• Since 1990, the total amount of MSW going to landfills dropped by about 5 million tons, from 142.3 million to 137.2 million tons in 2007 (see Table 3).

• The net per capita discard rate (after recycling, composting, and combustion for energy recovery) was 2.50 pounds per person per day, similar to the 2.51 per capita rate in 1960, when virtually no recycling occurred in the United States (see Table 4).

The Benefits of Recycling

Recycling has environmental benefits at every stage in the life cycle of a consumer product—from the raw material with which it's made to its final method of disposal. Aside from reducing GHG emissions, which contribute to global warming, recycling also reduces air and water pollution associated with making new products from raw materials. By utilizing used, unwanted, or obsolete materials as industrial feedstocks or for new materials or products, we can each do our part to make recycling work.

Nationally, we recycled 85 million tons of MSW. This provides an annual benefit of 193 million metric tons of carbon dioxide equivalent emissions reduced, comparable to removing the emissions from 35 million passenger cars. But the ultimate benefits from recycling are cleaner land, air, and water, overall better health, and a more sustainable economy.

Resources

The report summarized in this fact sheet characterizes the MSW stream as a whole by using a materials flow methodology that relies on a mass balance approach. For example, to determine the amounts of paper recycled, information is gathered on the amounts processed by paper mills and made into new paper on a national basis, instead of counting paper collected at curbside on a state-by-state basis. Using data gathered from industry associations, businesses, and government sources, such as the U.S. Department of Commerce and the U.S. Census Bureau, we estimate tons of materials and products generated, recycled, and discarded. Other sources of data, such as waste characterizations and research reports performed by governments, industry, or the press, supplement these data.

Energy Recovered from Waste Combustion

- In 2007, approximately 31.9 million tons of materials, or 12.6 percent, were combusted for energy recovery.
- MSW combustion for energy recovery has remained fairly constant since 1990.

The benefits of recycling and composting, such as elimination of GHG emissions, are calculated using EPA's WARM methodology. Please see:

www.epa.gov/warm

WARM calculates and totals GHG emissions of baseline and alternative waste management practices—source reduction, recycling, composting, combustion, and landfilling. The model calculates emissions in metric tons of carbon equivalent (MTCE), metric tons of carbon dioxide equivalent ($MTCO_2E$), and energy units (million Btu) across a wide range of material types commonly found in MSW. EPA developed GHG emissions reduction factors through a life-cycle assessment methodology. EPA's report, *Solid Waste Management and Greenhouse Gases: A Life-Cycle Assessment of Emissions and Sinks* (EPA-530-R-02-006), describes this methodology in detail (www.epa.gov/climatechange/wycd/waste/downloads/fullreport.pdf).

In percentage of total MSW generation, recovery for recycling (including composting) did not exceed 15 percent until 1990. Growth in the recovery rate to current levels (33.4 percent) reflects a rapid increase in infrastructure and market demand for recovery over the last decade.

The full report on MSW characterization for 2007 and a summary of the WARM methodology are available on the EPA Web site along with information about waste reduction and recycling. Please see:

www.epa.gov/epawaste/nonhaz/municipal/msw99.htm

www.epa.gov/epawaste/conserve/rrr/index.htm

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Solid Waste and Emergency Response (5306P)
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EPA-530-F-08-018
November 2008
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