Municipal Solid Waste

Municipal solid waste (also called trash or garbage) is defined at the national level as wastes consisting of everyday items such as product packaging, grass clippings, furniture, clothing, bottles and cans, food scraps, newspapers, appliances, consumer electronics, and batteries. These wastes come from homes; institutions such as schools and hospitals; and commercial sources such as restaurants and small businesses. EPA's definition of municipal solid waste (MSW) does not include municipal wastewater treatment sludges, industrial process wastes, automobile bodies, combustion ash, or construction and demolition debris. Once generated, MSW must be collected and managed. Common management methods include recovery for recycling or composting, combustion (with the resulting energy used to generate electricity or steam in some cases), and landfill disposal. Many wastes that are disposed of in landfills represent a loss of materials that could be reused, recycled, or converted to energy to displace the use of virgin materials.

Before the 1970s, MSW disposal generally consisted of depositing wastes in open or excavated landfills, accompanied by open burning to reduce waste volumes. Often industrial hazardous wastes were co-disposed with municipal garbage and refuse in landfills. Historically, environmental problems associated with these older landfills have included ground water contamination, emissions of toxic fumes and greenhouse gases, land contamination, and increases in pest and disease vector populations (e.g., rodents, flies, mosquitoes). Landfills are now subject to federal or state requirements to minimize these environmental impacts.

Beyond the environmental impacts of disposal, patterns in MSW generation can help reveal a component of the total materials a society creates and uses, which is an important aspect of sustainability. Generally speaking, as a society creates and consumes more materials, it demands more resources (e.g., water, energy, minerals, land) and generates greater quantities of pollutants and waste. In the U.S., more than 90 percent of the raw materials extracted from the environment, transported, and processed are eventually discharged as waste or atmospheric emissions (Fiksel, 2006).

Historically, economic growth and increased prosperity have been correlated with increased material consumption (Fiksel, 2009). An important goal of sustainable development is a reduction in material use without a reduction in economic well-being. Because nationwide material flow data are somewhat limited, one alternative method to track material use reduction is to look at nationwide "waste material intensity," which can be measured in terms of waste generation per capita and per dollar of gross domestic product (GDP) (i.e., the total value of all goods and services produced in the U.S.). Generally, lower levels of waste intensity imply that society is using materials more efficiently and more sparingly. By consuming fewer materials, households, businesses, and society at large can achieve cost savings and reduce effects on the environment. The way in which MSW is managed provides some insights into society's move toward sustainability through how those wastes are managed—for example, recycling and composting represent the recovery of materials that can offset the use of new raw materials.

This indicator shows trends in the national generation and management of MSW, as well as trends in waste generation intensity on an annual basis from 1960 to 2014. MSW generation and management totals are estimated annually using a materials flow methodology and a mass balance approach that relies on production data (by weight) for materials and products that eventually enter the waste stream. These data are collected from industry associations, businesses, and government agencies. Exhibit 2 compares MSW trends with the official U.S. population and real (inflation-adjusted) GDP.

These data are indexed such that 1960 equals 1, which allows all variables to be plotted on the same scale.

What the Data Show

The total quantity of MSW generated in the U.S. grew steadily from 88 million tons (MT) in 1960 to a peak of 259 MT in 2014 (Exhibit 1). Of the MSW generated in 1960, 6 percent was recovered through recycling, and 94 percent was landfilled or disposed of using other methods (including burning) (Exhibit 1). In 2014, 26 percent of MSW was recycled, 9 percent was composted, 13 percent was combusted with energy recovery, and 53 percent was landfilled or disposed of using other methods (Exhibit 1). The last several decades have seen steady growth in recycling and composting, while the total amounts landfilled peaked in 1990 (145 MT) and have generally declined since then (136 MT in 2014). The total amounts combusted have remained fairly steady. Disposal practices have also been influenced by the development of large waste-to-energy facilities, particularly during the 1980s.

Overall, from 1960 to 2014, total MSW generation in the U.S. increased by 193 percent. During this time, the U.S. population increased by 76 percent, and the size of the U.S. economy as measured by real GDP grew by 414 percent. MSW generation per capita increased by 70 percent from 1960 to 1990 (from 2.7 to 4.6 pounds per person per day), but has leveled off since then. MSW generation per dollar GDP has decreased steadily over the last five decades, with a 43-percent decrease from 1960 to 2014 (Exhibit 2).

Limitations

- The data in this indicator are derived from economic statistics on materials generation and estimates of the life cycle of goods, rather than from direct measurements of wastes disposed of. As a result of differences in methodologies, the figures reported in this indicator do not match estimates of MSW reported elsewhere (e.g., *BioCycle*). However, the four management methods shown in Exhibit 1 are rigorously defined and consistent from year to year, allowing for reliable long-term trend analyses.
- The data presented on landfills represent the amount of waste disposed of in landfills, but do not indicate the capacity or volume of landfills or the amount of land used for managing MSW. Land used for recycling facilities and waste transfer stations also is not included in this indicator. Data to describe the amount of land used or total capacity of landfills are not available nationally.
- The data also do not indicate the status or effectiveness of landfill management or the extent to which contamination of nearby lands does or does not occur.
- Exhibit 2 does not necessarily indicate the extent to which waste is being generated and managed at environmentally "sustainable" levels (i.e., levels that will not adversely impact the environment for future generations).
- MSW intensity can only reflect national-scale materials use intensity to a limited degree. Because of international trade, materials extracted or produced in one country may end up being managed as waste in another. This indicator covers waste managed in the U.S., regardless of country of origin.

Data Sources

Exhibits 1 and 2 are derived from estimates developed for EPA's annual MSW characterization

reports (U.S. EPA, 2016). Although the documents EPA publishes annually show primarily decadal data, EPA maintains annual data since 1960 (unpublished) that are used for this indicator. Additionally, Exhibit 2 incorporates GDP data obtained from the U.S. Bureau of Economic Analysis (BEA, 2017) and population data from the U.S. Census Bureau (2000, 2001, 2011, 2016).

References

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U.S. Census Bureau. 2016. Annual estimates of the resident population for the United States, regions, states, and Puerto Rico: April 1, 2010 to July 1, 2016 (NST-EST2016-01). Released December 2016. https://www.census.gov/data/tables/2016/demo/popest/nation-total.html.

U.S. Census Bureau. 2011. Intercensal estimates of the resident population by sex and age for the United States: April 1, 2000 to July 1, 2010 (US-EST00INT-01). Released September 2011. https://www.census.gov/data/tables/time-series/demo/popest/intercensal-2000-2010-national.html.

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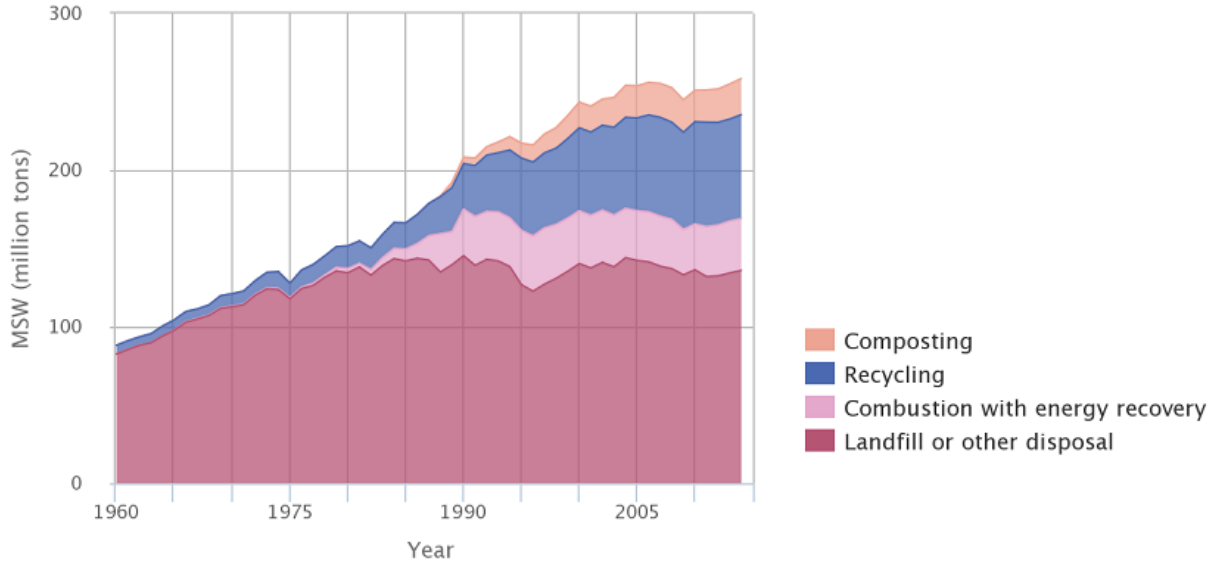
U.S. Census Bureau. 2000. Historical national population estimates: July 1, 1900 to July 1, 1999. Released April 2000. https://www.census.gov/population/estimates/nation/popclockest.txt.

U.S. EPA (U.S. Environmental Protection Agency). 2016. Advancing sustainable materials management: 2014 fact sheet. Accessed January 2017. https://www.epa.gov/sites/production/files/2016-11/documents/2014_smmfactsheet_508.pdf (PDF) (22 pp, 2.9MB).

Exhibit 1. Municipal solid waste generated and managed in the U.S., 1960–2014

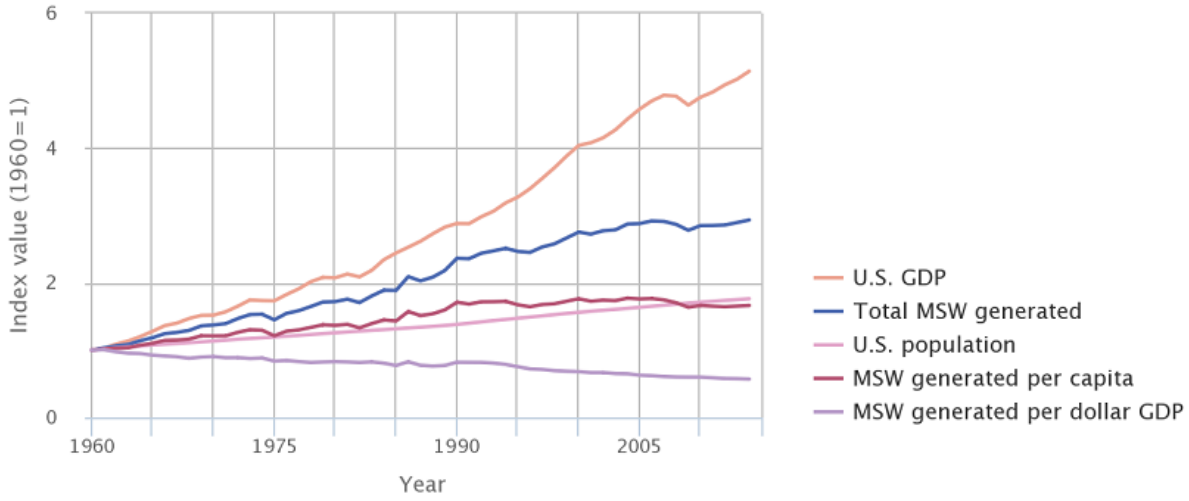


No composting data are available prior to 1988. "Landfill or other disposal" includes combustion without energy recovery.

Information on the statistical significance of the trends in this exhibit is not presented here. For more information about uncertainty, variability, and statistical analysis, view the technical documentation for this indicator.

Data source: U.S. EPA, 2016

Exhibit 2. Intensity of U.S. municipal solid waste generation, 1960–2014



Based on real (inflation-adjusted) GDP.

Information on the statistical significance of the trends in this exhibit is not presented here. For more information about uncertainty, variability, and statistical analysis, view the technical documentation for this indicator.

Data source: BEA, 2017; U.S. Census Bureau, 2000, 2001, 2011, 2016; U.S. EPA, 2016