Expanding Recycling in Michigan

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Prepared for
Michigan Recycling Partnership

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Executive Summary

This report documents the need for, and economic benefits from, increasing recycling in Michigan. It summarizes Michigan's municipal solid waste (MSW) recycling performance, identifies and summarizes selected model state recycling programs, and quantifies the economic benefits of increased recycling.

This report does not recommend specific policies or strategies for increasing Michigan's recycling rate, although it does provide examples of other states and local communities that are finding success. It is important to note that there is no single answer to increasing and sustaining recycling rates; various components must work together and complement efforts in all sectors and levels of government.

MICHIGAN IS WOEFULLY BEHIND IN ITS RECYCLING EFFORTS

Ironically, while Michigan is nationally recognized as a leader in conservation and environmental protection, the state is woefully behind its neighboring states and the nation in its MSW recycling efforts. The data presented in this report clearly show this:

- Michigan's recycling rate of 20 percent is lower than the other Great Lakes states (30 percent) and the U.S. (27 percent) averages.
- Michigan's recycling rate decreased by 20 percent from 1994 to 2004, while every other state in the region had at least a marginal increase in recycling.
- The per capita recycling rate (0.38 tons/year/person) has remained almost stagnant and continues to be below the regional and national averages (0.44 and 0.46, respectively).
- Unlike many states, Michigan does not collect or require reporting of MSW recycling data; therefore, Michigan does not have the ability to measure the state's recycling performance or its handling, collection, transport, and marketing of recyclable materials.
- Michigan's recycling program is funded at a fraction of the level of other Great Lakes state programs and ranks 41st out of 48 states that reported their allocations for recycling.
- Only 37 percent of Michigan residents have access to curbside recycling, the lowest percentage of all the states in the region.
- Michigan has not invested in developing or sustaining markets for recycled materials, and some businesses have to import recycled materials from other states because of the inconsistency in local supplies.

THE PUBLIC SUPPORTS AND IS WILLING TO PAY FOR INCREASED RECYCLING

Despite this dire picture, there is hope for a comprehensive recycling strategy in Michigan. Polling shows that Michigan residents overwhelmingly support the idea of comprehensive recycling—90 percent of survey respondents indicate that they are "very" or "somewhat" likely to support such a program. Residents also say that they are willing to pay for a comprehensive recycling program. Convenience is a critical key to success.

OTHER STATES ARE MORE SUCCESSFUL THAN MICHIGAN AT RECYCLING

Many states in the Great Lakes region and nationwide have made a greater commitment to recycling than Michigan. While states took different approaches to meet this commitment, there are key elements among successful programs around the country. The states with the highest recycling rates are generally those that:

- Provide the greatest opportunity to recycle and have strong statewide solid waste and recycling policies (e.g., every Oregon community with a population over 4,000 must have at least three recycling program elements available)
- Set clear and sometimes ambitious local and statewide goals
- Provide funding, tools, and technical assistance for communities to meet target goals
- Encourage source reduction in tandem with a recycling program
- Incubate and support markets for recyclable materials to close the waste stream loop and help bring recycling programs closer to being self-sustaining and even profitable
- Target education and recycling programs for different classes of waste generators (construction, schools, small/medium-sized business, residential, state departments, etc.)

MANY LOCAL MICHIGAN COMMUNITIES HAVE STRONG RECYCLING PROGRAMS

Despite the poor performance of Michigan's recycling to date and lack of funding statewide, some local Michigan communities have developed strong recycling programs—for example, the Southeastern Oakland County Resource Recovery Authority (SOCRRA) and the Resource Recovery and Recycling Authority of Southwest Oakland County. Both of these authorities are operated in southeast Michigan and are funded by member communities and through recycling fees for various items and services, as well as through the sale of collected materials. They also host a number of ongoing recycling and composting education programs in their communities.

MICHIGAN'S ECONOMY BENEFITS GREATLY FROM RECYCLING

There is much that Michigan can do to increase recycling, and the substantial economic benefits the state receives from the recycling and reuse sector—including jobs, support to the manufacturing sector, and tax revenues collected by state and local governments—should be an incentive to do so. Michigan has an estimated 2,242 establishments in the recycling and reuse industry with receipts of $11.6 billion, a payroll of about $2.06 billion, and employment of 61,700.

The recycling and reuse sector also produces indirect and induced economic activity as firms in the industry buy goods from other industries and the workers in these industries spend their wages to buy goods and services. Taking this into consideration, the industry is responsible for an additional 102,422 jobs. Combined with the 61,700 direct jobs, the industry is responsible for a total of 164,122 jobs, with a payroll of about $4.8 billion and receipts of $19.8 billion. The jobs created by the industry represent about 3.6 percent of

total Michigan wage and salary employment and the income generated is about 1.6 percent of total Michigan personal income. In addition, the industry generates about $490 million in state and local tax revenues.

INCREASING RECYCLING IN MICHIGAN ENHANCES THE ECONOMIC BENEFIT

Increasing recycling efforts in the state would greatly enhance these economic benefits. This report shows that increasing the recycling rate in Michigan from the current level of 20 percent (2002 estimate) to the average of the other Great Lakes states (30 percent), would produce a total of 6,810 to 12,986 jobs, approximately $155 to $300 million in income, and approximately $1.8 to $3.9 billion in receipts (accounting for multiplier effects). This additional income would generate about $12-$22 million in state taxes. These estimates may be conservative because they do not take into account the substitution of recycled materials for alternate raw materials, which would cause recycling manufacturing to grow and create even more jobs.

An increase of about 7,000–13,000 jobs due to increased recycling may seem modest, but to put it in context, over the last two years only three of Michigan's twelve major business sectors—educational and health services, leisure and hospitality, and accommodation and food services—created more than 7,000 jobs. Given Michigan's job prospects, unemployment rate, and economic outlook, capturing the economic benefits provided by increased recycling should be made a priority for the state.

Recyling Study Constraints

This study should be read with the understanding that recycling data is inconsistently reported and collected and, in some states, not collected at all.

The best-known municipal solid waste (MSW) data available nationally, the annual *BioCycle* "State of Garbage in America" reports, were used for this study. The *BioCycle* reports contain survey response data from the 50 states on MSW tonnage data and a percent breakdown of tons recycled, composted, combusted, and landfilled. However, as the following sections allude, comparing recycling rates across jurisdictions (state and even local) is made more difficult by the fact that there are no standardized practices for collecting, measuring, and reporting recycling and solid waste data. Even comparing data within a single jurisdiction over time can be skewed because measurement and reporting practices can change due to policy changes, funding sources with different reporting requirements, or technological advancements. The *BioCycle* survey requests data on municipal solid waste (i.e., only the residential and commercial/institutional streams); however, most states only had aggregate tons for solid waste, which may include construction and demolition debris, industrial waste, biosolids, etc. This is also true for recycling percentages in some states.

For the 2004 *BioCycle* report (based on the 2003 survey), data was requested in actual tonnages broken down by various categories of waste and recyclables. In order to make more accurate state-to-state and national comparisons, *BioCycle* uses the data provided to calculate only the MSW portions of total solid waste generated (noted as "estimated MSW generated"). *BioCycle* feels that this methodology provides "a generally accurate picture of the State of Garbage in America in 2003" (Kaufman et al. 2004).

In year-to-year comparisons of data in the following sections, the *BioCycle* data on "reported" MSW generation were used so that the study methodology remained constant. In the economic benefits section, the data on "estimated" MSW generation was used to provide a more accurate basis for economic predictions.

Michigan's MSW recycling rate of 20 percent is lower than the other Great Lakes states (30 percent) and the U.S. (27 percent) averages. Michigan's 1988 solid waste policy is out of date and no longer offers adequate guidance. In addition, the goals set forth in this policy are ineffectual; the state has no established method to measure, handle, collect, transport, and market recyclable materials.

The data available clearly show that Michigan is falling behind its regional neighbors in recycling. The trends detailed below demonstrate the significant disparities between Michigan and the rest of the Great Lakes states:

- Michigan's recycling rate decreased by 20 percent from 1994 to 2004, while every other state in the region had at least a marginal increase in recycling.
- The per capita recycling rate (0.38 tons/year/person) has remained almost stagnant and continues to be below the regional and national averages (0.44 and 0.46, respectively).
- Michigan's recycling program is funded at a fraction of the level of other Great Lakes state programs and ranks 41st out of 48 states that reported their allocations for recycling.
- Only 37 percent of Michigan residents have access to curbside recycling, the lowest percentage of all the states in the region.
- Michigan has not invested in developing or sustaining markets for recycled materials, and some businesses have to import recycled materials from other states because of the inconsistency in local supplies.

Despite this dire picture, there is hope for a comprehensive recycling strategy in Michigan. Residents say that they support a statewide program and would be willing to pay for it; polling shows that convenience is a critical key to success.

MICHIGAN'S RECYCLING POLICIES AND PROGRAMS

The Michigan Department of Environmental Quality's Waste Management Division (MDEQ–WMD) administers the state's solid-waste program under Part 115 of the state Natural Resources and Environmental Protection Act (P.A. 451 of 1994) The purpose of the statute is to encourage solid waste disposal methods that protect the environment and to enhance resource conservation. Among other provisions, Part 115 requires every Michigan county to develop and implement a solid-waste management plan and update it every five years. Related to recycling, the plan must include an evaluation of local recycling, composting, and waste reduction opportunities. According to the MDEQ's Recommendations for Improving and Expanding Recycling in Michigan report, only a handful of counties use the county plan to drive recycling efforts by setting goals and objectives for recycling within the county. Other counties only minimally mention recycling and waste prevention in their plans (MDEQ 2005).

The county solid-waste management plans must also include initiatives to increase reliance on recycling, composting, and waste reduction, and move the state toward meeting

the goals of Michigan's Solid Waste Policy. This policy, which was last updated in 1988, set the following state goals for the year 2005:

- Reduce the state's solid waste stream by 8–12 percent
- Reuse 4–6 percent of solid waste
- Compost 8–12 percent of solid waste
- Recycle 20–30 percent of solid waste
- Incinerate 35–45 percent of solid waste
- Landfill 10–20 percent of solid waste

There is no obligation on those collecting or managing recycled materials in Michigan to collect or report data. As a result, Michigan does not have an established method to either measure the state's recycling performance or determine whether Michigan has met these Solid Waste Policy goals. In addition, the policy no longer reflects Michigan's solid waste management priorities. The MDEQ–WMD is planning to convene a policy work group in 2006 to update the policy to reflect current solid waste management priorities for the state and identify methods for measuring progress.

Recycling programs initiated and managed at the state level basically consist of the bottle deposit law, funding and technical assistance to support household hazardous waste collections, and assisting businesses in recycling efforts. Michigan's bottle deposit law is successful in that it provides the opportunity for all Michigan residents to recycle their deposit beverage containers and results in a 97 percent return rate of deposit containers purchased (nationwide, beverage container recycling rates are below 50 percent). However, while highly visible and accessible to all Michigan residents, the deposit container returns contribute only about 2 percent to Michigan's overall municipal recycling rate, but represent about 10 percent of total recycling statewide (MDEQ 2005).

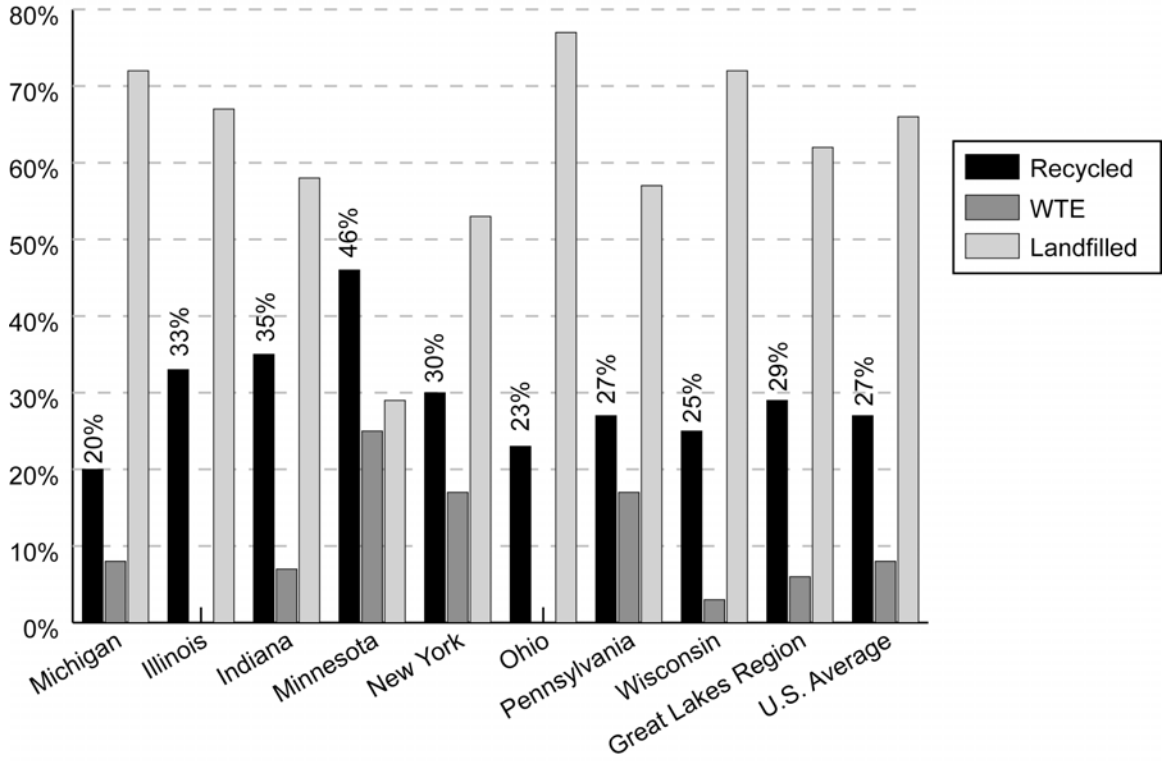
RECYCLING RATE AND TREND ANALYSIS

Michigan is one of eight states that do not collect data about the amount of municipal solid waste (MSW) recycled and/or composted annually, so measuring the state's recycling performance is difficult. In 1996, Michigan legislators mandated that the MDEQ–WMD develop a plan to collect recycling data. Without funding to support a data collection program, however, very little came of the 1996 mandate. The Michigan Recycling Coalition (MRC) received a federal grant to quantify the activities of the state's recycling-based industries. The report was published in 2001 and contained recycling data for 1999. The MRC calculated a 20 percent recycling rate for the state. This is the most recent comprehensive survey of recycling in Michigan (MRC 2001).

Michigan's 20 percent recycling rate is the lowest among the eight Great Lakes states (Illinois, Indiana, Michigan, Minnesota, New York, Ohio, Pennsylvania, and Wisconsin) and is lower than the national average, ranking 30th of all 50 states. According to *BioCycle*'s 2004 "State of Garbage in America" report, which is based on 2002 MSW tonnage data, the Great Lakes region's performance is comparable to that of the rest of the nation. The United States generates an estimated 369 million tons of MSW, and, of that, 26.7 percent is recycled, 7.7 percent is combusted in waste-to-energy plants (WTE), and 65.6 percent is landfilled. The eight Great Lakes states combine for a ratio of 29 percent recy-

cled, 9 percent WTE, and 62 percent landfilled. Minnesota posts the highest rates of both recycling and converted waste to energy (46 and 25 percent, respectively) and conversely has the lowest rate of landfilling (29 percent). Michigan has the lowest rate of recycling (20 percent) and one of the highest rates of landfilling (72 percent) among the Great Lakes states (see Exhibit 1). While other states have moved forward to grow and develop their recycling infrastructure, Michigan has remained firmly rooted in a program that has failed to move into the new century and to take advantage of the potential economic benefits that can be gleaned from capturing and recycling valuable resources.

EXHIBIT 1
Percentage of Municipal Solid Waste Recycled, Combusted (Waste to Energy), and Landfilled, 2002 Estimates

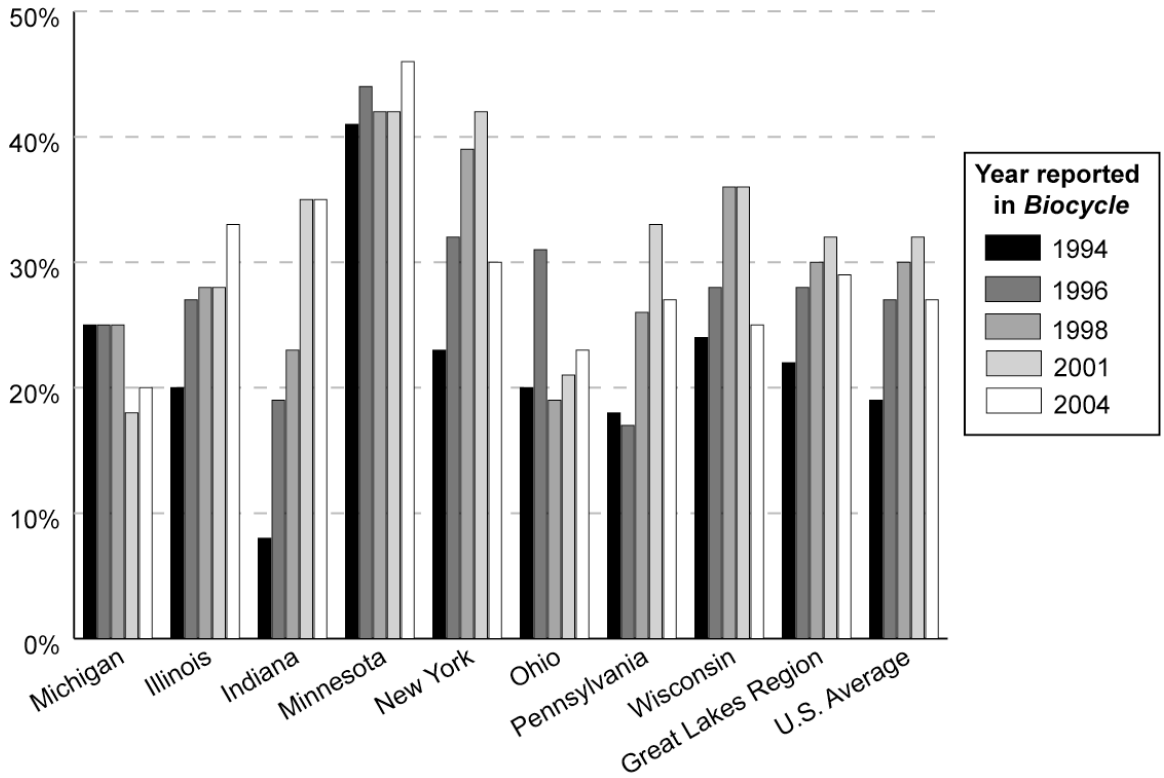


SOURCE: Data from *BioCycle* magazine's "State of Garbage in America" report from January 2004, Great Lakes region calculations by Public Sector Consultants Inc.
NOTES: These figures are percentages of the estimated MSW generated for each state. Estimated MSW generated is computed from reported tonnages of: [Landfill + Exported Landfill + WTE + Exported WTE + MSW Recycled] – [Construction and Demolition Debris Landfill + Industrial Landfill + Imported Landfill + Imported WTE]. Landfill includes the residential and commercial waste streams, organics, tires, and "other." The January 2004 issue of *BioCycle* reported a 15.1 percent recycling rate for Michigan. However, *BioCycle* later recognized this as a misprint and corrected it in the February 2004 issue to reflect the recycling rate of 20 percent, which was calculated by the MRC and is Michigan's most recent estimate. In Indiana, MSW generation is assumed to be equal to reported tons landfilled plus recycled, at same recycling rate as in 2000 (35 percent). Ohio data is from 2001.

Year-to-year comparisons among the states are somewhat difficult to make because the method of data collection and time period covered varies from state to state. Exhibit 2

displays the reported[1] recycling rates of the eight Great Lakes states from *BioCycle* magazine's "State of Garbage in America" reports in 1994, 1996, 1998, 2001, and 2004. The data are based on various years from 1992 to 2002. Many states reported peak recycling rates in previous years, which have since dropped; yet all states except Michigan have experienced growth in the recycling rates reported from 1994 to 2004. Indiana has shown the greatest growth in reported recycling, from 8 percent reported in 1994 (last among the eight states) to 35 percent (second) reported in 2004, a 337 percent increase[2]. Conversely, Michigan's recycling rate dropped 20 percent according to the figures reported for the same period (see Exhibit 2).

EXHIBIT 2
Recycling Rates in Great Lakes States, Selected Years

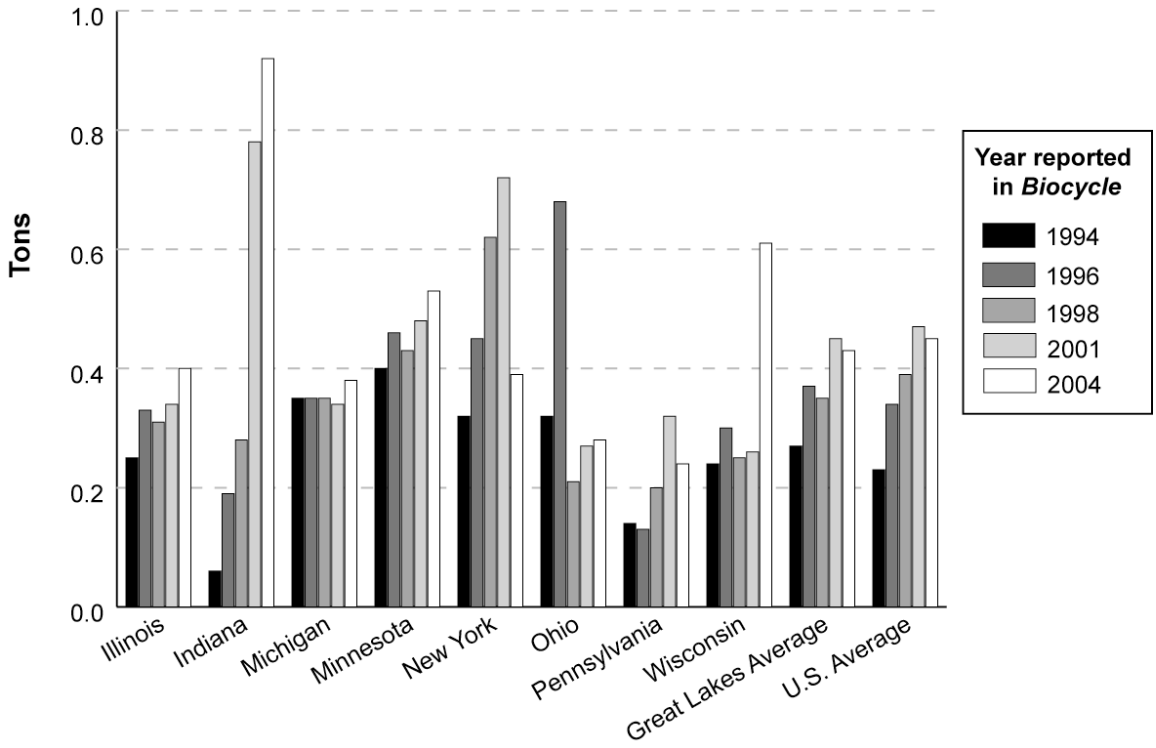


SOURCE: Data from *BioCycle* magazine's "State of Garbage in America" reports from April 1994, April 1996, April 1998, December 2001, and January 2004.
NOTE: The January 2004 issue of *BioCycle* reported a 15.1 percent recycling rate for Michigan. However, *BioCycle* later recognized this as a misprint and corrected it in the February 2004 issue to reflect the recycling rate of 20 percent, which was calculated by the MRC and is Michigan's most recent estimate.

[1] Estimated MSW data is from the 2004 survey, while reported MSW data is from previous surveys.
[2] According to personal communications with Michelle Weddle with the Indiana State Department of Environmental Management's Office of Land Quality, this reported increase is somewhat misleading. Indiana only tracks solid waste disposal, not total generation, so its diversion calculation may include composting, source reduction, and recycling. Composting has shown a significant increase in Indiana in recent years; however, its recycling rate is not measured; only rough estimates are reported to *BioCycle* and these may have been recalculated to make consistent comparisons with other states. More information on solid waste and composting in Indiana is available at *http://www.in.gov/idem/land/pubsforms/papers.html*.

Given the recycling rate, as well as census data on population figures and the total reported MSW generated, one can calculate the amount of MSW recycled on a per capita basis (see Exhibit 3). Michigan remains among the poorest performers in per capita recycling at 0.38 tons/year/person, according to the numbers reported in the 2004 "State of Garbage in America" survey. Seven of the eight Great Lakes states saw increases in per capita recycling in the last decade, including the best-performing state, Indiana, whose residents increased their recycling rate 15-fold (from 0.06 to 0.92 tons/year/person). Although Michigan's recycling rate was above the regional and national average per capita as reported in 1994, it is well below the averages for the 2004 reporting year. Ohio and New York residents' recycling rates peaked mid-decade and have now declined; yet Michigan's rate remained relatively stagnant through the 1990s.

EXHIBIT 3
Per Capita Recycling in Great Lakes States, Selected Years
(tons per year)

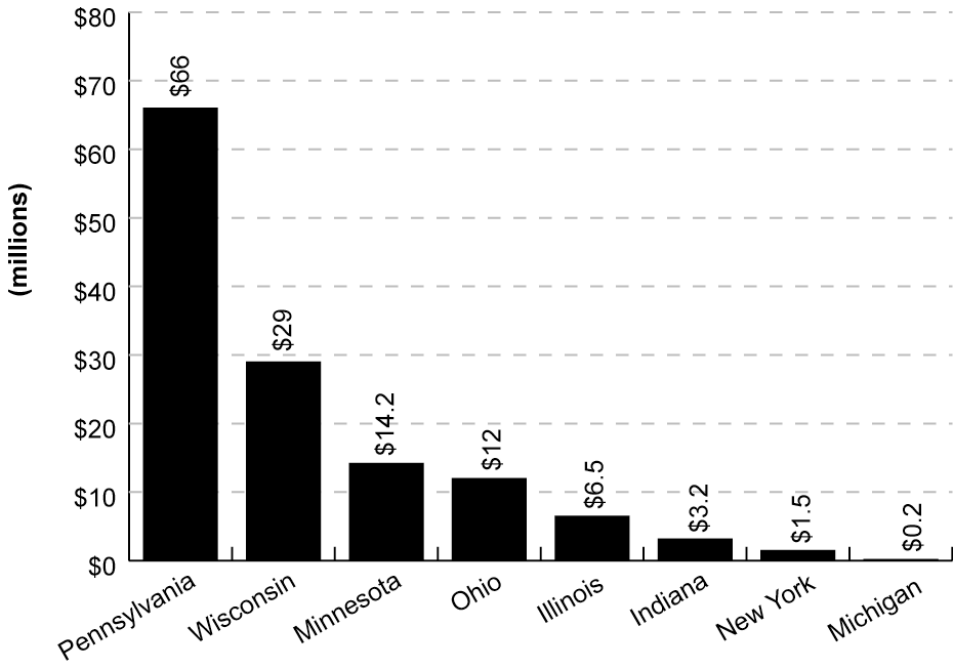


SOURCE: Recycling data from *BioCycle* magazine's "State of Garbage in America" reports from April 1994, April 1996, April 1998, December 2001, January 2004, and February 2004. State population data for 1994–2001 figures from U.S Census Bureau. State population data for 2004 figure based on 2002 population as reported in Kaufman et al. 2004 (Ohio data based on 2001 population from U.S Census Bureau).
NOTES: Per capita recycling rate based on reported MSW generated multiplied by the recycling rate, then divided by actual Census population or population estimate for data year. The 1994 survey is based on 1993 data (Minnesota and Pennsylvania 1992); 1996 on 1994 data; 1998 on 1996 data (New York and Wisconsin 1995); 2001 on 2000 data (Pennsylvania 1999, New York 1998, and Wisconsin 1995); and 2004 on 2002 data (Ohio 2001).

RECYCLING PROGRAM FUNDING

At the state level, Michigan annually allocates $200,000 to support recycling efforts (MDEQ 2005). This funding is largely devoted to salary and support of two staff persons: the recycling coordinator, who primarily assists residential recycling and composting programs, and a recycling specialist, who primarily focuses on electronics recycling and assists industrial and commercial recycling programs. This level of program support ranks 41st nationally out of 48 states reporting and last among the Great Lakes states (see Exhibit 4).

EXHIBIT 4
Annual Recycling Budgets for Great Lakes States (2005)



SOURCE: MDEQ 2005, Raymond Communications 2005.
NOTES: New York reported a range of $1–2 million, so the average was used. The seven reporting states that annually spend less on recycling than Michigan are Alaska, Kentucky, Louisiana, Montana, New Mexico, North Dakota, and Wyoming.

MICHIGAN RESIDENTS' ACCESS TO RECYCLING

The 2001 MRC study that collected 1999 municipal recycling data in Michigan identified 303 communities that manage and/or operate 347 curbside programs for approximately 3,670,072 Michigan residents. The study also found that 377 communities and private businesses manage and/or operate 425 drop-off collection programs that serve approximately 5,471,053 residents (MRC 2001). The study results show only 37 percent of Michigan's population having access to curbside recycling and 55 percent having access to a drop-off location.

The lack of access to recycling opportunities is further confirmed when Michigan is compared to other Great Lakes states. Michigan ranks the lowest among the Great Lakes

states in terms of the population's access to curbside recycling programs. New York State, where 91 percent of the population has access to a curbside program, ranks the highest and is the national leader in total number of programs with 1,500.[3] The most growth over the last decade has been in Indiana, which has increased the percentage of its population with access to curbside programs by 334 percent even though the total number of curbside programs decreased dramatically (89 fewer programs) between the 2001 and 2004 surveys. This growth in curbside access while simultaneously decreasing the number of programs may be due to the consolidation of programs along with increased efficiencies. With only 37 percent of residents having access to curbside recycling programs, Michigan is well below the regional average of 65 percent and the national average of 50 percent (see Exhibit 5).

RECYCLING MARKET DEVELOPMENT

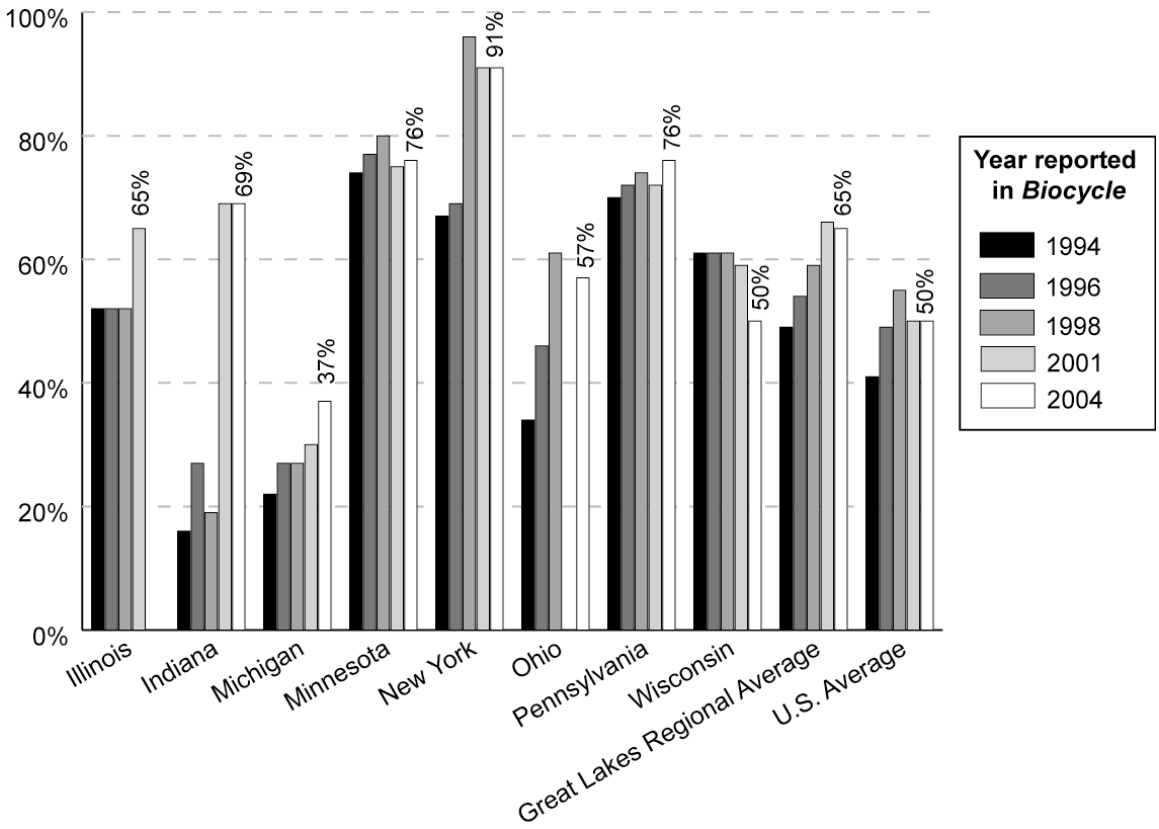
Collecting recyclable materials and keeping them out of landfills is only part of the recycling story. Recycling also involves hauling, processing, and brokering the recovered materials, as well as manufacturing and distributing products made with the recycled content. Unfortunately, Michigan is not investing in this part of the recycling cycle, either.

Michigan has no economic incentive programs to attract recycled product manufacturers to the state, does not encourage established manufacturers to convert to using recycled feedstock, does not specifically support existing Michigan-based recycled product manufacturers, and does not promote the purchase of recycled products available to the public and private sectors. Michigan businesses are currently importing recycled materials because they cannot rely on a steady supply of postconsumer materials from inside the state, largely because collection programs in Michigan are inconsistent and scattered geographically (MDEQ 2005).

There are many ways in which Michigan could capitalize on the economic and job-creation benefits associated with creating markets for recycled products. Michigan could sustain greater markets for products containing recycled content by providing information on where recyclables are being generated in a large enough volume to attract a recycling company. In addition, the state could use its purchasing power to support markets for products containing recycled content through recycled product purchasing requirements and dedicated resources to find recycled products. Michigan could also implement a market development program for recycling, provide grants to communities for collection programs, or provide tax incentives to businesses to use recycled feedstock in manufacturing products.

[3] Based on 1998 data, as reported in the 2004 "State of Garbage in America" report.

EXHIBIT 5
Percentage of State Population Served by Curbside Programs, Selected Years



SOURCE: Recycling data from *BioCycle* magazine's "State of Garbage in America" reports from April 1994, April 1996, April 1998, December 2001, and January 2004. State population data for 1994–1998 figures from Census 1990; state population data for 2001 and 2004 figures from Census 2000.
NOTE: Illinois did not report curbside recycling population figures for the 2004 survey; Ohio did not report curbside recycling population figures for 2001 survey.

Other Great Lakes states have economic development programs to support recycling market development. For example, the State of Indiana levies a 50-cent/ton solid waste surcharge and allocates half of the revenue to the Recycling Market Development Program. The purpose of the program is to reduce the amount of waste deposited in Indiana landfills by strengthening the recycling infrastructure. The program challenges Indiana businesses to reduce their waste and increase reuse, recycling, and the use of recycled-content material. Components of these programs include financial assistance, technical assistance, educational materials, and training. A grant program was added to the existing loan program in 2000.

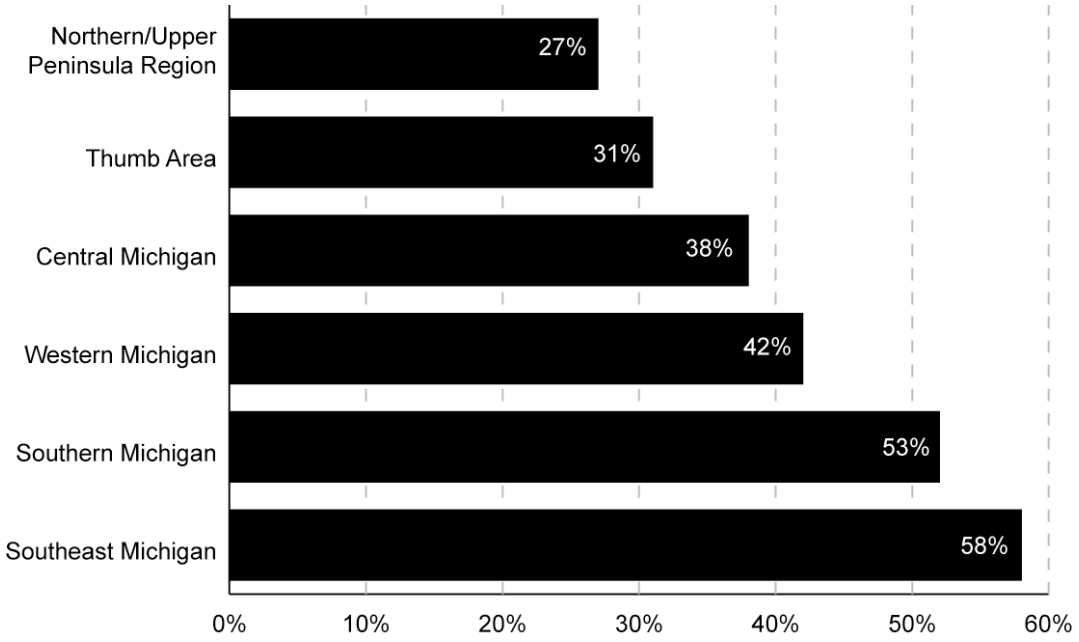
PUBLIC SATISFACTION WITH RECYCLING

In April 2005, Public Sector Consultants Inc. (PSC) conducted a telephone survey of Michigan adults to ascertain public opinion about comprehensive recycling and options for recycling funding. Respondents included a random sample of 600 Michigan adults and an oversample of 200 additional respondents to enable regional comparisons. Results based on the 600-person, random sample have a margin of error of ± 4 percent.

Major findings include the following:

- **Most residents report having access to some type of recycling.** Eighty-five percent of respondents report some type of recycling program in their community, a figure that may be attributable to the bottle deposit law. A plurality (47 percent) indicate that curbside pickup is available; 23 percent say that drop-off locations are available; and 15 percent report that both curbside and drop-off programs are available in their communities.[4] Eight percent say they have no recycling service or program available to them.
- **Southeast Michigan is the best at recycling.** More than half of respondents (58 percent) in the tri-county area of Macomb, Oakland, and Wayne report recycling "all the time" (see Exhibit 6).

EXHIBIT 6
Percentage of Survey Respondents Reporting Recycling "All the Time," by Region



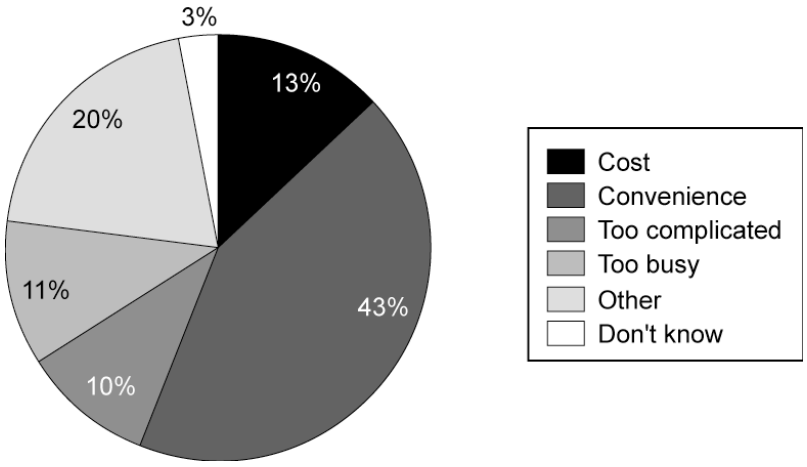
SOURCE: Public Sector Consultants Inc., Michigan Recycling Survey, March 2005.

- **"Lack of convenience" is the most common reason for not recycling more often.** Among respondents who recycle just half the time or less often, the most common reason for not recycling more often—cited by 43 percent of respondents—is lack of convenience. Another 20 percent say they do not recycle for some other, unspecified

[4] Readers may note that the percentage of respondents with access to curbside recycling pickup reported in this section (47 percent) is different from the percentage reported in the Michigan Residents' Access to Recycling section (37 percent). This is because the figures come from two different reports. This section reports the results of a 2005 survey of Michigan residents' perceptions of recycling. The previous section reports findings from a 2001 survey of individuals responsible for county solid waste planning/recycling officials/coordinators.

reason. Thirteen percent do not recycle because of the fees they would have to pay; 11 percent say that they are "too busy" to recycle; 10 percent think that recycling is too complicated; and 3 percent have no reason for not recycling more often (see Exhibit 7).

EXHIBIT 7
Reasons for Not Recycling



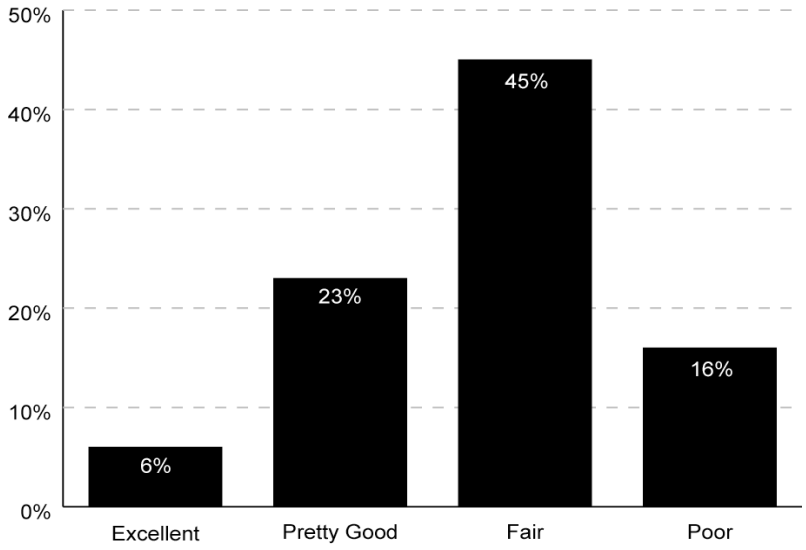
SOURCE: Public Sector Consultants Inc., Michigan Recycling Survey, March 2005.

- **Michigan residents do not rank themselves highly when it comes to recycling.** Just 6 percent of residents think that Michigan does an "excellent" job of recycling its solid waste. Twenty-three percent believe Michigan does a "pretty good" job, 45 percent of respondents believe Michigan does a "fair" job, and 16 percent think Michigan does a "poor" job of recycling its solid waste (see Exhibit 8).

- **Residents support the idea of comprehensive recycling in Michigan.** The public overwhelmingly supports the idea of comprehensive recycling—90 percent of respondents indicate that they are "very" or "somewhat" likely to support such a program.

- **The public is willing to pay for comprehensive recycling; willingness to pay improves dramatically when residents understand the impact it can have on Michigan's recycling rate and landfill capacity.** More than two-thirds (67 percent) of survey respondents say they are "very" or "somewhat" likely to support funding for a comprehensive recycling program in Michigan. Being told that Michigan is last among Great Lakes states in recycling and suggesting that a comprehensive recycling program could improve Michigan's rates is the most persuasive argument for support—nearly 80 percent of respondents say that knowing this would make them "much" or "somewhat" more likely to pay for a comprehensive recycling program. Almost 75 percent of residents are more likely to support paying for comprehensive recycling when told that if current trends continue, Michigan landfills will be full within 20 years.

EXHIBIT 8
Michigan Residents Rank How the State Performs in Recycling



SOURCE: Public Sector Consultants Inc., Michigan Recycling Survey, March 2005.

Model State Programs

Many states in the Great Lakes region and nationwide made a commitment to solid waste reduction, reuse, and recycling as preferred methods of managing solid waste over land-filling and incineration in the 1970s, '80s, and '90s. States took different approaches to meet this commitment; some set goals for waste reduction and recycling either in policy or statute, others developed innovative partnerships with the private sector. This section of the report summarizes some of the top programs in the country.

There are key elements among successful programs around the country, although there is no single answer to increasing and sustaining recycling rates; various components must work together and complement efforts in all sectors and levels of government. The states with the highest recycling rates are those that generally provide the greatest opportunity to recycle and have strong statewide solid waste and recycling policies. For example, every Oregon community with a population over 4,000 must have at least three recycling program elements available. Oregon also has many communities that must pay for their solid waste disposal, making recycling even more desirable since it is generally free.

Setting clear and sometimes ambitious local and statewide goals is important when starting a program, but providing funding and tools for communities to meet those targets will translate to the most success. Many of the model states set recycling rate goals (some mandated, others voluntary); however, some had to extend the time needed to reach them—Washington's target year for 50 percent recycling was moved from 1995 to 2007. Only a few states levied penalties for not meeting goals; many just required revised local solid waste management plans and additional analysis of existing policies and programs with state oversight. State governments that mandate recycling programs and/or provide technical and financial support to assist local governments in reaching their recycling goals have had the most success in increasing recycling in their communities.

Programs to encourage source reduction should be done in tandem with a recycling program, in order to reduce overall costs. Many states have incentives for reducing solid waste or have implemented fee structures that make it just as costly to throw garbage away as to recycle it. Iowa has a unique way of assessing tonnage fees based on planning area diversion rates, and the revenues generated from the fees fund the recycling program. New Jersey's new Solid Waste Management Plan calls for commercial product responsibility to improve the packaging and materials used in manufacturing items.

Incubating and supporting markets for recyclable materials closes the waste stream loop and can make recycling programs closer to being self-sustaining and even profitable, but only in a limited number of circumstances. Minnesota's recycling grants to communities can be used for a wide variety of activities, not only to increase recycling but also to develop markets for recycled products. Oregon requires a certain percentage of recycled content in materials purchased by the state, further supporting recycling efforts.

Finally, targeted education and recycling programs for different classes of waste generators (construction, schools, small/medium sized business, residential, state departments, etc.) is another way to maximize recycling. Each of the model states described in Exhibit 9 has different programs targeted to unique groups of recyclers because the composition

of the waste generated is different (organics, wood waste, paper, etc.). New Jersey even assigns recycling goals for targeted materials, based on the class of waste generation.

EXHIBIT 9
Summary of Model State Programs

State	Recycling rate (as % of MSW)	Recycling program summary
Oregon	48.8%	In 2001, Oregon's recovery goals were revised to set a 45 percent recovery goal for 2005 and 50 percent recovery by 2009. Previously, legislation adopted in 1991 had set a goal of 50 percent recovery by 2000. In 2002, the statewide recovery rate was 46.6 percent. Under the 2001 law, each county or "wasteshed" has separate recovery goals for 2005 and 2009. The goals range from a low of 8 percent in 2005 and 10 percent in 2009 to a high of 62 percent in 2005 and 64 percent in 2009. These goals are required, but if a wasteshed fails to achieve its 2005 or 2009 goal, the only penalty is that the wasteshed must conduct a technical review of existing policies or programs and determine changes needed to meet the recovery goals. Recycling programs are funded through a tipping fee of $1.24 on every ton of waste disposed of in or exported out of the state.
Minnesota	45.6%	A 1989 law set a 35 percent recycling goal by December 31, 1996, for the Greater Minnesota area (outside the 7-county metro area of Minneapolis and St. Paul) and a 50 percent recycling goal for the metro area. Source separation plans are required for each solid waste management district. All counties must provide the opportunity to recycle to residents, which means they must have one recycling center available that collects four broad types of materials. The county must also have curbside pickup (in cities with a population of 5,000 or more) and collection centers that are convenient for people to use. Individual counties have set their own goals in the planning process.
Iowa	41.7%	A 1988 law established a 25 percent waste reduction goal by July 1, 1994, and 50 percent by July 1, 2000; 25 of 45 planning areas have met the 25 percent reduction goal and 5 of the 45 have reached the 50 percent reduction goal. Landfills are required to collect a fee on each ton of nonexempt disposed waste based on their planning area's diversion goal. Planning areas not meeting the 25 percent diversion goal must collect $4.75 per ton and retain $1.45 to be used locally and remit $3.30 to the state. Planning areas exceeding the 25 percent but not meeting the 50 percent diversion goal must collect $3.65 per ton and retain $1.45 to be used locally and remit $2.20 to the state. Planning areas exceeding the 50 percent diversion goal must collect $3.25 per ton and retain $1.95 locally and remit $1.30 to the state. Waste management assistance programs and environmental protection programs involving waste are financed through the portion of the fee remitted to the state.
Missouri	38.9%	A 1990 law, SB530, established a 40 percent waste diversion goal by 1998. The state increased the percentage of solid waste recovered from 10 percent in 1990 to 26 percent in 1995 to 33 percent in 1996. In 2001, the diversion rate reached 41percent, and in 2002 the diversion rate was 43 percent. Diversion includes waste reduction, recycling, and composting. Goal still stands at 40 percent for the state. There is no mandate to meet this goal and no penalties for nonachievement. The goal has been met and surpassed. The Department of Natural Resources is continuing to make efforts to increase the diversion rate for the state of Missouri.
New Jersey	37.9%	The 1992 revisions to the recycling goals in the Recycling Act established a 50 percent municipal solid waste recycling goal by December 31, 1995, and

State	Recycling rate (as % of MSW)	Recycling program summary
		a 60 percent total recycling goal by December 31, 1996. The state failed to meet the municipal solid waste-recycling goal of 50 percent in 1995, but did meet the overall recycling goal, with a recycling rate of 61 percent in 1996.
Washington	34.1%	A mandatory recycling goal of 50 percent by 1995 was changed to 2007. Loans and grants are available to local governments for waste reduction, recycling programs, composting, and education; waste tax funding goals; parks, airports, and marinas separate two recycling materials; a recycling litter tax now applies to by-products produced by some manufacturers and food processors (1992). There is a business waste tax on trash sent to landfills. Local governments cannot institute bans, but the ban on bans was lifted in 1993. The state did not meet 1995 goal—all funding ended in 1995 but the goal still exists (year changed to 2007). The recycling rate for 2002 was 34.8 percent.

SOURCE: Recycling rate is from Kaufman et al. 2004; summaries of recycling programs are from APFA 2004.

OREGON (RECYCLING RATE: 48.8 PERCENT)[5]

A perceived shortage of landfill space, in part, led to passage of Oregon's first Opportunity to Recycle Act in 1983. This act also established solid waste management policies that recognized the environmental benefits of waste prevention, reuse, and recycling, stating that in order to conserve energy and natural resources, solid waste management should follow a hierarchy that gives preference to waste reduction, reuse, and recycling over waste-to-energy and landfilling. The 1983 act also required "wastesheds" (usually counties)[6] to have recycling depots and required cities with a population of more than 4,000 to provide monthly curbside recycling collection service to all garbage service customers.

Oregon's recycling activities and requirements were strengthened and broadened by the Oregon Recycling Act. The 1991 law

- set a statewide recovery goal of 50 percent by 2000 and interim recovery goals for individual wastesheds by 1995;
- established a household hazardous waste program;
- required recycled content in glass containers, directories, and newsprint and set requirements for recycling rigid plastic containers to promote market development;
- established government procurement requirements for recycled products;
- required the Oregon Department of Environmental Quality (ODEQ) to calculate recovery rates annually to measure progress toward the 50 percent goal;

[5] Recycling rate noted for each state is from Kaufman et al. 2004.

[6] A "wasteshed" is defined in Oregon law as an area of the state that shares a common solid waste disposal system, or an appropriate area in which to develop a common recycling system. For the most part, individual Oregon counties are designated as wastesheds. The two exceptions are (1) the greater Portland tri-county area, consisting of Clackamas, Multnomah, and Washington counties, designated as the Metro wasteshed and (2) Milton-Freewater, a city within Umatilla County, designated as a separate wasteshed.

- required the ODEQ to conduct a waste composition study every other year to determine what materials are being disposed, which helps in planning local government recycling programs;
- required the ODEQ to develop a solid waste management plan; and
- required and provided funding to develop a school curriculum on recycling and waste reduction.

The law (which was modified in 1997) also established solid waste management requirements for local governments by establishing a list of recycling program elements/options. All cities with a population of 4,000 or more must provide a minimum of three recycling program elements and basic recycling education and promotion. All cities with a population of 10,000 or more must provide an additional one or two recycling program elements (depending on the activities chosen). The options include:

- Weekly residential curbside collection of source-separated recyclable materials, on the same day as garbage service. (If this program element is not implemented, a minimum of monthly curbside collection is still required.) Local governments must also give notice to each person of the opportunity to recycle and encourage source separation of recyclable materials through an education and promotion program
- An expanded recycling education and promotion program, which includes, among other things, recycling collection promotion directed at residential and commercial solid waste service customers and generators at least four times a year
- Provision of at least one durable recycling container directly to each residential collection service customer
- Recycling collection service provided to multifamily dwelling complexes having five or more units
- Residential yard debris collection program for collection and composting of residential yard debris
- Regular, on-site collection of source-separated, principal recyclable materials from commercial generators
- Establishment of an expanded system of recycling depots that are conveniently located for the population served
- Garbage collection rates established as a waste reduction incentive, including a "mini-can" option at a substantially reduced rate
- A collection and composting program for commercial and institutional food waste, nonrecyclable paper, and other compostable waste

In addition, the act created a funding mechanism for recycling programs through a tipping fee of $1.24 on every ton of waste disposed in or exported out of the state. These funds are used to support the ODEQ Solid Waste Program's staff and a grant program for local government recycling and solid waste prevention or reduction projects. Since the first grant round in 1991, the ODEQ has awarded 230 grants totaling $4,513,286. Awards for 2005 have not yet been announced to the public, but ODEQ anticipates allocating $225,000 in grants to successful communities (ODEQ 2005).

It is important to note that the funds collected through tipping fees are not generally used to subsidize local recycling efforts. Funding for curbside collection programs in Oregon comes from the garbage service customers themselves. Local governments rarely provide the recycling or garbage service directly in Oregon, and few provide any subsidy for recycling. Instead, franchised garbage haulers provide garbage pick-up service, including curbside recycling, and directly bill their customers for the associated costs.

In 1997, the Oregon Legislature expanded that state's resource recovery efforts beyond recycling by creating a program that allowed wastesheds to earn 2 percent credits (up to 6 percent total) toward their resource recovery rate for establishing and maintaining programs in waste prevention (such as pay-as-you-throw [PAYT] programs), reuse, and backyard composting.

Oregon did not meet its 50 percent resource recovery goal in 2000, so the goal was revised in 2001 to 45 percent by 2005 and 50 percent by 2009 (Oregon's 2004 recovery rate was 48.8 percent). To help meet the statewide recovery goals, each wasteshed was given a new recovery goal for 2005 and 2009. The goals range from a low of 8 percent in 2005 and 10 percent in 2009 to a high of 62 percent in 2005 and 64 percent in 2009. These goals are required, but if a wasteshed fails to achieve its 2005 or 2009 goal, the only penalty is that the wasteshed must conduct a technical review of existing policies or programs and determine changes needed to meet the recovery goals (ODEQ 2003).

MINNESOTA (RECYCLING RATE: 45.6 PERCENT)

Minnesota's model legislation, commonly referred to as SCORE (based on the recommendations of the Governor's Select Committee on Recycling and the Environment), was adopted in 1989 as part of Minnesota's Waste Management Act. This set of laws initiated a stable source of state revenues to build comprehensive waste reduction and recycling programs. Goals for recycling and waste reduction were set for Minnesota counties. By 1996, counties outside of the metropolitan area (the seven-county metro area of Minneapolis and St. Paul) were required to recycle 35 percent (by weight) of total MSW; metropolitan counties have a goal of 50 percent. Each county is required to submit for approval its recycling implementation strategy, which must

- be consistent with the approved county solid waste management plan,
- identify the materials that are being and will be recycled in the county to meet the goals under this section and the parties responsible and methods for recycling the material,
- provide a budget to ensure adequate funding for needed county and local programs and demonstrate an ongoing commitment to spending the money on recycling programs, and
- include a schedule for implementing recycling activities needed to meet the goals.

The legislation also addressed the consequences for not meeting the interim and final goals by their deadlines. A county failing to meet the goals must, at a minimum, notify county residents of the failure to achieve the goal and why the goal was not achieved and provide county residents with information on recycling programs offered by the county. Based on continued monitoring, the director can recommend legislation to establish man-

datory recycling standards and to authorize the director to mandate appropriate solid waste management techniques designed to meet the standards in those counties that are unable to meet the goals.

Minnesota boasts the third best recycling rate in the nation (Kaufman et al. 2004) due to the level of participation by its residents and businesses, along with comprehensive recycling programs at the city and county levels—programs funded by local government and state revenues. According to the most recent report of SCORE programs in 2003, the statewide recycling rate is now at 46.5 percent, and counties outside the metropolitan area have greatly exceeded their legislative goal, recycling 46.7 percent of MSW. According to Rust et al. (2004), "Since the SCORE legislation was enacted in 1989, Minnesota's statewide recycling rate has climbed by 24 percentage points."

In 2003, Minnesota counties spent over $49 million for SCORE-related programs, an increase of more than $2.5 million, or 5 percent, from 2002. Continued funding commitments from the legislature and significant investments at the local level provide the funding these programs require, although this support has dwindled in recent years due to state cutbacks and budget reductions at the local level. State tax revenue is passed to the county level in the form of annual block grants, and counties have fairly broad discretion as to how to spend their block grants and local matching funds—source reduction, recycling, market development, management of problem materials, waste education, litter prevention, technical assistance to ensure proper solid waste management, and waste processing (Minn. Stat. § 115A.55).

The Office of Environmental Assistance (OEA) provided $11.2 million to eligible counties in calendar year 2003 and $12.5 million in 2004, although the most recent figure is still $1.6 million per year less than in previous years (1992–2001). Between 1993 and 2003, overall SCORE expenditures increased by 20 percent. These increases were funded entirely at the local level by counties and cities through use of general revenue, special assessments, or other sources of revenue. Each county is required to match the funding from the legislature with a local contribution of at least 25 percent. In 2003, counties contributed 11 times this match, spending over $35 million of county funds toward SCORE-related activities. This investment is in addition to undocumented dollars spent by other local units of government such as cities and townships on programs including recycling, household hazardous waste collection, and waste education.

Some counties faced with budget reductions are closing down recycling centers or limiting the types of materials they collect, despite the evidence of the economic value of the recycling industry. Rural programs in particular are having continued challenges getting materials to distant markets. The OEA's strategic objective is to continue efforts to expand Minnesota's secondary markets, increase recycling employment to 9,600 jobs, and to grow the industry overall by 20 percent in the next ten years.

IOWA (RECYCLING RATE: 41.7 PERCENT)

Iowa passed the Waste Volume Reduction and Recycling Act in 1989. This law initiated sweeping changes to Iowa's overall waste management systems. The changes were driven by two waste volume reduction goals established in the law: to reduce the waste

stream existing as of July 1, 1988, by 25 percent by July 1, 1994, and by 50 percent by July 1, 2000.

To assist in attaining these goals, Iowa law provides for the imposition and use of a state solid waste tonnage fee. Landfills are required to collect a fee on each ton of nonexempt disposed waste based on the area's progress toward meeting the state's 25 and 50 percent waste diversion goals. Planning areas not achieving the 25 percent diversion goal must collect $4.75 per ton, retain $1.45 to be used locally, and remit $3.30 to the state. Planning areas exceeding the 25 percent goal and not meeting the 50 percent diversion goal must collect $3.65 per ton and retain $1.45 to be used locally and remit $2.20 to the state. Planning areas exceeding the 50 percent diversion goal must collect $3.25 per ton, retain $1.95 locally, and remit $1.30 to the state. Both reductions in the tonnage fee are taken from the portion of the tonnage fees that would have been allocated to fund alternatives to landfills (Iowa Legislature 2005).

Waste management assistance programs and environmental protection programs involving waste—including developing and implementing demonstration projects for landfill alternatives and initiatives to encourage composting and tire, electronics, and appliance recycling—are financed through the portion of the fee remitted to the state.

Of the 47 solid waste planning areas in Iowa, 22 have met the 25 percent reduction goal and 5 have met the 50 percent reduction goal (APFA 2004).[7] The 20 planning areas that have failed to meet the state's 25 percent waste volume reduction and recycling goal must implement strategies to improve waste reduction and recycling efforts. Strategies include educational and promotional campaigns to inform residents and businesses of the manner and benefit of recycling, reusing, and purchasing products made of recycled content. In addition, a penalty of 50 cents per ton of waste landfilled must be paid to the state until the planning area can demonstrate that it has attained the 25 percent waste reduction and recycling goal. No more than once per fiscal year, planning areas may submit a written request to the Department of Natural Resources to have their progress toward the goal calculated. Finally, planning areas are also are required to charge residents for the amount of waste being disposed of, rather than just a flat rate fee (PAYT). This type of program is currently in place in 557 Iowa communities.

Iowa has the fifth highest recycling rate nationwide at 41.7 percent. This is due, in part, to the above measures, aided by Iowa's bottle deposit law (five cents on all carbonated and alcoholic beverages) and the fact that curbside recycling is available in approximately 650 communities (out of a total of 950).[8]

MISSOURI (RECYCLING RATE: 38.9 PERCENT)

During the late 1980s, the State of Missouri began shifting its policy focus from simply collecting and disposing waste to reducing waste and finding alternatives to disposal (MDNR 1999). In 1989, then Governor John Ashcroft announced the Missouri Policy on

[7] Information updated in a personal communication from Jeff Geerts, Program Planner, Iowa Department of Natural Resources, December 19, 2005.

[8] Personal communication from Jeff Geerts, Program Planner, Iowa Department of Natural Resources, December 19, 2005.

Resource Recovery. This policy directed state and local government to apply the integrated waste management hierarchy, which encourages (1) reduction of waste, (2) reuse, recycling, and composting of waste, (3) recovery and use of energy from waste, and (4) incineration or waste disposal. This policy influenced legislation that passed in 1990 to amend the Missouri Solid Waste Management Law (Senate Bill 530), which recognized the importance of the hierarchy and incorporated many of its concepts. The amendments

- set a goal to divert 40 percent of the waste stream from landfill disposal;
- created 20 solid waste management districts across the state to help cities and counties work cooperatively in the development of local recycling services;
- required that solid waste management district plans address recycling services for both rural and urban communities;
- levied a landfill $2.11 per ton fee to create the Solid Waste Management Fund and designated the fund's distribution for
  - recycled products market development grants;
  - solid waste reduction, recycling collection and processing, composting, informational activities, market development, and research and development grants;[9]
  - solid waste management district operating funds assistance and district grants;[10]
  - reduction of illegal dumps;
  - statewide education and training in solid waste management, among other incentives; and
- required the Missouri Department of Natural Resources to
  - create and distribute planning guidance and informational and educational materials that relate to recycling,
  - develop markets for recyclables to help develop a sustainable infrastructure, and
  - provide technical assistance to public and private sectors; and
- minimized regulatory requirements for recycling facilities.

Of the 600 communities surveyed, 358 communities have recycling services, including 198 with curbside collection. The curbside service is operated by the municipality in 32 cities. Another 94 communities contract with private haulers to provide curbside service. The remaining communities are served by 194 private haulers, nine nonprofits, and one solid waste management district. Drop-off services can also be public or private. Of the 253 communities with drop-off recycling, 102 are operated by municipalities and 13 by counties. In 35 cities, the local government contracts with a private business to operate the service. Drop-off collection sites are also provided by 174 private businesses, 51 nonprofits and one district. Many of the recycling services in Missouri manage source-separated recyclables. Over half of the curbside programs use a type of commingled collection, in which several types of recyclables may be placed in the same bin or bag for

[9] Since 1993, 324 grant projects have been completed, with a disbursement of approximately $20.8 million and a reported diversion from Missouri landfills of 334,565 tons (MDNR 2005).
[10] Since 1993, $44.9 million have been disbursed (MDNR 2005).

pick-up. Since these commingled recyclables are kept separate from mixed solid wastes, they can be easily sorted at a recycling center for processing and transport.

NEW JERSEY (RECYCLING RATE: 37.9 PERCENT)

While the State of New Jersey has shown a recent dip in its recycling rate, the state has reaffirmed its commitment to sound solid waste management and recycling by bringing together a diverse group of experts for a "Reinvigorating Recycling Workgroup," while at the same time drafting a 2006 update to the State Wide Solid Waste Management Plan (last updated in 1993). In December 2005, the work group presented "short-term" recommendations for increasing recycling rates in the state, including:

- Development of a new "branded" recycling message
- An analysis of the current method for reporting recycling activity to the department
- Increasing the involvement of the waste-hauling industry in providing recycling opportunities, especially for small and medium-sized businesses
- Increasing the level of enforcement of recycling mandates
- Rebuilding support for recycling at the local government level

This work group will continue to work on these and other issues related to recycling.

The updated 2006 State Wide Solid Waste Management Plan (SSWMP) provides the framework for the collection, transportation, and disposal of solid waste in the state, outlining the responsibilities of municipal, county, and state governments. The 21 counties and the New Jersey Meadowlands District are responsible for the development of plans for disposal facility siting and recycling, subject to state review, while municipalities are responsible for the collection and disposal of solid waste in accordance with those county plans. Past revisions of the SSWMP have included various programs for financial assistance to local governments that have since ended; the most recent version of the plan recommends the reestablishment of financial assistance, especially in the area of recycling.

The state calculates that an additional 1.7 million tons of material recycled from the waste stream is necessary to achieve its goal of a 50 percent recycling rate. The SSWMP outlines the target tonnage for each county, as well as the target for each form of recyclable material. In addition, the plan identifies specific classes of generators (schools, multifamily housing, small and medium-sized businesses) that need to be focused on to expand recycling of targeted materials. Each county must adopt a new plan by the end of 2006 in order to meet these goals. Tipping fees (generally $60–80 per ton) have not been sufficient to cover the debt associated with building the long-term solid waste facilities necessary, so the state appropriated $80 million over four years (FY 1998–2001) to provide a "safety net" to subsidize county debt service payments for solid waste. The amount of county solid waste debt assistance (through December 2003) totaled more than $264 million, with another $107 million of forgiven loans that were approved through a statewide vote in 1998. The outstanding debt equaled more than $931 million at the end of 2003.

The amended 2006 SSWMP proposes a number of legislative initiatives highlighting the need for commercial product responsibility and stewardship, including proposals on toxic packaging, products containing mercury, and electronics recycling. The plan also includes contingency planning for the solid waste challenges a natural or terror-related disaster might present (NJDEP 2005).

WASHINGTON (RECYCLING RATE: 34.1 PERCENT)

State law mandates that the State of Washington's Department of Ecology (Ecology) develop and update statewide plans for hazardous waste and solid waste management. These plans are intended to serve as guides for actions and programs that will reduce waste and toxic substance use statewide in all sectors of society, including government, business, institutions, and residential communities. The most recent statewide solid waste plan was developed for nonhazardous waste in 1991; this plan is outdated because many changes in solid waste handling and disposal have occurred since that time.

Work revising the solid waste plan began in 2000. The revised plan, entitled Beyond Waste, will help to create an integrated system to handle solid waste materials in accordance with principles of sustainability, emphasizing waste reduction, energy and resource conservation, material re-use and pollution prevention.

The Beyond Waste plan offers new ways of thinking about wastes and toxic substances. The goals of implementing the plan will be

- to influence significant reduction of wastes and toxic substances used;
- to shift toward a system where resources are used more efficiently and excess materials are reused as resources;
- to support efforts in Washington state to make sure the needs of businesses are met, while protecting the environment; and
- to incorporate sustainability principles into waste-related decisions (Ecology 2005).

Beyond setting a new vision for the future of solid waste, Washington has also seen some marked improvement in its recycling efforts, as noted in the state's December 2004 annual solid waste report (Ecology 2004). In 2001, the Solid Waste & Financial Assistance Program expanded its recycling survey to include non-MSW recyclables and non-MSW types as inert, construction, demolition, wood waste, and tires. From this, the "alternative" recycling rate was calculated at 47 percent, up from 45 percent in 2002. The "traditional" recycling rate also increased slightly to 38 percent in 2003, up from 35 percent in 2002.

The State of Washington has also provided financial support for local governments efforts to reduce solid waste and increase recycling. The Department of Ecology has access to the Waste Reduction, Recycling, and Litter Control Account, which contains revenues collected from tipping fees, permit fees, and penalties assessed for violations. Fifty percent of the money is used by various state departments (Ecology, Natural Resources, Revenue, Transportation, and Corrections, and the Parks and Recreation Commission) for litter control programs, 30 percent is utilized by Ecology for solid waste reduction and recycling programs, and 20 percent is reserved for local government financial assistance.

Ecology provided over $17.3 million in Coordinated Prevention Grants to local governments for the 2002–2003 cycle. These funds leveraged local matching funds to support more than $23 million worth of solid and moderate risk waste projects, including support for enforcement. Ecology also works closely with other state departments, industry representatives, private sector partners, and local governments on initiatives to promote sustainable design and construction (green building) and composting, and focus additional efforts and resources on emerging problem waste streams, such as electronics, tires and persistent bioaccumulative toxins.

Michigan's Model Programs

Despite the poor performance of Michigan's recycling to date and lack of funding statewide, some local Michigan communities have developed strong recycling programs. Both of the authorities described below are operated in southeast Michigan and are funded by member communities and through recycling fees for various items and services, as well as through the sale of collected materials. They also host a number of ongoing recycling and composting education programs in their communities for both residents and local businesses.

Southeastern Oakland County Resource Recovery Authority

The Southeastern Oakland County Resource Recovery Authority (SOCRRA) is a municipal corporation founded in the early 1950s. SOCRRA consists of 12 member municipalities with a total population of approximately 283,000 and covers an area of 75 square miles. Member cities are Berkley, Beverly Hills, Birmingham, Clawson, Ferndale, Hazel Park, Huntington Woods, Lathrup Village, Oak Park, Pleasant Ridge, Royal Oak and Troy; voting member power is based on the tonnage of member communities' municipal solid waste refuse delivered to the authority's facilities.

SOCRRA operates two transfer facilities that receive mixed solid waste, which is compacted and sent to private landfills. These facilities also handle and transfer yard trimmings from the member communities to a compost site in Rochester Hills. SOCRRA also operates a Material Recovery Facility (MRF) that receives source separated recyclable materials collected at curbside by the member municipalities. Each member municipality collects the recyclables in compartmentalized trucks, and delivers the recyclables to the MRF, where the material is weighed and placed on the various processing conveyors for further sorting and baling for shipment to markets. The MRF is designed to process 100 tons per day in an eight-hour shift, or 26,000 tons per year.

Education and outreach is also part of SCORRA's mission. It provides group tours of the MRF and hosts a biannual Recycling Jamboree to educate the public on reducing, reusing, and recycling solid waste. It has partnered with Michigan State University Extension and the Metropolitan Detroit Landscape Association to offer a Healthy Lawn and Garden Program that educates the public on reducing yard waste, protecting water quality and composting (SOCRRA 2006).

Resource Recovery and Recycling Authority of Southwest Oakland County

The Resource Recovery and Recycling Authority of Southwest Oakland County (RRRASOC) is an intergovernmental, municipal solid waste authority created in 1989 by the eight member communities of Farmington, Farmington Hills, Lyon Township, Novi, Southfield, South Lyon, Walled Lake, and Wixom.

The Recycle America/RRRASOC material recovery facility (MRF) was developed through a unique public-private partnership between RRRASOC members and the national private waste contractor, Waste Management Inc. The facility is operated by a subsidiary of Waste Management, Recycle America Alliance, and was built on the site of a vacant manufacturing building. During 2005, the MRF processed more than 66,000

tons of material. Nearly 9,300 tons of material, or 14 percent of the total volume, came from the curbside and drop-off programs of RRRASOC communities. Curbside recycling from nearly 51,300 RRRASOC area homes contributed to the recycling total.

RRRASOC hosts several outreach and education opportunities. It offers group tours of the MRF and staff will travel to give on-site presentations to classrooms and community groups. RRRASOC randomly presents awards to residents who have full bins on collection day and prepare their recyclables correctly. This authority also recruits residents to be block leaders to provide information and expertise to their neighborhood. RRRASOC has a number of flyers and newsletters that inform residents on special recycling collections and offers waste audits to businesses and organizations to show them how they can reduce their solid waste generation.

Economic Benefits of Increased Recycling

This section of the report provides estimates of the employment, income, and tax revenue generated by the recycling and reuse industry. It also provides an estimate of the economic benefits of increasing the recycling rate in Michigan.

Companies that use recycled materials provide diverse economic benefits. For instance, they create jobs, invest capital, and contribute tax dollars, thereby increasing the value of the state's economy. They can reduce environmental impacts as well. Manufacturers that use recycled feedstock avoid virgin materials consumption, often saving energy and decreasing air and water pollution. Also, these manufacturers help conserve landfill space.

Although more discards are disposed of than recycled, the recycling and reuse industry is larger than the waste management industry. This is because recycling and reuse are inherently value added, whereas disposal is not, and value-adding processes support jobs and economic activity.

In addition to the direct economic activity of the recycling and reuse industry itself, other economic activity (indirect) is generated because the industry purchases goods and services from other types of businesses (such as office supply companies, accounting firms, law firms, etc.). A third round of economic activity (induced) is generated as employees of the recycling and reuse industries (and employees in support businesses) spend their wages in the economy.

The estimates of direct employment and income in this report represent the collection, processing, and recycling of materials in 26 different industry categories. (See Exhibit 10 for a list of these industries.) More than 80 percent of the estimated employment is in manufacturing sectors such as plastics, steel, and paper that recycle recovered materials. The estimates are based on the U.S. Recycling Economic Information (REI) Study, which is described below.

Where possible, the national study eliminated establishments not involved in recycling and also estimated the share of a company's activity that was not related to recycling activity. (In some cases it was not possible to separate recycling and nonrecycling activities.) To do this, the national study used a three-tiered approach. Tier one statistics were reported only for certain business categories where data was available from a source that included all establishments in the category, even though some of them may not do any recycling. For example, data for all paper mills was included even though some of those establishments do not utilize recovered paper. Tier two statistics cover only those establishments that have some involvement in recycling. Although all of these establishments perform some amount of recycling or reuse activity, they may also be involved in non-recycling activities. For example, statistics for all paper mills that utilize recovered paper is included, even though some of the establishments may also be involved in non-covered activities such as production of wood pulp. Tier three statistics are the heart of the study. They are conservative estimates of the portion of economic activity in tier one and tier two that can be reasonably attributed to the recycling activities covered in the study. The overall result is that the employment numbers are a reasonably reliable estimate of the number of workers actually involved in recycling activities.

When the numbers are allocated to Michigan, however, some of this precision is lost because there is no way of determining whether the 26 industries are involved in the same amount of recycling at the state level as at the national level.

EXHIBIT 10
Industries Involved in Recycling-Related Activities

Government-staffed collection	Plastics reclaimers
Privately-staffed collection	Plastic converters
Compost & miscellaneous organics producers	Rubber products
Materials recovery facilities	Steel mills
Recyclable recovery facilities	Iron & steel foundries
Glass containers	Other recycling processors
Glass products producers	Computer & appliance demanufacturers
Nonferrous secondary smelting	Motor vehicle parts
Nonferrous products	Retail used merchandise sales
Nonferrous foundries	Tire retreaders
Paper & paperboard	Wood reuse
Paper-based products manufacturing	Materials exchange services
Pavement mix producers	Other reuse

SOURCE: Compiled by Public Sector Consultants Inc. from REI study.

A number of studies, both national and state-specific, have estimated the size of the current recycling and reuse industry, as well as its economic contributions and environmental benefits. These studies have found that the industry creates a significant economic impact, and that investments in promoting recycling create benefits well in excess of their cost. A number of these studies are summarized below.

NATIONAL STUDY

The U.S. Recycling Economic Information (REI) Study is a landmark national study released in 2001 that documents the importance of recycling and reuse in the U.S. economy. The report was commissioned by the U.S. Environmental Protection Agency and several states through a cooperative agreement with the National Recycling Coalition (R.W. Beck, July 2001b). It clearly shows that recycling and reuse activities are a significant force in the U.S. economy and make a vital contribution to job creation and economic development.

The U.S. REI study included a comprehensive analysis of existing economic data and reasonable estimates based on targeted surveys of recycling businesses and sophisticated economic modeling. The study measured several industry characteristics, including the number of recycling establishments, total jobs, annual payroll, annual receipts, and the amount of materials collected and processed. Using the best available data from 1997–1999, the study evaluated information from 26 different types of reuse and recycling establishments and calculated both direct and indirect economic impacts.

The study estimated that the U.S. recycling and reuse industry involves more than 56,000 establishments employing more than 1.1 million workers, with an annual payroll of $37 billion and annual receipts of more than $236 billion. These numbers compare favorably with other industries, such as automobile manufacturing and mining. The average wage for recycling employees is $36,000, about $3,000 above the national average.

The study also calculated the indirect economic impacts of the recycling industry. Businesses that support recycling and reuse establishments, such as equipment manufacturers and accounting or engineering firms, receive an economic boost from the industry. Through indirect impacts, an estimated 1.4 million jobs are supported by the recycling industry, with an annual payroll of $52 billion and an estimated $173 billion in receipts. Recycling and reuse industry employees also support economic activity when they spend their paychecks, supporting an estimated 1.5 million jobs, with a payroll of $41 billion and gross receipts of $146 billion. The recycling and reuse industry also generates approximately $12.9 billion in federal, state, and local tax revenues.

STATE STUDIES

The national REI study conforms to the methodology that was developed by the Northeast Recycling Council and that has been used in many other state studies. Several of these studies are summarized below. A summary of the estimated benefits found by these studies and other state studies not described below are included in Exhibit 11.

EXHIBIT 11
Economic Impact of Recycling and Reuse Industry, Selected States

State	Direct employment	Direct income (000)	Total employment	Total income (000)	% of state employment	State revenues (millions)*
Ohio	98,302	$3,602,743	239,386	$8,233,000	4.3	$650.6
Pennsylvania	81,322	$2,886,264	229,555	$8,066,000	4.0	$747.9
Massachusetts	19,445	$629,000	40,477	$1,381,000	1.2	$142.3
Minnesota	8,700	NA	28,700	$1,200,000	1.1	$93.0
Indiana	74,970	$3,086,333	234,100	$7,912,000	7.9	$692.6
Illinois	56,249	$1,849,637	135,018	$4,891,000	2.3	$650.6
California	84,000	$2,200,000	134,350	$4,080,000	0.9	$511.0

* The estimate for Illinois includes both state and local revenues. State revenues alone were estimated at $347 million.
NA = not available
SOURCE: Compiled by Public Sector Consultants Inc. from selected state REI studies and a study prepared by the Minnesota Office of Environmental Assistance.

California

The National Recycling Coalition and R.W. Beck prepared a comprehensive analysis of the economic benefits of recycling in a July 2001 report (R.W. Beck, July 2001a). The report estimated the size of the recycling and reuse industry for 26 business categories. It concluded that California hosts about 5,300 recycling and reuse establishments employ-

ing 84,000 workers generating an annual payroll of $2.2 billion and $14.2 billion in annual revenues. Over one-half of the economic activity for the industry is accounted for by four recycling manufacturing sector categories:

- Paper, paperboard, and de-inked market pulp mills
- Plastic converters
- Recyclable material wholesalers
- Retail used merchandise sales

These four categories account for 56 percent of all employment, 53 percent of wages, and 64 percent of total receipts.

The report also estimated the indirect and induced economic activity from four categories of support businesses that provide goods and services to recycling and reuse industry establishments:

- Recycling and reuse equipment manufacturers
- Consulting/engineering
- Transporters
- Other indirect establishments

The indirect and induced benefits amounted to 50,235 jobs, $1.88 billion in payroll, and $6.6 billion in receipts. In total, the recycling and reuse industry accounted for 1.3 percent of California employment and 0.8 percent of gross state product. The study also estimated that the recycling and reuse industry contributed $218 million in revenues to state government.

Minnesota

The Minnesota study was based on the same methodology used in the national REI study. The new study, which was prepared by the Office of Environmental Assistance (OEA), provides an overview of the economic activity generated by recycling in Minnesota and across the nation.

According to the study, Minnesota's manufacturers involved in recycling created 8,700 direct jobs and a total of 28,700 direct, indirect, and induced jobs, about 1.1 percent of total employment. These jobs paid an estimated $1.2 billion in wages and generated an estimated $93 million in state tax revenue. Total gross economic activity for Minnesota's value-added recycling manufacturing industry is $3.48 billion.

According to the study the recycling efforts of Minnesota residents and businesses are improving the environment every day. The results are cleaner air and water, avoided material consumption, avoided energy consumption, more forested land and open space, and reduced greenhouse gases.

An "environmental benefits calculator" was developed through a partnership with the Recycling Association of Minnesota and the National Recycling Coalition to quantify the impact of recycling. Using Minnesota's recycling data for 2000, the OEA calculated the following:

- Recycling in Minnesota conserves energy and reduces greenhouse gas emissions. The 1,341,248 tons of paper, glass, metals, and plastic and other material recycled in 2000 saved nearly 22 trillion BTUs of energy—enough energy to power nearly 217,483 homes (equivalent to all of Ramsey County) for one year. In addition, recycling also resulted in reduction of net greenhouse gas emissions of 930,959 tons.
- Recycling in Minnesota conserves natural resources. By using recycled materials instead of trees, metal ores, minerals, oil, and other raw materials, recycling-based manufacturing conserves the world's scarce natural resources. For example, material consumption of natural resources for making steel was reduced by 486,585 tons as a result of recycling efforts.
- Recycling in Minnesota reduces air and water pollution. In 2001, recycling reduced overall emissions excluding carbon dioxide and methane by 35,589 tons. In addition, waterborne wastes were reduced by 5,895 tons.

Ohio

The Ohio study was based on the same methodology used in the national REI study and the California study described above. The report provided the first-ever evaluation of the economic impact of Ohio's recycling industry and its supporting businesses (R.W. Beck, January 2001).

According to the report, 3,177 Ohio businesses are directly involved in recycling activities, while another 133 businesses support those industries in some indirect way. More than 98,000 workers are employed in the recycling industry—sorting recyclables, operating machinery, and manufacturing end products; another 3,800 workers support their activities as accountants, attorneys, consultants, and manufacturers.

The combined annual payroll of these workers is $3.6 billion, with another $60 million going to people employed in supporting businesses. The average wage paid by the recycling and reuse industry was $36,600, about $8,000 more than the state average. Recycling accounts for $22.5 billion in direct sales and $625 million in indirect sales. State tax revenues from both direct and indirect recycling efforts total $650.6 million annually. Employment generated by recycling activities accounts for about 4.3 percent of total Ohio employment, considerably higher than reported in most other states that produced studies of the economic impact of recycling.

Illinois

The Illinois study was also based on the same methodology used in the national REI study and the California, Indiana, and Ohio studies described in this section (R.W. Beck, December 2001).

According to the report, 2,412 Illinois businesses are directly involved in recycling activities. More than 56,000 workers are employed in the recycling industry—sorting recyclables, operating machinery, and manufacturing end products. The combined annual payroll of these workers is $1.85 billion. Recycling accounts for $22.5 billion in direct sales.

The study also includes estimates of the indirect and induced economic benefits of the recycling and reuse industry. In total, the industry is responsible for about 135,000 jobs, with a payroll of $4.9 billion and receipts of $22.3 billion. State and local tax revenues from both direct and indirect recycling efforts total $650.6 million annually. Employment generated by recycling activities accounts for about 2.3 percent of total Illinois employment.

Unlike other state studies, the Illinois study included a section titled "Future Growth Scenarios," which analyzed the barriers to, policy changes required by, cost involved in, and economic benefits of increasing the recycling rate in the state from its then level of 27 percent to 35 percent and 50 percent (see discussion below).

Indiana

Like the studies discussed above, the Indiana study was based on the same methodology used in the national REI study (R.W. Beck, May 2001). The study found that efforts to recycle and reuse scrap add significantly to Indiana's economy. Materials once considered waste have now become value-added raw materials and move through collection, processing, remanufacturing, and sales. The recycling and reuse industry is involved in metals, paper, plastics, glass, organic materials, computers and electronics, tires, and other post-consumer and post-industrial scrap. Jobs in this industry involve collection, processing, reuse, remanufacturing, sales, and more.

Indiana's recycling and reuse industry includes 1,700 establishments, employs approximately 75,000 people, and has an annual payroll of $3 billion while generating $19 billion in annual revenues. The study found that Indiana had the most recycling and reuse employees per capita of the states participating in the U.S. REI study.

The study also found that recycling and reuse jobs generally pay above the average state wage. The average industry wage for Indiana recycling and reuse jobs is $41,200, approximately $14,000 or 52 percent more than the Indiana average wage.

The study noted that public and private sector investment in recycling and reuse collection, processing, and manufacturing spurs significant "downstream" economic activity, the indirect impact of recycling on support industries such as accounting firms and office supply companies. The REI study calculated the indirect economic impact of this industry, as well as the induced impact, the economic effects of employee spending. In total, the recycling and reuse industry supports 7.9 percent of the jobs in Indiana (a total of about 234,000), 2.5 percent through direct employment, and 5.4 percent through industry and employee spending in the economy. Of Indiana's gross state product, 7.2 percent is attributable to the industry, 2.8 percent provided directly, and 4.4 percent through spending in the economy. The recycling and reuse industry also generates roughly $692.6 million in annual state government tax revenues.

ESTIMATES OF ECONOMIC BENEFITS OF RECYCLING

As discussed above, a number of national and state studies have estimated the amount of jobs, income, output, and government revenues generated by recycling. The 2001 na-

tional REI study described above is the most comprehensive and has spawned a number of state studies, but a comparable study has not been done in Michigan.[11]

It is beyond the scope of this report to prepare such a comprehensive study for Michigan, but it is possible to make some reasonable estimates of the amount of economic activity generated in Michigan by the recycling and reuse industry and the potential increase in economic benefits from an increase in the recycling rate.

The national REI study identified 26 sectors involved in recycling and the reuse of recycled materials. The study estimated the number of establishments, employment, payroll, and receipts for each of these sectors. The estimates were based in large part on data from the 1997 economic census prepared by the U.S. Census Bureau, but also on surveys, data from the states, and other sources.

One way to develop estimates for Michigan is to compare the economic census data for Michigan to the national data for the 26 sectors. As shown in the appendix, Michigan accounts for 4 percent of the establishments, 4.9 percent of the receipts, 5.6 percent of the payroll, and 5.5 percent of the employment in these 26 sectors. Some adjustments were made to the data for large sectors that have a small amount of recycling-related economic activity. For example, rubber products manufacturers employed 195,422 workers nationwide, but according to the REI study only 3,917 of these jobs were related to recycling. Therefore, this sector was excluded from the analysis. (As a check, the same calculations were made using data from the 2002 economic census. The Michigan share was 4 percent for establishments and 5.6 percent for employment, almost identical to the 1997 numbers.)

Applying these percentages to the national estimates suggests that in Michigan there are 2,242 establishments in the recycling and reuse industry with receipts of $11.6 billion, a payroll of about $2.06 billion, and employment of 61,700. These numbers could be a little inflated because the recycling rate in Michigan is below the national average, yet the amount of recycled materials per capita is 0.3 tons per year both nationwide and in Michigan (based on estimated MSW figures, see Exhibit 11 and corresponding footnote). However, these are estimates of the jobs and income created by businesses involved in recycling and the reuse of recycled materials, and the critical factor is Michigan's share of these businesses.

Two methods were used to check the reliability of these numbers. First, these numbers were compared with estimates in the comprehensive REI reports produced for other states. The states most similar to Michigan are Illinois, Indiana, and Ohio. As shown in Exhibit 11, compared to Michigan the number of direct jobs attributed to the recycling and reuse industry are higher in both Indiana and Ohio and slightly lower in Illinois. As

[11] The only report in recent years that attempted to measure the economic impact of recycling in Michigan was done by the Michigan Recycling Coalition and released in November 2001. The report was limited in scope. The economic estimates were based on a survey sent to 406 firms, of which about 50 percent responded and only 70 percent of the respondents provided complete information. The report estimated recycled material processing was responsible for 5,028 direct and indirect jobs in Michigan; it did not attempt to estimate the number of jobs generated by recycling manufacturing, which accounts for about 75 percent of all the jobs created by the recycling and reuse industry.

shown in Exhibit 12, all three states have higher recycling rates and recycle more solid waste materials than Michigan. These numbers suggest that the Michigan estimates are reasonable.

EXHIBIT 12
Estimated[12] MSW Tonnage Generated, MSW Tons Recycled, and Recycling Rates, Michigan and Selected States, 2002

State	Population 2002	MSW generated (tons)	MSW recycled (tons)	Recycling rate	MSW recycled per capita (tons)
Illinois	12,600,620	15,951,037	5,191,388	32.5%	0.4
Indiana	6,159,068	9,542,378	3,339,832	35.0%	0.5
Michigan	**10,050,446**	**14,235,985**	**2,847,197**	**20.0%**	**0.3**
Minnesota	5,019,720	5,043,752	2,301,455	45.6%	0.5
Ohio	11,421,267	16,211,198	3,808,058	23.5%	0.3
Pennsylvania	12,335,091	12,675,854	3,399,002	26.8%	0.3
Wisconsin	5,441,196	5,592,862	1,378,470	24.6%	0.3
New York	19,157,532	24,775,000	7,384,000	29.8%	0.4
8 State Region	82,184,940	104,028,066	29,649,402	28.5%	0.4
Region less Michigan	72,134,494	89,792,081	26,802,205	29.8%	0.4
U.S.	287,797,800	369,381,411	98,675,222	26.7%	0.3

SOURCE: *The State of Garbage in America,* Scott M. Kaufman, Nora Goldstein, Karsten Millrath, and Nickolsa J. Themelis, *BioCycle,* a joint study with the Earth Engineering Center of Columbia University, January 2004.
NOTE: The January 2004 issue of *BioCycle* reported a 15.1 percent recycling rate for Michigan. However, *BioCycle* later recognized this as a misprint and corrected it in the February 2004 issue to reflect the recycling rate of 20 percent, which was calculated by the MRC and is Michigan's most recent estimate.

Second, the methodology used to generate the estimates for Michigan was applied to Ohio. Employment in the 26 sectors in Ohio was 8.9 percent of national employment. This would translate to 99,840 jobs in the recycling and reuse industry. The Ohio REI study estimated that the industry directly employed about 98,000 workers. Both methods suggest that the methodology used to produce these estimates is reliable and the users of this report can have a reasonable level of confidence in the results.

In addition to the direct economic activity of the recycling and reuse industry itself, other economic activity (indirect) is generated because the industry purchases goods and services from other types of businesses (such as office supply companies, accounting firms, law firms, etc.). A third round of economic activity (induced) is generated as employees of the recycling and reuse industry (and employees in support businesses) spend their wages in the economy.

[12] Per capita recycling rates that were shown in Exhibit 3 are based on the *reported* MSW generated, so that year-to-year comparisons use the same source of data; this gives Michigan a rate of 0.38 tons/year/person. In Exhibit 11, *estimated* MSW tonnage figures are used, which lowers Michigan's rate to 0.3.

The national REI study used an economic input-output model to estimate this additional economic activity. The economic model produces "multipliers," which are applied to income, employment, and output to determine the overall economic benefits. The study used two types of multipliers: Type 1, which measures the value of direct and indirect economic activity, and Type 2, which measures the value of all economic activity (direct, indirect, and induced) that are stimulated in the economy by the industry under study.

For purposes of this study, Type 2 multipliers were used. However, the national multipliers are not appropriate for use at the state level. It was beyond the scope of this study to acquire multipliers for Michigan; therefore, we used the average of the multipliers used in the REI studies for Illinois, Indiana, and Ohio, states in our region with somewhat similar economies. The multipliers used are 2.66 for employment, 2.31 for income, and 1.71 for output.

Applying these multipliers to the estimates of direct economic activity generated by the recycling and reuse industry in Michigan indicated that the industry is responsible for 164,122 jobs, with a payroll of about $4.8 billion and receipts of $19.8 billion. The jobs created by the industry represent about 3.6 percent of total Michigan wage and salary employment and the income generated is about 1.6 percent of total Michigan personal income.

Michigan state and local taxes are about 10.2 percent of total Michigan personal income, with state taxes accounting for 7.5 percent of personal income, and local taxes, 2.7 percent. The income generated by the recycling and reuse industry translates to an estimated $490 million in total state and local revenue, with $360 million in state revenue and $130 million in local revenue.

As noted above, these estimates are based largely on data for the period 1997–1999. It is unlikely, however, that the employment numbers would change significantly if 2005 data were available; if anything, they could be lower, because Michigan's employment is about the same now as in the 1997–1999 period, and the recycling rate is lower today than in the late 1990s. However, the amount of income generated is likely to be higher as personal income in Michigan has increased more than 20 percent since the late 1990s.

ECONOMIC EFFECTS OF INCREASED RECYCLING IN MICHIGAN

In 2001, R.W. Beck prepared a recycling economic information study for the Illinois Department of Commerce and Community Affairs. In addition to gathering information on the current Illinois recycling and reuse industry, the study included information on the barriers and impediments to increased recycling and reuse activity and projected the economic impact of achieving a 35 percent and a 50 percent state recycling rate. At the time of the study, the recycling rate in Illinois was estimated at 27 percent.

The study noted that many products that could easily be recycled are disposed of. The reasons for this are many and varied but can be grouped into four categories.

1. Recovery infrastructure: Is convenient recyclables collection, processing, and transportation infrastructure in place?

2. Behavior: Do people participate in available programs, and, if they participate, to what extent are they capturing all recyclables?

3. Economics: Do low disposal rates limit reaching higher recovery rates?

4. End markets: Is there sufficient end market capacity for new recovered materials or increases in recovery of materials already targeted?

The study assumed that local collection/processing infrastructures and their cost/benefits increase linearly with the growth in the recycling rate. The assumptions for recycling manufacturing were more complex and required an evaluation of whether the additional materials were likely to displace virgin or imported recovered materials, or whether there were opportunities for manufacturing industry growth in Illinois. In developing the economic estimates, the study included offsets from activity that is lost in other sectors of the economy such as waste collection, landfills, and rock quarries.

The report also noted that substitution of recovered materials for virgin materials at existing manufacturers generally does not produce additional economic activity. For economic growth to occur, either new establishments must open or existing establishments must increase their production and product sales. Because Illinois has end market demand that outstrips in-state supply for many materials, it was assumed that material substitution of recovered material for imported recovered material would occur in most recycling manufacturing instances. Therefore, the report concluded that most of the estimated increase in economic activity would occur in local collection and processing, although it was assumed that some opportunities existed to expand recycling manufacturing in the state. At both the 35 percent and the 50 percent recycling rate, about 80 percent of the total jobs were associated with local collection and processing.

The Illinois study found that increasing the recycling rate to 35 percent (from an estimated 27 percent) produced 16,042 jobs (7,627 direct), $456.8 million in income ($222.9 million direct) and $4.9 billion in receipts ($2.8 billion direct). Increasing the recycling rate to 50 percent produced 26,574 jobs (12,560 direct), $744.7 million in income ($370 million direct), and $9.2 billion in receipts ($5.1 billion direct).

The report also included a cost-benefit analysis of increasing the recycling rate. The net costs of achieving the 35 percent recycling rate were estimated at $44 million and the total taxes attributed to the increased economic activity were estimated at $84 million. The net costs of achieving the 50 percent recycling rate were estimated at $99 million and the increased taxes at $138 million.

There are clearly some differences between Michigan and Illinois. Illinois has about 25 percent more people than Michigan and its recycling rate is higher, 32.5 percent based on 2002 data compared with 20 percent (see Exhibit 11). Illinois also recycles more solid waste per capita, 0.4 tons per person compared to 0.3 tons per person in Michigan (see Exhibit 11). However, the direct employment generated by the recycling and reuse industry is about the same, over 56,000 in Illinois and nearly 62,000 in Michigan. Also, the demand for various types of recovered materials likely differs in the two states. Nonetheless, since most of the economic activity is not generated by recycling manufacturing, this should not make a significant difference.

As indicated in Exhibit 11, the average recycling rate of the other Great Lakes states is 29.8 percent. A reasonable goal would be to increase the Michigan recycling rate to this level (rounded to 30 percent for purposes of this study). Based on the total estimated solid waste generated in Michigan in 2002, this would require the recycling of an additional 1.42 million tons of material (Kaufman et al. 2004).

There are at least two possible methods that could be used to translate the Illinois results to Michigan. The first would take the ratio of the 1.42 million tons of additional recycled materials in Michigan to the 3.7 million tons reported as recycled in Illinois at the 35 percent rate. Applying this ratio of .38 to the direct jobs created in Illinois produces an estimate of 2,898 direct jobs in Michigan. The second method is to use the 50 percent recycling rate in the following manner. Illinois reported that at a 50 percent rate, 6.86 million tons of material would be recycled. This translates to total solid waste generated of 13.7 million tons. The amount of material recycled at a 27 percent rate would be 3.7 million tons, or an increase of 3.16 million tons at a recycling rate of 50 percent. The ratio of the 1.42 million tons of additional recycled materials in Michigan to 3.16 million tons is .44. Applying this ratio to the estimated number of direct jobs created in Illinois produces an estimate of 5,526 direct jobs in Michigan.

Accounting for the multiplier effects suggests that increasing the recycling rate in Michigan to the average of the other Great Lakes states would produce a total of 6,810 to 12,986 jobs, approximately $155 to $298 million in income, and approximately $1.8 to $3.9 billion in receipts.[13] This additional income would generate about $12 to $22 million in state taxes. There also would be some additional local revenue, but data on the effect of increased recycling on property values would be required to estimate local revenues, and this information is not available. These estimates could be conservative. If the substitution of recycled materials for alternate raw materials makes Michigan manufacturers more competitive, then recycling manufacturing will grow and more jobs will be created.

An increase of about 7,000-13,000 jobs due to increased recycling may seem modest, but to put it in context, over the last two years only three of Michigan's twelve major business sectors—educational and health services, leisure and hospitality, and accommodation and food services—created more than 7,000 jobs.

The cost of collecting recycled materials is about $140 per ton. The cost of collecting 1.4 tons of material would be about $199 million, or $37,725 per job. This number does not take into account the many noneconomic benefits of recycling. These include conserving energy, reducing greenhouse gas emissions, conserving natural resources, and reducing air and water pollution. This may seem like a high cost per job, but many states offer financial incentive packages to potential employers worth over $100,000 per job. There are no specific numbers available for Michigan, but a recent article in the *Montgomery Advertiser* newspaper reported that the State of Alabama has offered an incentive package to Hyundai Motors worth $117,317 per job. In the past, Alabama paid $169,000 per job to attract a Mercedes-Benz plant and $105,000 per job to attract Honda plant. A 2005 report

[13] The multipliers used in this analysis for employment and income are lower than the multipliers used to estimate the current level of economic activity generated by the recycling and reuse industries because most of the new employment and income created by increasing the recycling rate is in the recycling collection and processing sectors, which have lower multipliers than manufacturing sectors.

by the Mackinac Center examining the activities of the Michigan Economic Growth Authority states that Michigan pays a high cost for the number of jobs created but provided no estimates of the specific cost per job (LaFaive and Hicks 2005).

SUMMARY

- National and state studies have found that the recycling and reuse industry creates a significant economic impact, and that investments in promoting recycling create benefits well in excess of their cost.
- Michigan's economy receives substantial benefits from the recycling and reuse sector in terms of jobs, support to the manufacturing sector, and tax revenues collected by state and local governments.
- In Michigan, there are an estimated 2,242 establishments in the recycling and reuse industry with receipts of $11.6 billion, a payroll of about $2.06 billion, and employment of 61,700.
- The recycling and reuse sector also produces indirect and induced economic activity as firms in the industry buy goods from other industries and the workers in these industries spend their wages to buy goods and services. Applying economic multipliers to the estimates of direct economic activity generated by the recycling and reuse industry in Michigan indicated that the industry is responsible for 164,122 jobs, with a payroll of about $4.8 billion and receipts of $19.8 billion. The jobs created by the industry represent about 3.6 percent of total Michigan wage and salary employment and the income generated is about 1.6 percent of total Michigan personal income. In addition, the industry generates about $490 million in state and local tax revenues.
- Increasing the recycling rate in Michigan from the current level of 20 percent (2002 estimate) to the average of the other Great Lakes states (30 percent) would produce a total of 6,810 to 12,986 jobs, approximately $155 to $300 million in income, and approximately $1.8 to $3.9 billion in receipts (accounting for multiplier effects). This additional income would generate about $12-$22 million in state taxes.

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Appendix

Michigan and U.S. 1997 Economic Census Data

Establishments, Receipts, Payroll, and Employment Data,
Recycling and Reuse Business Categories

	United States				Michigan			
NAICS	Establishments	Receipts	Payroll	Employees	Establishments	Receipts	Payroll	Employees
562111	7,083	$18,211,495	$4,048,032	137,049	207	$671,934	$154,355	4,802
56292	765	1,299,033	283,476	10,846	32	26,355	6,216	174
327213	61	4,198,122	840,703	21,184	1			175
327212	516	6,108,705	1,232,018	35,533	0			
331314	111	3,651,180	229,223	6,714	5	148,715	22,700	750
331423	35	1,269,088	91,105	3,333	0			
331492	252	3,750,387	425,719	11,610	14	114,269	13,809	371
331421	129	7,679,080	766,621	21,150	6	382,932	26,082	750
331315	70	13,755,566	1,199,382	25,111	0			
331316	160	6,177,701	944,829	30,357	10	236,108	51,381	1,446
331319	36	1,656,607	143,914	4,306	0			
33152	1,676	11,598,177	2,897,629	94,496	122	1,201,432	271,178	8,584
322121	262	40,184,064	5,834,974	120,176	18	2,073,533	318,687	6,179
322122	31	5,584,285	767,084	14,015				
322123	217	19,828,695	2,684,728	54,643				
322299	604	3,985,626	699,443	24,302	33	253,969	36,876	1,262
324121	1,175	5,930,820	564,835	14,089	31			375
325991	836	7,818,015	957,095	27,766	42	319,977	38,912	1,029
3261	14,054	125,555,007	23,230,801	826,615	841	8,638,315	1,768,549	61,661

	United States				Michigan			
NAICS	Establishments	Receipts	Payroll	Employees	Establishments	Receipts	Payroll	Employees
32192	2,995	4,466,370	969,951	51,134	144	182,813	41,452	2,069
321999	2,408	3,979,505	918,833	43,839	86	241,823	48,813	1,750
325314	449	3,327,265	236,488	8,842	13	43,972	6,804	297
326212	754	982,607	192,387	7,939				0
331111	275	56,955,555	7,467,490	145,514	14	2,886,240	419,804	7,500
33151	1,144	17,533,215	4,666,674	132,853	101	1,855,260	504,322	11,743
42193	9,088	38,748,659	3,229,092	114,992	357	1,671,632	145,572	4,448
4533	17,990	6,043,642	1,203,591	97,965	546	147,776	31,725	2,937
811212	7,729	8,502,271	2,546,429	70,432	202	162,133	35,983	1,083
42114	7,105	5,272,107	971,776	45,807	265			1,750
Total	**78,010**	**$434,052,849**	**$70,244,322**	**2,202,612**	**3,090**	**$21,259,188**	**$3,943,220**	**121,135**

SOURCE: U.S. Census Bureau. 1997. Economic Census.