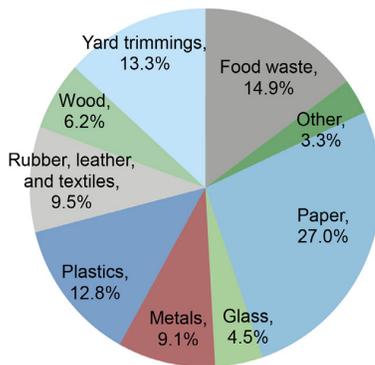




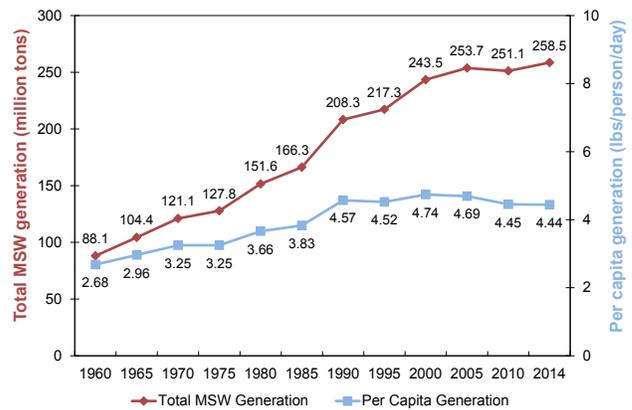
## Municipal Solid Waste

Municipal Solid Waste (MSW), commonly called “trash” or “garbage,” includes wastes such as durable goods (e.g., tires, furniture), nondurable goods (e.g., newspapers, plastic plates/cups), containers and packaging (e.g., milk cartons, plastic wrap), and other wastes (e.g., yard waste, food). This category of waste generally refers to common household waste, as well as office and retail wastes, but excludes industrial, hazardous, and construction wastes. The handling and disposal of MSW is a growing concern as the volume of waste generated in the U.S. continues to increase.<sup>1</sup>

U.S. MSW Composition, 2014<sup>1</sup>



U.S. Annual MSW Generation<sup>1</sup>



### Generation Statistics

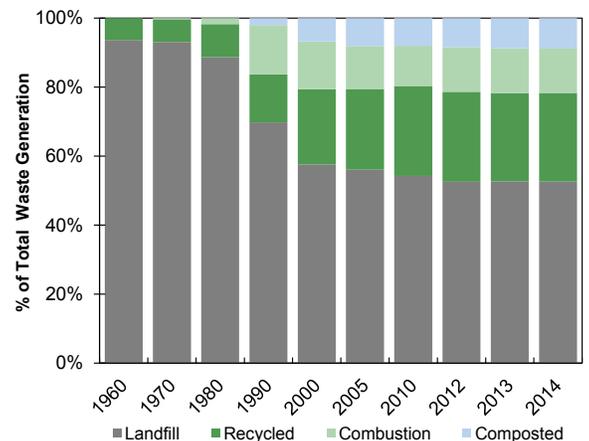
- Total annual MSW generation in the U.S. has increased by 71% since 1980, to the current level of about 259 million tons per year.<sup>1</sup>
- Per capita MSW generation increased by 21% over the same time period, from 3.7 pounds to 4.4 pounds per person each day, although per capita generation has decreased slightly since 1990.<sup>1</sup> For comparison, MSW generation rates (in lbs/person/day) are 2.8 in Sweden, 3.7 in Germany, and 2.9 in the United Kingdom.<sup>2</sup> At the current per capita rate, an average American weighing 180 pounds generates their own weight in MSW every 41 days.<sup>3</sup>
- The generation of MSW from private consumption in the U.S. is approximately \$21.32 per pound or 47 lbs per thousand dollars. Comparable generation rates (in lbs/thousand dollars) are 40 in the UK, 50 in Sweden, and 61 in Germany.<sup>2</sup>
- Packaging, containers, and nondurable goods (including papers and plastics that last under 3 years) made up over 50% of MSW generation in 2014. Most of the remainder was split between durable goods, yard trimmings, and food waste.<sup>1</sup>

### Management Methods

#### Landfill

- In 2014, 52.6% of MSW generated in the U.S. was disposed of in 1,908 landfills.<sup>1,4</sup>
- While the total number of landfills in the U.S. has steadily declined, total capacity has increased.<sup>1</sup> The 2016 combined capacity of the two largest landfill corporations in the U.S. was close to 10 billion cubic yards.<sup>5</sup>
- Landfill disposal fees, or “tipping” fees, in the U.S. currently average \$44 per ton, with a high of \$96 per ton in Vermont.<sup>6</sup>
- Environmental impacts of landfill disposal include loss of land area, emissions of methane (CH<sub>4</sub>, a greenhouse gas) to the atmosphere, and potential leaching of hazardous materials to groundwater, though proper design reduces this possibility.<sup>7,8</sup>
- Landfills were the third largest source of U.S. anthropogenic CH<sub>4</sub> emissions in 2015, accounting for 116 million metric tons CO<sub>2</sub>-equivalent emissions, about 1.8% of total GHG emissions. 58% of landfill-produced CH<sub>4</sub> is recovered and combusted into CO<sub>2</sub> through flaring or electricity generation.<sup>7,9</sup>

MSW Management in the U.S.<sup>1</sup>



## Combustion

- In 2014, 12.8% of MSW generated in the U.S. was disposed of through waste incineration with energy recovery.<sup>1</sup>
- Combustion reduces waste by about 75% (by weight), leaving behind a residue called ash. A majority of this ash is landfilled, although recent attempts have been made to reuse the residue.<sup>11</sup>
- Biogenic MSW (paper, food, and yard trimmings) was converted into energy to provide 168 trillion Btu in 2009, less than 0.2% of total U.S. energy consumption.<sup>12</sup>
- In 2014, 84 waste-to-energy facilities were in operation in the U.S., with a combined capacity to generate 2,769 megawatt-hours of electricity.<sup>13</sup>
- Incineration of MSW generates a variety of pollutants (CO<sub>2</sub>, heavy metals, dioxins, particulates) that contribute to impacts such as climate change, smog, acidification, asthma, and heart and nervous system damage.<sup>14</sup>

## Recycling and Composting

- In 2014, 34.6% of MSW generated in the U.S. was recovered for recycling or composting, diverting 89 million tons of material from landfills and incinerators—2.7 times the amount diverted in 1990.<sup>1</sup>
- Composted materials represent nearly 26% of all recovered MSW.<sup>1</sup>
- Curbside recycling programs currently serve over 70% of people in the U.S.; almost two-thirds of these are single-stream, meaning materials such as glass and paper are separated at the recycling plant.<sup>11</sup> The number of curbside programs in the U.S. has increased more than threefold since 1990.<sup>11,15</sup>
- 90% of corrugated boxes were recovered for recycling in 2014; other commonly recycled products include lead-acid batteries (99%), newspapers (68%), major appliances (58%), and aluminum beverage cans (55%).<sup>4</sup>
- Common products with poor recycling rates include: carpet (6%), small appliances (6%), and furniture (0.01%).<sup>11</sup>

## Solutions and Sustainable Alternatives

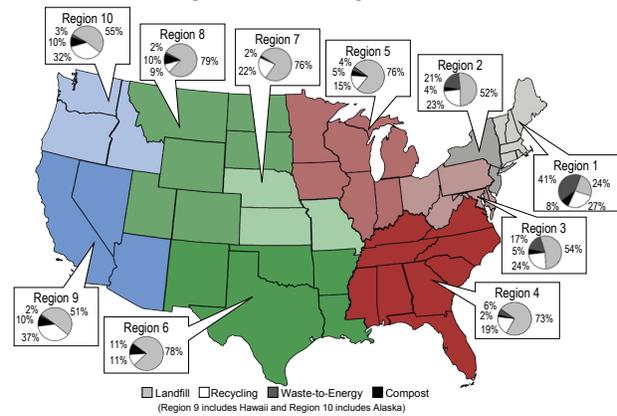
### Source Reduction

- Source reduction activities help prevent materials from entering the MSW stream and are the most effective way to reduce waste generation.<sup>16</sup>
- Packaging and containers made up 30% of the MSW generated in 2014. Minimize the volume of packaging material required by selecting products packaged efficiently or buying in bulk.<sup>1</sup>
- Identify opportunities to reuse materials in the home or community. Purchase items like furniture and appliances from reuse centers and consignment shops.
- Purchase products with post-consumer recycled content and encourage companies to implement source reduction programs.
- More than one million tons of plastic plates and cups were disposed of in 2013. Choose reusable plates, cups, and silverware over disposable goods.<sup>11</sup>
- Food waste makes up 14.9% of MSW in the U.S., and only 5% is recovered or composted. Reduce food waste through efficient meal planning and composting of scraps.<sup>1</sup>

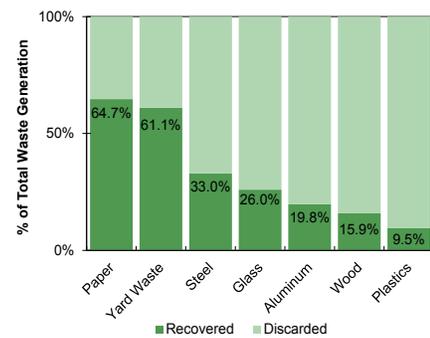
### Encourage Supportive Public Policy

- Many communities have implemented Pay-As-You-Throw programs, designed to limit the volume of MSW per household by charging residents for waste collection based on the amount they throw away.<sup>17</sup>
- In 2013, the U.S. Department of Agriculture and Environmental Protection Agency launched the U.S. Food Recovery Challenge, with a goal to divert food from landfills by donating to food charities, composting, and generating electricity through anaerobic digestion of food scraps.<sup>18</sup>
- Implementation of curbside recycling and composting programs where currently unavailable can help reduce the burden of waste disposal.
- Although most states restrict landfill disposal of certain materials, some states do not restrict the disposal of potentially hazardous items (e.g., oil, batteries, scrap tires, and electronics).<sup>6</sup> Many of these are difficult to recycle and have limited management options.
- Ten states (CA, CT, HI, IA, ME, MA, MI, NY, OR, and VT) have deposit laws that encourage the return of empty beverage containers for refunds.<sup>11</sup>

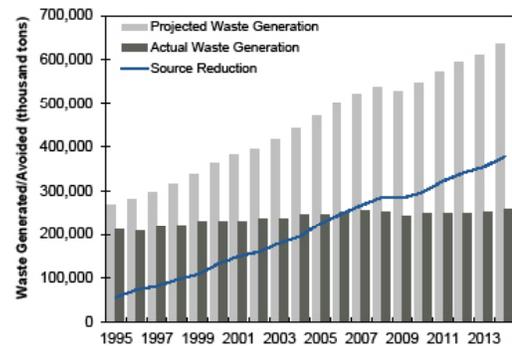
Regional MSW Management, 2010<sup>10</sup>



Recovery of Materials in MSW, 2014<sup>1</sup>



U.S. Source Reduction<sup>1,19,20</sup>  
(1990 Baseline)



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