

THE STATE OF GARBAGE

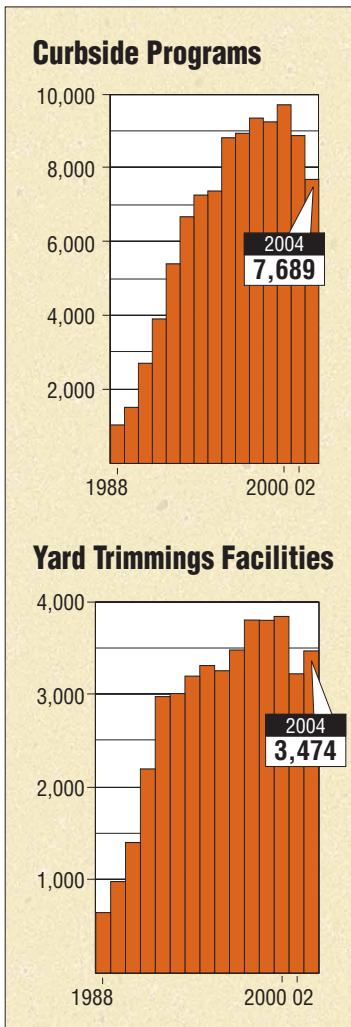
A joint study by BioCycle and the
Earth Engineering Center of Columbia University

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.

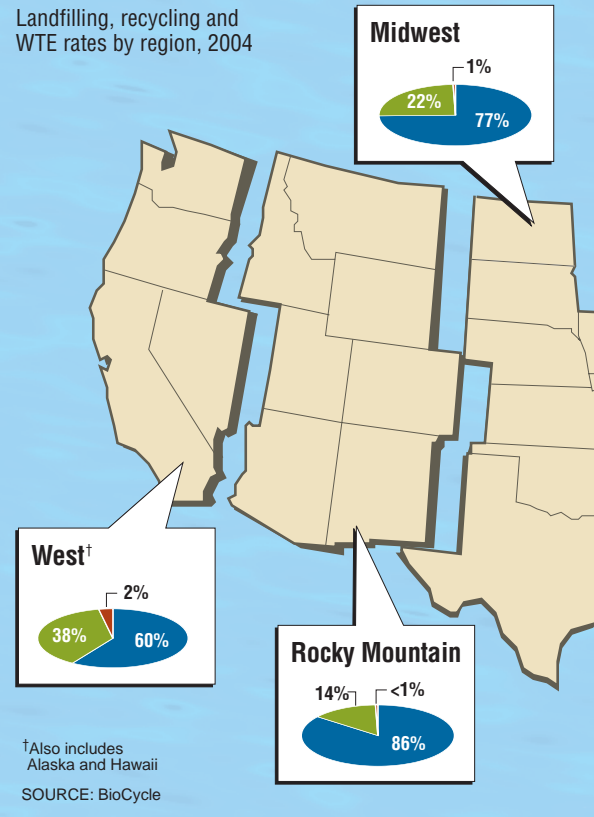


Latest national data on MSW management — 28.5% recycled and composted, 7.4% combusted in WTE plants and 64.1% landfilled.

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

Regional Breakdown

Landfilling, recycling and WTE rates by region, 2004

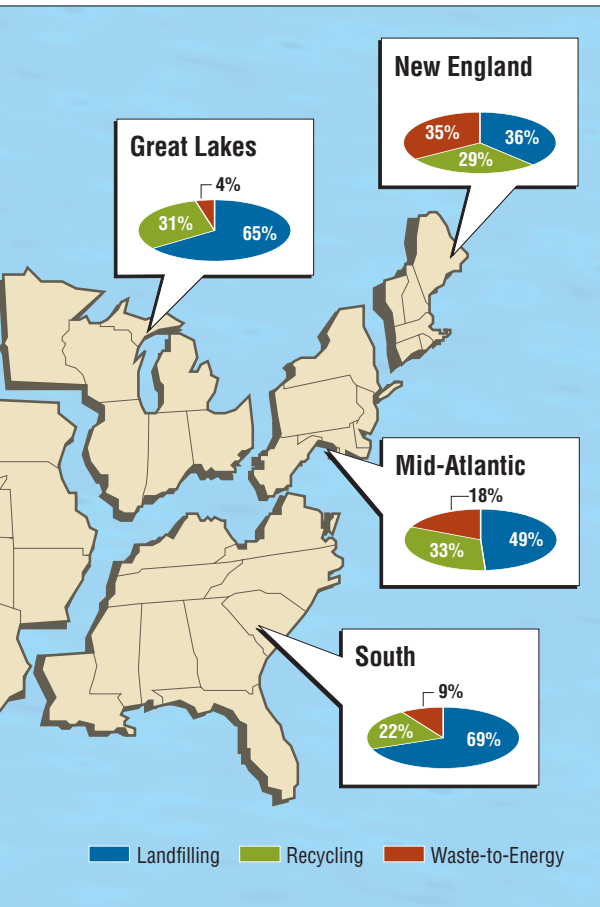


ORIGINAL METHODS

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.

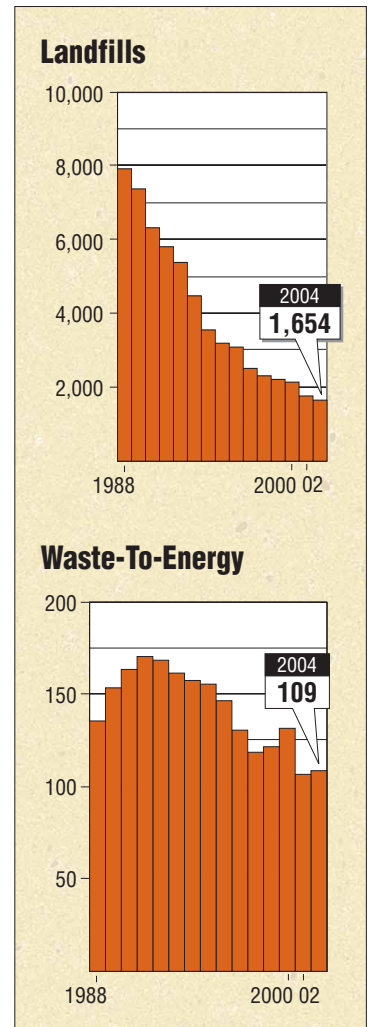


Table 1. State of Garbage in America survey data 1989–2004: Reported MSW generation and estimated MSW generated, and rates of MSW recycling, waste-to-energy and landfilling¹

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

¹All 2002 and 2004 percent MSW Recycled, MSW Incineration/Waste-To-Energy, and MSW Landfilled have been adjusted to exclude non-MSW; ²Reported 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; ³Estimated MSW Generated is the sum of MSW recycled, combusted and landfilled with each of these three categories adjusted to exclude non-MSW; ⁴MSW 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.

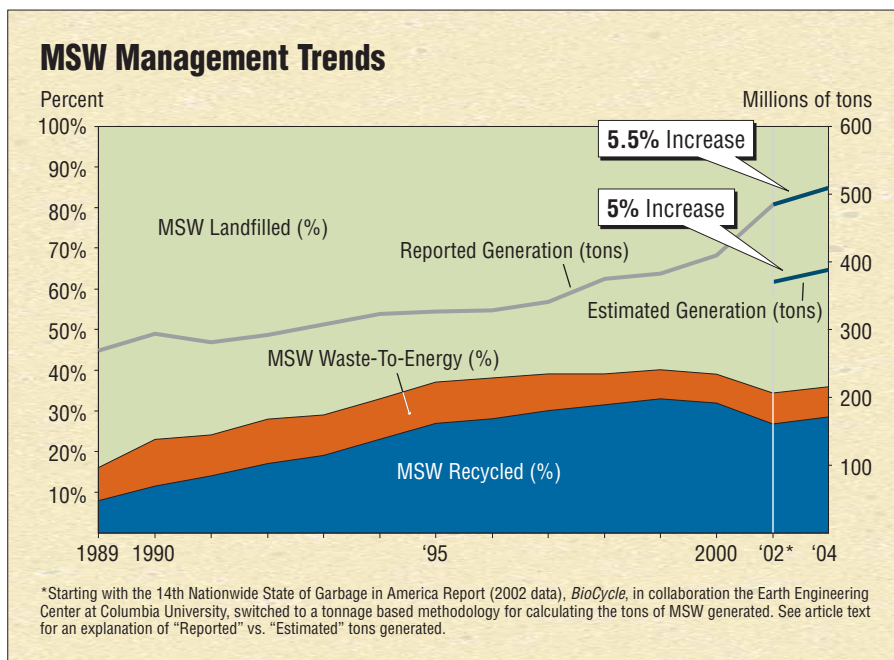
CHALLENGES AND DATA GAPS

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 facili-

ties, 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-



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 cal-

culated,” 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:

$$(\text{Recycled Tons}^1) \div (\text{Disposed Tons}^2 + \text{Recycled Tons}) = \text{Recycling Rate}$$

¹Includes MSW recycled and composted;
²Includes 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)	Imported							
		Residential	Commercial	C&D	Industrial	Ag.	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	509,155,516⁶								

¹Alabama, 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; ³2003 data; ⁴2000 data; ⁵Sum of the reported MSW generated tons from the 39 states providing data (83.2% of U.S. population in 2004); ⁶Based 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

¹Alabama, 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; ²All percent MSW Recycled, MSW Waste-To-Energy and MSW Landfilled have been adjusted to exclude non-MSW; ³Reported 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; ⁴Estimated MSW Generated is the sum of MSW recycled, combusted and landfilled with each of these three categories adjusted to exclude non-MSW; ⁵MSW 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); ⁶1999 recycling data reported; ⁷Waste 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; ⁸2003 data; ⁹2002 MSW generation and landfill data, 2003 recycling data, 2004 WTE data; ¹⁰Does not report a recycling rate (see Table 12); ¹¹2000 data; ¹²2003 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

¹Alabama, 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;

²All tons MSW Recycled, MSW Incineration/Waste-To-Energy, and MSW Landfilled have been adjusted to exclude non-MSW; ³Estimated MSW Generated is the sum of MSW recycled, combusted and landfilled with each of these three categories adjusted to exclude non-MSW; ⁴MSW 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); ⁵Includes tons combusted without energy recovery; ⁶1999 recycling data reported; ⁷Waste Business Journal data was used to provide tons recycled and composted for California; ⁸2003 data; ⁹2002 MSW generation and landfill data, 2003 recycling data, 2004 WTE data; ¹⁰2000 data; ¹¹2003 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 land-filling (65.6% to 64.1%). Table 3 summarizes the data reported in this section — with percent breakouts for tons recycled/composted, combusted and land-filled. 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 land-filled 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)

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

¹Imported 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

¹Waste Business Journal data was used to provide tons recycled and composted for the following states: Alabama, Alaska, Arkansas, California, Colorado, Hawaii, and Louisiana; ²When 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); ³2003 data; ⁴1999 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

¹26 states represent those that reported quantities for individual recyclable materials. Aggregate organics recycled/composted can be found in Tables 4 and 6; ²2003 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

¹2003 data from California Integrated Waste Management Board report, "Second Assessment of California's Compost- and Mulch-Producing Infrastructure"; ²2003 data; ³2002 data. "—" indicates information not reported by the state.

tons) as did the recycling rate (26.7% to 28.5%). This number includes organic materials composted and/or mulched.

As shown in Table 3, several states had recycling rates of roughly 40 percent and above, including California (39.6%), Iowa (39.6%), Minnesota (43.2%), and Oregon (45.8%), all of which had similar recycling rates in 2002 (40.2, 41.7, 45.6, and 48.8 percent, respectively). New York (43.0 vs. 29.8%), Washington (40.5 vs. 34.1%), and Tennessee (42.2 vs. 26.4%) all had significant increases in their recycling rates over 2002. Several states also had decreases in their recycling rates of greater than 10 percentage points relative to 2002, including Maine (34.5 vs. 49.0%), Arkansas (19.7 vs. 36.3%), and Delaware (10.4 vs. 20.4%).

The large swings in percent recycling raise questions, of course, for those who think critically about waste management issues. Does the swing represent reality? This issue will be investigated in greater depth in a future article, but there could be several partial explanations, as follows: 1) The swing in recycling rates is, in fact, real. Actual tonnages recycled or disposed have been known to shift significantly from year to year, and there have been two full years between the State of Garbage surveys. For instance, in its annual solid waste management reports, Virginia showed increases in MSW disposed of 8.6 percent and 7.1 percent in 2003 and 2004. In 2002, the MSW disposed decreased by 7.5 percent; 2) Follow-up correspondence with states for the 2006 State of Garbage survey emphasized tracking MSW only in all waste management categories. This emphasis was not put forward as strongly in previous surveys; and 3) Outside of the State of Garbage surveys, many states may have strengthened their internal reporting methodologies resulting in different rates.

Table 6 highlights the contribution of organics to the overall recycling rate. Forty-six of the 50 states reported tonnage data for "recycled" (composted or mulched) organics (including yard trimmings and food residuals) and/or wood (non-C&D). (Data for Alabama, Alaska, Arkansas, Hawaii and Louisiana were obtained from Waste Business Journal.) The last column of Table 6 calculates the percentage that organics represent in the MSW recycling rate. Based on data from those states, organics (including wood) contributed an average of 18.5 percent of all materials recycled. This is down from the 28 percent reported two years ago (2002 data). Uncertainty surrounds the reason for the large drop. Is it due to greater recycling of nonorganics? Is the difference due to organics reporting issues, perhaps the differential inclusion/exclusion of non-MSW wood? Many states commented that composting operations are not required to report throughput, making data collection difficult and variable.

Table 7 includes recycled tonnages (by material type) reported by the states. Only 26 states provided this type of breakdown.

CURBSIDE COLLECTION PROGRAMS

Since the State of Garbage In America survey began in 1989, *BioCycle* has tracked the number of residential curbside collection programs in the U.S. In 1988, there were 1,042 curbside collection programs. That number quickly doubled within two years, and grew rapidly thereafter. A total of 9,709

Table 9. Number of municipal solid waste landfills and waste-to-energy plants, average tip fees, and capacity by state for 2004

State	Number of MSW Landfills	Average Landfill Tip Fee (\$/ton)	Total Landfill Capacity Remaining (cubic yards-cy (or tons as noted))	Landfill Capacity Being Added? (y=yes n=no)	Number Of WTE Plants	Average WTE Tip Fee (\$/ton)
Alabama	—	—	—	—	1 ¹	—
Alaska	—	—	—	—	1 ¹	—
Arizona	40	—	—	y	0	—
Arkansas	—	—	—	—	0	—
California	153	—	—	y	3	—
Colorado	72	—	—	—	0	—
Connecticut ²	2	—	150,000 cy	n	6	\$63.50
Delaware	3	\$58.50	59,800,000 tons	y	0	—
Florida ³	54	\$43.00	—	y	12	\$58.00
Georgia	57	—	515,384,163 cy	y	1	\$60.00
Hawaii	—	—	—	—	1 ¹	—
Idaho ⁴	26	—	—	y	0	—
Illinois	52	—	986,473,000 cy	y	0	—
Indiana	36	—	170,663,435 cy	y	1	—
Iowa	59	\$33.23	41,688,538 tons	y	1	\$52.75
Kansas	52	\$30.00	230,000,000 cy	—	0	—
Kentucky	27	\$28.57	164,000,000 tons	y	1	—
Louisiana	—	—	—	—	0	—
Maine ²	10	\$70.00	5,500,000 cy	y	4	\$85.00
Maryland	31	—	13,246,226 cy	n	6	—
Massachusetts	21	\$62.68	2,277,930 tons	n	7	\$69.03
Michigan	51	\$38.29	483,366,134 cy	y	3	\$94.00
Minnesota	23	\$52.50	32,400,000 cy	y	9	\$40.50
Mississippi	17	\$26.00	—	y	0	—
Missouri	22	\$36.63	195,831,391 cy	y	5	\$20.00
Montana	29	\$25.00	83,069,130 cy	n	1 ⁵	—
Nebraska	23	—	—	y	0	—
Nevada	23	—	99,702,787 cy	y	0	—
New Hampshire	8	—	—	y	2	—
New Jersey	12	\$70.00	38,000,000 tons	n	5	\$75.00
New Mexico	39	—	162,739,490 cy	y	0	—
New York	26	\$50.00	—	y	10	\$65.00
North Carolina	41	\$27.50	137,354,710 tons	y	1	\$40.00
North Dakota	14	\$28.43	—	y	0	—
Ohio	42	\$31.00	617,989,838 cy	y	0	—
Oklahoma	31	\$18.00	—	y	1	—
Oregon	28	\$35.00	—	n	2 ⁵	\$67.45
Pennsylvania	48	—	278,704,216 tons	n	5	—
Rhode Island	2	—	6,332,000 tons	—	0	—
South Carolina	18	\$32.00	—	—	1	—
South Dakota	15	\$33.50	—	—	0	—
Tennessee	35	\$28.00	—	—	0	—
Texas	189	\$26.09	1,134,264,509 tons	y	8 ⁵	—
Utah	34	—	—	y	1	—
Vermont	4	\$98.00	850,000 cy	y	0	—
Virginia	60	—	235,094,159 tons	y	5	—
Washington	19	\$53.16	214,000,000 tons	n	3	\$98.00
West Virginia	18	\$41.00	107,568,455 tons	n	0	—
Wisconsin	36	\$36.00	—	y	2	\$49.67
Wyoming	52	—	—	y	0	—
TOTAL	1,654				101	

¹Waste To Energy Research and Technology Council data; ²2003 data; ³Landfill data is from 2000; WTE data is from 2004; ⁴2000 data. "—" indicates information not reported by the state. ⁵Montana, Oregon, and Texas WTE counts include 1, 1, and 6 combustion facilities without energy recovery, respectively. Those facilities are not included in the national total of WTE plants (101).

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

¹2003 data; ²Landfill data is 2000. Transfer station data is 2002; ³2000 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		
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				

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

¹Comments received during data confirmation process between SOG team and state officials; ²34.39% is the diversion rate reported by Maryland. Using EPA's definition of MSW, state recycling rate is 31.4%; ³At 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"; ⁴State 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

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

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.

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.

A THANK YOU TO CONTRIBUTORS

BIOCYCLE and the Earth Engineering Center gratefully acknowledge the assistance of the following individuals — the majority in state solid waste and recycling offices — for all of their help and persistence in providing valuable data for the 2006 State of Garbage In America survey. We appreciate your patience with our follow-up questions and the speed with which you responded. Thank you!

Arizona: Tammy Shreeve and David Janke. *California:* Lanny Clavecilla. *Colorado:* Charles Johnson. *Connecticut:* Judy Belaval and K.C. Alexander. *Delaware:* Tom Houska. *Florida:* Sheileen Smith. *Georgia:* Joe Dunlop and Randy Hartmann. *Idaho:* Dean Ehlert. *Illinois:* Ellen J. Robinson and Gary Cima. *Indiana:* Michelle Weddle, Al Melvin. *Iowa:* Becky Jolly. *Kansas:* Kent Foerster, Winona Dixon and Ken Powell. *Kentucky:* Sara Evans, Tom Heil, Dara Carlisle, Leslie King, Cathy Guess, Allan Bryant, Billy Hill and Bob Bickner. *Maine:* George MacDonald. *Maryland:* David Mrgich, Hilary Miller and Tariq Masood. *Massachusetts:* John Fischer and Amy Roth. *Michigan:* Matthew Flechter. *Minnesota:* Mark Rust. *Mississippi:* Mark Williams and Pradip Bhowal. *Mis-*

souri: Dennis Hansen. *Montana:* Brian Spangler, Sandra Boggs, Howard Haines and Rick Thompson. *Nebraska:* Steve Danahy, Keith Powell. *Nevada:* David Friedman. *New Hampshire:* Donald E. Maurer. *New Jersey:* Ray Worob. *New Mexico:* John O'Connell. *New York:* Michael Munson, Scott Menrath, Sally Rowland, Peter Pettit, David Vitale, Steve Hammond and Gus Ribeiro. *North Carolina:* Scott Mouw and Paul Crissman. *North Dakota:* Steven Tillotson. *Ohio:* Michelle Kenton and Angel Arroyo-Rodriguez. *Oklahoma:* Carol Bartlett. *Oregon:* Peter Spindelov and Martine Roberts-Pillon. *Pennsylvania:* Carl Hursh, Greg Harder, Larry Holley, Gayle Leader, Sally Lohman, John Lundsted, Patti Olenick, Linda Polk, Habib Sharifihosseini, Steve Socash. *Rhode Island:* Mike McGonagle. *South Carolina:* Elizabeth Rosinski. *South Dakota:* Steven Kropp. *Tennessee:* Nick Lytle. *Texas:* Mike Lindner and Edward Block. *Utah:* Ralph Bohn. *Vermont:* Vicky Viens. *Virginia:* G. Stephen Coe. *Washington:* Gretchen Newman. *West Virginia:* Jim Hill. *Wisconsin:* Cynthia Moore, Gretchen Wheat, Steve Drake, Dennis Mack and Kate Cooper. *Wyoming:* Bob Doctor.

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. ■

Phil Simmons is pursuing his Master of Science degree in Earth and Environmental Engineering at Columbia University in conjunction with his research work at the Earth Engineering Center (EEC). EEC is the engineering unit of the Earth Institute at Columbia University, headed by Prof. Jeffrey Sachs. Simmons is a senior project scientist with HydroQual, Inc. HydroQual is an environmental engineering and science firm with a wide range of expertise in water quality, wastewater, solid and hazardous waste, and environmental assessment and permitting. The support by HydroQual of Mr. Simmons' studies at Columbia is gratefully acknowledged.

Nora Goldstein is Executive Editor of BioCycle, and has been involved with the magazine's State of Garbage In America surveys since their inception.

Scott Kaufman is a research scientist in the EEC of Columbia University, where he is pursuing his Ph.D. in Earth and Environmental Engineering. He is also the Research Director for Recycle-Bank, LLC, an incentive-based recycling company headquartered in Philadelphia and operating nationally. Mr. Kaufman was also the senior author of the 2004 State of Garbage in America report.

Nickolas J. Themelis is Director of the EEC and Stanley-Thompson Professor, Earth and Environmental Engineering, at Columbia University. Prof. Themelis was the first Chair of the new Department of Earth and Environmental Engineering (1997-2000).

James Thompson, Jr. is President of Waste Business Journal, a market research & analysis firm serving the waste management industry. Waste Business Journal publishes the "Directory & Atlas of Non-Hazardous Waste Sites" and other forms of up-to-date industry research including customized client reports.