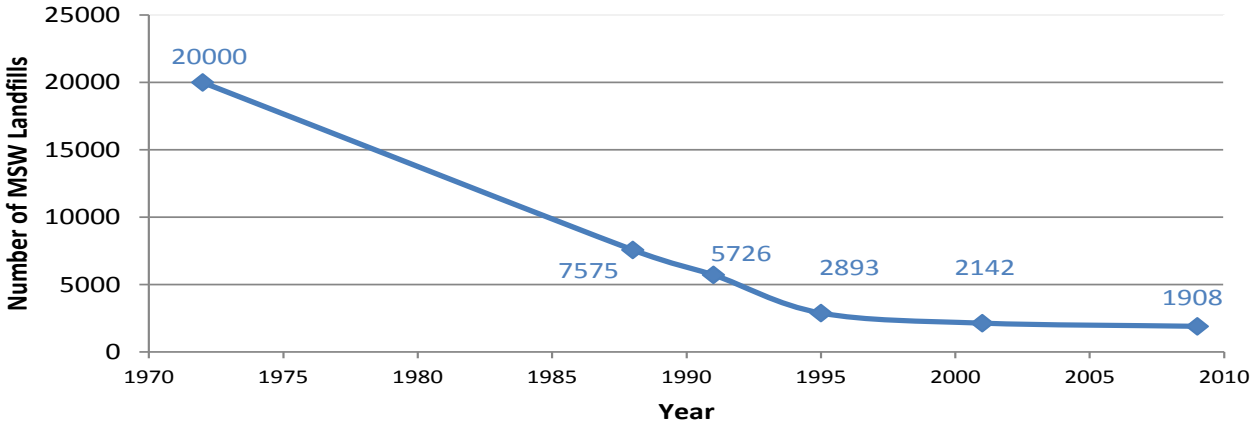
MUNICIPAL SOLID WASTE LANDFILL FACTS

Landfilling remains the most common way to dispose of municipal solid waste (MSW) in the United States (U.S.). According to the U.S. Environmental Protection Agency (EPA), of the 249.86 million tons of MSW generated in 2010, 135.65 million tons (54.3%) were landfilled. Landfills have received approximately the same amount of MSW since 1980 despite a steady decline in landfill numbers. In the 1970s, some 20,000 landfills existed and most were unlined dumps. As a result of stringent federal and state regulations, there are slightly more than 1,900 MSW landfills. Figure 1 shows the decline in MSW landfills over time.

Figure 1. Number of MSW Landfills



Although the number of MSW landfills has declined with time, national capacity has not changed significantly because older MSW landfills tended to be smaller and more numerous. These landfills may have closed to avoid the cost of new federal and state regulations. Older landfills were replaced by newer, larger landfills supported by greater intra- and inter-state wastesheds. Table 1 lists the largest landfill by state in 2010. Slightly more than 40 percent of the states (21) had a landfill that received in excess of 1,000,000 tons per year. Generally, these very large landfills are located in highly populated states or near major population centers.

LANDFILL TIPPING FEES

The cost of waste disposal at an MSW facility is referred to as the tipping fee. Many tipping fees exist at a facility, but the most commonly referenced tipping fee is the spot market tip fee (i.e., the drive-up cost to dispose of a single ton of MSW). Figure 2 shows the average national tip fees at landfills from 1985 to 2010. A regression analysis (R^2=0.9293) of the data showed a statistically significant correlation between tipping fees and time. Figure 2 shows that tipping fees have increased on average by $1.24 per year.

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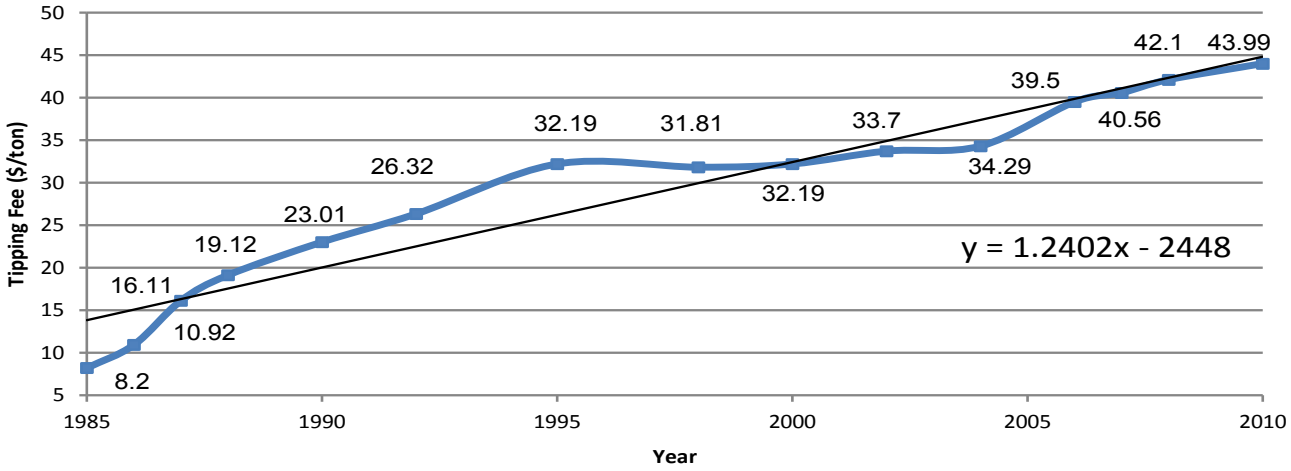
TABLE 1. LARGEST LANDFILLS BY STATE

(*Waste & Recycling News*, 2011)

State	Landfill	Location	2010 Tonnage
Alabama	Sand Valley	Collinsville	353,328
Alaska	Anchorage Regional	Anchorage	318,000
Arizona	Butterfield Station	Mobile	1,565,473
Arkansas	Two Pine	Jacksonville	467,692
California	El Sobrante	Corona	2,025,468
Colorado	Denver Arapahoe	Aurora	1,766,028
Connecticut	Manchester	Manchester	86,845
Delaware	Northern SWM Center 2	Wilmington	395,171
Florida	Central Disposal	Pompano Beach	1,171,000
Georgia	Chesser Island Road	Folkston	1,522,766
Hawaii	PVT	Nanakuli	214,660
Idaho	Hidden Hollow	Boise	468,000
Illinois	Orchard Hills	Davis Junction	1,995,167
Indiana	Newton County	Brook	2,317,994
Iowa	Metro Park East	Mitchellville	498,635
Kansas	Johnson County	Shawnee	1,122,727
Kentucky	Outer Loop	Louisville	648,352
Louisiana	River Birch	Avondale	1,156,716
Maine	Juniper Ridge	Old Town	561,757
Maryland	Brown Station	Upper Marlboro	452,708
Massachusetts	Fall River	Fall River	236,422
Michigan	Pine Tree Acres	Lenox	1,610,321
Minnesota	Elk River	Elk River	391,293
Mississippi	Clearview	Lake	415,578
Missouri	Fred Weber	Maryland Heights	1,040,605
Montana	Missoula	Missoula	236,058
Nebraska	Pheasant Point	Omaha	586,349
Nevada	Apex Regional	Las Vegas	3,341,591
New Hampshire	Turnkey	Rochester	827,197
New Jersey	Gloucester County	South Harrison	587,753
New Mexico	Camino Real	Sunland Park	622,157
New York	Seneca Meadows	Waterloo	2,013,723
North Carolina	Charlotte Motor Speedway	Concord	1,076,806
North Dakota	Fargo	Fargo	207,423
Ohio	Hughes Road	Colerain Township	1,958,484
Oklahoma	Oklahoma City	Oklahoma City	583,400
Oregon	Columbia Ridge	Arlington	1,864,427
Pennsylvania	Grows North	Morrisville	1,545,106
Rhode Island	Central	Johnston	1,091,235
South Carolina	Richland	Elgin	956,061
South Dakota	Sioux Falls	Sioux Falls	248,825
Tennessee	Middlepoint	Murfreeboro	894,927
Texas	McCarty Road	Houston	1,793,086
Utah	Wasatch Regional	Tooele County	569,400
Vermont	Waste USA	Coventry	370,000
Virginia	Atlantic Waste	Waverly	1,721,159
Washington	Roosevelt Regional	Roosevelt	1,245,409
West Virginia	Meadowfill	Clarksburg	365,270
Wisconsin	Orchard Ridge	Menomonee Falls	980,796
Wyoming	Casper	City of Casper	118,300

Figure 2. MSW Landfil Tipping Fees



Between 1987 and 1995, tipping fees increased steadily at $2.36 per year. This increase was likely caused by states implementing the federal Resource Conservation and Recovery Act (RCRA) Subtitle D regulations or their state equivalents. Tipping fees remained relatively constant between 1995 and 2004. From 2004 to 2010 tipping fees rose at a rate similar to the 1987 to 1995 period at $1.95 per year. This increase was probably caused in part to rising fuel costs.

GAS-TO-ENERGY PROJECTS

MSW is comprised of more than 60 percent biomass, including paper and paperboard (28.5%), food scraps (13.9%), yard trimmings (13.4%), and wood (6.4%). When this biomass is safely managed in an MSW landfill, it has the ability to produce landfill gas that is comprised approximately of equal parts of methane and carbon dioxide with a trace amount of non-methane organics. Because methane is a combustible gas, MSW landfills have installed gas collection and destruction systems (e.g., flares, internal combustion engines, turbines, or boilers). These destruction devices can be linked to systems that capture the energy commonly referred to as landfill gas-to-energy (LFGTE) projects. These LFGTE projects have been around since the late 1970s, providing renewable energy in the form of electricity and direct use of the gas as an alternative fuel.

In June 2012, some 594 operational LFGTE projects existed in 47 states according to EPA's Landfill Methane Outreach Program (LMOP), i.e., only Alaska, Hawaii, and Wyoming did not have projects. These landfills produced 1,813 megawatts (MW) of electricity that is sufficient to power 1,070,463 homes and 312 million standard cubic feet per day (mmscfd) of gas for direct use that could heat 736,361 homes.

LMOP believes that there is approximately 540 candidate landfills that could be utilizing collected landfill gas. If projects were developed at these landfills, an additional 1,212 MW or 590 mmscfd of gas for direct use. Table 2 provides the states with operational landfill GTE projects and the number of candidate projects.

According to EPA, the estimated environmental benefits of LFGTE projects in 2011 were equivalent to:

- The amount of GHG emissions from 20,044,488 passenger vehicles; or
- The carbon sequestered annually by 21796,779 acres of pine or fir forests or,
- The carbon dioxide emissions from consuming more 11,461,413,766 gallons of gasoline.

TABLE 2. OPERATIONAL AND CANDIDATE LANDFILL GAS-TO-ENERGY PROJECTS

State/Territory	Operational Projects	Candidate Landfills
Alabama	4	24
Alaska	0	3
Arizona	3	17
Arkansas	4	7
California	75	37
Colorado	2	13
Connecticut	3	3
Delaware	3	*
Florida	18	19
Georgia	17	23
Hawaii	0	8
Idaho	3	3
Illinois	33	25
Indiana	22	14
Iowa	4	15
Kansas	6	8
Kentucky	7	20
Louisiana	6	7
Maine	2	2
Maryland	10	12
Massachusetts	21	4
Michigan	39	8
Minnesota	8	4
Mississippi	3	11
Missouri	13	16
Montana	2	3
Nebraska	2	5
Nevada	1	3
New Hampshire	8	2
New Jersey	18	4
New Mexico	2	6
New York	28	5
North Carolina	23	30
North Dakota	2	1
Ohio	22	21
Oklahoma	4	14
Oregon	8	3
Pennsylvania	40	10
Puerto Rico	0	12
Rhode Island	2	*
South Carolina	14	8
South Dakota	1	1
Tennessee	9	9
Texas	27	57
Utah	4	7
Vermont	5	*
Virgin Islands	0	1
Virginia	30	15
Washington	6	8
West Virginia	2	8
Wisconsin	28	6
Wyoming	0	2
Totals	**594**	**540**

* Data not available.