2013 Report Card for America's Infrastructure Findings

In 2010, Americans generated 250 million tons of trash. Of that, 85 million tons were recycled or composted. This represents a 34% recycling rate, more than double the 14.5% in 1980. Per capita generation rates of waste have been steady over the past 20 years and have even begun to show signs of decline in the past several years.

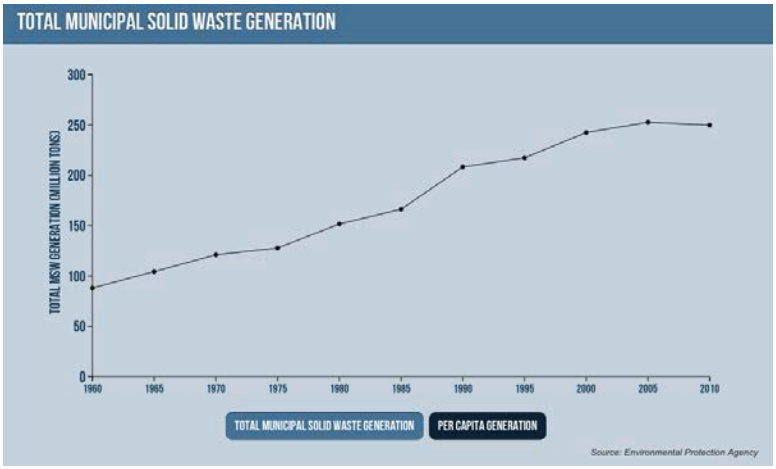
Solid Waste: Conditions & Capacity


Recycling bins in Cupertino, California
Courtesy of Flickr/Peter Kaminski

In 2010, the United States produced 250 million tons of municipal solid waste (MSW) of all types—an increase from the 243 million tons produced in 2009, but down from the 255 million tons produced in 2007. These numbers can be compared to the 88 million tons produced in 1960 and the 151 million tons produced in 1980. This increase can be attributed in part to increased population. Organic materials continue to be the largest component of solid waste. Paper and paperboard account for 29% and yard trimmings and food scraps account for another 27%. Other materials include plastics, which make up 12%; metals at 9%; rubber, leather, and textiles at 8%; wood at 6%; glass at 5%; and other miscellaneous waste make up 3%.

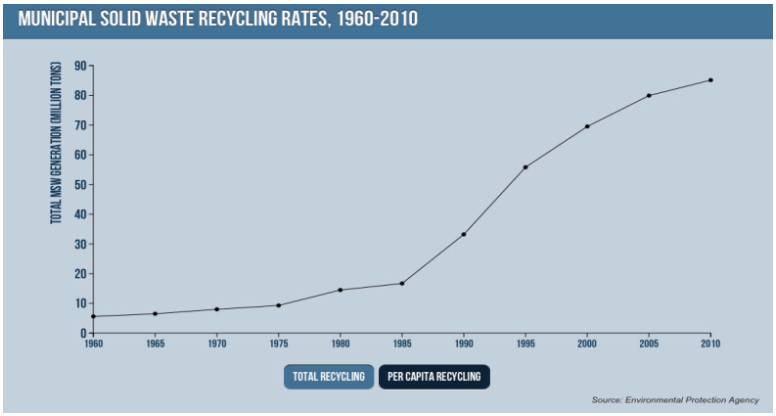
The Environmental Protection Agency (EPA) reports that the number of landfills has steadily declined over the years; however, the average size of each landfill has increased. At the national level, landfill capacity is sufficient, although there are some local areas where capacity is an issue. Federal and state regulations require that solid waste landfills include features that protect the environment from contaminants which may be

present in the solid waste stream, including siting plans to avoid environmentally sensitive areas, as well as on-site environmental monitoring systems which sense any sign of groundwater contamination or landfill gas. In addition, landfills must collect potentially harmful landfill gas emissions.



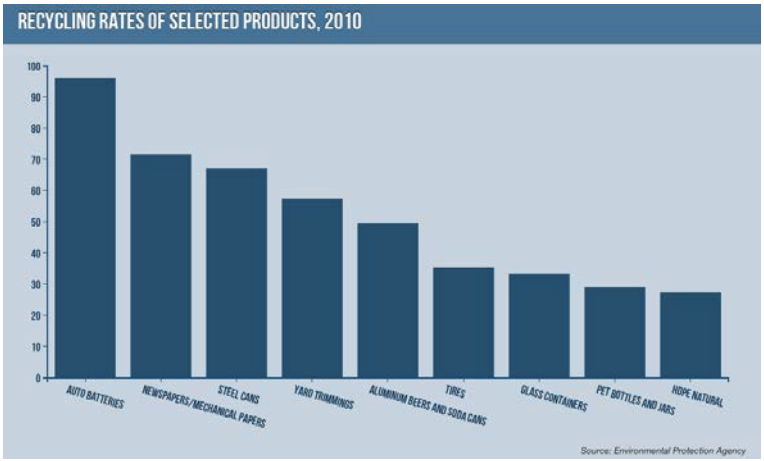
Diesel-fueled waste collection vehicles have traditionally been the backbone of the waste collection industry. The recent relatively low price of natural gas compared to the price of diesel fuel has increased the interest of the industry in natural gas as an alternative fuel. Waste collection and transfer vehicles currently account for 11% of the total of U.S. natural gas vehicles.

In the last several decades, the recycling and composting of MSW has changed dramatically. While the per-person generation of solid waste increased from 3.66 to 4.43 pounds per day between 1980 and 2010, the recycling rate has also increased from less than 10% of MSW generated in 1980 to about 34% in 2010. The percentage of MSW disposed in landfills has therefore decreased, from 89% in 1980 to about 54% in 2010. Since 1990, the total amount of MSW going to landfills has dropped from 145 million to 135 million tons in 2010. The net per capita discard rate (after recycling, composting, and combustion for energy recovery) was 2.4 pounds per person per day, lower than the 2.5 pounds per day in 1960.



Recycling and composting diverted 85 million tons (approximately 34%) from being disposed of in landfills in 2010, up from just 15 tons recycled in 1980. This recycling and composting also avoided the release of approximately 186 million metric tons of carbon dioxide equivalent into the air in 2010, roughly equal to removing 36 million cars from the nation's roads for one year. Recycling recovered about 65 million tons of waste in 2010, including 72% (7 million tons) of newspaper and 35% of metals (8 million tons). Additionally, composting diverted over 20 million tons of wastes, including 58% of yard trimmings.

One area of concern continues to be the growing amount of used electronics being disposed of. In addition to the loss of valuable resources contained in electronics such as copper, gold, aluminum, electronics have the potential to leak toxic substances with known adverse health effects. The EPA estimates that 438 million electronic products were sold in 2009, which



represents a doubling of sales from 1997, driven by a ninefold increase in mobile device sales. That same year, the EPA found that only about 25% of electronics were collected for recycling, with computers collected at the highest rate (38%).

Solid Waste Landfill, Houston, Texas
Courtesy of Michael Glasgow

Food waste makes up 13.9% of MSW generated; however, only about 2.8% is recovered or recycled, with the rest being disposed of in landfills. Because food waste degrades rapidly, collection of gas produced by food waste is not economically feasible. Separate collection of residential food waste makes it cost-prohibitive and was the primary deterrent to expanding food waste recovery efforts. Yet in many communities, edible food residuals are donated to the needy, while inedible food residuals are blended into compost or reprocessed into animal feed. In some areas, composting operations are working with high-volume commercial and institutional food producers to recover their food byproducts, saving these firms significant disposal costs. On average, Americans throw away 25-30% of their food purchases.

Combustion with energy recovery diverted an additional 29 million tons (11.7%) of solid waste, but these results could improve. Energy recovery from waste is the conversion of nonrecyclable waste materials into useable heat, electricity, or fuel through a variety of processes, including combustion, gasification, pyrolization, anaerobic digestion, and landfill gas (LFG) recovery. Energy recovery, or "waste-to-energy" as it is often called, produced approximately 2,720 megawatts of electricity in 2010, about 0.2% of total power generated and consumed in the United States that year. Advances in technology for recovering energy from waste hold promise as an alternative to land disposal and current waste-to-energy practices. Recovery of methane from decaying waste in more than 550 MSW landfills also provides a renewable fuel for electricity generation while reducing greenhouse gas emissions. According to the EPA, the benefits are the equivalent of cutting oil consumption by 58 million barrels a year and not burning 373,000 railcars of coal a year.

The fragmented and local-based nature of the waste disposal industry makes pinpointing its size difficult. A 2001 snapshot of the U.S. waste disposal enterprise showed that an estimated 27,000 organizations, private sector companies, and public or quasi-government organizations were providing solid waste collection and/or disposal in the United States. More than 55% of these were in the public sector, while the remaining, approximately 45%, were privately held.

Solid Waste: Investment & Funding

In the United States, city and county governments are responsible for solid waste disposal and recycling. Each individual municipality can choose whether to provide these services itself or can contract these services out to private companies. Solid waste collection is paid for either through local taxes or direct fees charged for the service.

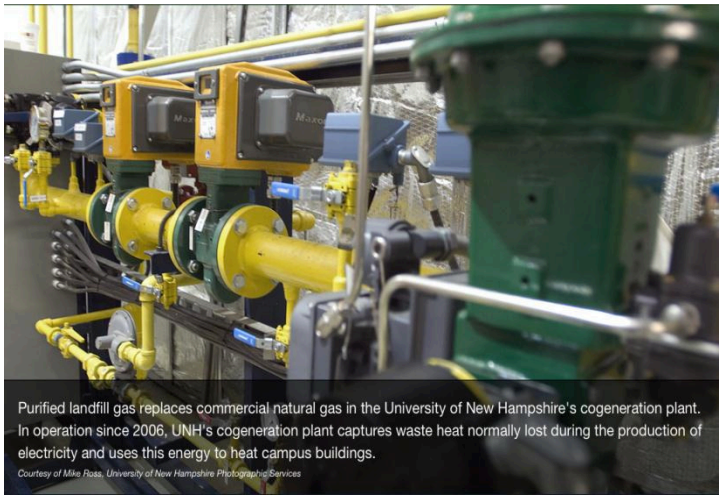
The U.S. solid waste industry grew just 2% in 2011 to $55 billion in 2011. The industry accounts for approximately one-half of 1% of the gross domestic product (GDP) of the United States, producing $96 billion and 948,000 jobs for the U.S. economy.

Solid Waste: Success Stories

UNH Uses Trash to Light Campus

The University of New Hampshire (UNH)'s EcoLine is a landfill gas-to-energy project that uses purified methane gas from a Waste Management landfill to provide up to 85 percent of campus power. Started in May of 2009, UNH is the first university in the nation to use recovered landfill gas as its primary energy source.

Landfill gas, which is about 50 percent methane and 50 percent carbon dioxide and water vapor, is produced by decomposing organic waste in landfills. Usually, the landfill will collect and burn off this excess gas, which can become explosive if it is not managed. However, by using a series of pipe lines and gas wells, the landfill gas is collected and transported to a processing facility where it is purified to remove a majority of the carbon dioxide, water vapor, and other trace elements. After processing, the gas is now about 98 percent methane, which travels down 12 miles of pipeline to UNH's cogeneration plant to produce electricity and heat for the 5 million square-foot campus.



Purified landfill gas replaces commercial natural gas in the University of New Hampshire's cogeneration plant. In operation since 2006, UNH's cogeneration plant captures waste heat normally lost during the production of electricity and uses this energy to heat campus buildings.

Courtesy of Mike Ross, University of New Hampshire Photographic Services

Cherry Island Vertical Expansion

To meet the growing demands for solid waste disposal space, the Delaware Solid Waste Authority planned to expand its Cherry Island Landfill. Located on reclaimed land composed of dredge spoils, the landfill was nearing capacity, with limited options for expansion. Originally constructed in 1985 on an area that was partly reclaimed from the Delaware River, the site was used for many years as a dredged material disposal site for the U.S. Army Corps of Engineers.

The subsurface characteristics at the site consist of very soft and extremely compressible materials, and previous stability analysis indicated that the capacity of the landfill for expansion was limited. The site was expected to reach its capacity by 2006. Engineers used an innovative solution that included a foundation improvement technique that used prefabricated vertical drains (PVDs) combined with a mechanically stabilized earth (MSE) berm that permitted the creation of additional air space on top of the existing landfill.

Solid Waste Landfill, Houston, Texas

Courtesy of Michael Glasgow

The expansion will add an additional 20.7 million yards of capacity and a cost-effective 19 years of additional disposal life for the landfill.

Solid Waste: Conclusion

Innovative technologies and recycling efforts have proven successful in improving the safety, sustainability, and efficiency of the nation's waste disposal system. However, the continued under-use of waste-to-energy practices highlights the need for research and development of new policies and management practices.

Raising the Grades: Solutions that Work Now

- **Implement a comprehensive approach to waste management** that reduces the volume of waste landfilled, increases the amount of materials recovered and recycled, and reduces the emissions of greenhouse gases from landfills
- **Support the Environmental Protection Agency (EPA)'s Resource Conservation Challenge** (RCC) strategic plan, with goals of achieving the national recycling rate of 40% for municipal solid waste (MSW), beneficial use of secondary materials, priority and toxic chemical reduction, and reuse and recycling for electronics
- **Encourage greater use of landfill gas to energy conversion** to reduce greenhouse gas emissions and create new energy resources
- **Allow the interstate movement of municipal solid waste** to new regional landfills that meet all federal requirements
- **Implement source reduction policies** that call for better design, packaging, and life span of commercial products
- **Develop national standards** to promote proper, effective, and efficient collection and recycling of waste electronics
- **Decrease the environmental impact of waste collected** through use of renewable energy sources and optimize operation of waste collection vehicles