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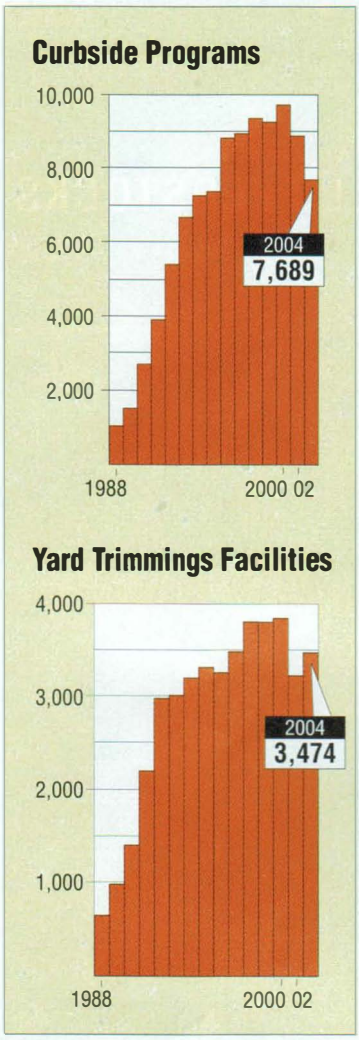
15th Nationwide Survey

The State of Garbage In America

TRANSPORTING ORGANICS – FROM FEEDSTOCKS TO PRODUCTS

POSITIVE STEPS IN BUILDING COMPOST MARKETS • EROSION CONTROL IN CALIFORNIA

ENERGY RECOVERY FROM BIOSOLIDS TREATMENT • CLOSING THE LOOP ON ANAEROBIC DIGESTION



15th NATIONWIDE SURVEY OF MUNICIPAL SOLID WASTE MANAGEMENT IN THE UNITED STATES

THE STATE OF GARBAGE

A joint study by BioCycle and the Earth Engineering Center of Columbia University

Latest national data on MSW management — 28.5% recycled and composted, 7.4% combusted in WTE plants and 64.1% landfilled.

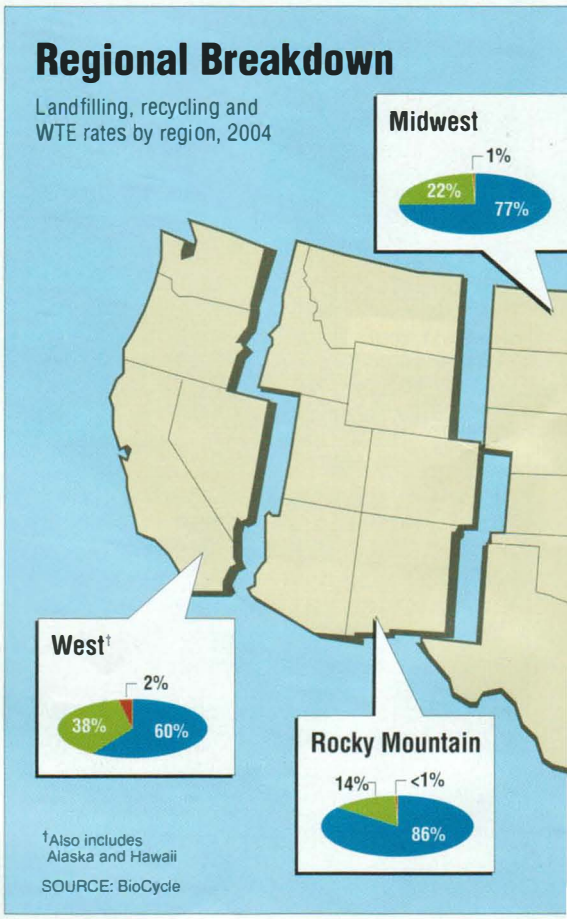
Phil Simmons, Nora Goldstein, Scott M. Kaufman, Nickolas J. Themelis and James Thompson, Jr.

BioCycle is pleased to produce the State of Garbage in America Report, providing a picture on how municipal solid waste (MSW) is handled throughout the United States. For this 15th nationwide survey, which began in 1989, *BioCycle* continued its collaboration with Columbia University's Earth Engineering Center(EEC), relying on the methodology developed through the collaboration and initially used in the 2004 State of Garbage survey. The 2006 State of Garbage in America (SOG) survey conducted over the fall/winter of 2005 and 2006 collected and reports on calendar year 2004 data provided by individual states (where available).

Prior to 2004, *BioCycle* had requested estimates of the amount of waste generated and disposed in each state. Recycling rates, as a percent of the total municipal solid waste stream (MSW) were also requested, filling out the picture of waste management techniques for each state and the nation.

The new methodology launched in 2004 requested tons of materials for each of the major categories of MSW management — tons recycled (including tons composted), tons combusted at waste-to-energy (WTE) facilities (includes MSW combusted without energy recovery — less than 1% of total MSW combusted), and tons landfilled. These categories were added together to provide an estimate of the total MSW stream for each state and the nation. The tonnages also were used to calculate state and national recycling rates. By adopting a tonnage-based approach, it was felt that a truer picture of municipal waste management was obtained.

The information in this article is the culmination of the second *BioCycle*/EEC collaboration, conducted by the authors of this report using 2004 data. The national picture of the State of Garbage in America is: Of an estimated total of 388 million tons of MSW generated, 28.5 percent is recycled and composted, 7.4 percent is combusted in waste-to- energy plants and 64.1 percent is landfilled. The invaluable contributions of the state solid waste and recycling officials providing data (see sidebar) are most appreciated.

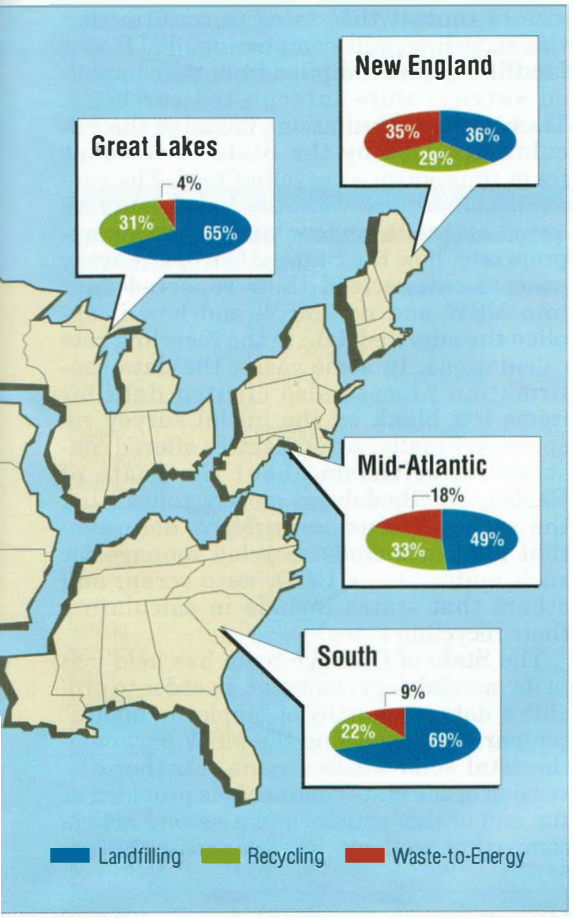


ORIGINAL METHODS

The 2004 State of Garbage in America survey report, published in the January 2004 issue of *BioCycle*, utilized MSW management data from calendar year (CY) 2002 as reported by individual states. The fundamental approach to the 2004 and 2006 State of Garbage In America surveys was to request all data in actual tonnages. In prior surveys, *BioCycle* asked states to provide the annual tons of MSW generated and a percent breakdown of tons recycled, composted, combusted, and landfilled. The tonnages of MSW recycled, combusted and landfilled were calculated using the percentage breakdowns and MSW generation tons for each state. Those tonnages (based on weighted averages) were used to calculate the national rates for recycling, combustion and landfilling (see years 1988-2000 in Table 1).

The old approach worked for several reasons: a) It was used every year, so the year-

IN AMERICA



to-year data could be compared to show trends; b) The waste-to-energy (WTE) and landfill data provided by the states typically included fairly accurate tonnages because of permit requirements for WTE facilities and landfills; and c) Tonnage data were supplied by a few states and allowed for some state-to-state comparisons.

The primary disadvantage of the "old" approach was that even though we requested data on municipal solid waste (i.e., only the residential and commercial/institutional streams), most states only had aggregate tons for solid waste, which may include construction and demolition debris (C&D), industrial waste, biosolids, etc. The same was true of the recycling percentages, (e.g., some states include construction and demolition debris recycled, which technically is not *municipal* solid waste). This reality made it difficult to get an accurate reading as to how much MSW was being recycled, combusted or landfilled.

TONNAGE ONLY METHODOLOGY

To address that situation, we decided to move to a more objective, numbers-based analysis of solid waste management in the U.S. In the 2004 State of Garbage in America survey, therefore, all data were requested in actual tonnages. For instance, instead of asking states what percent of the total MSW generated was landfilled, the survey questionnaire asked for the tons landfilled in each category listed (e.g., residential, commercial, industrial, C&D, organics, tires). If such a breakdown was not available, we asked for total tons landfilled. The same was done with recycling data: Instead of asking for a recycling rate, we requested specific tonnages recycled, broken down by categories (e.g., glass, metal, paper).

In order to maximize the opportunity for direct comparisons (state by state and nationally), the next step was to calculate the MSW-only portion of total solid waste generated, recycled, combusted and landfilled. That was accomplished by including only MSW stream tonnages. With landfilling, for example, that included the residential and commercial waste streams, organics, tires and "other." It did not include C&D, industrial and agricultural waste.

MSW that crossed state lines was attributed to the state of origin; imported waste was excluded from state MSW totals while exported waste was included. Recyclables included tons reported for glass, steel, aluminum, other metals, paper, plastic, tires, organics, wood and "other." C&D materials and industrial wastes (e.g., automobile scrap) were not included. The estimated tonnage of MSW generated in a state consisted of the sum of tons recycled and composted, combusted in WTE facilities, and landfilled.

A primary goal of the survey methodology was to standardize the waste streams from each state so that when the rates for each state are compared, the same categories of materials in the MSW stream are included. With some exceptions as described below, all percentages/rates reported in the 2006 State of Garbage survey (of 2004 data) are calculated from tonnage numbers provided by the states. Obviously, the better the information reported by each individual state, the more accurate the results. We believe that what is reported in these pages provides a fairly reasonable picture of the 2004 national MSW stream.

The first question on the 2006 survey questionnaire asked states to provide the total tons of MSW generated in 2004 (or for the most recent year that data were available). The resulting national total (509 million tons) is in line with the generation tonnages reported in *BioCycle* State of Garbage In America reports starting with 1989 (see Table 1) and prior to our collaboration in 2003-2004. States were asked to indicate all categories of waste included in that total solid waste generation number (Table 2). Boxes to check off included residential, commercial,

A primary goal of the methodology is to standardize data from each state so when rates are compared, the same categories of materials in the MSW stream are included.

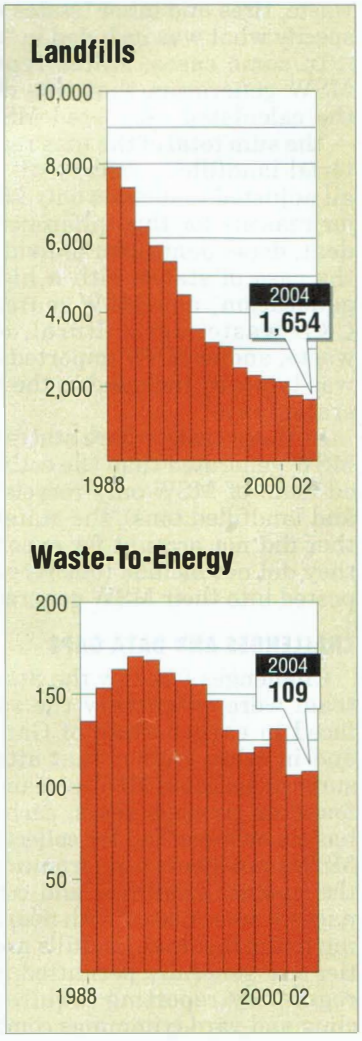


Table 1. State of Garbage in America survey data 1989–2004: Reported MSW generation and estimated MSW generated, and rates of MSW recycling, waste-to-energy and landfilling[1]

Year Of Data	Reported MSW[2] Generation (tons/yr)	Estimated[3] MSW Generated (tons/yr)	MSW[4] Recycled (%)	MSW Waste-To-Energy (%)	MSW Landfilled (%)
1989	269,000,000	–	8.0	8.0	84.0
1990	293,613,000	–	11.5	11.5	77.0
1991	280,675,000	–	14.0	10.0	76.0
1992	291,472,000	–	17.0	11.0	72.0
1993	306,866,000	–	19.0	10.0	71.0
1994	322,879,000	–	23.0	10.0	67.0
1995	326,709,000	–	27.0	10.0	63.0
1996	327,460,000	–	28.0	10.0	62.0
1997	340,466,000	–	30.0	9.0	61.0
1998	374,631,000	–	31.5	7.5	61.0
1999	382,594,000	–	33.0	7.0	60.0
2000	409,029,000	–	32.0	7.0	61.0
2002	482,770,983	369,381,411	26.7	7.7	65.6
2004	509,155,516	387,855,461	28.5	7.4	64.1

[1]All 2002 and 2004 percent MSW Recycled, MSW Incineration/Waste-To-Energy, and MSW Landfilled have been adjusted to exclude non-MSW; [2]Reported MSW generation is the tons of MSW reported by the states without any calculation to standardize the reported values. Reported Generation for 2004 (509,155,516 tons) was determined through a population-based projection of the data from respondent states to the national population of 293 million; [3]Estimated MSW Generated is the sum of MSW recycled, combusted and landfilled with each of these three categories adjusted to exclude non-MSW; [4]MSW Recycled includes recycled and composted tons.

C&D, industrial, agricultural, imported waste, tires and other (states were asked to specify what was included in "other").

In some cases, states reported a total MSW generation that was different than the calculated estimated MSW generated — the sum total of the tons reported for material landfilled, combusted, and recycled, all adjusted to include only MSW. Two major reasons for this difference became evident, dependent upon individual states: In the case of states with a higher reported generation, non-MSW material, such as C&D waste, agricultural, or industrial waste, and/or MSW imported into the state was typically included in the reported generation rate.

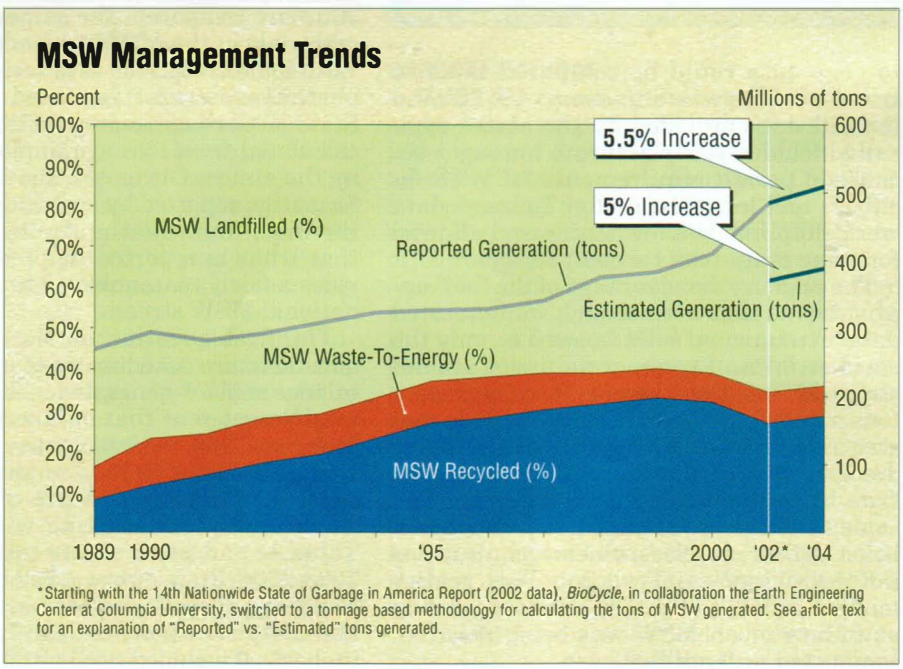
In those cases where states reported less MSW generated than the estimate calculated (sum of MSW-only recycled, combusted and landfilled tons), the states typically either did not account for exported MSW, or they did not include tons recycled and composted into their MSW generation figure.

CHALLENGES AND DATA GAPS

Challenges faced by the State of Garbage team were essentially the same as those faced in earlier State of Garbage surveys and in other studies that attempt to measure the national MSW stream. As has been found in previous years, each of the states has its own method for collecting statewide MSW management information. In general, the in-state landfilled and combusted tonnages were reported with near certainty owing to the fact that landfills and WTE facilities are generally permitted facilities with regulatory reporting requirements. Recycling and yard trimmings composting facilities, on the other hand, are not necessarily required to report throughput. Therefore, some states reported estimates of their recycled or composted tons based on historical data or waste composition studies, while some did not report these categories at all. Exported MSW presented another challenge for a handful of states that either did not track or report exported waste or were unsure as to how much non-MSW was exported along with MSW.

How did the 2006 State of Garbage survey team fill in the data gaps? The first step was to contact the states to confirm that the recycling and composting, WTE and landfilling data compiled from the completed surveys were interpreted correctly. These data confirmations included the calculations used by the State of Garbage team to produce a recycling rate. The confirmation process was very helpful and allowed states to review, and adjust as appropriate, how the State of Garbage survey process categorized their reported data into MSW and non-MSW and how it applied the adjusted data in the recycling rate calculations. In some cases, the data confirmation process also elicited data for items left blank on the initial survey responses. Finally, several states offered constructive criticism about the State of Garbage methodology, mostly concerning the survey's focus on an MSW definition that did not include recycled tonnage for such materials as C&D, auto scrap, and others that states include in calculating their recycling rates.

The State of Garbage team has held fast to its methodology, however, in order to provide a data set worthy of "apples to apples" comparisons regarding the MSW portion of the total solid waste stream. Further discussion of the state comments is provided at the end of this article, and a second article comparing methods for measuring the na-



*Starting with the 14th Nationwide State of Garbage in America Report (2002 data), *BioCycle*, in collaboration the Earth Engineering Center at Columbia University, switched to a tonnage based methodology for calculating the tons of MSW generated. See article text for an explanation of "Reported" vs. "Estimated" tons generated.

tional solid waste stream will be published in *BioCycle* in the near future.

The data confirmation process is believed to have had a positive effect on the accuracy of the survey. It also highlighted the fact that different methods of waste stream tracking are used by different states. The data confirmation process also can help explain differences noted between the 2004 and 2006 surveys. For instance, in past surveys, New York was the top exporter of waste in the nation. In the 2006 State of Garbage report, New York is third on the list as the focus on "true" MSW resulted in the state's adjustment to exclude over 2 million tons of exported non-MSW from New York's MSW stream.

Data gaps were also filled in, or "back calculated," through the use of historic State of Garbage recycling rates applied to the known tonnage disposed from 2004. By plugging in the known data to the following equation (i.e., using the reported tons combusted and landfilled and the 2002 recycling rate), an estimated "tons recycled" could be calculated for use in the 2006 survey:

(Recycled Tons[1]) ÷ (Disposed Tons[2] + Recycled Tons) = Recycling Rate

([1]Includes MSW recycled and composted; [2]Includes MSW landfilled and combusted)

In addition, historical percent recycled and percent composted figures also were applied to the total amount recycled to estimate the recycled and composted tons, where appropriate. These methods were

Data confirmations with each state included the calculations used by the State of Garbage survey team to produce a recycling rate.

Table 2. Tons of MSW (nonhazardous) generated by state and waste stream categories included (2004 data unless noted)[1,2]

State	Reported MSW Generated (tons/yr)	Residential	Commercial	C&D	Industrial	Ag.	Imported Waste	Tires	Other
California	77,900,000	x	x	x	x	x	x	x	-
Colorado	7,593,783	x	x	x	x	x	-	-	-
Connecticut	29,625[3]	x	x	-	x	x	-	-	-
Delaware	1,437,000	x	x	x	x	-	-	x	x
Florida	29,203,709	x	x	x	x	-	-	x	x
Idaho	1,086,000[4]	x	x	-	x	-	-	-	-
Illinois	40,363,746	x	x	x	-	-	-	-	-
Iowa	3,780,556	x	x	x	x	x	x	-	-
Kansas	3,239,092	x	x	-	-	-	x	-	-
Kentucky	6,212,770	x	x	x	-	-	x	x	-
Maine	2,019,998[3]	x	x	x	-	-	-	-	x
Maryland	8,114,104	x	x	x	x	-	x	x	x
Massachusetts	8,461,185	x	x	-	-	-	-	x	-
Minnesota	5,979,200	x	x	-	-	-	-	-	-
Missouri	11,703,455	x	-	x	x	-	x	x	x
Montana	1,461,988	x	x	x	x	x	-	x	x
Nevada	7,133,653	x	x	x	x	x	-	x	-
New Hampshire	2,126,244	x	x	x	x	-	x	-	-
New Jersey	19,805,372[3]	x	x	-	x	-	-	-	-
New Mexico	3,404,540	x	x	x	x	-	x	x	x
New York	36,500,000	x	x	x	x	-	x	x	-
North Carolina	8,130,914	x	x	x	x	-	-	x	-
North Dakota	715,858	x	x	-	x	-	-	x	-
Ohio	15,778,746	x	x	-	x	-	-	x	x
Oklahoma	5,297,137	x	x	x	-	x	x	-	x
Oregon	5,352,422	x	x	x	-	-	-	x	-
Pennsylvania	10,881,798	x	x	-	-	-	-	-	-
Rhode Island	1,614,380	x	x	x	x	-	-	x	-
South Carolina	4,305,345	x	x	-	-	-	-	x	x
South Dakota	650,000	x	x	x	x	-	x	-	-
Tennessee	12,928,999	x	x	x	x	x	-	x	x
Texas	45,898,387	x	x	x	-	-	x	x	x
Utah	2,727,952	x	x	-	-	-	x	-	-
Vermont	644,327	x	x	-	-	-	-	-	-
Virginia	11,989,925	x	x	-	-	-	-	x	-
Washington	7,803,630	x	x	-	-	-	-	x	x
West Virginia	1,822,524	x	x	x	x	-	-	x	x
Wisconsin	5,343,340	x	x	-	-	-	-	x	-
Wyoming	690,000	x	x	x	x	-	x	x	
Subtotal	423,531,704[5]								
TOTAL	**509,155,516[6]**								

[1]Alabama, Alaska, Arkansas, Hawaii and Louisiana did not respond to the 2006 State of Garbage in America survey. Arizona, Georgia, Michigan, Mississippi and Nebraska responded, but did not provide data for this question; [2]"x" indicates that the waste category is included in the reported MSW generated (tons/year). A "-" indicates the waste category is not included; [3]2003 data; [4]2000 data; [5]Sum of the reported MSW generated tons from the 39 states providing data (83.2% of U.S. population in 2004); [6]Based on a per capita projection for nonreporting states, the total for the U.S. is 509,155,516 tons.

Given California's size and impressive recycling infrastructure, the method selected to estimate the state's recycled and composted tons would affect the national picture.

Table 3. Reported MSW generated, estimated MSW generated, estimated MSW generated per capita, and percents of MSW recycled, combusted via waste-to-energy (WTE) and landfilled (2004 data unless noted) [1,2]

State	Population (2004)	Reported[3] MSW Generated (tons/yr)	Estimated[4] MSW Generated (tons/yr)	Estimated MSW Generated Per Capita (tons/person)	MSW Recycled[5] (%)	MSW To Waste-To-Energy (%)	MSW Landfilled (%)
Alabama	4,530,182	–	6,996,344	1.5	8.5	2.8	88.8
Alaska	655,435	–	1,332,188	2.0	7.5	2.8	89.6
Arizona[6]	5,743,834	–	5,195,330	0.9	19.7	0.0	80.3
Arkansas	2,752,629	–	2,826,602	1.0	19.7	1.3	79.0
California[7]	35,893,799	77,900,000	54,995,884	1.5	39.6	1.5	58.9
Colorado	4,601,403	7,593,783	7,930,426	1.7	12.5	0.0	87.4
Connecticut[8]	3,503,604	3,429,625	3,430,706	1.0	24.2	64.9	10.9
Delaware	830,364	1,437,000	988,433	1.2	10.4	0.0	89.6
Florida[9]	17,397,161	29,203,709	22,797,930	1.3	24.0	25.4	50.6
Georgia[10]	8,829,383	–	8,142,378	0.9	8.3	1.1	90.6
Hawaii	1,262,840	–	1,630,425	1.3	23.4	27.6	49.0
Idaho[11]	1,393,262	1,086,000	1,185,590	0.9	8.4	0.0	91.6
Illinois	12,713,634	40,363,746	23,950,931	1.9	37.7	0.0	62.3
Indiana	6,237,569	–	12,945,873	2.1	35.0	5.0	60.0
Iowa[6]	2,954,451	3,780,556	3,700,284	1.3	39.6	1.3	59.1
Kansas	2,735,502	3,239,092	3,729,900	1.4	19.0	0.1	80.9
Kentucky	4,145,922	6,212,770	5,748,162	1.4	22.4	0.2	77.5
Louisiana	4,515,770	–	6,308,427	1.4	13.2	4.2	82.6
Maine[8]	1,317,253	2,019,998	1,939,547	1.5	34.5	19.1	46.4
Maryland	5,558,058	8,114,104	7,015,513	1.3	31.4	19.6	49.0
Massachusetts	6,416,505	8,461,185	8,463,940	1.3	33.8	37.0	29.2
Michigan	10,112,620	–	15,010,032	1.5	17.3	6.9	75.8
Minnesota	5,100,958	5,979,200	5,868,432	1.2	43.2	20.7	36.1
Mississippi	2,902,966	–	3,170,149	1.1	1.6	0.0	98.4
Missouri	5,754,618	11,703,455	8,184,739	1.4	38.9	0.5	60.6
Montana	926,865	1,461,988	1,468,831	1.6	15.0	0.8	84.2
Nebraska[12]	1,747,214	–	2,466,972	1.4	15.4	0.0	84.6
Nevada	2,334,771	7,133,653	3,744,298	1.6	19.3	0.0	80.7
New Hampshire	1,299,500	2,126,244	1,659,490	1.3	25.1	16.1	58.8
New Jersey[8]	8,698,879	19,805,372	10,215,776	1.2	35.9	15.1	49.0
New Mexico	1,903,289	3,404,540	2,198,193	1.2	8.5	0.0	91.5
New York	19,227,088	36,500,000	19,422,924	1.0	43.0	19.5	37.5
North Carolina	8,541,221	8,130,914	8,130,914	1.0	18.7	0.9	80.4
North Dakota	634,366	715,858	684,351	1.1	18.0	0.0	82.0
Ohio	11,459,011	15,778,746	15,927,546	1.4	26.4	0.0	73.6
Oklahoma	3,523,553	5,297,137	4,493,232	1.3	3.8	8.0	88.2
Oregon	3,594,586	5,352,422	4,325,290	1.2	45.8	3.6	50.6
Pennsylvania[10]	12,406,292	10,881,798	15,428,702	1.2	23.8	18.6	57.6
Rhode Island	1,080,632	1,614,380	1,363,576	1.3	12.5	0.2	87.4
South Carolina	4,198,068	4,305,345	4,496,509	1.1	22.8	5.1	72.1
South Dakota	770,883	650,000	537,629	0.7	3.0	0.0	97.0
Tennessee	5,900,962	12,928,999	11,357,218	1.9	42.2	0.0	57.8
Texas	22,490,022	45,898,387	27,804,505	1.2	20.4	0.1	79.6
Utah[6]	2,389,039	2,727,952	2,789,313	1.2	14.2	4.4	81.4
Vermont	621,394	644,327	644,386	1.0	29.3	8.8	61.9
Virginia	7,459,827	11,989,925	8,873,022	1.2	28.7	12.6	58.7
Washington	6,203,788	7,803,630	8,723,068	1.4	40.5	3.5	56.1
West Virginia	1,815,354	1,822,524	1,568,210	0.9	6.9	0.0	93.1
Wisconsin	5,509,026	5,343,340	5,353,340	1.0	32.4	2.6	65.0
Wyoming	506,529	690,000	690,000	1.4	5.1	0.0	94.9
TOTAL	**293,101,881**	**509,155,516**	**387,855,461**	**1.3**	**28.5**	**7.4**	**64.1**

[1]Alabama, Alaska, Arkansas, Hawaii and Louisiana did not respond to the 2006 State of Garbage in America survey. Waste Business Journal data was used to provide tons recycled, composted, combusted in WTE facilities, and landfilled for these states, as well as Colorado, which only reported tons of MSW generated; [2]All percent MSW Recycled, MSW Waste-To-Energy and MSW Landfilled have been adjusted to exclude non-MSW; [3]Reported MSW generation is the tons of MSW reported by the states without any calculation to standardize the reported values. Based on a per capita projection for nonreporting states, the total for the U.S. is 509,155,516 tons; [4]Estimated MSW Generated is the sum of MSW recycled, combusted and landfilled with each of these three categories adjusted to exclude non-MSW; [5]MSW Recycled includes recycled and composted tons. When not reported, recycling and/or composting rates and data from the 2004 SOG report were used to "back calculate" recycled and/or composted tons for the following states — Recycled and composted (GA, ID, IN, WV), Recycled only (MS), Composted only (FL, KY, MO, NE, SD); [6]1999 recycling data reported; [7]Waste Business Journal data was used to provide tons recycled and composted for California. The state reports a diversion rate (48%) that includes non-MSW materials; [8]2003 data; [9]2002 MSW generation and landfill data, 2003 recycling data, 2004 WTE data; [10]Does not report a recycling rate (see Table 12); [11]2000 data; [12]2003 recycling data. "-" indicates information not reported by the state.

used to calculate recycled and/or composted tons for Florida (composted tons), Georgia (both), Idaho (both), Indiana (both), Kentucky (composted tons), Missouri (composted tons), Mississippi (recycled tons), Nebraska (composted tons), South Dakota (composted tons), and West Virginia (both). In one sense, filling the gaps in this manner was a return to the "old" methodology, however, this method was based on recycling rates that had clearly excluded non-MSW, an important distinction in the "new" methodology.

In those cases where no data were available (i.e., Alaska, Alabama, Arkansas, Hawaii, and Louisiana did not respond to the survey and Colorado only reported a total waste figure), data from the Waste Business Journal (WBJ) *Directory & Atlas of Non-Hazardous Waste Sites* were used to supply information for recycled, composted, combusted and landfilled tons. WBJ researchers collect data primarily by calling individual waste management operations and asking what types and quantities of wastes are accepted, among other inquiries. The data gathered through the direct survey are then compared and cross-checked with data received from relevant state regulatory agencies (e.g., state EPAs, DEQs, DNRs). For those cases where WBJ is unable to obtain material quantities for certain facilities, estimates of throughput are based on averages from similar types of facilities serving the same market — or if the sample size is small, other, similar markets — as that of the facility with unknown throughput. The State of Garbage team used the WBJ data to fill these gaps because its tonnage-based approach provides consistency with the State of Garbage survey methodology.

Finally, California was considered a special case. California submitted combustion and landfilling data, but it did not report recycled or composted tons for either this or the 2004 State of Garbage survey. Considering California's size and its impressive recycling infrastructure, it was obvious that the method selected to estimate the California recycling tons would have a significant effect on the national picture. Because California reports a diversion rate (48% or 30.7 million tons) that includes non-MSW material (e.g., C&D debris), the State of Garbage team decided to use the Waste Business Journal reported amount of tons recycled (21.8 million or a 39.6% recycling rate). The difference between these estimates translates to a 1.6 percentage point difference in the national recycling rate — 28.5 percent using State of Garbage calculations and 30.1 percent using California's 48 percent diversion rate. Further analysis of these kinds of impacts will be discussed in the follow-up article on the *BioCycle*/EEC State of Garbage in America methodology.

THE NATIONAL PICTURE

In this second tonnage-based State of Garbage survey, the historical national

Table 4. Estimated MSW tonnage generated and MSW tons recycled, combusted via waste-to-energy (WTE) and landfilled (by state, 2004 data unless noted)[1,2]

State	Estimated [3] MSW Generated (tons/yr)	MSW [4] Recycled (tons/yr)	MSW To WTE [5] (tons/yr)	MSW Landfilled (tons/yr)
Alabama	6,996,344	591,608	194,039	6,210,696
Alaska	1,332,188	100,516	37,574	1,194,098
Arizona[6]	5,195,330	1,025,591	0	4,169,739
Arkansas	2,826,602	558,216	35,464	2,232,923
California[7]	54,995,884	21,766,226	830,630	32,399,028
Colorado	7,930,426	995,156	3,083	6,932,187
Connecticut[8]	3,430,706	830,263	2,228,065	372,378
Delaware	988,433	103,150	0	885,283
Florida[9]	22,797,930	5,466,500	5,796,339	11,535,091
Georgia	8,142,378	675,817	90,478	7,376,083
Hawaii	1,630,425	381,625	450,594	798,206
Idaho[10]	1,185,590	99,590	0	1,086,000
Illinois	23,950,931	9,030,574	0	14,920,357
Indiana	12,945,873	4,531,056	647,682	7,767,135
Iowa[6]	3,700,284	1,464,395	48,272	2,187,617
Kansas	3,729,900	710,000	4,267	3,015,633
Kentucky	5,748,162	1,285,753	10,000	4,452,410
Louisiana	6,308,427	835,318	262,860	5,210,249
Maine[8]	1,939,547	668,232	371,038	900,277
Maryland	7,015,513	2,200,625	1,377,389	3,437,499
Massachusetts	8,463,940	2,864,783	3,127,997	2,471,160
Michigan	15,010,032	2,594,940	1,039,389	11,375,703
Minnesota	5,868,432	2,536,856	1,213,000	2,118,576
Mississippi	3,170,149	50,535	0	3,119,614
Missouri	8,184,739	3,183,864	37,500	4,963,375
Montana	1,468,831	220,249	11,967	1,236,615
Nebraska[11]	2,466,972	379,914	0	2,087,058
Nevada	3,744,298	722,115	0	3,022,183
New Hampshire	1,659,490	415,825	267,664	976,001
New Jersey[8]	10,215,776	3,663,501	1,546,155	5,006,120
New Mexico	2,198,193	186,466	0	2,011,727
New York	19,422,924	8,358,951	3,784,197	7,279,776
North Carolina	8,130,914	1,520,729	74,984	6,535,201
North Dakota	684,351	123,480	0	560,871
Ohio	15,927,546	4,208,014	0	11,719,532
Oklahoma	4,493,232	170,000	360,000	3,963,232
Oregon	4,325,290	1,981,369	155,368	2,188,553
Pennsylvania	15,428,702	3,675,683	2,867,423	8,885,596
Rhode Island	1,363,576	170,021	2,270	1,191,285
South Carolina	4,496,509	1,025,916	227,802	3,242,791
South Dakota	537,629	16,129	0	521,500
Tennessee	11,357,218	4,798,402	0	6,558,816
Texas[6]	27,804,505	5,659,287	17,066	22,128,152
Utah	2,789,313	395,470	124,101	2,269,742
Vermont	644,386	189,046	56,558	398,782
Virginia	8,873,022	2,545,135	1,115,063	5,212,824
Washington	8,723,068	3,529,466	303,978	4,889,624
West Virginia	1,568,210	108,207	0	1,460,003
Wisconsin	5,353,340	1,734,050	140,290	3,479,000
Wyoming	690,000	35,000	0	655,000
TOTAL	**387,855,461**	**110,383,615**	**28,860,545**	**248,611,301**

[1]Alabama, Alaska, Arkansas, Hawaii and Louisiana did not respond to the 2006 State of Garbage in America survey. Waste Business Journal data was used to provide tons recycled, composted, combusted in WTE facilities, and landfilled for these states, as well as Colorado, which only reported tons of MSW generated; [2]All tons MSW Recycled, MSW Incineration/Waste-To-Energy, and MSW Landfilled have been adjusted to exclude non-MSW; [3]Estimated MSW Generated is the sum of MSW recycled, combusted and landfilled with each of these three categories adjusted to exclude non-MSW; [4]MSW Recycled includes recycled and composted tons. When not reported, recycling and/or composting rates and data from the 2004 SOG report were used to "back calculate" recycled and/or composted tons for the following states — Recycled and composted (GA, ID, IN, WV), Recycled only (MS), Composted only (FL, KY, MO, NE, SD); [5]Includes tons combusted without energy recovery; [6]1999 recycling data reported; [7]Waste Business Journal data was used to provide tons recycled and composted for California; [8]2003 data; [9]2002 MSW generation and landfill data, 2003 recycling data, 2004 WTE data; [10]2000 data; [11]2003 recycling data.

trends seem to continue. MSW tons increased for each of the three categories of waste management. On a percentage basis, recycling increased slightly from the 2004 to the 2006 *BioCycle*/EEC report (from 26.7% to 28.5%). MSW combustion decreased slightly (7.7% to 7.4%), as did landfilling (65.6% to 64.1%). Table 3 summarizes the data reported in this section — with percent breakouts for tons recycled/composted, combusted and landfilled. Table 4 provides the "raw" tonnages used to calculate the percentages.

The 2006 State of Garbage survey (2004 data) shows that the United States continued its increasing trend in MSW generation. Reported annual MSW generation (sum of the tons of MSW reported by the states without any calculation to standardize the reported values) from the states resulted in a 5.5 percent increase over that reported for 2002 — from 483 million tons to 509 million tons. (The national reported MSW generation was determined through a population-based projection of the data from respondent states to the national population of 293 million. This accounts for states not reporting data for the 2006 report.)

The estimated MSW generation — the sum of MSW recycled, combusted and landfilled with each category adjusted to exclude non-MSW — also increased since 2002, by roughly 5.0 percent (from 369 million tons to 388 million tons). On a per capita basis, 2004 and 2002 had similar average estimated MSW generation rates (1.32

Table 5. Waste imports and exports by state for 2004 (unless noted)[1]

State	Imported (tons/yr)	Exported (tons/yr)
Arizona	438,000	5,000
California	70,057	468,824
Connecticut	69,773	286,348
Georgia	1,618,083	200,000
Idaho	–	65,530
Illinois	2,200,000	831,000
Indiana	2,049,485	–
Iowa	339,061	76,244
Kansas	962,500	410,633
Kentucky	702,295	193,229
Maine	228,638	156,994
Maryland	324,061	2,566,226
Massachusetts	256,885	1,366,858
Michigan	6,045,434	–
Minnesota	–	850,445
Mississippi	647,452	–
Missouri	307,573	2,170,924
Nevada	407,909	–
New Hampshire	669,878	42,947
New Jersey	590,018	2,524,725
New Mexico	886,000	–
New York	1,361,149	2,200,000
North Carolina	100,000	1,048,111
North Dakota	85,666	10,000
Ohio	3,157,614	892,796
Oklahoma	422,255	–
Oregon	1,847,968	50,664
Pennsylvania	10,560,625	350,000
Rhode Island	–	2,270
South Carolina	1,530,256	131,164
Tennessee	645,264	66,247
Texas	264,103	518,968
Vermont	–	141,928
Virginia	5,893,419	–
Washington	122,884	1,515,532
West Virginia	–	382,975
Wisconsin	1,800,000	–
TOTAL	**46,604,305**	**19,526,582**

[1]Imported and Exported MSW includes material reported as delivered to landfill and WTE facilities; "-" indicates information not reported by the state.

Table 6. Organics recycled (tons/year); Contribution to state MSW recycling rate (2004 data unless noted)[1]

State	Organics Composted/ Mulched (tons/yr)	Total MSW[2] Recycled Including Organics Composted/ Mulched (tons/yr)	MSW Recycling Rate (%)	Organics Contribution To Recycling[2] (%)
Alabama	164,635	591,608	8.5	27.8
Alaska	36,718	100,516	7.5	36.5
Arkansas	111,618	558,216	19.7	20.0
California	4,266,197	21,766,226	39.6	19.6
Colorado	171,789	995,156	12.5	17.3
Connecticut[3]	233,030	830,263	24.2	28.1
Delaware	47,900	103,150	10.4	46.4
Florida[3]	1,063,137	5,466,500	24.0	19.4
Hawaii	19,596	381,625	23.4	5.1
Illinois	387,645	9,030,574	37.7	4.3
Indiana	575,301	4,531,056	35.0	12.7
Iowa[4]	290,279	1,464,395	39.6	19.8
Kansas	146,795	710,000	19.0	20.7
Kentucky	34,238	1,285,753	22.4	2.7
Louisiana	194,761	835,318	13.2	23.3
Maine[3]	128,153	668,232	34.5	19.2
Maryland	843,219	2,200,625	31.4	38.3
Massachusetts	676,106	2,864,783	33.8	23.6
Michigan	739,904	2,594,940	17.3	28.5
Minnesota	115,356	2,536,856	43.2	4.5
Mississippi	40,535	50,535	1.6	80.2
Missouri	445,439	3,183,864	38.9	14.0
Montana	48,318	220,249	15.0	21.9
Nebraska	256,731	379,914	15.4	67.6
Nevada	32,803	722,115	19.3	4.5
New Hampshire	32,082	415,825	25.1	7.7
New Jersey	1,656,854	3,663,501	35.9	45.2
New Mexico[3]	8,163	186,466	8.5	4.4
New York	891,999	8,358,951	43.0	10.7
North Carolina	583,101	1,520,729	18.7	38.3
North Dakota	49,799	123,480	18.0	40.3
Ohio	822,449	4,208,014	26.4	19.5
Oklahoma	106,468	170,000	3.8	62.6
Oregon	431,140	1,981,369	45.8	21.8
Pennsylvania	874,152	3,675,683	23.8	23.8
Rhode Island	64,738	170,021	12.5	38.1
South Carolina	60,000	1,025,916	22.8	5.8
South Dakota	13,534	16,129	3.0	83.9
Tennessee	986,915	4,798,402	42.2	20.6
Texas[4]	699,553	5,659,287	20.4	12.4
Utah	191,705	395,470	14.2	48.5
Vermont	33,180	189,046	29.3	17.6
Virginia	707,856	2,545,135	28.7	27.8
Washington	511,434	3,529,466	40.5	14.5
West Virginia	612	108,207	6.9	0.6
Wisconsin	572,200	1,734,050	32.4	33.0
TOTAL	**20,368,139**	**110,383,615**	**28.5**	**18.5**

[1]Waste Business Journal data was used to provide tons recycled and composted for the following states: Alabama, Alaska, Arkansas, California, Colorado, Hawaii, and Louisiana; [2]When not reported, recycling and/or composting rates and data from the 2004 SOG report were used to "back calculate" recycled and/or composted tons for the following states — Recycled and composted (GA. ID, IN, WV), Recycled only (MS), Composted only (FL, KY, MO, NE, SD); [3]2003 data; [4]1999 data.

Table 7. Quantity of materials recovered in 26 states via recycling in 2004 (tons/year) unless noted[1]

State	Glass	Steel	Aluminum	Other Metals	Wood	Paper	Plastic	Tires	Organics	Other
Connecticut[2]	–	–	–	75,507	–	458,445	–	–	233,030	63,281
Delaware	3,500	5,200	250	–	–	15,400	1,200	12,200	47,900	17,500
Florida[2]	178,915	1,422,974	39,333	260,993	374,342	1,887,438	77,968	161,400	1,063,137	–
Iowa	47,409	–	7,058	601,569	103,194	341,692	29,724	43,470	290,279	–
Kentucky	5,406	719,580	9,087	36,563	–	464,032	2,680	14,000	34,238	168
Maine[2]	42,218	141,000	2,109	19,000	92,154	277,000	13,387	35,467	35,999	9,898
Maryland	71,558	–	–	302,904	–	836,605	30,641	–	843,219	115,698
Massachusetts	278,104	–	–	355,400	12,091	1,271,092	36,978	21,556	676,106	213,456
Michigan	167,447	–	–	869,837	–	712,526	40,624	–	739,904	64,602
Minnesota	116,000	41,000	24,500	385,000	–	895,000	47,000	20,000	115,356	893,000
Montana	3,825	26,487	2,252	74,585	–	57,314	232	–	48,318	7,236
Nebraska[2]	6,641	1,392	6,152	–	–	107,718	1,280	–	256,731	–
Nevada	7,918	436,410	2,604	21,510	1,456	189,240	5,095	2,591	32,803	22,488
New Hampshire	7,641	376,102	–	–	–	–	–	–	32,082	–
New Jersey[2]	263,782	–	30,759	375,938	92,813	1,179,960	65,104	36,793	1,564,041	54,312
New Mexico	3	67,590	14,326	–	11,998	80,580	476	2,992	8,163	338
New York	339,375	1,965,340	139,754	201,027	149,957	2,029,045	272,984	37,251	891,999	2,332,219
Oregon	103,231	–	–	408,064	15,591	786,137	25,455	24,296	431,140	187,455
Pennsylvania	44,242	84,126	17,210	775,997	–	1,347,893	49,612	63,787	874,152	418,664
South Carolina	10,497	–	–	135,980	–	460,477	16,020	–	60,000	342,942
Tennessee	46,309	893,336	161,623	693,441	–	817,571	273,611	72,662	986,915	884,394
Utah	–	–	–	–	–	–	–	35,006	191,705	168,759
Vermont	–	–	–	35,240	–	91,024	–	–	33,180	29,600
Virginia	47,153	503,857	–	–	–	981,813	37,144	81,234	707,856	186,078
Washington	74,035	965,238	17,596	134,060	353,167	924,870	35,943	50,393	511,434	462,730
Wisconsin	104,800	46,600	32,500	–	–	779,900	29,600	12,750	572,200	155,700

[1]26 states represent those that reported quantities for individual recyclable materials. Aggregate organics recycled/composted can be found in Tables 4 and 6; [2]2003 data."-" indicates information not reported by the state.

tons/person/year for 2004 vs. 1.31 tons for 2002). The estimated MSW per capita generation rates varied from South Dakota's low of 0.7 to Indiana's 2.1 tons/person/year. Based on the reported generation (without adjustment to exclude non-MSW tons), per capita rates were 1.74 for the 2004 population of 293 million and 1.68 for the 2002 population of 288 million (a 1.8 percent population increase).

The national recycling rate also grew along with the total MSW relative to 2002. Of the 388 million tons of MSW generated in 2004, 110 million tons were recycled or composted for a 28.5 percent national recycling rate. Twenty-nine million tons (7.4%) were combusted (the bulk at WTE facilities), and 249 million tons (64.1%) were landfilled. In comparison, the 2004 State of Garbage (2002 data) found that 98.7 million tons (26.7%) were recycled or composted, 28.5 million tons (7.7%) were combusted, and 242 million tons (65.6%) were landfilled. (In the 2001 State of Garbage in America report utilizing the old survey methods, the national rates were 32 percent recycled, 7 percent combusted and 61 percent landfilled.)

On an individual state basis, increases and decreases in each waste management category were as follows:

- Reported MSW generation: Increased in 19 states, constant in one state, decreased in 18 states (38 states responded to both the 2004 and 2006 surveys).
- Estimated MSW generation: Increased in 31 states, decreased in 19 states.
- Recycled Tons: Increased in 36 states, decreased in 14 states.
- Recycling Rate: Increased in 31 states, decreased in 19 states.
- WTE and Incinerated Tons: Increased in 23 states, decreased in 14 states (30 states have WTE facilities, 36 states use WTE or incineration as a waste management technique, including those that export MSW for combustion; the WTE facility in Tennessee was closed).
- Landfilled Tons: Increased in 28 states, decreased in 22 states.

REGIONAL BREAKDOWN

The 2006 survey breakdown on a regional basis (see map on pages 26-27 to identify states in each region) is as follows. The percentage rates from the 2004 State of Garbage report are in parentheses and are in the order of recycled/composted, WTE, landfilled:

- New England: Recycled-29%; WTE-35%; Landfilled-36% (27%-34%-39%).
- Mid-Atlantic: Recycled-33%; WTE-18%; Landfilled-49% (28%-14%-58%). (The large difference in landfilled percent can be explained in part by greater attention to excluding non-MSW from the 2006 calculations.)
- South: Recycled-22%; WTE-9%; Landfilled-69% (19%-12%-69%)
- Great Lakes: Recycled-31%; WTE-4%; Landfilled-65% (27%-5%-68%).
- Midwest: Recycled-22%; WTE-1%; Landfilled-77% (25%- <1%-75%).
- Rocky Mountain: Recycled-14%; WTE-

Estimated MSW generation increased by roughly 5.0 percent since 2002, from 369 million tons to 388 million tons.

<1%; Landfilled-86% (9%-1%-90%).

- West: Recycled 38%; WTE-2%; Landfilled-60% (38%-3%-59%).

IMPORTS/EXPORTS

Finally, in terms of the big picture, significant tonnages of solid waste continue to cross state borders (Table 5). As in previous years, Pennsylvania leads in the MSW importing category, receiving 10.6 million tons of solid waste in 2004 (the bulk of which was landfilled). Michigan is second with 6.0 million tons, Virginia is third with 5.9 million tons and Ohio is fourth with 3.2 million tons imported. As with Pennsylvania, almost all waste imported is landfilled in the states doing the importing. Illinois, which was second in imported waste in 2002, ranks fifth in terms of waste imports (2.2 million in 2004).

On the export side, Maryland ranks highest with 2.6 million tons exported in 2004. New Jersey is in second place, with 2.5 million tons. Third place is held by New York with 2.2 million tons, and in fourth place is Missouri with 2.17 million tons. Other states with over 1 million tons of exports include Massachusetts (1.4 million), North Carolina (1.05 million tons), and Washington (1.5 million tons). Most of the tonnages exported were landfilled in the receiving states. We surmise that the emphasis on MSW only in our survey follow-ups in 2006 resulted in states excluding non-MSW more thoroughly than in previous years. This would account in part for unexpected ranking changes among the exporting states from 2002 to 2004. For instance, New York reported 5.4 million tons of exported waste in the last survey and was the top waste exporting state. In the initial 2006 survey, New York reported 4.4 million tons of exported waste, but this number was adjusted to 2.2 million tons when the request for including only MSW exported was emphasized.

THE RECYCLING SCENE

The amount of MSW recycled increased from 2002 to 2004 (99 million to 110 million

Table 8. Number of residential curbside recycling programs, population served, and yard trimmings composting sites by state (2004 data unless noted)

State	Curbside Programs	Population With Access To Curbside Collection	Yard Trimmings Composting Sites
Arizona	31	2,830,000	–
California	–	–	117[1]
Connecticut[2]	–	–	95
Delaware	2	665,000	3
Florida[3]	79	6,760,313	–
Georgia	169	4,761,455	57
Idaho	–	–	5
Illinois	–	–	40
Indiana	78	–	120
Iowa	641	1,880,232	106
Kansas	84	1,366,136	110
Kentucky	88	1,741,720	34
Maine[2]	84	400,000	80
Massachusetts	167	4,963,112	223
Michigan	347	3,670,072	155
Minnesota	730	3,750,000	80
Mississippi	16	475,000	5
Missouri	211	–	93
Montana	3	110,342	22
Nevada	3	1,050,000	2
New Hampshire	37	324,875	25
New Jersey[2]	500	–	172
New Mexico	7	1,000,000	10
New York	1,500	18,976,457	35
North Carolina	212	3,600,000	120
North Dakota	2	40,500	40
Ohio	480	–	586
Oklahoma	2	176,000	3
Oregon	133	2,700,000	44
Pennsylvania	974	10,000,000	465
Rhode Island	26	–	15
South Carolina	149	–	96
South Dakota	–	–	128
Tennessee	–	–	2
Texas	–	–	108
Utah	–	–	23
Vermont	–	559,255	12
Virginia	60	400,000	11
Washington	159	5,056,087	33
West Virginia	20	–	25
Wisconsin	695	5,000,000	174
TOTAL	**7,689**	**82,256,556**	**3,474**

[1]2003 data from California Integrated Waste Management Board report, "Second Assessment of California's Compost- and Mulch-Producing Infrastructure"; [2]2003 data; [3]2002 data. "-" indicates information not reported by the state.

Table 10. C&D landfills and MSW transfer stations by state for 2004 (unless noted)

State	C&D Landfills	MSW Transfer Stations
Arizona	8	125
California	143	478
Connecticut[1]	26	97
Delaware	3	1
Florida[2]	94	93
Georgia	54	76
Idaho[3]	21	38
Illinois	–	98
Indiana	7	57
Iowa	4	30
Kansas	114	63
Kentucky	18	82
Maine[1]	24	240
Maryland	7	10
Massachusetts	9	194
Michigan	4	64
Minnesota	114	29
Mississippi	80	40
Missouri	2	52
Montana	2	8
Nebraska	21	38
Nevada	6	13
New Hampshire	–	235
New Jersey[1]	1	43
New Mexico	3	212
New York	18	503
North Carolina	65	81
North Dakota	183	29
Ohio	73	59
Oklahoma	7	42
Oregon	6	139
Pennsylvania	6	124
South Carolina	129	30
South Dakota	173	16
Tennessee	60	31
Utah	37	8
Vermont	1	–
Virginia	19	61
Washington	26	100
West Virginia	–	18
Wisconsin	–	87
Wyoming	3	–
TOTAL	**1,571**	**3,744**

[1]2003 data; [2]Landfill data is 2000. Transfer station data is 2002; [3]2000 data. "-" indicates information not reported by the state.

programs were reported in the 2001 survey.

According to our data, the number of curbside collection programs in the U.S. dropped between 2000 and 2002 to 8,875, and again to 7,689 in 2004. However, only 32 states responded to that question in the 2006 survey (Table 8). There is no way to assess whether national curbside recycling is shrinking in size as well as number, or if program consolidation or other changes in reporting account for the decrease.

Comparing data from the three most recent surveys, however, the following can be noted:

Several states have had significant declines in curbside programs from 2000 to 2004 (data presented as 2000, 2002, 2004). These include Georgia (459, 184, 169), California (546, 396, not reported), Washington (283, 150, 159), Indiana (168, 79, 78), North Carolina (279, 256, 212), West Virginia (51, 51, 20), Kansas (109, 118, 84), and Florida (299, 333, 79).

Significant increases in curbside recycling programs occurred in Ohio (232, 459, 480), Pennsylvania (892, 945, 974), Missouri (177, 216, 211), Maine (34, 40, 84), and Wisconsin (631, 544, 695).

YARD TRIMMINGS COMPOSTING

As in the case with curbside programs, data have been collected on the number of yard trimmings composting sites since the first State of Garbage survey in 1989. According to the first report, there were 651 yard trimmings composting sites in 1988. Due to both rapid growth and better data tracking, that number more than doubled to 1,407 by 1990, and doubled again to 2,981 by 1992. Growth between 1992 and 2000 was more steady, increasing to 3,846 yard trimmings composting sites in the U.S. by 2000.

In 2002, the reported number of yard

Table 11. MSW landfill disposal bans for selected materials

State	Yard Trimmings	Whole Tires	Used Oil	Lead-Acid Batteries	Batteries (General)	White Goods	Electronics	Others
Arizona		x	x			x[1]		
Arkansas	x[2]				x			
California		x	x		x	x	x	x[3]
Connecticut	x[4]			x				
Delaware		x						
Florida	x	x	x	x		x		
Georgia	x	x		x				
Idaho		x		x				
Illinois	x	x	x	x		x		
Indiana	x[5]	x		x				
Iowa	x	x	x	x		x		
Kentucky		x		x				x[6]
Maine		x		x		x	x[7]	
Maryland	x[8]	x	x		x	x[1]		
Massachusetts	x	x		x		x	x[7]	x[9]
Michigan	x	x	x	x		x[1]		x[10]
Minnesota	x	x	x	x		x	x[7]	x[11]
Missouri	x	x	x	x		x		
Nebraska	x	x	x	x		x		
New Hampshire	x							
New Jersey	x[12]							x[13]
New Mexico			x	x				
New York			x	x				
North Carolina	x	x	x	x		x		x[14]
North Dakota			x	x		x		x[15]
Ohio		x						x[16]
Oregon		x	x	x		x		x[17]
Pennsylvania	x[18]	x		x				
Rhode Island		x				x		
S. Carolina	x[19]	x		x		x		
S. Dakota	x	x	x	x		x		
Tennessee		x	x	x				
Texas		x	x	x				
Utah		x			x			
Vermont		x	x	x	x	x		x[20]
Virginia		x		x				
W. Virginia	x	x			x			
Wisconsin	x	x	x	x		x	x[7]	x[21]
Wyoming				x				

[1]Containing refrigerants; [2]Leaves and grass; [3]Fluorescent bulbs; [4]Grass clippings; [5]Leaves, brush and woody vegetative matter >3-feet; [6]Yard trimmings are banned from a few landfills; [7]Cathode ray tubes; [8]Separately collected loads of yard trimmings are banned from disposal; [9]Glass, metal and plastic containers and recyclable paper. As of July 2006, asphalt paving, brick, concrete, metal and wood are banned from disposal; [10]Beverage containers; [11]Source separated recyclables; [12]Leaves only; [13]All recyclables that any local government designates as recyclable materials; [14]Aluminum cans. Banned items recently expanded to include wood pallets, oil filters, plastic bottles and oyster shells (effective October 2009); [15]Scrap metal; [16]Yard trimmings are not banned but disposal is restricted; [17]Whole vehicles; [18]Truckloads comprised primarily of leaves; [19]Includes landscaping debris; [20]Oil-based paint; [21]Office paper, newspaper, OCC, magazines, glass/plastic/steel/aluminum beverage containers.

The recycling rate increased in 31 states, and decreased in 19 states.

trimmings composting sites was 3,227, a decrease of 619 from the 2000 data. It is believed the primary reason for the drop was that five states providing numbers for 2000 were not able to do so for CY 2002 (e.g., Minnesota reported 454 in 2000 and Wisconsin reported 140). In the 2006 survey, 38 states provided data on their composting infrastructure for CY 2004 (Table 8), totaling 3,357 reported yard trimmings composting facilities. States with significant yard trimming compost site increases from 2002 to 2004 included Wisconsin (140, 174), Maine (<25, 80), Pennsylvania (>300, 465), and Ohio (534, 586). States with major drops in reported composting facilities include New Hampshire (192, 25), Texas (160, 108), and South Carolina (128, 96).

While California did not provide any yard trimming composting facility data, a survey conducted in 2003-04 for the California Integrated Waste Management Board (CIWMB) identified 117 green waste composting facilities statewide (see "Second Assessment of California's Compost- and Mulch-Producing Infrastructure," CIWMB, May 2004). Adding the CIWMB's data to the national number, the total for CY 2004 is 3,474.

Florida, another of the top three most populous states in the nation, also did not report data on yard trimmings composting sites. The state did, however, note it has 178 mulch-only processing facilities. (Nine states reported data for the question on mulch production (other than "0") for a total of 518 mulch production facilities.)

LANDFILLING AND WASTE-TO-ENERGY STATISTICS

Based on data from 45 states, the total number of landfills in operation in 2004 was

Table 12. State observations, comments and alternative recycling rates

State	Comment/Observation On "State of Garbage" (SOG) Methodology[1]	State Alternatives To SOG Recycling Rate (%)	SOG Calculated Recycling Rate (%)
Arizona	C&D and other tonnage considered recycled MSW by AZ not included. No accounting for tonnages from nonpermitted facilities, e.g., composting	26.4	19.7
California	C&D and other recovered and diverted tonnage considered MSW by CA not included	48.0	39.6
Connecticut	All categories of tonnage considered recycled MSW by CT not included, e.g., "bulky waste" includes furniture that is "oversized" MSW, C&D and land clearing debris	> 25	24.2
Delaware	C&D and other tonnage considered recycled MSW by DE not included. Variable quality control makes it difficult to compare recycling rates among states. Some states' data reflect estimates of MSW categories; others use recorded weights	30.5	10.4
Georgia	Recycling rate derived from calculated waste generation creates confusion and results in an artificially low recycling rate. C&D and other waste material outside of the MSW definition that were recycled or diverted for beneficial use not included		8.3
Illinois	SOG calculates higher recycling rate for IL	34.1	37.7
Iowa	All tonnage considered recycled MSW by IA not included		39.6
Kansas	KS calculates higher recycling rate than SOG	20 - 23	19.0
Maine	MSW definition excludes recycled C&D which is considered MSW in ME		34.5
Maryland	C&D and other tonnage considered recycled MSW by MD not included	34.39[2]	31.4
Minnesota	MN calculates base recycling rate differently than SOG. Compost and mulch tons not included by MN; estimates for on-site disposal and problem materials disposed included	40.5	43.2
New Jersey	Materials such as C&D and auto scrap included in NJ's recycling rate calculation not included	51.8	35.9
New York	C&D and other materials recycled in NY not included		43.0
North Carolina	Actual level of recycling in NC not represented because material recovered through private recycling facilities not captured in NC's data collection	> 16	18.7
Pennsylvania	DEP suggests inclusion of variables in addition to the sum of MSW disposed, recycled and composted [3]	> 30 to > 40[4]	23.8
South Dakota	SD uses a population-based estimation to report an approximate 37% diversion rate.	37.0	3.0
Wisconsin	WI includes WTE tonnages in the numerator of the recycling rate calculation.	36.0	32.4

[1]Comments received during data confirmation process between SOG team and state officials; [2]34.39% is the diversion rate reported by Maryland. Using EPA's definition of MSW, state recycling rate is 31.4%; [3]At Pennsylvania's request, the following comment is being included in this table: "Pennsylvania recognizes that calculating MSW generation includes variables in addition to the sum of MSW disposal and MSW recycling and composting. Until MSW generation rates can be accurately portrayed, recycling rates cannot be expressed with precision. For further information, please contact the Pennsylvania DEP Division of Waste Minimization and Planning at (717) 787-7382"; [4]State suggests recycling rate is >30 to >40% (2003) depending upon EPA or Pennsylvania definition of MSW.

1,654, down from 1,767 in 2002 and 2,142 reported in 2000 (Table 9). The lack of data from the five states that did not respond — Alaska, Alabama, Arkansas, Hawaii and Louisiana — likely accounts for some of our reported decrease of 113 landfills between CY 2002 and CY 2004. Five states reported significant changes in landfill numbers between 2002 and 2004 (data is presented as 2002, 2004): Maryland (20, 31), Oklahoma (40, 31), Texas (175, 189), Virginia (67, 60), Wisconsin (42, 32), and Florida (100, 54).

Twenty-seven states reported average landfill tipping fees (Table 9), with a low in Oklahoma of $18/ton and a high of $98/ton in Vermont. Of the other 25 states, seven reported tipping fees of $20 to $29/ton, nine between $30 and $39/ton, two between $40 and $49/ton, four of $50 to $60/ton, and three of $60 to $70/ton.

The states also were asked to provide the amount of total landfill capacity remaining measured in total tons or cubic yards. Twenty-nine responses were tallied across these two categories, ranging from lows of 150,000 cubic yards in Connecticut to 986 million cubic yards in Illinois and from 2.3 million tons in Massachusetts to 1.1 billion tons in Texas.

Thirty-nine states also responded to a qualitative, yes/no question about whether landfill capacity was being added. Thirty reported "yes" and nine reported "no."

Table 9 also includes data on waste-to-energy plants in the U.S. Prior to *BioCycle*'s collaboration with EEC, State of Garbage in America surveys did not specifically ask states for data on waste-to-energy combustion, but instead only asked about incineration (which may or may not include energy recovery). There were 107 WTE facilities reported for CY 2002, in comparison to the 132 WTE/incineration plants reported for 2000. In 2004, 101 WTE facilities were reported in 29 states, including two facilities that burn tires or MSW with coal, and not including eight incinerators that do not recover energy (109 total facilities that burn MSW — other sources report between 89 and 102 WTE facilities nationwide). Thirty-six states reported the use of WTE or incineration as a means of waste management, six of which did not report WTE facilities in-state — Kansas combusts roughly 4,000 tons of tires in cement kilns, Rhode Island and Vermont export MSW to WTE facilities but do not have WTE capacity in state, and Arkansas, Louisiana, and Colorado did not report WTE facility numbers. Connecticut, New York, and Minnesota, all states with WTE facilities, also reported exported MSW going to WTE facilities. Tipping fees at waste-to-energy plants, based on 15 respondents, ranged from $40/ton in North Carolina with one facility to $98/ton in Washington with three WTE plants.

Maryland ranks highest with 2.6 million tons of MSW exported in 2004. New Jersey is second, with 2.5 million tons.

Table 10 provides data on C&D landfills and MSW transfer stations. In 2004, a total of 1,571 C&D landfills were reported (38 re-

Twenty-nine states provided remaining landfill capacity in cubic yards or tons. Texas reported the highest amount — 1.1 billion tons.

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spondents), compared with 1,931 reported in 2002 and 1,825 reported for 2000. The total number of MSW transfer stations reported for 2004 was 3,744 (40 respondents). In 2002, 3,895 were reported and 3,970 were reported for 2000.

Table 11 show materials that are banned from MSW landfills in various states. For example, 21 states have bans on the landfill disposal of leaves, grass clippings and/or all yard trimmings. Few states have added additional materials to their list of banned items over the years. Massachusetts is one that has; in early 2006 asphalt pavement, brick, concrete, metal and wood in the C&D stream were banned from disposal. The state's 2000 solid waste Master Plan includes a ban on disposal of commercial organic feedstocks, e.g., from supermarkets and food service establishments. A date that it will become effective was not specified.

METHODS BEHIND THE METHODOLOGY

The State of Garbage team is extremely grateful to the state representatives across the U.S. who helped by providing data, feedback, time, and effort in support of the 2006 State of Garbage In America survey. The accompanying sidebar acknowledges these individuals by name. Some of our e-mail exchanges with state officials highlighted the challenges of developing a standardized waste stream characterization for all 50 states — not to mention difficulties that states encounter as they attempt to collect standard waste stream data from numerous towns, cities, and counties. The comments and observations from several states (Table 12) provide a flavor of some of these discussions. Many of the comments are constructive critiques of the State of Garbage methodology, and, although anecdotal in nature and not formally requested as part of the survey, provide insight into the varied nature of waste stream data collection by different states.

Most of the comments suggest that recycled construction and demolition debris (C&D) and other recycled materials that do not fall into the U.S. EPA definition of MSW should be included in the calculation of the State of Garbage recycling rate. (The EPA definition includes paper and paperboard, yard trimmings, food scraps, plastics, metals, glass, wood, rubber, leather and textiles, household batteries, etc.) Others allude to the difficulty of tracking data, the variable quality of data from different reporting units, and the use of estimates, as opposed to actual hard data, to develop MSW generation and recycling rates. Finally, a philosophical controversy seems to exist as well, involving the definitions of solid waste and the reference points used to track the success of recycling efforts (e.g., landfill diversion vs. recycling rates; EPA MSW vs. state-defined MSW).

For our part, the State of Garbage team has applied a methodology to characterize the EPA defined MSW portion of the total

solid waste stream. *BioCycle* will be publishing follow-up articles to the April 2006 State of Garbage report to compare its methodology with other techniques for characterizing the national waste stream. ■

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