Recycling Economic Information Study Update: Delaware, Maine, Massachusetts, New York, and Pennsylvania

FINAL REPORT

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EXECUTIVE SUMMARY

Overview

Recycling has significant environmental benefits, replacing virgin materials with secondary materials, and thus avoiding the mining, transport, and processing energy inputs and environmental impacts. As the impacts of climate change become increasingly well documented, the environmental benefits of recycling become all that more important to a sustainable materials management policy.

Recycling can also have significant economic impacts, replacing materials often mined and manufactured outside of the region with materials collected and processed within the region. For this reason, the Northeast Recycling Council, Inc. (NERC) contracted with DSM Environmental Services, Inc. (DSM) and subcontractor MSW Consultants (MSW), collectively referred to as the *Project Team*, to research the contribution of recycling and reuse industries to the economy in the states of Delaware, Maine, Massachusetts, New York, and Pennsylvania (the Participant States).

This research is intended to provide state officials and NERC with an updated ability to communicate the economic value of the recycling industry in their states as well as compare results for 2007 (Study Update) against findings in the original *Recycling Economic Information (REI)* report published in 2000 (2000 Report).

The 2000 Report was based primarily on Economic Census data from 1992, updated in some cases to 1997. This Study Update is based on 2002 Economic Census data, updated in some cases to 2007. Therefore, this Study Update represents the economic status of the recycling industry ten years after the 2000 Report.

The Project Team attempted to follow the methodology developed by NERC and the United States Environmental Protection Agency to define direct economic impacts, analyzing and reporting on the same sectors of the economy, and gathering data on the same economic measurements from recycling and reuse industries in the Participant States sponsoring this research. Data were gathered on total employment, total payroll, and gross receipts for each recycling and reuse industry.

There were, however, several significant changes to the methodology used to estimate the direct economic impacts between the 2000 Report and this Study Update designed to more accurately report the economic impacts for 2007. These changes are:

- This Study Update divides the direct economic data into three categories of economic activity instead of two. The first category includes all activities associated with the collection and processing of recyclables to make them available for use in a new industrial process. These industries were labeled “supply side” activities in the 2000 Report and are now explicitly labeled the “recycling industry.” This Study Update reports economic data for the recycling industry separate from economic data for the industries that purchase secondary materials from the recycling industry. These industries were labeled “demand side” activities in the 2000 Report and were reported as the “recycling industry” in the 2000 Report. These demand side industries are now separately reported as “recycling reliant” industries for the Study Update to reflect the fact that, for example,

a paper mill would commonly be thought of as part of the paper industry, which relies on a mix of recycled and virgin materials. The third category remains the same as in the 2000 Report, and includes all reuse and remanufacturing industries.

- Most industries can use virgin material, recycled material, or a mix of virgin and recycled materials. It is unreasonable to assume, for example that all employees (and all revenues) from a pulp mill that purchases recycled fiber and pulp wood are related to recycling, ignoring the forest products economy that is also contributing to the input to the pulp mill. For that reason it was decided for this Study Update to allocate recycling economic activity to that portion of the mill that uses recycled materials. For example, if a pulp mill uses an estimated average of 25 percent recycled fiber, then 25 percent of employment, payroll, and gross receipts is allocated to recycling.

This Study Update also reports on the indirect and induced economic impacts of the recycling industry on a sector-by-sector basis. However, unlike the 2000 Report, the indirect and induced effects are not added to the direct economic impacts to calculate the total impact of the recycling, recycling reliant, and reuse and remanufacturing industries. That is because the Project Team believes that this is not an appropriate use of an Input/Output analysis in that it results in significant double counting when all of the industries are summed. Instead, the indirect and induced impacts are reported for each sector for use by the Participant States to estimate the impact of a change in economic activity in any one of the sectors reported on in this Study Update.

As stated above, one of the goals of the Study Update was to compare the economic impact of recycling in 2007 against the economic impact of recycling in 1997. However, during development of the Study Update it became clear that it is difficult to compare the two studies for the following two reasons:

- The U.S. Census Bureau changed industry classifications in 1997, making it difficult to compare time series data between 1992 (the economic census data used in the 2000 Report) and 2002 (the economic census data used in this Study Update).

- There have been significant changes in the methodology between the 2000 Report and this Study Update. While these changes in methodology are designed to more accurately estimate the economic contribution of the recycling industry to the five Participant States, in most cases these changes reduce the estimated economic impact when compared to the 2000 Report.

Summary of Direct Economic Impacts

Twenty-six business sectors were included in the 2000 Report, and are again included in this Study Update. These 26 sectors are divided into three categories: Recycling Industries, Recycling Reliant Industries, and Reuse and Remanufacturing Industries.

The size of each sector was determined through a combination of the following:

- Utilization of U.S. Census Bureau data;
- Trade association data;
- State and private databases;
- Surveys of establishments in certain sectors; and,
- Modeling of certain sectors based on the number of establishments and other attributes of the industry.

Table ES.1 summarizes the estimated direct economic impacts of the industry for each of the five Participant States.

Table ES.1

Summary of the Direct Economic Impact of Recycling, Recycling Reliant, and Reuse and Remanufacturing Industries for the States of Delaware, Maine, Massachusetts, New York, and Pennsylvania (c. 2007)

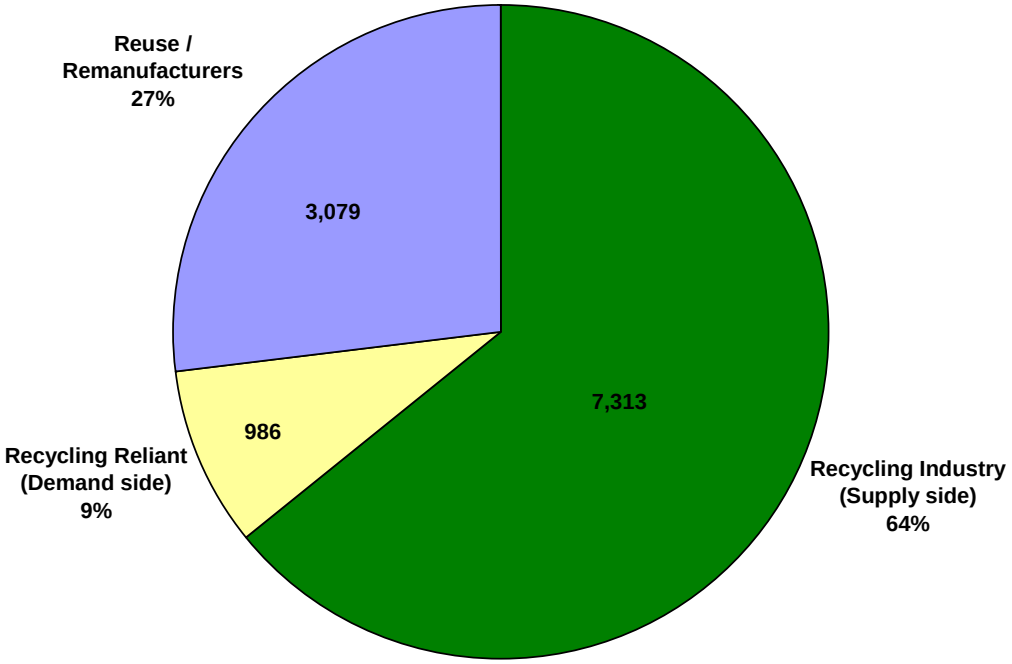
Economic Data	DE	ME	MA	NY	PA	All 5 States	%
Establishments							
Recycling Industry	73	1,201	1,381	2,392	2,265	7,313	*64%*
Reliant on Recycling	18	42	192	251	484	986	*9%*
Reuse / Remanufacturers	84	191	446	1,304	1,054	3,079	*27%*
Total:	175	1,434	2,018	3,948	3,803	11,378	*100%*
Employment							
Recycling Industry	632	2,096	5,452	13,485	10,171	31,837	*30%*
Reliant on Recycling	545	1,385	5,252	14,063	34,039	55,283	*53%*
Reuse / Remanufacturers	703	1,063	3,202	4,691	8,106	17,765	*17%*
Total:	1,880	4,544	13,905	32,240	52,316	104,885	*100%*
Annual Payroll ($1,000)							
Recycling Industry	$17,725	$54,741	$188,972	$502,031	$326,711	$1,090,181	*26%*
Reliant on Recycling	$24,356	$56,602	$233,749	$683,150	$1,685,742	$2,683,599	*63%*
Reuse / Remanufacturers	$14,886	$19,214	$74,828	$201,004	$158,204	$468,135	*11%*
Total:	$56,968	$130,557	$497,549	$1,386,185	$2,170,657	$4,241,915	*100%*
Receipts ($1,000)							
Recycling Industry	$199,401	$359,765	$1,279,228	$3,820,301	$5,951,010	$11,609,704	*33%*
Reliant on Recycling	$93,496	$352,995	$1,568,764	$5,286,317	$14,003,259	$21,304,831	*61%*
Reuse / Remanufacturers	$53,161	$92,950	$320,315	$948,990	$611,414	$2,026,830	*6%*
Total:	$346,057	$805,710	$3,168,308	$10,055,608	$20,565,682	$34,941,365	*100%*

Establishments

A total of 11,378 establishments are involved in recycling, or the use of recycled materials, in the five Participant States. As Figure ES.1, below, illustrates, 64 percent (7,313 establishments) of the total establishment are in the recycling industries, with another 27 percent in reuse and remanufacturing. Only 9 percent of establishments are recycling reliant industries. This is consistent with the pyramid that one would expect, with many smaller collection, processing, and wholesaling operations feeding a few larger recycling reliant industries.

Figure ES.1

Total Establishments
In All Five Participant States

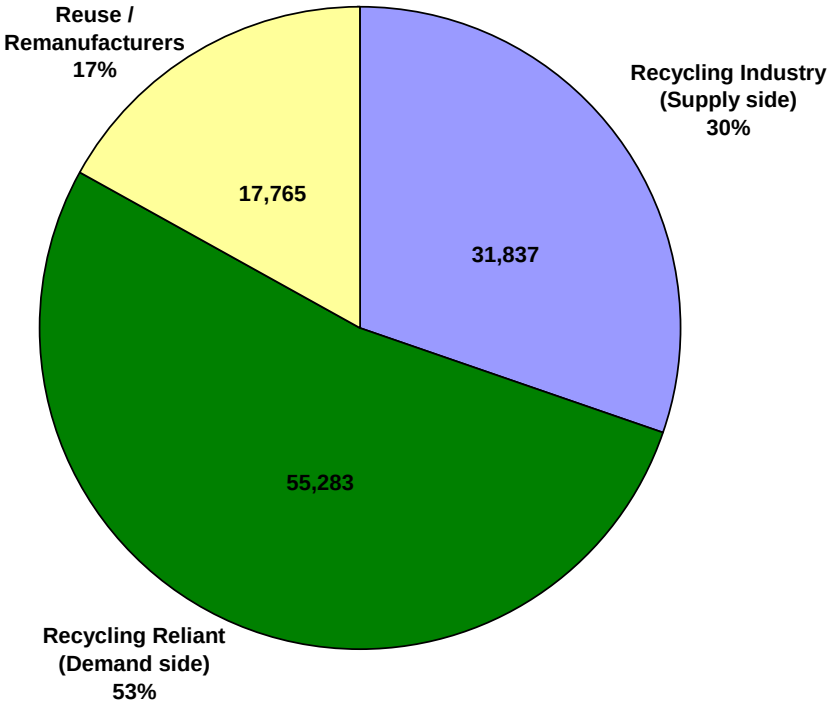


Employment

The 11,378 establishments employed an estimated 104,885 people in the five Participant States (Figure ES.2). Interestingly, employment does not track establishments, with only 30 percent of total jobs in the recycling industries (31,837 jobs), 53 percent of jobs in the recycling reliant industries (55,283 jobs), and 17 percent (17,765 jobs) in reuse and remanufacturing. This is primarily because of the small number of full time equivalent employees working at the large number of small composting, drop-off, and bottle bill redemption facilities.

Figure ES.2

Total Employment
In The Five Participant States

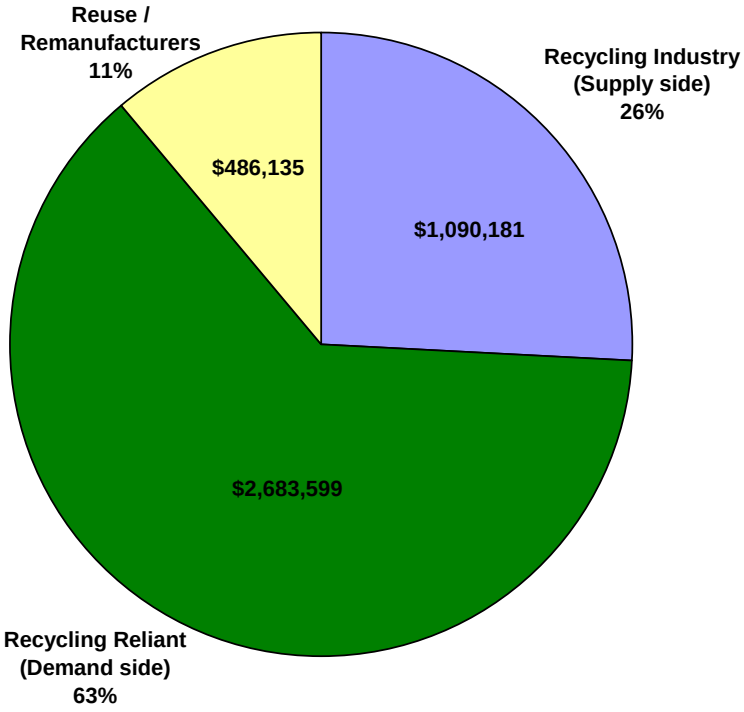


Payroll

The 104,885 jobs provided $4.2 billion dollars in annual payroll, with payroll roughly paralleling the employment distribution among recycling industries, recycling reliant industries, and the reuse and remanufacturing industries. (Employee pay was slightly higher in recycling reliant industries reflecting higher pay manufacturing jobs.)

Figure ES.3

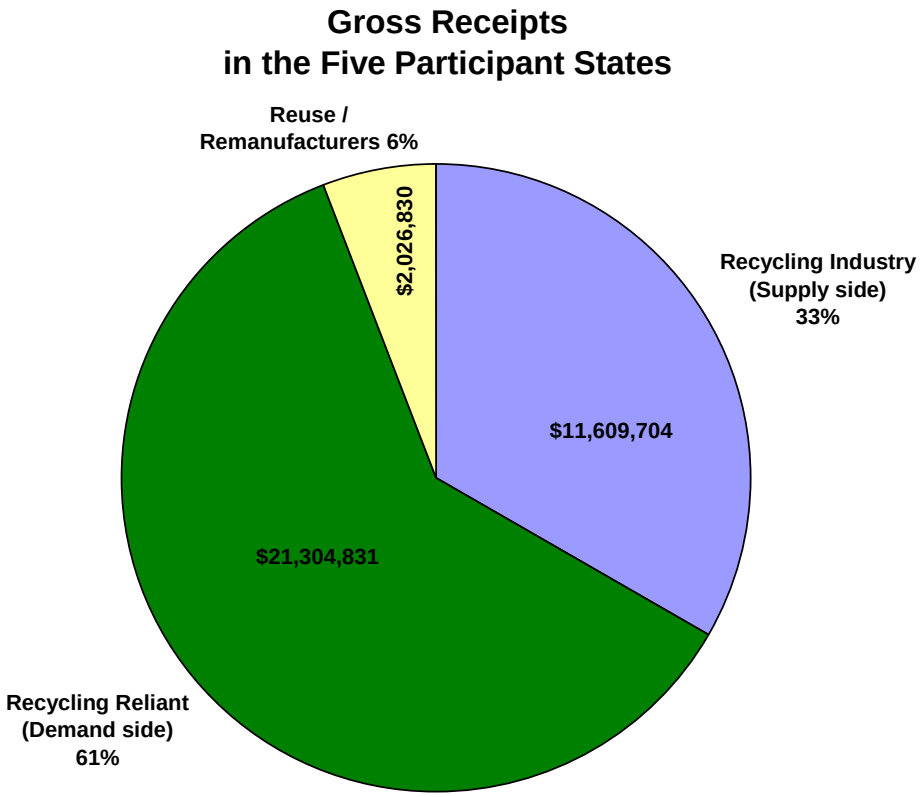
Total Annual Payroll ($1,000)
In The Five Participant States



Gross Receipts

A total of $35 billion (rounded) in gross receipts was generated by the recycling, recycling reliant, and reuse and remanufacturing industries. Thirty-three percent of gross receipts are generated by the recycling industries, with 61 percent generated by the recycling reliant industries. Only six percent of gross receipts are generated by the reuse and remanufacturing industries, which tend to deal in lower value materials, but may have significant environmental benefits.

Figure ES.4



Indirect and Induced Effects

As stated above, this Study Update reports indirect and induced effects for each of the 26 sectors. These indirect and induced effects were estimated using the IMPLAN model.

As described in the 2000 Report:

"Indirect Effects measure the value of additional economic demands that the direct economic activity places on the supplying industries in the region. When firms produce goods or conduct business, they must make many purchases. Some of these are from suppliers in the area. Some are not. Public utilities, communications systems, fuel, wholesale goods and services, manufactured goods, financial and legal services, raw and processed commodities and a variety of professional services are necessary to produce the gross receipts estimated from the direct economic impacts."

"*Induced effects* accrue when workers in the direct and indirect industries spend their earnings on goods and services in the region. Induced effects can also be called household effects, and the terms are often used interchangeably. When workers in the direct and indirect industries purchase goods and services for household consumption, they, in turn, stimulate another layer of the economy. Most induced activity accrues to retail, services and finance, insurance and housing spending. Because employment is stimulated in these industries as well, *their* demands for inputs increase, yielding an additional round of indirect purchases and additional rounds of induced activity. The I/O models solve for these iterative rounds of transactions until all of the possible inter-industrial transactions have been accumulated."

The correct use of the Input/Output analysis is for estimating the total economic impact of a change in a single firm, or industrial sector. Thus, totals for multiple sectors, and the sum of all indirect and induced effects are not reported in this Study Update.

PART I.
Background and Methodology

Introduction

Recycling has significant environmental benefits, replacing virgin materials with secondary materials, and thus avoiding the mining, transport, and processing energy inputs and environmental impacts. As the impacts of climate change become increasingly well documented, the environmental benefits of recycling and reuse become all that more important to a sustainable materials management policy.

What is less well known is that recycling can also have significant economic impacts, replacing materials often mined and manufactured outside of the region with materials collected and processed within the region. For this reason, the Northeast Recycling Council, Inc. (NERC), contracted with DSM Environmental Services, Inc. (DSM) and subcontractor MSW Consultants (MSW), collectively referred to as the *Project Team*, to research the contribution of recycling and reuse industries to the economy in the states of Delaware, Maine, Massachusetts, New York, and Pennsylvania (the Participant States).

This research is intended to provide state officials and NERC with an updated ability to communicate the economic value of the recycling industry in their states as well as compare results for 2007 against findings in the original *Recycling Economic Information (REI)* report published in 2000 (2000 Report).

This Final Report presents both the *direct* economic impacts, as well as a discussion of *indirect and induced impacts*, which are estimated based on the direct impacts.

The Project Team followed the methodology developed by NERC and the United States Environmental Protection Agency (U.S. EPA)[1] to define direct economic impacts, analyzing and reporting on the same sectors of the economy, and gathering data on the same economic measurements from recycling and reuse industries in the five NERC member states sponsoring this research. Data were gathered on total employment, total payroll, and gross receipts for each recycling and reuse industry. Employment included all employees (jobs) in the recycling and reuse industries (allocated for use of recycled versus virgin materials as described in detail below), from the factory worker to the administrator, and is reported as full time equivalent jobs. Payroll represents total taxable wages for each employee counted. Gross receipts represent total sales revenue for each recycling and reuse industry.

The economic activities included in the recycling and reuse industries were specifically defined by the U.S. EPA and NERC prior to the 2000 Report, and were broadly grouped as follows:

- Collection, processing, and wholesaling of recyclable materials including paper, metals, glass, plastics, textiles, and electronics;
- Processing/composting and sale of organic materials including leaf and yard waste, brush and tree trunks, food waste, and biosolids;

[1] In 1997, the U.S. EPA sponsored a study administered by NERC to develop methodology and estimate costs for gathering economic information on the recycling and reuse industries.

- Reclamation of processed materials to prepare them for end use (e.g. granulating plastics, cleaning up cullet);

- Manufacturing first stage products from recycled scrap including, but not limited to paper rolls, metal ingots, billet or rods, metal castings, plastic lumber, sheet or shapes, and glass containers[2];

- Wholesale reuse businesses, such as materials exchange services and used motor vehicle parts sales; and,

- Retail reuse businesses, such as used clothing, electronics, furniture, wood, and building supply stores.

Detailed descriptions of each sector within these broad categories are provided in this report, after a description of the study methodology.

Historical Background

Significant discussion among recycling industry stakeholders in the 1990's led to the definition of the "recycling industry" used in this report. This began with the 1994 report, *Value Added to Recyclable Materials in the Northeast* (Roy F. Weston) prepared under contract to the U.S. Department of Commerce, Economic Development Administration.[3] The discussion of what industries to include, and at what level, continued with the NERC report to the U.S. EPA, *Recommendations for Conducting a Study of the U.S. Recycling and Reuse Industries* (1997), and finally concluded with the NERC study prepared by R.W. Beck and published in 2000 (2000 Report). The 2000 Report covered six NERC member states[4], and was Phase 1 of a two-phase project, that culminated in the *U.S. Recycling Economic Information Study* (published in July 2001) that made estimates for the nation as a whole.

The final recycling industry definition in the 2000 Report included:

- All "supply side" activities that resulted in collecting, recovering, and preparing materials for recycling or products for resale; and,

- All "demand side" activities up to the first point at which the recovered material or product for reuse competes against the primary or virgin equivalent materials.

In other words, measurement of recycling economic activity was to stop at the primary manufacturing stage, or the last point before fabrication. This excluded any value added after first product manufacturing.

In the case of paper, this was at the paper mill, where a roll of paper was manufactured with pulp made in whole or part from recycled paper. While it included molded paper products, such as egg cartons, it excluded any conversion activities, such as envelopes or container making. In the case of ferrous or nonferrous operations, this included the steps after smelting and refining

[2] "First stage" refers to the first product produced from recycled materials, such as a roll or paper, sheet of plastic, glass bottle, or metal billet.
[3] U.S. Department of Commerce. Project Number: 99-06-07358.
[4] Delaware, Massachusetts, New Jersey, New York, Pennsylvania, and Vermont.

to produce primary forms of the product. In addition, the definition of recycling activities was to exclude:

- Activities involving incineration or use of recovered materials as fuel; and,
- Activities of non-business entities involved in education, advocacy, or other activities that do not directly support or add value to the recovered materials or used products.

Table 1 below, reproduces Table 2.1 *Business Category Definitions* that was included in the 2000 Report. These same business categories (referred to as "sectors" in this report) are included in this 2007 Study Update.

Table 1
Sector Definitions

Sector		Definition
RECYCLING AND RECYCLING RELIANT INDUSTRIES: Categories 1 - 19		
1.	Municipal Residential Curbside and Drop-Off Collection	Recyclables collection from curbside and drop-off collection programs using government employees
2.	Private Residential and Commercial Collection	Private sector collection of recyclables, including contract collection on behalf of municipalities, cardboard and mixed paper collection from businesses, and collection of beverage containers under the separate bottle redemption handling systems in Maine, Massachusetts, and New York.
3.	Compost and Miscellaneous Organics Producers	Establishments that produce compost, mulch, bark, or bedding from yard and wood waste, biosolids, or other organics
4.	Materials Recovery Facilities (MRFs)	Establishments that process commingled or recovered materials, usually from curbside/drop-off collection or recyclables separated from solid waste
5.	Recyclable Material Wholesalers	Paper stock dealers, scrap metal processors, and other establishments that sort, remove contaminants, and densify recovered materials including wholesalers of recovered electronics, textiles, and plastics
6.	Glass Container Manufacturing Plants	Establishments that produce finished glass containers
7.	Glass Product Producers (other recycled uses)	Establishments that produce glass products other than containers, such as fiberglass, abrasives, or other products
8.	Nonferrous Secondary Smelting and Refining Mills	Recycling and alloying of nonferrous metals into primary shapes including billets, ingots, and other basic shapes
9.	Nonferrous Product Producers	The production of nonferrous primary products through extrusion, rolling, or drawing processes
10.	Nonferrous Foundries	Produce castings from nonferrous metals
11.	Paper and Paperboard Mills/Deinked Market Pulp Producers	Produce paper and paperboard products from recovered paper or market pulp and/or deink recovered paper and sell pulp

12.	Paper-Based Product Manufacturers	Produce cellulose-based products from recovered paper or paperboard (e.g., cellulose insulation, hydro-seeding, molded fiber trays)
13.	Pavement Mix Producers (asphalt and aggregate)	The production of asphalt paving mix from Recycled Asphalt Pavement (RAP)
14.	Plastics Reclaimers	Transform recovered plastics into raw materials (recycled feedstock) such as flake or pellet ready for remanufacture
15.	Plastics Product Manufacturers	Transform recovered plastics directly into products (e.g., plastic lumber) or convert a recycled plastic flake or pellet into an intermediate or end product
16.	Rubber Product Manufacturers	Manufacture products using crumb rubber or cut rubber shapes and stampings as feedstock
17.	Steel Mills	Produce iron and steel slabs, billets, bar, plate, and sheet from scrap and/or raw materials including upstream preparation and downstream stamping and cutting
18.	Iron and Steel Foundries	Produce cast iron or steel products
19.	Other Recycling Processors/Manufacturers	Processors and manufacturers not elsewhere classified, using ash, sludge, engineering application of tires, or other recyclable materials
REUSE AND REMANUFACTURING INDUSTRY: Categories 20 – 26		
20.	Computer and Electronic Appliance Demanufacturers	Sort, grade, dismantle, and/or rebuild used electronic appliances
21.	Motor Vehicle Parts (used)	Clean, sort, inspect, remanufacture, wholesale, and retail used automobile parts
22.	Retail Used Merchandise Sales	Retail thrift stores, antique shops, reuse centers, and other shops dedicated to selling used merchandise, including building materials
23.	Tire Retreaders	Remove old tread from worn tires and add new tread
24.	Wood Reuse	Process used wood for reuse (e.g., pallet rebuilders, construction materials)
25.	Materials Exchange Services	Facilitate the reuse of products and materials by commercial and industrial establishments
26.	Other Reuse	Other reuse or remanufacturing, not elsewhere classified

It should be noted that the 1994 Roy F. Weston report methodology was modified significantly in the 2000 Report. Two important differences between the 1994 Report and the 2000 Report include:

- The 1994 Report estimated the value added associated with using recyclables instead of virgin materials, while the 2000 Report used gross receipts. Using gross receipts double counts economic activity because it ignores the purchase cost of the recycled material, which represents the gross receipts of the supply side activity providing the scrap material. For this reason, one cannot compare total recycling economic activity as a

percent of Gross Domestic Product (GDP) for a Participant State, because GDP is based on value added calculations.

- The 1994 report estimated economic activity for demand side activities based on the tons of scrap used per employee – in essence allocating employment and receipts based on the percent of scrap consumed. The 2000 Report assumed that most economic activity at a plant that used recycled material as an input could be allocated to recycling.

Subsequent to publication of the 2000 Report there were criticisms of the report published in influential trade magazines questioning the scope of the activities included, and the methodology for counting total economic activity. The Project Team has attempted to include the same list of business categories included in the 2000 Report, but has modified the scope of the activity counted within some of those business categories to attempt to address the criticisms of the 2000 methodology. These modifications are described below.

MODIFICATIONS TO THE 2000 METHODOLOGY

Two significant modifications to the 2000 Methodology were proposed by the Project Team and reviewed with the Participant States during the initial project kickoff meeting, and have been followed in this report. The third revision to the methodology occurred during the analysis of the economic data. Each is discussed below.

1) Division of Economic Data Between Recycling Activities and Industries that Rely on Recycled Materials (Recycling Reliant Industries)

This report explicitly divides the direct economic data into three categories of economic activity (see Table 4, below, for a detailed list by category). The first category includes all activities associated with the collection and processing of recyclables to make them available for use in a new industrial process. These industries were labeled “supply side” activities in the 2000 Report and are now explicitly labeled the “recycling industry.” The recycling industry is separated in this report from industries that purchase secondary materials from the recycling industry. These industries were labeled “demand side” activities in the 2000 Report and are now labeled as “recycling reliant” industries. That is because a paper mill is first and foremost part of the paper industry and a glass factory is part of the glass industry. Both paper and glass can be produced without using secondary materials, but often use a mix of secondary materials purchased from the recycling industry, as well as virgin materials. The third category remains the same as in the 2000 Report and includes all reuse and remanufacturing industries.

The reason for this division is to allow the Participant States to quantify the “recycling industry” – those activities that collect and broker recyclables, sort into compatible materials and sort out contaminants, and process the sorted material to the point where they can be used in a manufacturing activity; and then to quantify the size of the industry which relies on these recycled materials as input into the production process.

2) Allocation of Employment, Payroll, and Revenues within the Industries Which Rely on Recyclables

Most industries can use virgin material, recycled material, or a mix of virgin and recycled materials. It is unreasonable to assume, for example that all employees (and all revenues) from

a pulp mill that purchases recycled fiber and pulp wood are related to recycling, ignoring the forest products economy that is also contributing to the input to the pulp mill. As stated above, one of the criticisms of the 2000 Report was that the estimated direct economic impact did not explicitly account for this issue. For that reason it was decided for this Study Update, to allocate recycling economic activity to that portion of the mill that uses recycled materials. For example, if a pulp mill uses an estimated average of 25 percent recycled fiber, then 25 percent of employment, payroll, and gross receipts is allocated to recycling. While it is understood that the relationship between use of recycled material and employment and revenue is not a direct link, it is a reasonable assumption given the level of data available to conduct this analysis.

It should be noted that this change in allocation resulted in declines in reported economic activity associated with recycling over that reported in the 2000 Report. As such, it is difficult to directly compare the results of the current study with those of the 2000 Report.

3) Iron and Steel

The iron and steel industry is different from industries that manufacture paper, plastic, and glass in that many modern steel mills cannot produce iron and steel without scrap.[5] This was noted in the 2000 Report, which as a consequence counted all economic activity associated with iron and steel production, including making steel and shapes and forming tube and pipe.

This report continues to count downstream activities as recycling related, but modifies the 2000 methodology to allocate employment, payroll, and gross receipts based on the underlying types of furnaces operating in each state and the national average scrap consumption by furnace type.

According to research performed by the Steel Recycling Institute (SRI), electric arc furnaces run on a very high charge of scrap (83 percent scrap on average in 2006), while basic oxygen furnaces run on a much lower charge of scrap (averaging 29 percent in 2006). The Project Team relied on the SRI to provide data on the mix of electric arc and basic oxygen furnaces operating in each state in 2007 and then allocated employment, payroll, and gross revenues based on the throughput of each and the agreed upon percentage.

While in theory, this change in methodology should have significantly reduced recycling economic impact for the iron and steel industry in Pennsylvania, which has a significant amount of basic oxygen capacity, the significant increase in the value of steel in recent years coupled with increased economic activity in this sector results in similar economic values for Pennsylvania. These results demonstrate that even though only 47 percent of total economic activity is allocated to recycling (based on the mix of electric arc and basic oxygen furnaces operating in Pennsylvania), scrap metal recycling plays a very important economic role in Pennsylvania.

[5] This is primarily the case for steel mills using electric arc furnaces.

COMPARISON WITH THE 2000 REPORT

The Request for Proposals for this Recycling Economic Information Study Update states:

> *"The third goal is to compare the results of this new study with the REI Study. Therefore the participant states expect the new report to be presented in a form that makes it readily comparable to the REI Study."*

Unfortunately, despite this goal there are three primary issues that make a direct comparison difficult.

First, as discussed above, changes have been made to the methodology, especially with respect to the economic analysis of the recycling reliant, or demand side, industries. These changes make a direct comparison between the 2000 Report and this Study Update difficult for those demand side industries most affected by the change in methodology – especially paper, plastic, and steel.

Second, according to the U.S. Census Bureau:

"The implementation of NAICS in 1997 caused major disruptions in the availability of comparable information across time periods. In recent history, the SIC system was updated three times (in 1967, 1972, and 1987) and each time a significant number of new industries was introduced in the existing framework. What was different for 1997 was that the whole framework was changed. While data from nearly half of the SICs in use in 1992 can (be) derived from the 1997 NAICS industries, a substantial number of SIC industries cannot be much more than approximated under NAICS….NAICS time series can go forward from 1997, but they cannot generally go backward to earlier years, because many NAICS categories require information that was not collected in 1992 and earlier censuses."

A close reading of the 2000 Report indicates that the majority of the census data used was SIC data (not NAICS data) meaning that it was either from the 1992 census, or updated to the most recent year available which would have been 1995 or 1996 (depending on the census data) because, just as in 2008 (when the 2007 census data are not available requiring use of 2002 data, updated in some cases to 2005 or 2006), the 1997 census data had not been published at the time the 2000 Report was being undertaken.[6]

Third, there were literally hundreds of manipulations of data necessary to estimate the economic information contained in the 2000 Report. While the Project Team has attempted to follow a similar methodology, there are many cases where data that were not available for the 2000 Report are now available (in part because of the change in the NAICS categories), but other data are not available requiring new manipulations. These manipulations of data for both studies introduce a lot of "noise," for a lack of a better term, to the data which makes direct comparisons very difficult.

For all of these reasons the reader is cautioned that this report can not readily address the third goal of the Participant States. While it is hoped that the NAICS industrial categorizations will remain in place going forward, it is better to view this report as a stand alone document that

[6] Note that for sectors where economic census data were not used, or could be updated by use of industry data, the data year was 2007, just as it was 1997 in some cases by R.W. Beck.

provides a rough approximation of the size of the supply and demand side industries providing and relying on recyclables in each Participant State.

An attempt has been made in the sector-by-sector description and at the end of this report to provide general information on the change in the industry since the 2000 Report, but this general information is not necessarily informed by a comparison of economic data from the two reports.

Research and Survey Methodology

The Project Team attempted to compile, and accurately classify, recycling activity in each sector and in each Participant State, including or counting only known recycling industries, as defined in the original REI methodology report (1997).

Our data development and survey approach included the following steps.

First, the Project Team sought to develop comprehensive databases of recycling businesses, by sector, in each state. The Project Team collected and merged contact lists from a myriad of sources, including state recycling market listings and databases, trade organization member lists, state economic development office business listings by NAICS code, and published and purchased directories. The Project Team then carefully reviewed the listings for duplication, and performed limited research to correctly code each listing, with the goal of creating a single database of recycling businesses for each state coded by sector. This was critical since often material brokers are listed as an end user with an address in one state but may represent or supply an end user in a different state.

Second, the Project Team reviewed and compiled available government economic and throughput data on each sector. The types of government economic data used for the study included:

- ***The United States Economic Census*** is conducted every five years in the years ending with ‘2 and ‘7, with the most recent data available from 2002. The U.S. Census Bureau mails the majority of larger employers a survey, concentrating particularly on manufacturers, and a sample of establishments are surveyed in the construction and retail sectors. Compliance is mandatory, and response rates are reported to be over 80%. However some data are not published due to a small sample size and/or federal disclosure laws. In smaller states, such as Delaware and Maine, this makes the economic census harder to use. Readers of the report tables will see a “D” for certain sectors where the Project Team has compiled data but is not reporting it in that sector (it is accounted for in the totals) because the data represent one or two firms and disclosure of the data would reveal economic data specific to a firm.

- ***County Business Patterns (CBP)*** is a supplemental set of economic data on employment and wages. Essentially additional payroll data is collected through other sources and reported on what is known as “multi-unit companies” (those with more than one location). These data are matched to the data in the Business Registry by use of Employer Identification Numbers (EINs) and other identifying information to update the Business Registry (formerly called the Standard Statistical Establishment List). The most recent year of CBP data is 2006 with both 2005 and 2006 data used in this report.

- ***The Annual Survey of Manufacturers (ASM)*** is an annual survey undertaken by the U.S. Census Bureau of a subset of manufacturers. A weighting factor is applied to determine how large a sample, and from which NAICS code, surveys should be conducted each year. As in the case of the economic census, businesses are mandated by law to complete the survey form. Data are reported in less detail than the Economic Census, with many 4, 5, and 6 digit NAICS codes and some state level data omitted. Therefore, while data from some industries, such as iron and steel mills, glass container manufacturing, foundries (ferrous and nonferrous are grouped together), and pulp, paper and paperboard mills are available for 2006, some are not available at the state level for this study because they are either too small or the data are not disclosed due to the small number of establishments in that state.

- ***The Bureau of Labor Statistics*** (BLS) provides quarterly and annual employment statistics by state and occupation, which can be used to supplement suppressed data from the economic census and/or to research average wages in a state or occupation. For example, BLS data are available on refuse and recyclable materials collection workers.

- ***Product Line Information*** is also compiled by the U.S. Census Bureau by product type and can be reviewed for recycling industries to help identify in which sector to place these recycling industries.

- ***The United States Geological Survey Metals Yearbook*** provides an annual review of the mineral and material industries of the United States and foreign countries, and contains statistical data on materials and minerals including economic and technical trends and development. While some data are available at the state level, national data for nonferrous scrap recovery were used for this study.

Third, the Project Team contacted all active trade organizations representing recycling industries in the United States. A list of contacts made to trade organizations and to other government experts (including the different sections of the Census Bureau) and that provided input to this study are shown in Table 2.

Table 2
Government, Industry, and Organization Resources to Project Team

Organization	Contact Person	Sector
Aluminum Association	Hank Sattlethight, Manager, Statistical Programs	8, 9
American Chemistry Council, Plastics Division	Peter Dinger and Judith Dunbar (Director, Environmental & Technical Issues)	14, 15
American Forest & Paper Association	Stan Lancey	11, 12
American Foundry Society	Scott Lammers Technical Director (Ferrous)	18
American Foundry Society	Steve Robison, Technical Services (Non-ferrous)	10
American Foundry Society	Al Spada (Economic Information)	10, 18
Association of Battery Recyclers	Web Site/Research Data	19
Association of Lighting and Mercury Recyclers	Web Site/Research Data	19
Association of Post Consumer Recyclers	Steve Alexander and David Cornell	14, 15
Association of Responsible Recyclers (formerly the National Oil Recycling Association)		19
Automotive Office – Aluminum Association	Laura Wilson	5, 8 , 9
Bureau Labor Statistics	Economist	Several
Carpet America Recovery Effort (CARE)	Robert Peoples and Jeremy Stroop	19
Cellulose Insulation Manufacturers' Association	Dan Lea, Executive Director	12
Center for Paper Business and Industry Studies	Web Site/Research Data	11, 12
Construction Materials Recycling Association	Bruce Barkevich	13
Delaware Asphalt Paving Association	James Clemdaniel, Executive Director	13
Environmental Protection Agency	EPR2 Project - Electronic Equipment Recyclers Contact List	20
FIRST (Foundry Industry Recycling Starts Today)	Elizabeth Olenbush, Executive Director	8, 9, 10
Glass Packaging Institute	Joe Cattaneo, President	6
Institute of Scrap Recycling Industries	Tom Crane	5, 29
International Association of Electronic Recyclers	Phil Palmatier	20
National Association of Insulation Manufacturers	Dan Lea	7
National Solid Waste Managers' Association	Steve Changaris, Regional Manager	2
National Wood Pallet and Container Association	National Wood Pallet and Container Association	24
Non-Ferrous Founders' Society	James Mallory, Executive Director	10
NY Department of Labor	James Brown, Economist	Several
Pennsylvania Asphalt Pavement Association	Ronald Cominsky, P.E., Executive Director and Joseph Zimmerman, President	13
Pennsylvania Dept. of Environmental Protection	Patti Olenick	3
Pennsylvania Department of Labor & Industry	John Long	8, 9, 10
Pennsylvania Foundry Association	Christopher Moyer	10, 18
Professional Recyclers of Pennsylvania	John Frederick	3
Recycling Research Institute (Scrap Tire News)	Mary Sikora	16
Resource Recycling Magazine	Jerry Powell and Jef Drawbaugh	All
Rubber Manufacturers Association	Mike Blumenthal	16
Steel Recycling Institute	Bill Heenan, Chip Foley, Greg Crawford	17
The Gypsum Association	Web Site/Research Data	19
Tire Retread Information Bureau	Harvey Brodsky, Managing Director	23
U.S. Census Bureau - Annual Survey of Manufacturers	Thomas Flood, Annual Survey of Manufacturers	Many
U.S. Census Bureau - Metals Manufacturers	Nathaniel Shelton	Several
U.S. Census Bureau - Wholesale Trade	Yvonne Wade, Wholesale trade	5, 29
U.S. Compost Council	Dr. Stuart Buckner, Executive Director	3
U.S. Geological Society	Lee Bray	8, 9
Vinyl Institute	Web Site	14, 15

Fourth, for sectors where existing data were unavailable or insufficient, the Project Team surveyed establishments on a state-by-state basis based on the lists compiled from the sources described above. The survey data were used to either define economic activity for that sector, or to provide partial data to complement existing economic census information where data were suppressed on a statewide basis. A discussion of the sectors surveyed and the survey method follows.

Finally, the Project Team gathered critical data to model economic activity to estimate the size of the public and private recycling collection industries in each state. The approach is described below.

SURVEY METHOD

The survey instrument was designed based on the original NERC REI Study survey (2000 Report). Using advances in desktop application software, the Project Team also generated an electronic, interactive survey form which could be emailed to targeted establishments and returned electronically. The survey form could be viewed and downloaded from a web page, or printed and faxed if the respondent preferred. The web page also contained information about the project and an introductory letter from NERC. The Project Team conducted surveys in the sectors shown in Table 3 below.

Table 3
Sectors Surveyed by Project Team

Sector	Name
1	• Drop-off Recycling (all states) • Curbside (Pennsylvania)
3	Organics Recycling
6	Glass Container Manufacturers
7	Glass Product Manufacturers
12	Paper-based Product Manufacturers
13	Pavement Mix Producers (asphalt and aggregate) (1)
14	Plastic Reclaimers
15	Plastic Product Manufacturers
16	Rubber Product Manufacturers
19	Other Recycling Processors/Manufacturers
20	Computer and Electronic Appliance Demanufacturers
24	Wood Reuse
25	Materials Exchange Services
26	Other Reuse

(1) In all states but Delaware, industry data were used to update census data. In Delaware, survey data were used.

In each sector, the Project Team developed a comprehensive database of establishments. The database was populated state-by-state using a number of sources including industry trade association membership lists, recycling organization lists, state recycling market lists, published lists, and internet research. Establishments were coded by sector and targeted for contact, as well as recoded during the survey process if necessary.

The Project Team attempted to reach each listed establishment in the surveyed categories by telephone first. Establishments were ultimately contacted and surveyed via a combination of mail, email, and telephone calls. Mail and email contacts were mailed or emailed a survey form along with an introductory letter. If a response was not received within a designated time period, Project Team surveyors attempted to follow up by telephone.

The Project Team attempted to contact all listed establishments in each sector unless collected survey responses for that sector reached a point where meaningful extrapolations could be made for the rest of the establishments.[7] Overall, 760 establishments were contacted of the 2,257 identified for contact. A total of 320 surveys were completed, or 14 percent of those targeted for the survey.

In some sectors for some states, where there was a small sample size for that sector, all establishments in the sector were successfully surveyed and the data aggregated for complete reporting. In the majority of cases, however, sector-wide data were estimated on a state-by-state basis by applying average data from surveyed establishments across the five participant states. On average, 34 percent of those confirmed establishments in each sector were surveyed. Where survey response rates were low in a sector, industry sources and other data were sought to confirm or supplement data.

It should be noted that surveying business sectors to estimate economic activity is a weak link in this report. In many cases it is simply impossible to obtain sufficient participation from individual establishments concerning their economic activity to accurately estimate economic activity for that sector. Only the U.S. Census Bureau, which has the legal authority to require full reporting, is capable of obtaining sufficient data. As such, should the Participant States desire to continue to update this study going forward, contacts should be made with the U.S. Census Bureau to encourage further disaggregation and reporting of specific industries listed in Table 3.

MODELING

Two critical areas of recycling economic activity were modeled by the Project Team to estimate the number of employees and gross revenues – Sector 1 (Municipal Residential Curbside and Drop-Off Collection), and Sector 2 (Private Residential and Commercial Collection). In both cases the number of establishments was obtained for each state and employee payrolls estimated based on the economic census data. However, the number of employees and gross revenues were estimated based on modeling and Bureau of Labor Statistics data.

To model municipal collection activity, the Project Team collected data on the number of households served and/or the tons of material collected. The Project Team used the tonnage and household count to estimate truck and labor requirements in each state based on detailed cost spreadsheets that the Project Team has developed over the years to provide cost estimates to municipalities associated with adding or expanding curbside collection of recyclables. To model commercial collection activity, the Project Team collected data on tons of material recycled by material type in each state. Collection costs were again modeled based on

[7] Because of the difficulty in obtaining enough surveys to develop quality data, in some cases it was necessary to extrapolate from completed surveys based on our best professional judgment and any other data available to the Project Team. In other cases, the Project Team was able to conduct sufficient surveys so that the data started to trend around similar answers, in which case the Project Team would move on to another sector where there were fewer surveys and wider gaps between the survey data.

truck and labor requirements using data that the Project Team has gathered on commercial collection costs.

Finally for beverage container redemption activity, included in Sector 2, the Project Team used the handling fees collected in each state as a surrogate for actual costs to manage beverage containers based on the assumption that the handling fee accurately represents beverage container handling costs net of material revenues and escheats.

The Project Team is comfortable that the Sector 1 data are relatively accurate because: (1) data on the number of establishments are maintained by the public sector and therefore are relatively readily available; and (2) Project Team members have extensive experience estimating costs for this sector.

Modeling of private commercial collection is much more difficult. Modeling is driven by the Project Team's best estimate of tons of commercial recyclables, as reported to the Project Team by state officials. However, with few exceptions, the states do not compile complete data on commercial recycling activity, and the private sector is not required to report. In addition, pricing of collection is negotiated between myriad private entities and is almost never reported. As such, estimates of private commercial collection should be viewed as rough estimates based on best professional judgment.

SUPPORTING DATA AND BASE YEAR

For many sectors (as described in the footnotes to the spreadsheets, Part II, below), the Project Team used a combination of approaches to finalize the economic estimates, including census data, county business patterns (CBP) data, economic data from trade organizations, economic data on individual businesses from business databases, tonnage and program information from State agencies, and direct surveying of individual firms to develop total numbers for each sector by state.

Work on compiling databases and surveying firms began in January 2008 and was finalized in early July 2008, with the majority of the information gathered from April through June 2008. While the base year for much of the data was calendar year 2007, the most recent census data available was from 2002. Whenever possible, 2002 census data were updated to reflect current conditions. This was especially the case for revenue derived from materials sales, which have increased dramatically since 2002.[8]

Study Limitations

While the Project Team believes that this study accurately portrays the magnitude of the recycling industry in each state, the following limitations must be taken into account when reviewing and using the economic data contained in this report.

First, both industry data and industry purchased databases that could be helpful to this study at the national level are often not helpful at the state level because company financial data are not

[8] 2007 material prices were used for this Study Update. Subsequent to completion of the direct economic impact analysis prices for secondary material have fallen dramatically, illustrating the need to move to a value added reporting format for future updates to this study.

always specific to a location (e.g. state). For some industries, the Project Team had to be more reliant on census data, which is developed on an establishment or single location basis, and on survey data.

Second, it was often the case that state and national databases mixed brokers with recycling reliant firms, and it was difficult to separate these two activities unless a telephone survey was successfully completed to properly designate each listing.

Third, wherever possible the Project Team relied on economic census data, which was last published for calendar year 2002, and which is now five years old.[9] In addition, in a number of cases the economic census data were not reported at the state level because of the limited number of firms in that NAICS code and associated disclosure issues. This made it necessary to use national or regional data and extrapolate to the state level. To compensate for economic disclosure problems and outdated data available from the economic census, the Project Team used industry (trade association) data and estimates whenever available, instead of census data. In some cases, this provided more recent data, and allowed the Project Team to allocate economic data based on the throughput of recycled versus virgin material.

Fourth, there are some critical sectors where economic census data and trade association data are not available (e.g. the plastics and glass industry), making it necessary to rely on limited survey data. The results are likely to be less reliable because it is extremely difficult to obtain survey data on sensitive economic information. In most cases it took a significant effort to reach a knowledgeable person by telephone, and many firms were reluctant, or refused to divulge economic data. As a consequence, survey responses were lower than hoped for in some categories, leading to potential underreporting in some cases of recycling activity or potential over reporting when a small sample size included a large establishment. For example, glass product and paper product manufacturers were difficult to identify, or when identified, refused to be surveyed. Therefore extrapolating this data from one business to another had to be done even though businesses are not homogenous in this sector.

Fifth, in order to increase the willingness of businesses to report economic data, survey data were gathered in ranges for employment, payroll, and gross receipts. While in some cases the business owner reported actual figures, most surveys produced data from a range. The Project Team used the midpoint of each range from which to compile the data.[10]

Sixth, the Project Team reported data only from plastic product manufacturers (they were called “plastic converters” in the 2000 Report) known to use recycled resins. This is a significant departure from the 2000 Report which assumed a much wider use of recycled resin use in new plastic products than data available to the Project Team appear to indicate. This significantly lowers the reported economic activity for this sector.

Seventh, first stage products are sometimes converted into final stage products (e.g. envelopes, plastic bottles, or metal parts) at the same facility, and isolating the costs of production of the first stage product is difficult if not impossible for some facilities.

[9] It is important to note that the 2000 Report relied primarily on 1992 economic census data (in some cases updated to 1996) so the data reported for this Study Update (which relied on the 2002 census with updates to 2006 in some cases) are ten years newer then the data used in the previous report.
[10] The midpoint of the range was used in the 2000 Report, and is used here as well. No attempt has been made to conduct statistical analysis of the survey data, instead relying on the midpoint as a reasonable assumption.

Finally, there is no question that tonnage data are double, triple, or quadruple counted in this report, as they were in the 2000 Report. Given that this is an economic study, it may be that eliminating the reporting of tonnage data should be considered because there is no way for the various industries to avoid double counting of tonnage as it moves up the supply chain.

THE RECYCLING INDUSTRY SECTOR BY SECTOR

Table 4 lists the 26 sectors for which economic information were collected for this report. Table 4 divides the sectors into the three overarching categories: Recycling Industries (supply side), Recycling Reliant Industries (demand side), and Reuse and Remanufacturing Industries. Following Table 4 is a more detailed description of each sector.

Table 4
Categorization of Included Sectors

RECYCLING INDUSTRIES (Supply Side)	
Sector	**Description**
1	Government Staffed Residential Collection
2	Private Staffed Recycling Collection
3	Compost/Organics Processor
4	Materials Recovery Facilities
5	Recyclables Material Wholesalers
14	Plastics Reclaimers
RECYCLING RELIANT INDUSTRIES (Demand Side)	
6	Glass Container Manufacturing Plants
7	Glass Product Producers
8	Nonferrous Secondary Smelting and Refining Mills
9	Nonferrous Product Producers
10	Nonferrous Foundries
11	Paper and Paperboard Mills/Deinked Market Pulp Producers
12	Paper-based Product Manufacturers
13	Pavement Mix Producers (asphalt and aggregate)
15	Plastics Product Manufacturers
16	Rubber Product Manufacturers
17	Steel Mills
18	Iron and Steel Foundries
19	Other Recycling Processors/Manufacturers
REUSE AND REMANUFACTURING	
20	Computer and Electronic Appliance Demanufacturers
21	Motor Vehicle Parts (used)
22	Retail Used Merchandise Sales
23	Tire Retreaders
24	Wood Reuse
25	Materials Exchange Services
26	Other Reuse

RECYCLING INDUSTRIES

Sector 1: Public Collection

Municipal curbside and drop-off recycling collection programs are extensive in the NERC states and an important first step in the municipal recycling process. They also are a large and often overlooked contributor to the recycling economy. With employment in New York City alone of over 6,000 sanitation workers performing the ever important job of collecting refuse and recyclables from city streets, and about 20 percent of these workers dedicated to recycling, the payroll (and operating costs) of these collection workers is high. When recyclable materials increase in value, more materials may be picked up in recycling trucks instead of refuse trucks, further increasing jobs in recycling collection.

In the states of Massachusetts, New York, and Pennsylvania, curbside recycling collection is provided to more than half of the population parallel to the refuse collection service. While parallel curbside collection of recycling is expanding in Maine and Delaware, an extensive system of drop-off recycling locations are also available to residents of these states, as well as to residents of the more rural areas of the other Participant States.

In Maine, both refuse and recycling can be dropped off at municipal and regional/county transfer stations and drop-off centers maintained by public officials (or in some cases under contract to private entities). In contrast, the Delaware Solid Waste Authority has long maintained an extensive system of recycling drop-offs open 24/7 at convenient locations. However, Delaware households are transitioning to curbside collection services, with a large jump in the population with curbside service in both 2006 and 2007.

For this study, residential recycling collection was accounted for under Public Collection (Sector 1) or Private Collection (Sector 2). Public collection encompasses municipal curbside and drop-off recycling collection programs offered through local governments, including towns, cities, villages, counties and solid waste districts or authorities. The programs are staffed by public employees. Sector 1 excludes programs offered through local government but under contract to a private entity, which are accounted for under Sector 2, Private Collection.

In each state, the Project Team collected or was provided with data on the type of collection program offered in municipalities (drop-off, municipal curbside, or subscription curbside service) and the number of households or total population served by the program. In most cases the Project Team was also provided with recycling tonnage data by municipality.

Using the household counts, the Project Team was able to estimate curbside collection labor and trucks necessary to service the population. The Project Team then modeled total costs based on the trucks and labor necessary, including capital and operating costs. The Project Team then used data reported in the County Business Patterns (2005) and Bureau of Labor Statistics (2006) to determine the average pay of recycling collection workers, and to estimate total payroll based on the modeled labor requirements in each state.

Sector 2: Private Collection

This sector encompasses those private businesses engaged in the collection of recyclables from residents and businesses through a direct contract with the municipality (to service residents) or the generator. This includes private subscription residential recycling collection service and all commercial recycling collection.

These recycling haulers collect mixed recyclables from households or businesses (delivering them to materials recycling facilities for sorting as described in Sector 4), or specific materials such as corrugated, mixed paper, and metals, and in some cases plastics, electronics, or glass.

The Project Team estimated employment, payroll, and gross receipts from these recycling haulers using three approaches:

- For ***municipal contracted collection***, the Project Team estimated payroll and operating costs based on the number of households served, estimated route sizes, and truck operating and maintenance costs using recent Project Team collection cost models. The Project Team used 2005 County Business Patterns and 2006 Bureau of Labor Statistics wage data for collection workers to validate estimated labor costs.

- For ***residential subscription recycling***, the Project Team estimated the number of subscription customers (customers who must sign up and pay for separate collection of recyclables) in each state based on data from state agencies on which communities relied on subscription curbside service. Based on these population counts, the Project Team assumed 15 percent of households offered the recycling service subscribed. Using this information, the Project Team then modeled subscription recycling costs based on route sizes and truck operating and maintenance costs, similar to the modeling done for municipal recycling.

- For ***commercial recycling costs***, the Project Team either gathered existing tonnage data on quantities of cardboard and mixed paper collected for recycling from the commercial sector, or made estimates based on other state data. Data were available in Delaware, Maine, Massachusetts, and Pennsylvania, and extrapolated for New York State. Using the tonnage data and the tonnage by source (as available), the Project Team made estimates of the amount of material that was collected by private haulers as opposed to brokered directly from the commercial generator to the end user. With these tonnage estimates, the Project Team was able to estimate the number of trucks necessary to collect material and the truck operating costs, including labor (based on collection models the Project Team had developed for other projects).

- Finally, ***beverage container redemption*** activity was also included in this sector for the States of Maine, Massachusetts, and New York. The handling fee paid to redemption centers multiplied by the total containers redeemed was used to estimate gross receipts. Total establishments were provided by State officials and employment and payroll were estimated based on Project Team work on redemption center operating costs in Vermont and Massachusetts.

Sector 3: Compost and Miscellaneous Organics Producers

Compost is produced by municipal and private facilities that accept, handle and process leaf and yard waste, brush and tree trimmings, food waste and biosolids to material specifications. Composting facilities handle and process material using a combination of low technology windrow composting, and higher technology in-vessel systems. While facilities that handle biosolids, animal wastes, and food waste on a large scale utilize more sophisticated composting processes to control orders and material curing time, yard waste (grass, leaves and brush) and wood wastes (branches, limbs, trunks and ground untreated wood) are often composted through simple methods utilizing less equipment, labor, and expense.

The Project Team surveyed public and private composting facilities by telephone to determine the average cost of operations, annual throughput, and annual employment and payroll costs to estimate total economic activity in each state. The averages were then applied to facility counts by facility type (e.g. municipal, private, and biosolids composting facilities) to develop total estimates of employment, payroll, and gross receipts.

This sector also includes facilities that produce mulch, bark, and other soil amendments in addition to compost. For example, a grinding operation that ground wood waste for use as landscaping materials or mulch was part of the survey and accounted for in the total activity for each state.

Sector 4: Materials Recovery Facilities

Materials recovery facilities (MRFs) are processing facilities that handle mixed and separated recycled materials but that have the capacity to mechanically sort as well as process materials for sale to end markets. MRFs add value to recycling by allowing municipalities and private haulers to collect material commingled, making collection more efficient, and then deliver mixed materials to the MRF which cleans, separates, and densifies materials for transport to specific end markets.

The Project Team purchased a commercially available database of MRFs to obtain data on the number of establishments, employment, throughput, and average material revenues, and used economic census data to estimate payroll for reported employment in each state.

Sector 5: Recyclable Material Wholesalers

This sector encompasses those businesses that are primarily engaged in the "merchant wholesale distribution of automotive scrap, industrial scrap, and other recyclable materials[11]." This includes establishments who wholesale and distribute scrap iron and steel, paper and paperboard scrap (paper stock dealers),

[11] NAICS code 423930 Recyclable Material Merchant Wholesalers description.

and recovered nonferrous metals, textiles, glass, plastics, rubber, and oil.

These businesses primarily handle material processed elsewhere, such as corrugated from grocery and large retail outlets. However, wholesalers may also consolidate loads, and may reprocess material to increase value by removing contaminants from lower grade materials.

NAICS code 423930 was assigned to Recyclable Material Merchant Wholesalers for the 1997 economic census reassigned from SIC code 5093. The Project Team used the economic census data as a starting point, but then worked with the Institute of Scrap Recycling Industries (ISRI) to adjust figures to reflect 2007 receipts. The Iron Age #1 Composite Prices from 2002 to 2007 were reviewed and gross receipts were adjusted upward to reflect the increase for 2007. The Project Team also used more recent data from the *Paper Stock Report* to update corrugated, newsprint, and sorted office paper prices to reflect the significant increase in prices subsequent to the 2002 census.

For the other recyclables materials merchant wholesalers (e.g. textiles, glass, plastics, rubber, and oil), the Project Team used the 2002 census figures because the breakdown by material could not be determined by the census data from which to equitably apply changes in prices from 2002 to 2007.

Sector 14: Plastics Reclaimers

Plastics reclaimers take post-industrial and post-consumer plastics and process them to prepare them for end-use in a manufacturing facility. Plastic reclaimers are separate from establishments who broker, sort, or bale plastic material, or manufacture an end product, which are included in Sectors 29, 4 or 5, and 15, respectively.

Reclaimers often specialize in a single commodity resins such as polyethylene or polypropylene, or in engineering or other specialty resins. Depending on the needs of the end-user, processes at reclaimers may include grinding into flake, washing, colorizing, or adding other additives, compounding, remixing, and/or extruding into pellets. The material is then sold to manufacturers who make end products.

The Project Team surveyed plastics reclaimers over the telephone to determine the average cost of operations, the typical size and throughput, annual employment, and payroll costs to estimate total economic activity in each state. The averages were then applied to facility counts in each state to develop total estimates of employment, payroll, and gross receipts for each state.

RECYCLING RELIANT INDUSTRIES

Sector 6: Glass Container Manufacturers

This sector is comprised of manufacturers of glass containers for liquor, beer, wine, other beverages, and food. The manufacturers use a portion of recycled glass cullet along with virgin raw materials in their production.

The Project Team surveyed by telephone glass

container manufacturing facilities in each state to estimate average cullet throughput, annual employment, and payroll costs, and gross receipts. There are no plants in Maine or Delaware. Because survey data were limited from Pennsylvania plants, data from Massachusetts and New York plants were used to estimate the values for this sector for Pennsylvania.

The use of recycled material at the surveyed establishments ranged from 50 to 80 percent, and therefore total estimates of employment, payroll, and gross receipts are reduced by the percentage cullet used to account for only that activity involving recycled material (e.g. cullet).[12]

Sector 7: Glass Product Producers

This sector encompasses manufacturers (other than glass container manufacturers, which are covered in Sector 6) which use recycled glass to produce a product. Establishments preparing glass for other manufacturers (glass beneficiation plants) are not included in this sector, but in Sector 5.

Examples of Sector 7 manufacturers include those producing fiberglass, sandblasting materials, industrial beads (e.g. for reflective paint), countertops, specialty glass, and artists using recycled glass in their artwork.

The Project Team surveyed glass product producers to develop estimates of the average size of facilities, and then applied the averages to facility counts to estimate total employment, payroll, and gross receipts.

Sector 8: Nonferrous Secondary Smelting and Refining Mills

Nonferrous metals (those that do not contain iron) are used in a wide variety of manufactured products, including beverage cans, electronics, automobiles, and household appliances. Secondary manufacturers smelt (chemically reduce), refine, and sometimes blend nonferrous scrap along with metals recovered from shaping and trimming during primary metal production and fabrication processes. The most common nonferrous metals recovered domestically are aluminum, lead, copper, and zinc followed by chromium, nickel, and magnesium.[13]

Aluminum is the most widely used nonferrous metal. It is used by container and packaging manufacturers as well as in the transportation, construction, and electrical sectors. Copper is used in power, lighting, and communications transmissions. While the domestic use of lead has decreased in most products, lead's primary use is in storage batteries for automobile ignition starters, and uninterruptible and standby power supplies (necessary for computers, emergency lighting, and telephones). Finally, zinc is primarily used to galvanize products found in the automobile, steel, and construction industries, but secondary zinc is often used to produce brass and bronze or blended for alloys.

Data used to estimate the value of the nonferrous smelting and refining operations came primarily from the economic census, with input from the Aluminum Association and USGS metal experts. The NAICS codes used by the economic census separates out secondary smelting and refining mills by metal type, for aluminum (331314), and copper (331423), but groups the rest of

[12] It is unclear whether economic data for glass container manufacturers was prorated based on the percent of cullet use in the 2000 Report.
[13] USGS: 2005.

nonferrous metals into NAICS 331492, as Secondary Smelting, Refining, and Alloying of Nonferrous Metals.

Sector 9: Nonferrous Product Producers

The nonferrous product producers sector encompasses manufacturers that produce primary products or shapes from nonferrous scrap, including bar plate, sheet, strip, and tube. This sector excludes secondary smelting and refining activity (see Sector 8 above) but includes the following activities:

- **Aluminum sheet, plate, and foil manufacturing,** including flat, rolling or continuous casting sheet, plate, foil, and welded tube from purchased aluminum and/or recovering aluminum from scrap and flat rolling or continuous casting sheet, plate, foil, and welded tube in integrated mills.

- **Aluminum extruded product manufacturing** includes rolling, drawing, and/or extruding shapes in integrated mills.

- **Other aluminum rolling and drawing** includes extruding aluminum bar, pipe, and tube blooms, or extruding or drawing tube from purchased aluminum and/or recovering aluminum from scrap and extruding bar, pipe, and tube blooms in integrated mills.

- **Copper rolling, drawing and extruding** includes rolling, drawing, and/or extruding shapes (except bare or insulated copper communication or energy wire) from purchased copper and/or recovering copper from scrap and rolling, drawing, and/or extruding shapes (except bare or insulated copper communication or energy wire) in integrated mills.

- **Nonferrous metals (other than copper and aluminum)** includes rolling, drawing, and/or extruding shapes from purchased nonferrous metals and/or recovering nonferrous metals from scrap and rolling, drawing, and/or extruding shapes in integrated mills.

Sectors 10 and 18: Nonferrous and Ferrous Foundries

Ferrous and nonferrous foundries specialize in melting and casting metals into specific shapes that are used in automobiles, plumbing fixtures, trains, airplanes, and other equipment. A wide variety of casting processes (utilizing molds made of sand, metal dies, and ceramics) and metal choices can be combined to serve characteristics of the final product. While all metals can be cast, the most predominant are iron, aluminum, steel, and copper-base alloys.

According to the American Foundry Society (AFS), over 14 million tons of castings were produced in the U.S. in 2007, valued at $32.3 billion. After China, the U.S. is the world's second-largest producer of castings, followed by Japan, Russia, Germany, and India. There are currently 2,336 operations representing 220,000 jobs in the U.S. (80 percent of which are small businesses with less than 100 employees) down from 3,300 operations in 1990. According to the AFS, this decrease is due to increased foreign competition, regulatory burdens, and some attempts over the past decade to position the U.S. more toward a service economy.

Nonferrous casting is primarily done with aluminum and copper (roughly 70 – 80 percent by weight according to experts at the AFS), with magnesium representing a large percentage of the remainder.

Economic data on both ferrous and nonferrous foundries were obtained primarily from economic census data with input from technical experts from the American Foundry Society, the Pennsylvania Foundry Society, and the Nonferrous Founders Society to allocate scrap percentages.

Sector 11: Pulp and Paper Mills

According to the American Forest and Paper Association (AF&PA), nearly 80 percent of all paper mills in the United States use recovered paper. The mills use it to make everything from newspapers and corrugated boxes to paperboard packaging and office paper. The AF&PA defines "recovery" as paper that is recycled at domestic mills, exported, or used to make new non-paper products. Paper that is recovered but not utilized is not counted.

According to the AF&PA, 56 percent of the paper consumed in the U.S. was recovered for recycling in 2007 (or 360 pounds per capita). The industry has set the goal to recover 60 percent of the paper consumed in the U.S. by 2012.

Recovered paper consumption by mills in the study region ranged from an estimated low of 7 percent (rounded) in Maine to an estimated high of 86 percent (rounded) for Massachusetts in 2006. To be considered a recycling industry for purposes of this study, the methodology measured activity at the first stage of manufacturing only. For paper, this was at the mill where a roll of paper was made, and excluded any conversion of paper to products such as containers or envelopes, even if they had some or all recycled content.

The Annual Survey of Manufacturers' 2006 data were used to develop the base economic data for this sector. Employment, payroll and gross receipts for NAICS code 3221 (pulp, paper, and paperboard mills) were then adjusted to represent the percent of recycled scrap paper used, on average, in each state compared to virgin pulp.

Sector 12: Paper-based Product Manufacturers

This sector encompasses manufacturers (other than paper mills, which are covered in Sector 11) that use recycled paper to produce a product. Examples of Sector 12 manufacturers include those producing cellulose insulation, hydro-seeding mulch, pressed paperboard and molded fiber (e.g. food service trays, egg cartons, tableware, berry baskets), construction paperboard (e.g. for poured concrete spacers), and masking tape backing.

The Project Team surveyed manufacturers over the telephone to determine throughput and percentage of recycled paper used, annual employment, and payroll costs, and gross revenues to estimate total economic activity in each state. Data from surveys in Maine, Massachusetts, and New York were used to estimate survey data for Pennsylvania where only a limited survey sample was obtained.

Sector 13: Pavement Mix Producers (asphalt and aggregate)

This category includes the use of recycled asphalt and aggregate. Recycled asphalt pavement (RAP) consists of old asphalt pavement milled and ground into aggregate. RAP can substitute

for a portion of aggregate required in bituminous concrete (i.e. asphalt pavement) in both the base course and surface course. The advantages of using RAP include savings on purchasing new aggregate and the use of less liquid asphalt per ton - an increasing advantage as liquid asphalt prices rise when petroleum prices increase.

Most new hot-mix plants have installed the equipment necessary to use RAP in their product, whereas older plants often do not have the capability. The amount of RAP used in pavement varies, often limited by state or bid specifications to 20 or 30 percent of total aggregate, yet it has been used upwards of 40 percent in base course applications. Another limitation is imposed by air emission requirements - as the percentage of RAP rises, emissions of air pollutants can increase.

Typical RAP Specification Limits on State Highway Projects

State	Base Course	Surface Course
New York	30%	20%
Massachusetts	40%	10%
Maine	15%	15%
Delaware	Limitation in air pollution control	
Pennsylvania	15%	15%

Other recycled materials such as pulverized glass and asphalt shingles also can be used in asphalt paving. Very little of this is reportedly being done in the Participant States.

Crushed concrete can be used for sub-base aggregate in road building. It is cost-effective and technically suitable to reuse old concrete roads on-site and in-place by “rubblizing” the old concrete and laying new base course and surface course over the material. New York State has many concrete roads which are being reconstructed in this manner. Maine has also completed some in-place reclamation projects. Massachusetts and Delaware have each completed some in-place projects, but have had mixed results and therefore this practice is limited.

The 2000 Report does not specifically address the recycling of concrete. The tonnages reported would indicate that concrete was not included although footnote 40 to the tables states that it is based *on NERC web site data for asphalt/concrete*. For purposes of this study the Project Team has made the assumption that concrete is not included.

Although industry groups such as the Asphalt Recycling and Reclaiming Association and state departments of transportation do not collect definitive data on tons of RAP used, the Project Team was able to generate reasonable estimates based on speaking with knowledgeable experts at those organizations in each state. State industry and/or Department of Transportation officials were able to produce relatively accurate counts of plants which are RAP-capable in their respective state for the establishment count. The Project Team then applied a state-wide average of RAP usage to economic census data to estimate employment, receipts, and tonnage for each state. Payroll was estimated using state payroll averages for each state.

Sector 15: Plastic Product Manufacturers

The 2000 Report used the term "Plastic Converters" for Sector 15, and included *"Establishments which produce intermediate plastic products (e.g. molded products and components, sheet and fiber) using recycled pellets or granulated plastic as a feedstock."*

The correct definition of a "plastic converter" is "*[a] manufacturer who uses raw materials such as plastic resins and films, paper, foil, cellophane, adhesives and inks to create rigid or flexible packages or packaging materials that are then sold to organizations who package products therein."*[14]

The Project Team has changed the title of Sector 15 to "Plastic Product Manufacturers" to more closely represent this industry, which essentially purchases recycled plastic flake, granulate, and/or pellets; for use in the production of new plastic products.

Most of the establishments use post-industrial plastic scrap which has been processed by a plastics reclaimer or grinder. A few are using post-consumer resins (PCR), and others are reclaiming material themselves before manufacturing. Only establishments that are purchasing or receiving recycled materials from external sources are included (those recovering only their own scrap back into their process are excluded). Examples of Sector 15 manufacturers include manufacturers of plastic lumber and furniture, swimming pools, battery casings, crates, paint trays, razors and toothbrushes, washers, fluorescent light bulb covers, and packaging inserts. In most cases the recycled plastic resin is mixed with virgin resins to produce the final product. Therefore, as is the case with paper, steel, and glass product manufacturing, economic activity is allocated to represent the average recycled resin content of the products manufactured

The Project Team surveyed from the list of plastics manufacturers known to use recycled resins to determine the percent of recycled resin used, size and throughput, annual employment and payroll costs, and gross receipts. The averages were then applied to establishment counts of manufacturers known to use recycled resin (from state and trade association databases) to develop total estimates of employment, payroll, and gross receipts in each state.

Sector 16: Rubber Product Manufacturers

Recycled rubber product manufacturers produce a wide array of products from whole scrap tires, buffings, crumb rubber, and ground rubber materials. The Recycling Research Institute reports that in 2007, total national consumption of recycled tires in ground rubber markets was 51 million tires. Of this total, 62 percent was estimated to be consumed for the manufacture of molded products or surface/ground covers, with the remaining 38 percent consumed as rubber modified asphalt or tire/automotive uses. The target population of rubber manufacturing businesses was obtained from the Recycling Research Institute's Scrap Tire and Rubber 2008 User's Directory, which was also cited by a representative of the Rubber Manufacturing Association as being the best source of companies that utilize recycled rubber for manufacture of other products.

The range of products into which recycled rubber is manufactured is quite diverse. Companies found in the five states included in this study were reported to manufacture flooring and surface applications (indoor and outdoor), block rubber products for a range of building applications,

[14] Osborn, K. and W. Jenkins, *Plastic Films: Technology and Packaging Applications*, Technomic Publishing Company, Lancaster, PA, 1992, p 239.

pavers and mats for landscaping, rubber mulches, and a wide range of specialized molded rubber (sometimes composite) products.

The Project Team surveys of this category specifically excluded companies that perform grinding, reprocessing, and reclaiming of rubber products for use in tire-derived fuel and civil engineering applications (assuming these companies are better classified as wholesalers). It also excluded companies that collect, distribute, or broker ground rubber materials including buffings and rubber dust because these companies are included in Sector 5.

Sector 17: Iron and Steel Mills

Steel (an alloy of iron and carbon) is produced in mills that rely on scrap metal to produce new steel. In fact, as discussed in the section *Modifications to 2000 Methodology*, above, it is no longer possible to produce steel in some steel mills in the United States without scrap as one of the inputs. In 2006, over 73 million tons of U.S. generated steel scrap were recycled or exported for recycling.

Depending on the mill capacity, furnace type, and available scrap supply, different quantities of scrap metal are used. In general, however, input to U.S. mills employing electric arc furnaces averaged roughly 82.8 percent ferrous scrap in 2006 to produce products such as structural beams and steel plates. In contrast, input to basic oxygen furnaces averaged roughly 28.9 percent ferrous scrap in 2006 to produce products such as automotive fenders, and food and product packaging (e.g. food cans and steel drums).[15]

Using these average scrap percentages by furnace type and data from the Steel Recycling Institute (SRI) on the capacity of each mill located in the NERC states, the Project Team worked with the SRI to estimate total scrap throughput at steel mills in each NERC state. Scrap usage at mills were totaled for each state to enable employment, payroll, and gross receipt data to be allocated to recycling activity based on resultant estimated scrap use.

The Project Team used the Annual Survey of Manufacturer's economic data (2006) to determine how current industry derived data compared to the 2000 Report, which relied primarily on census data. The NAICS code 33111 "Iron and Steel Mills and Ferroalloy Manufacturing" data was used and comprises establishments "primarily engaged in one or more of the following manufacturing activities:

- Direct reduction of iron ore;
- Pig iron in molten or solid form;
- Converting pig iron into steel;
- Ferroalloys;
- Making steel;
- Making steel and shapes (e.g., bar, plate, rod, sheet, strip, and wire); and
- Making steel and forming pipe and tube."[16]

Employment and payroll data were estimated for each state with guidance from SRI. National employment and payroll figures from a National Iron and Steel Industries 2006 survey of the industry were used to estimate employment and payroll in each state.

[15] Steel Recycling Institute. *The Inherent Recycled Content of Today's Steel*. 2006.
[16] U.S. Economic Census definition for NAICS code 33111.

The primary information source used to ascertain employment, payroll, and gross receipts for the 2000 Report was the 1995 Standard Statistical Establishments List, SIC code 3312, adjusted to 95 percent of total reported value to account for downstream conversion. In contrast, this study relied on data provided by the SRI on actual mill capacity and estimated scrap usage at steel producing mills as the basis for recycling employment, payroll, and gross receipts.

While these adjustments to the methodology should have significantly reduced reported economic values, the significant increase in the value of steel in 2006, as reflected in the 2006 Annual Survey of Manufacturer's data for each state virtually made up for the reduced activity reported in this study.

Sector 18: Ferrous Foundries

See description of Sectors 10 and 18: Nonferrous and Ferrous Foundries, above.

Sector 19: Other Recycling Processors

This is the first of two catch-all categories in the study (Sector 26, Other Reuse, is the other). Establishments engaged in recycling that did not fall into any other recycling category are classified here. In some cases, it was possible to define and identify lists of companies that potentially fall in this category. By definition, this category includes:

- Fluorescent lamp and mercury recyclers;
- Gypsum drywall recycling;
- Carpet recyclers;
- Waste oil recycling; and
- Textile (rags) recycling.

The acquisition of comprehensive lists for such a diverse array of niche recyclers was relatively challenging. While some trade associations exist that address one or more of these functions, none of these associations are as mature (and therefore as informative) when compared to most of the other recycling business categories included in the study.

Additionally, response rates on direct surveys of the businesses in this category were low. Many of the businesses that were identified in the preliminary research phase were ultimately not found to be in business (e.g. number disconnected, different business at that number). With one exception (industrial textile recycler), responses were received only from smaller, specialized companies (a used oil filter recycler and a lamp recycler). As a consequence the Project Team believes that the results undercount the contribution from these recyclers, both from the industries that were specifically defined to be in this category, as well as other businesses – potentially many other businesses – that were never even identified for surveying that could lay claim to some recycling process.

REUSE AND REMANUFACTURING INDUSTRIES

Sector 20: Computer and Electronic Appliance Demanufacturers

The computer and electronic recycling and recovery industry has evolved significantly in recent years. Recovery of electronic waste (e-waste) falls into two categories. The first involves

recovery of the component parts of e-waste, through dismantling, sorting, grading, and recycling. The second involves the reuse of electronics through a process of remanufacture (with unusable components subsequently shipped downstream for further processing and recovery). The 2000 Report categorized all establishments that handled electronics for remanufacture or recycling here.

The Project Team performed extensive research and held multiple discussions with e-waste recycling industry stakeholders – primarily ISRI – and U.S. Census Bureau staff specializing in relevant NAICS codes. Based on these discussions, it is the Project Team's understanding that establishments that are strictly engaged in the recovery of the recyclable metals and plastics that are found in electronic waste are classified, for business census purposes, under Recyclable Material Wholesalers (Sector 5). This was in fact confirmed through further research by the Project Team as many of the establishments identified by the International Association of Electronics Recyclers (IAER) turned out to be wholesalers who dealt with e-scrap as one of many commodities targeted. Wholesalers who handled electronic waste along with other ferrous and nonferrous metals (and potentially other commodities) were therefore not included in this category, but rather are believed to have been captured in Sector 5 data.

The companies in this category were instead primarily focused on demanufacture, remanufacture, and/or reuse of computers and electronics as the primary focus of their business, with a meaningful portion of the business being remanufacture/asset recovery. They did not branch into recovery of other non-computer/non-electronic scrap materials. These establishments included corporate computer asset recovery business units of larger companies, but primarily consist of smaller remanufacture/recovery businesses targeting a specific niche market (either geographical or business niche such as computer recovery for schools). The Project Team surveyed these businesses and used the survey data to estimate economic activity.

Sector 21: Motor Vehicle Parts (used)

This sector is primarily covered under NAICS code 423140 - Motor Vehicle Parts (Used) Merchant Wholesalers. It comprises establishments "primarily engaged in the merchant wholesale distribution of used motor vehicle parts (except used tires and tubes) and establishments primarily engaged in dismantling motor vehicles for the purpose of selling the parts."

Scrap automobiles had record recovery in 2006 (104 percent) the last year data were available.[17] Motor vehicle parts are first removed and sold for reuse (or in some cases the high metal value) before the vehicle is crushed and processed as scrap metal use in new metal production.

The Project Team used the County Business Patterns (2005) under NAICS 423140 for employment and payroll data to report on this sector and relied on census data (2002) for gross receipts by state.

However, to directly compare this sector with the 2000 Report data, there is a need to add in economic data from the retailing of used motor vehicle parts, which was included in the original

[17] USGS, *Iron and Steel Scrap*, Mineral Commodity Summaries. January, 2008. Recovery of greater than 100 percent simply means that more scrap automobile tonnage was recovered in 2007 then the amount of steel used to produce new automobiles. This is due in part to the historically high price for automotive scrap in 2007.

SIC code 5015, Motor Vehicle Parts Used. To do so, the Project Team obtained unpublished data from the Census Bureau in order to determine that the 9 percent (rounded) of NAICS code for automotive parts and accessories stores were classified as "used." This percentage was applied to the NAICS code 441310 in each state to account for used retail sales in each state, and enable a direct comparison to be made.

Sector 22: Retail Used Merchandise Sales

This sector is covered under NAICS code 453310 - Used Merchandise Stores – and comprises "establishments primarily engaged in retailing used merchandise, antiques, and secondhand goods (except motor vehicles, such as automobiles, RVs, motorcycles, and boats; motor vehicle parts; tires; and mobile homes)." The Project Team was able to confirm, after significant discussion with the U.S. Census Bureau, that this new NAICS code captures not only antique stores (and historic documents), used apparel stores, used clothing, used book dealers, used household appliance stores, thrift stores and used sporting good stores, but also brick dealers, building materials, flea markets, used furniture stores, salvage stores, secondhand stores, and a few others.

In addition, it includes not-for-profits as well as for profit businesses which means that the Salvation Army, Goodwill, and used building materials stores are all included, assuming that they have anyone on the payroll.

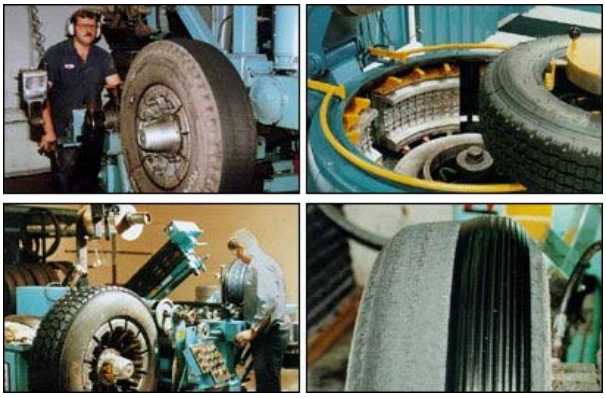
One difference between the 2000 Report (based on 1992 SIC codes) and the current study (based on 2002 NAICS code) is that pawn shops were included in the SIC code 5932 (which was used for Sector 22 in the 2000 Report) and are not captured in the new NAICS codes. Instead, pawn shops are now coded as financial institutions.

The Project Team used employment and payroll data in each state from 2006 County Business Patterns and used 2002 economic census data for gross receipts in this sector for each of the NERC states.

Sector 23: Tire Retreaders

This sector is covered under NAICS code 326212 Tire Retreaders, which comprises "establishments primarily engaged in retreading or rebuilding tires." Retreads are made from tires that are worn yet otherwise structurally sound or that have a good foundation. The first step in retreading is inspection, then buffing (where the remaining tread is removed), then preparing the casing, and applying the new tread.

(Photo Source: Tire Retread Information Bureau)



The Project Team contacted the Tire Retread Information Bureau (TRIB) for establishment counts by participant state. However TRIB did not have industry economic data by state, therefore the Project Team turned to the CBP (2006) and Census (2002) for employment, payroll, and gross receipts.

Sector 24: Wood Reuse

This category consists of all establishments that accept clean wood, primarily wood pallets and possibly some dimensional lumber, and either remanufacture pallets and/or chip clean wood to create a saleable product other than wood chips for fuel. The universe of companies was identified primarily from the National Wood Pallet and Container Association, and supplemented by state recycler lists.

The intent of the Project Team was to place all wood ground to produce mulch and as a bulking agent for compost in Sector 3, although it is possible that some of the ground wood produced by companies in this sector also goes into mulch – primarily colored mulches.

This category does not include companies that grind wood for use as fuel, nor specialty antique wood product recovery companies, which were generally included under the Other Reuse category, and are described in more detail below.

Sector 25: Materials Exchanges

The Materials Exchanges category included any business or entity that provided either a physical or virtual market where generators of used materials (industrial, construction-related, residential durable goods, etc.) and potential users of such products could facilitate a transaction to reuse otherwise end-of-life materials.

The Project Team identified materials exchanges through the U.S. EPA website and state websites, as well as several private/non-profit organizations that have compiled lists of Materials Exchanges. Materials Exchanges spanned several niches, including those specializing in industrial waste materials, construction/demolition/renovation/deconstruction, industry-specific materials (such as arts/crafts), and college or community warehouses. At least several of the Exchanges were strictly virtual and required little or no day-to-day maintenance. At least one Exchange was found to be temporarily non-operational, although with the expectation of resuming operations in the future. As a consequence of these virtual and minimally operating exchanges, the economic contributions from these establishments as measured by payroll and gross receipts are among the lowest of all recycling/reuse industry businesses. The volume of reused/recycled materials may have been much larger, although few of the establishments could quantify the weight of materials for which transactions occurred.

Sector 26: Other Reuse

This is the second catch-all category, intended to capture all businesses that either purchase or otherwise obtain used materials, equipment, or merchandise for repairing, cleaning, or otherwise putting back into use. As with the Other Recycling category, there are no trade associations dedicated to reuse businesses. Therefore the Project Team's ability to identify such businesses was limited to their inclusion on one of the state recycling directories consulted

at the outset of the project, or in some cases as a result of businesses that were thought to be in other categories getting reclassified into Other Reuse.

Survey respondents included a specialty used tire reseller, a barn recovery/reuse company (that manufactured the recovered wood and other barn materials into specialty furniture), a homeless shelter that had developed a reuse program to fund its operations, artists who use recycled materials in their work, and a shipbuilding venture that highlights reuse/recycling opportunities for scrap metal. All of these businesses were found to be small, so to the extent one or more of the non-responsive companies in this list were larger, the Project Team's projections of the economic contribution of this sector would be low.

PART II.
Results and Comparison

Results by Sector and State

The detailed results for industries identified in each Participant State, and the economic activity attributed to recycling, are shown in Appendix A – Detailed Reporting Form, All NERC States. Also in Appendix A are footnotes that explain the data source for each sector, and any differences between state data sources.

The detailed results presented in Appendix A are summarized by Participant State and shown below in Table 5. Table 5 has been reproduced to match Table ES-1 of the 2000 Report for comparison purposes. Note that in reading Table 5, the data for establishments and employment are actual, while the reported data for tons, payroll, and gross receipts are all in 1,000s.

Table 5
Summary of Recycling Direct Economic Impacts, By State

Note: "D" represents non-disclosure of data by the U.S. Census Bureau and/or the Project Team to protect confidential information due to a limited number of firms.

		Estimates of Total Recycling					
A. Business Category	*B. Data Type*	*DE*	*ME*	*MA*	*NY*	*PA*	All 5 states
RECYCLING AND RECYCLING RELIANT INDUSTRIES:							
1 Municipal Residential	Establishments (#)	2	194	334	860	1,068	2,458
Curbside and Drop-Off	Employment (#)	47	300	431	1,555	1,326	3,658
Collection	Annual Payroll ($1,000)	1,221	8,749	21,162	109,094	47,115	187,341
	Receipts ($1,000)	8,543	23,818	54,542	268,841	53,316	409,060
	Throughput (1,000 tons)	43	98	276	714	686	1,817
2 Private Residential and	Establishments (#)	21	880	597	879	287	2,665
Commercial Collection	Employment (#)	19	868	1,284	2,749	1,207	6,127
	Annual Payroll ($1,000)	870	19,968	36,139	71,712	44,927	173,617
	Receipts ($1,000)	4,444	38,162	81,442	140,529	115,216	379,792
	Throughput (1,000 tons)	87	252	908	2,316	1,619	5,182
3 Compost and Misc.	Establishments (#)	28	85	267	137	446	963
Organics Producers	Employment (#)	217	474	1,408	767	1,278	4,144
	Annual Payroll ($1,000)	5,635	10,612	39,776	22,518	26,255	104,796
	Receipts ($1,000)	20,003	37,023	111,906	66,083	88,590	323,605
	Throughput (1,000 tons)	512	436	1,376	1,216	955	4,495
4 Materials Recovery	Establishments (#)	2	6	10	41	48	107
Facilities (MRFs)	Employment (#)	26	34	286	1,244	870	2,460
	Annual Payroll ($1,000)	528	722	11,497	40,979	28,684	82,411
	Receipts ($1,000)	2,913	3,895	33,221	166,810	50,859	257,698
	Throughput (1,000 tons)	61	81	604	2,229	1,004	3,979
5 Recyclable Material	Establishments (#)	19	36	154	455	397	1,061
Wholesalers	Employment (#)	248	421	1,753	6,732	5,126	14,280
	Annual Payroll ($1,000)	7,446	14,690	66,161	240,056	166,087	494,440
	Receipts ($1,000)	154,498	256,868	874,083	3,009,357	5,504,777	9,799,584
	Throughput (1,000 tons)	148	-	-	-	2,011	2,159
6 Glass Container	Establishments (#)	-	-	1	2	5	8
Manufacturing Plants	Employment (#)	-	-	(D)	303	871	1,173
	Annual Payroll ($1,000)	-	-	(D)	16,500	61,127	77,627
	Receipts ($1,000)	-	-	(D)	67,375	183,946	251,321
	Throughput (1,000 tons)	-	-	(D)	151	686	837

(continued)

		Estimates of Total Recycling					
A. Business Category	*B. Data Type*	*DE*	*ME*	*MA*	*NY*	*PA*	All 5 states
RECYCLING AND RECYCLING RELIANT INDUSTRIES:							
7 Glass Product Producers	Establishments (#)	1	-	2	7	2	12
(other recycled uses)	Employment (#)	(D)	-	11	283	153	447
	Annual Payroll ($1,000)	(D)	-	525	14,140	6,504	21,169
	Receipts ($1,000)	(D)	-	525	56,788	24,313	81,626
	Throughput (1,000 tons)	(D)	-	66	42	9	117
8 Nonferrous Secondary	Establishments (#)	-	-	9	25	46	80
Smelting and Refining	Employment (#)	-	-	554	953	2,610	4,116
Mills	Annual Payroll ($1,000)	-	-	30,419	39,473	100,188	170,079
	Receipts ($1,000)	-	-	186,106	349,038	741,938	1,277,082
	Throughput (1,000 tons)	-	-	-	-	-	-
9 Nonferrous Product	Establishments (#)	-	1	11	27	38	76
Producers	Employment (#)	-	182	433	2,378	3,265	6,259
	Annual Payroll ($1,000)	-	5,938	15,672	112,884	143,736	278,230
	Receipts ($1,000)	-	42,672	260,500	1,150,437	955,835	2,409,443
	Throughput (1,000 tons)	-	-	-	-	-	-
10 Nonferrous Foundries	Establishments (#)	-	5	37	53	77	172
	Employment (#)	-	19	612	1,864	4,469	6,964
	Annual Payroll ($1,000)	-	675	22,990	90,060	187,340	301,065
	Receipts ($1,000)	-	3,445	89,110	365,180	494,475	952,210
	Throughput (1,000 tons)	-	-	-	-	-	-
11 Paper and Paperboard	Establishments (#)	-	6	15	25	22	68
Mills / Deinked Market	Employment (#)	-	438	2,089	3,767	2,319	8,613
Pulp Producers	Annual Payroll ($1,000)	-	24,972	106,018	206,411	143,977	481,378
	Receipts ($1,000)	-	197,111	732,442	1,699,767	2,106,234	4,735,554
	Throughput (1,000 tons)	-	317	513	1,991	847	3,668
12 Paper-Based Product	Establishments (#)	-	2	1	3	6	12
Manufacturers	Employment (#)	-	465	(D)	318	900	1,683
	Annual Payroll ($1,000)	-	17,438	(D)	6,650	31,995	56,083
	Receipts ($1,000)	-	63,875	(D)	47,563	156,644	268,082
	Throughput (1,000 tons)	-	93	(D)	75	229	397
13 Pavement Mix Producers	Establishments (#)	7	23	44	18	86	178
(asphalt and aggregate)	Employment (#)	180	168	210	200	376	1,134
	Annual Payroll ($1,000)	2,400	4,754	9,473	9,029	13,062	38,719
	Receipts ($1,000)	24,750	2,667	61,200	150,000	234,000	472,617
	Throughput (1,000 tons)	512	148	1,020	2,200	3,900	7,780
14 Plastics Reclaimers	Establishments (#)	1	-	19	20	19	59
	Employment (#)	(D)	-	290	440	364	1,094
	Annual Payroll ($1,000)	(D)	-	14,237	17,671	13,643	45,550
	Receipts ($1,000)	(D)	-	124,033	168,681	138,252	430,966
	Throughput (1,000 tons)	(D)	-	122	225	186	533
15 Plastic Product Manufacturers	Establishments (#)	4	3	27	36	19	89
	Employment (#)	22	105	620	1,059	1,110	2,916
	Annual Payroll ($1,000)	550	2,569	19,371	29,804	29,989	82,283
	Receipts ($1,000)	9,900	41,920	134,728	194,825	241,861	623,234
	Throughput (1,000 tons)	2	15	77	149	111	354
16 Rubber Product	Establishments (#)	1	-	13	12	34	60
Manufacturers	Employment (#)	(D)	-	151	143	400	694
	Annual Payroll ($1,000)	(D)	-	4,581	4,352	12,139	21,072
	Receipts ($1,000)	(D)	-	17,317	16,451	45,889	79,657
	Throughput (1,000 tons)	(D)	-	20	19	52	90
17 Steel Mills	Establishments (#)	1	-	-	12	58	71
	Employment (#)	(D)	-	-	1,969	11,886	13,856
	Annual Payroll ($1,000)	(D)	-	-	120,754	728,795	849,549
	Receipts ($1,000)	(D)	-	-	1,078,156	8,167,198	9,245,354
	Throughput (1,000 tons)	(D)	-	-	1,232	2,909	4,141

(continued)

		Estimates of Total Recycling					
A. Business Category	***B. Data Type***	***DE***	***ME***	***MA***	***NY***	***PA***	**All 5 states**
RECYCLING AND RECYCLING RELIANT INDUSTRIES:							
18 Iron and Steel Foundries	Establishments (#)	-	2	20	17	73	112
	Employment (#)	-	7	414	642	5,450	6,513
	Annual Payroll ($1,000)	-	256	16,650	24,030	215,640	256,576
	Receipts ($1,000)	-	1,305	56,430	79,020	611,550	748,305
	Throughput (1,000 tons)	-	-	-	-	-	-
19 Other Recycling	Establishments (#)	4	-	11	15	18	48
Processors /	Employment (#)	19	-	134	185	230	568
Manufacturers	Annual Payroll ($1,000)	256	-	6,563	9,063	11,250	27,132
	Receipts ($1,000)	546	-	22,969	31,719	39,375	94,609
	Throughput (1,000 tons)	3	-	-	-	-	3
RECYCLING	Establishments (#)	91	1,243	1,572	2,644	2,749	8,299
SUBTOTALS	Employment (#)	1,177	3,481	10,703	27,549	44,210	87,120
	Annual Payroll ($1,000)	42,081	111,343	422,721	1,185,181	2,012,453	3,773,780
	Receipts ($1,000)	292,897	712,760	2,847,993	9,106,618	19,954,268	32,914,535
REUSE AND REMANUFACTURING INDUSTRY: Categories 20-26							
20 Computer and Electronic	Establishments (#)	-	1	9	10	7	27
Appliance	Employment (#)	-	(D)	121	148	103	372
Demanufacturers	Annual Payroll ($1,000)	-	(D)	1,884	2,305	1,604	5,793
	Receipts ($1,000)	-	(D)	11,052	13,518	9,408	33,978
	Throughput (1,000 tons)	-	-	-	-	-	-
21 Motor Vehicle Parts	Establishments (#)	19	40	117	295	270	741
(used)	Employment (#)	162	263	894	2,076	1,889	5,284
	Annual Payroll ($1,000)	3,719	4,503	26,357	51,252	43,239	129,069
	Receipts ($1,000)	17,862	32,508	105,171	244,662	238,144	638,347
	Throughput (1,000 tons)	-	-	-	-	-	-
22 Retail Used Merchandise	Establishments (#)	56	137	303	959	670	2,125
Sales	Employment (#)	459	651	1,919	1,919	4,834	9,782
	Annual Payroll ($1,000)	7,425	9,977	37,865	129,862	69,839	254,968
	Receipts ($1,000)	21,352	50,172	155,099	569,026	241,088	1,036,737
	Throughput (1,000 tons)	-	-	-	-	-	-
23 Tire Retreaders	Establishments (#)	1	9	8	24	76	118
	Employment (#)	(D)	100	60	175	646	981
	Annual Payroll ($1,000)	(D)	3,424	1,794	5,233	22,116	32,567
	Receipts ($1,000)	(D)	5,802	28,259	84,754	56,205	175,020
	Throughput (1,000 tons)	(D)	-	-	-	-	-
24 Wood Reuse	Establishments (#)	8	1	7	12	19	47
	Employment (#)	72	(D)	204	365	577	1,218
	Annual Payroll ($1,000)	3,400	(D)	6,848	12,252	19,368	41,868
	Receipts ($1,000)	10,200	(D)	20,584	36,830	58,221	125,835
	Throughput (1,000 tons)	38	-	-	-	-	38
25 Materials Exchange	Establishments (#)	-	2	2	2	2	8
Services	Employment (#)	-	3	4	4	4	15
	Annual Payroll ($1,000)	-	60	80	50	50	240
	Receipts ($1,000)	-	113	150	100	100	463
	Throughput (1,000 tons)	-	-	-	-	-	-
26 Other Reuse	Establishments (#)	-	1	-	2	10	13
	Employment (#)	-	(D)	-	4	53	57
	Annual Payroll ($1,000)	-	(D)	-	50	1,988	2,038
	Receipts ($1,000)	-	(D)	-	100	8,248	8,348
	Throughput (1,000 tons)	-	-	-	-	-	-
REUSE AND	Establishments (#)	84	191	446	1,304	1,054	3,079
REMANUFACTURING	Employment (#)	703	1,063	3,202	4,691	8,106	17,765
SUBTOTALS	Annual Payroll ($1,000)	14,886	19,214	74,828	201,004	158,204	468,135
	Receipts ($1,000)	53,161	92,950	320,315	948,990	611,414	2,026,830
GRAND TOTALS	Establishments (#)	**175**	**1,434**	**2,018**	**3,948**	**3,803**	**11,378**
Recycling, Reuse, &	Employment (#)	**1,880**	**4,544**	**13,905**	**32,240**	**52,316**	**104,885**
Remanufacturing	Annual Payroll ($1,000)	**56,968**	**130,557**	**497,549**	**1,386,185**	**2,170,657**	**4,241,915**
	Receipts ($1,000)	**346,057**	**805,710**	**3,168,308**	**10,055,608**	**20,565,682**	**34,941,365**

COMPARISON OF RELATIVE SIZE OF THE RECYCLING INDUSTRY (SUPPLY SIDE) AND RECYCLING RELIANT (DEMAND SIDE) INDUSTRIES

Table 6, below, summarizes the number of establishments, total employment, payroll, and gross receipts for the Recycling Industries (Supply Side), Recycling Reliant Industries (Demand Side) and the Reuse and Remanufacturing Industries.

As would be expected, the Recycling Industries comprise the bulk of establishments (63 percent), followed by Reuse and Remanufacturing Industries. Recycling Reliant industries comprise a relatively small percent of total establishments (9 percent) but are the largest employer (53 percent), and are the largest source of payroll and gross receipts (63 and 61 percent, respectively).

Table 6

Comparison of Recycling, Recycling Reliant, and Reuse and Remanufacturing Industries (Establishments, Employment, Payroll, and Gross Receipts)

Economic Data	DE	ME	MA	NY	PA	All 5 States	%
Establishments							
Recycling Industry	73	1,201	1,381	2,392	2,265	7,313	*64%*
Reliant on Recycling	18	42	192	251	484	986	*9%*
Reuse / Remanufacturers	84	191	446	1,304	1,054	3,079	*27%*
Total:	175	1,434	2,018	3,948	3,803	11,378	*100%*
Employment							
Recycling Industry	632	2,096	5,452	13,485	10,171	31,837	*30%*
Reliant on Recycling	545	1,385	5,252	14,063	34,039	55,283	*53%*
Reuse / Remanufacturers	703	1,063	3,202	4,691	8,106	17,765	*17%*
Total:	1,880	4,544	13,905	32,240	52,316	104,885	*100%*
Annual Payroll ($1,000)							
Recycling Industry	$17,725	$54,741	$188,972	$502,031	$326,711	$1,090,181	*26%*
Reliant on Recycling	$24,356	$56,602	$233,749	$683,150	$1,685,742	$2,683,599	*63%*
Reuse / Remanufacturers	$14,886	$19,214	$74,828	$201,004	$158,204	$468,135	*11%*
Total:	$56,968	$130,557	$497,549	$1,386,185	$2,170,657	$4,241,915	*100%*
Receipts ($1,000)							
Recycling Industry	$199,401	$359,765	$1,279,228	$3,820,301	$5,951,010	$11,609,704	*33%*
Reliant on Recycling	$93,496	$352,995	$1,568,764	$5,286,317	$14,003,259	$21,304,831	*61%*
Reuse / Remanufacturers	$53,161	$92,950	$320,315	$948,990	$611,414	$2,026,830	*6%*
Total:	$346,057	$805,710	$3,168,308	$10,055,608	$20,565,682	$34,941,365	*100%*

Comparison with 2000 Report

As discussed above, it is difficult to draw direct comparisons between the economic data presented in the 2000 Report and this Study Update for three primary reasons:

- Materials values have changed significantly. The year that materials' prices were based on for the 2000 Report is not known. In 2007 (the year used for material prices for this Study Update), materials prices were at an historic high.

- There have been significant changes in methodology between the two reports.

- The differences between business classifications under SIC versus NAICS do not allow for direct time series comparisons between pre-1997 economic census data and post-1997 data. The 2000 Report is based primarily on 1992 economic census data, or updates to the 1992 data through 1996. It is therefore, pre-1997 data, whereas this report is based on the 2002 economic census and/or updates through 2006.

Given these caveats concerning direct comparisons, some general comparisons can be made based on a review of the data and the Project Team's professional observations of the recycling industry.

Impact of Export - There has been concern by the Participant States that the increase in export of secondary materials, and the decline in manufacturing in the United States, would adversely impact on the Recycling Reliant Industries. A general observation is that the Recycling Reliant Industries have not shrunk as significantly as one would have expected. This is due, in part, to the resurgence in steel production over the past ten years. The one exception is clearly Sector 11 (Paper and Paperboard Mills) where the number of mills using recycled paper has shrunk from 118 to 68 over the past ten years. This is the result of the closure of a number of older mills in the Northeast, with production shifting to newer mills in the Southeast and in Canada, combined with the increased demand, and price, for lower quality secondary fiber by newer mills in Asia with the capacity to process more highly contaminated feedstock. Conversely, if exports of recycled materials had not increased and new demand had been met through increased manufacturing capacity in the Northeast, there would have been greater growth than actually occurred.

Jobs - As would be expected the number of jobs reported in this Study Update are about one-half of those reported in the 2000 Report, this despite the fact that jobs in the recycling collection industry have increased over the 2000 Report due both to the methodology used in this update, and to increased numbers of recycling collection programs. While it is plausible that some job loss is due to increased mechanization and productivity, it is likely that the largest single factor affecting the numbers reported in this study is the change in methodology which allocates employment based on the percent of secondary material used in the Recycling Reliant Industries, rather than a reflection of actual job loss.

Municipal and Private Collection - In general, for both municipal and private collection programs, employment and payroll are up significantly. This is probably due to a combination of new investment in recycling collection programs and a more aggressive attempt by the Project Team to quantify collection costs and revenues.

Organics - As with recyclables collection, organics management is up across the board. In this case it is probably due to investments by state and local governments, coupled with significant investments by the private sector driven by yard waste bans and increased demand for compost and mulch.[18]

Materials Recovery Facilities - In general this area has remained relatively stable. While there has been some growth, it is not significant except for in New York. The Project Team relied on a purchased data base which we believe to be accurate, and does not have an explanation for the apparent growth in MRFs in New York State.

Plastics Manufacturing - There are significant declines in the figures reported in this sector, but that is due to a significant change in methodology, not to a decline in the amount of PCR resin actually used. The Project Team believes that the use of PCR resin has increased in the past ten years as more manufacturers' source recycled resin; especially as virgin resin prices increased in the past several years. The 2000 Report assumed 84 percent of "converters" used recycled PCR, and did not adjust down for virgin resin use. The Project Team assumed most plastic manufacturers do not use recycled PCR resin, and instead built data from surveys of known PCR users and allocated economic data based on the percent of PCR resin used. The Project Team believes this to be a much more accurate portrayal of the actual economic activity associated with recycled plastic resin use.

Pavement Mix Producers - There are large increases over the previous study. This is probably due to better data combined with an increased use of recycled asphalt in the past ten years as RAP has become accepted by highway engineers and highway specifications have allowed an increase in the percent RAP in new asphalt paving.

Steel Mills - The number of establishments has held steady in New York and Pennsylvania. Employment is down but payroll is up slightly. Gross receipts are way up due to much higher commodity prices. Higher steel prices mask the change in methodology which would otherwise have reported significantly reduced gross receipts.

Reuse and Remanufacturing - It is difficult to obtain accurate data on this sector. Therefore the estimate of economic activity is based primarily on survey data. However, even a significant increase in the number of establishments would not impact total economic activity appreciably because of low wages and gross receipts. Data from the economic census has been reduced significantly because pawn shops are no longer counted in the reuse retail merchandise industry.

Recommendations for Future Studies

RETURN TO VALUE ADDED CALCULATION

The Project Team believes that a more accurate assessment of the contribution of the recycling and recycling reliant industry to the economy of the Northeast would be based on a value added assessment for the demand side industries. This is the approach that was taken in the 1994 Report. In essence, this would subtract the input price for recycled scrap when calculating receipts.

[18] The increased investment has included new investments in biomass boilers capable of burning ground C&D wood. These establishments are not included in this Study Update, but should be considered for inclusion in future studies.

A return to value added calculations for the demand side industries would provide benefits in two areas. First, it would allow an estimation of the role of the recycling industry as a percent of GDP. Second, and more importantly, it would allow future comparisons of the recycling industry that are not masked by large changes in commodity values – because these commodity values would be incorporated into the input price for the demand side industries.

Because gross receipts were used in the 2000 Report, and are reported in this report, the next update should report both gross receipts and value added data to ease the transition to value added reporting.

CONDUCT UPDATES IN SYNC WITH RELEASE OF MOST RECENT ECONOMIC CENSUS DATA

Both the 2000 Report and this Study Update were forced to use relatively old Economic Census data because the most recent census data were not yet available. The Economic Census is currently conducted in the second and seventh year of each ten year period, but is typically not released for 18 months to two years after completion of the survey.

BE EXPLICIT ABOUT THE YEAR IN WHICH THE MATERIALS VALUES ARE REPORTED

Because of the wide variations in commodity prices, it is critical that the year used for the materials prices is explicitly reported in the report, together with a graph of recycled materials prices for that year as compared to historical prices, including prices in the past report year. However, it should be noted that this is inherently difficult because the most recent year may only be used for those sectors where census data are not available, leading to more then one year used in each Study Update.

CONTINUE TO ALLOCATE BASED ON RECYCLED MATERIAL INPUT

The Project Team believes that it is critical that future reports continue to allocate employment, payroll, and receipts based on the percent of input of recycled material to the demand side industries.

MAINTAIN STATE-WIDE DATABASES

The Project Team was hampered by the lack of quality databases of recycling industries and demand side industries. The database developed during this report should be maintained and updated periodically by each Participant State to assure continuity in future updates and reduce the cost of compiling the updates.

CONSIDER REPORTING REQUIREMENTS

Participating states should consider introducing legislation requiring that all brokers, processors, and demand side users report annually on quantities of recyclables handled by material type. This reporting requirement would not only improve the accuracy of the Recycling Economic Information Studies, but also of state recycling rate calculations.

PART III.
Indirect and Induced Impacts

Introduction

As in the 2000 Report, the Project Team has estimated indirect and induced economic impacts associated with the direct economic activity reported for each sector in Table 5, above.

The estimates were completed for each participant state by Dr. Steven Deller at the University of Wisconsin using the IMPLAN model[19] and the direct economic coefficients reported in Table 5.

Because this report was prepared to provide an update of the 2000 Report, the description of Input/Output models, and the use and limitation of the results have been excerpted from the 2000 Report,[20] from a detailed article on IMPLAN,[21] and from a report prepared by Steven Deller.[22]

Input/Output Modeling Process and Limitations

The most common and widely accepted methodology for measuring the total economic impact of a firm or industry in a given geographic area is Input/Output (I/O) analysis. I/O analysis is a mathematical model developed by Wassily Leontief (1905 – 1999) to express relationships between sectors of an economy in a chosen geographic area.[23] I/O models are used descriptively to show the relative importance to the economy of a business, industry, or sector (e.g., paper production), or to predict the economic impact on a region from alternative actions (e.g., construction of a new paper mill, expanding the existing paper mill, or closing the existing mill).

An I/O model details the sales and purchases of goods and services between all sectors of the economy in a geographic area for a given period of time. The activities of all economic agents (industry, government, households) are divided into production sectors. The transactions between the sectors are measured in terms of dollars and segmented into two broad categories: non-basic, which includes transactions between local industries, households, and other institutions, and basic transactions between industries, households, and other institutions outside the economy being modeled (i.e., imports).

One can think of an I/O model as a large spreadsheet of the economy. Figure 1, below, presents a simplified example of an I/O model for a paper mill located in one of the Participant States, purchasing some of its inputs from recycling industries, households, and the transport and engineering sectors within the region, and purchasing other inputs from outside of the region. The columns represent purchasing agents in the economy. For example, the MRF in

[19] http://www.economics.nrcs.usda.gov/technical/implan/implanmodel.html
[20] *Final Report, Recycling Economic Information Study, Prepared for the Northeast Recycling Council,* R.W. Beck, June 2000, pages 5.1 – 5.5.
[21] *The Numbers Factory,* Twin Cities Business Newsletter, February, 2008, Sara Aase.
[22] *Study of the Impact of Cooperatives on the US Economy,* Draft Report, Steven Deller, University of Wisconsin/Extension, Madison, WI.
[23] Leontief won the Nobel Memorial Prize in Economic Sciences for his development of this model.

Figure 1 purchases commingled waste paper from private and government collection programs and from brokers within the region, and also imports some waste paper from outside of the region. The MRF also purchases labor from households in the region, and services (e.g., engineering, equipment repair, fuel) from within the region and outside of the region.

The greater the amount of purchases made from within the region, the larger the multipliers. The greater the purchase of imports from outside of the region, the lower the multipliers.

The rows of the spreadsheet represent agents that are selling in the economy. These agents include industries selling goods and services to other industries, households selling labor to the industries in the region, and governments, and consumers outside of the region purchasing the outputs of the industries within the region. The latter represents exports out of the economy. Within the terminology of input-output modeling, this "spreadsheet of the economy" is referred to as a transactions table.

Figure 1

Simplified I/O Table (For Illustration Purposes Only)

Processing Sectors	**Production Sectors**						**Final Demand**		**Total/Output**
	Collection	Broker	MRF	Transport	Mill	Services	HH	Exports	
Collection	0	10	20	1	2	1			34
Broker	0	5	2	0	30	0	10	90	137
MRF	0	0	0	0	10	10	0	70	90
Transport	20	10	15	2	10	5	5	30	97
Mill	0	0	1	0	0	2	1	200	204
Services	30	10	10	20	25	10	15	15	135
HH (Labor)	30	20	30	20	40	15	10	20	185
Imports	20	10	10	10	25	10	20	0	105
Total/Inputs	100	55	68	52	140	52	61	425	953

INPUT-OUTPUT MULTIPLIERS

Using linear algebra to manipulate the matrix represented in Figure 1, it is possible to compute a unique multiplier for each sector in the economy. These multipliers can be used to estimate the economic impact of changes in the local economy associated with a change in one sector of the economy. In addition, the multipliers can be used to identify the degree of structural interdependence between different sectors of the economy.

INITIAL (DIRECT), INDIRECT, AND INDUCED EFFECTS

The construction of the multipliers allows the user to decompose the multiplier effect into three parts: the initial (or direct) impact, the indirect, and the induced effects. The direct economic activity of each recycling, recycling reliant and remanufacturing and reuse sector was estimated in Part II of this Study Update, and is presented in Table 5, above.

In order to produce outputs (the direct economic activity), the firm or industry must purchase inputs. The inputs take two forms: (1) purchases from other businesses, and (2) labor. Purchases from other businesses *within the region being modeled* create what is referred to as the *indirect effect;* labor spending income within the region being modeled create the *induced effect*.

As the 2000 Report states[24]:

"Indirect Effects measure the value of additional economic demands that the direct firms place on the supplying industries in the region. When firms produce goods or conduct business or when public entities provide public goods or services, they must make many purchases. Some of these are from suppliers in the area. Some are not. Public utilities, communications systems, fuel, wholesale goods and services, manufactured goods, financial and legal services, raw and processed commodities and a variety of professional services are necessary to produce the direct values described above."

"*Induced effects* accrue when workers in the direct and indirect industries spend their earnings on goods and services in the region. Induced effects can also be called household effects, and the terms are often used interchangeably. When workers in the direct and indirect industries purchase goods and services for household consumption, they, in turn, stimulate another layer of the economy. Most induced activity accrues to retail, services and finance, insurance and housing spending. Because employment is stimulated in these industries as well, *their* demands for inputs increase, yielding an additional round of indirect purchases and additional rounds of induced activity. The I/O models solve for these iterative rounds of transactions until all of the possible inter-industrial transactions have been accumulated."

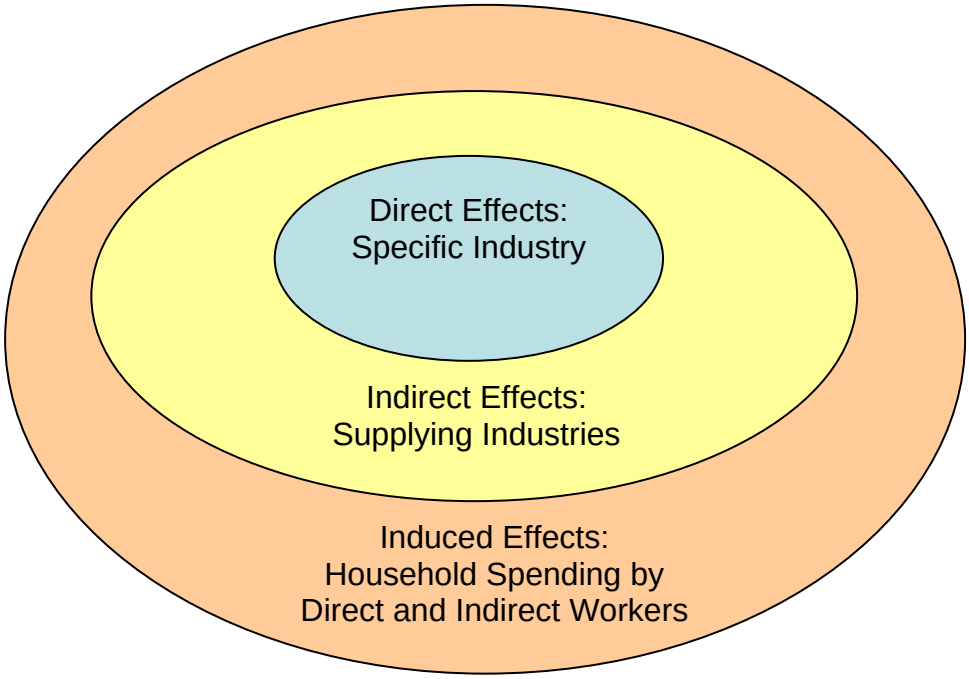
"*Total economic effects* are the sum of direct, indirect, and induced effects. The term *multiplier* or *multiplier effect* is frequently used when referring to the economic effects or economic impacts. There are different kinds of multipliers – this study reports two types. The Type I multiplier identifies the value of direct and indirect purchases from its suppliers in the region – relative to the value of only the direct transactions. The Type II multiplier identifies the value of <u>all</u> economic transactions (direct, indirect, and induced) that are stimulated in the economy by an industry under study, including the personal spending of employees throughout the supply chain whose economic activity is apportioned to the industry, relative to the value of only the direct transactions."

The relationship of direct to indirect, and to induced, effects is shown on the next page in Figure 2.

[24] *Recycling Economic Information Study,* R.W. Beck, Inc., June, 2000, page 5-5.

Figure 2

Relationship of Direct, Indirect, and Induced Effects



Ideally, estimates of what percent of a firm (or industry's) inputs are purchased locally, and at what cost, are developed from local industry surveys. However, these surveys are costly, time consuming, and often difficult to complete because of the confidential nature of the business data which must be collected. As a consequence, most I/O analyses are completed using national or regional industrial surveys, with the assumption being made that the local industries behave in a similar way. While the majority of economic transactions for much of the recycling and especially reuse industry continue to occur within the local region, it should be noted that several of the sectors included in this analysis rely on recyclable commodities that can and are purchased throughout the national and even global economy (e.g., steel mills). No attempt was made in this study to develop state and industry-specific estimates of local versus imported inputs; rather, I/O model defaults were used.

MODELING SYSTEM

The input-output modeling system used in this report is the IMPLAN Model, originally developed by the USDA Forest Service. It is currently one of the most widely used I/O models in the United States. To accommodate demand for the model, the Forest Service privatized IMPLAN which is now operated by the Minnesota IMPLAN Group (MIG). In addition to updating and improving the databases and software, MIG holds regular training sessions, biannual user conferences and maintains a collection of hundreds of papers that make use of IMPLAN. MIG annually updates the model using aggregated production, employment and trade data from local, regional, and national sources, including the U.S. Census Bureau *County Business Patterns* report and the U.S. Bureau of Labor Statistics annual report called *Covered Employment and Wages*.

LIMITATIONS

There are five important limitations to the use of the IMPLAN model (or any other I/O model) which must be recognized by the Participant States when reporting total economic impacts from the recycling, recycling reliant, and reuse and remanufacturing industries.

First and foremost, the sum of indirect and induced economic activity across all sectors ***cannot*** be added to the sum of direct economic activity across all sectors in Table 5 to make statements about the total economic impact of the "recycling industry" in a state. That is because the indirect and induced estimates for the recycling reliant industries ***include*** inputs from the recycling industries supplying the recycled material, which has ***already been accounted for*** in Table 5 (direct impacts). Therefore summing the indirect and induced impacts, together with the direct economic activity, results in significant double counting. The illustrative transaction table presented above (figure 1) clearly demonstrates, for example, that the paper mill is purchasing services, either directly or indirectly from the collection company (or municipality), the broker (or wholesaler) and the MRF, which have already been accounted for in Table 5.

The 2000 Report draws a similar conclusion when it states[25]:

"Economic values are most accurate at the (individual) business category level. Summing totals by groups of recycling or reuse activity for the state as a whole (as has been done in the tables) results in some degree of duplicated accounting of economic activity. This is true for any set of industrial assessments in any output modeling scenario – it is not a problem with recycling per se, nor with this study, but arises simply because of the ***many business categories that are included in this study*** (emphasis added)… A large portion of the raw commodity processor's (or supply side industries) direct sales is already reflected in the finished good (or demand side) industry's input purchases."

"Based on other modeling experience, it is believed that aggregation bias may have inflated the subtotals and totals by up to 15 percent, and possibly higher."

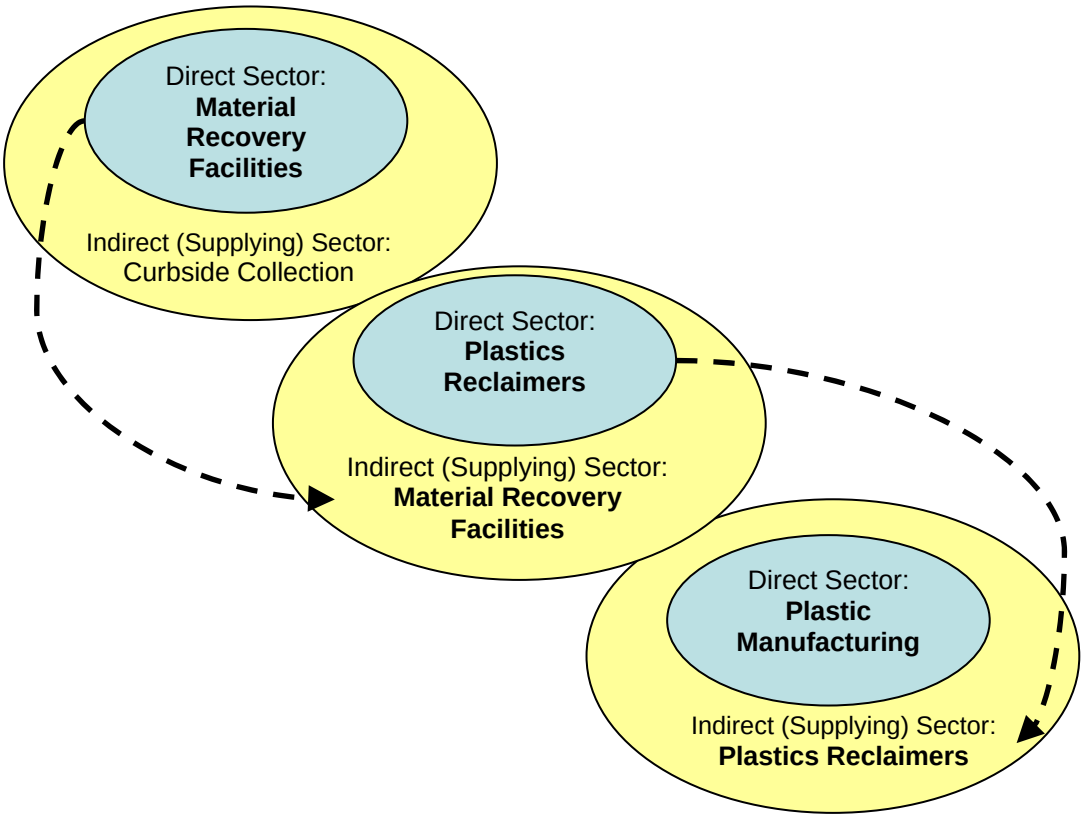
It is the Project Team's believe that the doubling counting, when summing all sectors, may be significantly greater then 15 percent, and as such this Study Update does **not** sum the indirect and induced effects with the direct economic impacts, instead simply reporting the induced and indirect effects for each sector for use by the Participant States in assessing future changes in any recycling or recycling reliant sector.

[25] Ibid, page 5-17.

Figure 3 presents a visual depiction of the double counting relationship between several of the targeted sectors.

Figure 3

Example of I/O Model Double Counting



As shown in Figure 3, as recyclables proceed from collection, through initial sorting through final manufacturing, various sectors defined in this study are among the suppliers being measured through the indirect effect of the I/O model. Yet, the multipliers for each sector in this study are calculated independently of the other sectors. While it would in theory be possible to manually adjust the I/O model to account for this overlap, doing so would be cost-prohibitive at a minimum, and still would face the remaining limitations below.

Second, the multipliers are state specific. Therefore, multipliers constructed for New York, as an example, should not be applied to another state or even a sub-region within the state. Generally, because of the scale of state economies state level multipliers will overstate the economic impact if applied at a sub-regional level. This limitation is related to the third issue - that I/O models are most effective when it is possible to obtain actual economic inputs through surveying, rather than relying on national or state-level data. It may be more practical and not cost-prohibitive to examine the impact of an industry on a single county through direct surveys for required I/O model inputs, but this level of surveying was not possible for this study.

Third, the I/O coefficients used in the IMPLAN model are based in part on U.S. Census data, including the County Business Pattern data. However, as the Project Team learned during development of the direct economic impact data, County Business Pattern data are often suppressed, even at the state level because of confidentiality issues. Therefore, the multipliers used in the IMPLAN model may be based on national (or multi-state) data, which make it difficult to apply to state or regional data.

Fourth, the extent of imports and exports is critical to the size of the multipliers – the greater the extent of import and export, the lower the multiplier effect. Data on imports and exports of recyclable materials to/from the recycling reliant industries were not collected as part of this study. While this limitation may not have been as important to the results of the 2000 Report, it can be reasonably asserted that the recycling industry in 2008 has become much more a part of the global commodities market and that imports and exports play a greater role in recycling among the Participant States in this study. Therefore it is difficult to know whether the multipliers used are of the correct magnitude – other than to judge their relative size compared to typical multipliers.

Fifth, and finally, while IMPLAN has developed multipliers for over 500 sectors of the economy, these sectors do not necessarily include all of the sectors used in this report. For example, while the Census Bureau has reasonably captured the “tire retread” industry, there are no precise industry sectors for “plastics manufacturers that use secondary resin as a feedstock” or “other recycling processors and manufacturers.” For this reason it was necessary to first attempt to match the recycling sectors to the closest sector for which IMPLAN had multipliers, and then to manipulate the multipliers where they appeared to be out of the range of the expected values.

EFFECT ON STATE AND FEDERAL GOVERNMENT TAX REVENUES

Because of the double counting issues associated with application of the I/O analysis to the direct economic impacts, no assessment of government revenues has been made as part of this analysis. In general, the 2000 Report showed “own-source” state government revenues equal to roughly 4 to 4.5 percent of total gross receipts. Assuming that some double counting was occurring in the 2000 Report, it is likely that a Participant State could assume own-source government revenues in the range of 3 – 3.5 percent of gross receipts as a reasonable estimate of government revenues generated by recycling, recycling reliant, and reuse and remanufacturing industries.

Results

Three tables are presented for each of the Participant State. Multipliers, and the resulting indirect, induced, and total impacts for each sector are presented, divided into a table for the recycling industries, a table for the recycling reliant industries, and a table for the reuse and remanufacturing industries. No totals for groups of industries are presented to eliminate double counting of the results. These tables can be used by the Participant States to evaluate the potential impacts of changes in any sector on the regional economy of the state in which it is located.

For example, the Commonwealth of Massachusetts could assess the total economic impact associated with the construction of a new single stream MRF (Sector 4) if data were available on expected employment, payroll, and gross receipts for the new MRF by using the indirect and

induced multipliers to estimate the total economic impact of operating the new MRF. Similarly, Pennsylvania could assess the total economic impact of closure of a steel mill in a region using data on the mill's employment, payroll, and receipts, and the indirect and induced multipliers.

It should be noted that the multipliers run off of the direct impacts in the far left column, which are taken directly from the far right column of Table 5 (Part II) for each state and each sector.

Table 7.1a
Delaware Indirect and Induced Impacts

Sector # and Description	*Data Type*	DE	MULTIPLIERS			IMPACTS			
RECYCLING INDUSTRY:		DIRECT IMPACTS	Indirect	Induced	Indirect + Induced	Indirect	Induced	Indirect + Induced	Total
1 Municipal Residential	Establishments (#)	2							
Curbside and Drop-Off	Employment (#)	47	0.3929	0.3274	0.7204	18	15	34	81
Collection	Annual Payroll ($1,000)	1,221	0.3623	0.2411	0.6034	442	294	737	1,958
	Receipts ($1,000)	8,543	0.3031	0.2112	0.5143	2,589	1,804	4,394	12,937
2 Private Residential and	Establishments (#)	21							
Commercial Collection	Employment (#)	19	0.3929	0.3274	0.7204	7	6	14	33
	Annual Payroll ($1,000)	870	0.3623	0.2411	0.6034	315	210	525	1,396
	Receipts ($1,000)	4,444	0.3031	0.2112	0.5143	1,347	939	2,285	6,729
3 Compost and Misc.	Establishments (#)	28							
Organics Producers	Employment (#)	217	0.0046	0.0964	0.1010	1	21	22	239
	Annual Payroll ($1,000)	5,635	0.0148	0.1851	0.1999	83	1,043	1,126	6,761
	Receipts ($1,000)	20,003	0.0425	0.5486	0.5911	851	10,973	11,824	31,826
4 Materials Recovery	Establishments (#)	2							
Facilities (MRFs)	Employment (#)	26	0.3929	0.3274	0.7204	10	9	19	45
	Annual Payroll ($1,000)	528	0.3623	0.2411	0.6034	191	127	319	846
	Receipts ($1,000)	2,913	0.3031	0.2112	0.5143	883	615	1,498	4,411
5 Recyclable Material	Establishments (#)	19							
Wholesalers	Employment (#)	248	0.3334	0.4527	0.7861	83	112	195	443
	Annual Payroll ($1,000)	7,446	0.2016	0.2126	0.4141	1,501	1,583	3,084	10,530
	Receipts ($1,000)	154,498	0.2055	0.2507	0.4562	31,752	38,733	70,486	224,984
14 Plastics Reclaimers	Establishments (#)	1							
	Employment (#)	(D)							
	Annual Payroll ($1,000)	(D)							
	Receipts ($1,000)	(D)							

Table 7.1b
Delaware Indirect and Induced Impacts

Sector # and Description	*Data Type*	DE	MULTIPLIERS			IMPACTS			
RECYCLING RELIANT INDUSTRIES:		DIRECT IMPACTS	Indirect	Induced	Indirect + Induced	Indirect	Induced	Indirect + Induced	TOTAL
6 Glass Container	Establishments (#)	-							
Manufacturing Plants	Employment (#)	-							
	Annual Payroll ($1,000)	-							
	Receipts ($1,000)	-							
7 Glass Product Producers	Establishments (#)	1							
(other recycled uses)	Employment (#)	(D)							
	Annual Payroll ($1,000)	(D)							
	Receipts ($1,000)	(D)							
8 Nonferrous Secondary	Establishments (#)	-							
Smelting and Refining	Employment (#)	-							
Mills	Annual Payroll ($1,000)	-							
	Receipts ($1,000)	-							
9 Nonferrous Product	Establishments (#)	-							
Producers	Employment (#)	-							
	Annual Payroll ($1,000)	-							
	Receipts ($1,000)	-							
10 Nonferrous Foundries	Establishments (#)	-							
	Employment (#)	-							
	Annual Payroll ($1,000)	-							
	Receipts ($1,000)	-							
11 Paper and Paperboard	Establishments (#)	-							
Mills / Deinked Market	Employment (#)	-							
Pulp Producers	Annual Payroll ($1,000)	-							
	Receipts ($1,000)	-							
12 Paper-Based Product	Establishments (#)	-							
Manufacturers	Employment (#)	-							
	Annual Payroll ($1,000)	-							
	Receipts ($1,000)	-							
13 Pavement Mix Producers	Establishments (#)	7							
(asphalt and aggregate)	Employment (#)	180	0.3567	0.5833	0.9400	64	105	169	349
	Annual Payroll ($1,000)	2,400	0.2712	0.2245	0.4957	651	539	1,190	3,590
	Receipts ($1,000)	24,750	0.4691	0.1444	0.6136	11,611	3,575	15,186	39,936
15 Plastic Product Manufacturers	Establishments (#)	4							
	Employment (#)	22	0.3858	0.5086	0.8944	8	11	19	41
	Annual Payroll ($1,000)	550	0.2843	0.2260	0.5104	156	124	281	831
	Receipts ($1,000)	9,900	0.2142	0.1393	0.3536	2,121	1,379	3,500	13,400
16 Rubber Product	Establishments (#)	1							
Manufacturers	Employment (#)	(D)							
	Annual Payroll ($1,000)	(D)							
	Receipts ($1,000)	(D)							
17 Steel Mills	Establishments (#)	1							
	Employment (#)	(D)							
	Annual Payroll ($1,000)	(D)							
	Receipts ($1,000)	(D)							
18 Iron and Steel Foundries	Establishments (#)	-							
	Employment (#)	-							
	Annual Payroll ($1,000)	-							
	Receipts ($1,000)	-							
19 Other Recycling	Establishments (#)	4							
Processors /	Employment (#)	19	0.3929	0.3274	0.7204	7	6	14	33
Manufacturers	Annual Payroll ($1,000)	256	0.3623	0.2411	0.6034	93	62	154	410
	Receipts ($1,000)	546	0.3031	0.2112	0.5143	165	115	281	827

Table 7.1c
Delaware Indirect and Induced Impacts

Sector # and Description	*Data Type*	DE	MULTIPLIERS			IMPACTS			
REUSE AND REMANUFACTURING INDUSTRIES:		DIRECT IMPACTS	Indirect	Induced	Indirect + Induced	Indirect	Induced	Indirect + Induced	TOTAL
20 Computer and Electronic	Establishments (#)	-							
Appliance	Employment (#)	-							
Demanufacturers	Annual Payroll ($1,000)	-							
	Receipts ($1,000)	-							
21 Motor Vehicle Parts	Establishments (#)	19							
(used)	Employment (#)	162	0.1675	0.2545	0.4220	27	41	68	230
	Annual Payroll ($1,000)	3,719	0.1533	0.2035	0.3568	570	757	1,327	5,046
	Receipts ($1,000)	17,862	0.2195	0.3003	0.5198	3,921	5,365	9,285	27,147
22 Retail Used Merchandise	Establishments (#)	56							
Sales	Employment (#)	459	0.0670	0.1123	0.1793	31	52	82	541
	Annual Payroll ($1,000)	7,425	0.1382	0.2057	0.3439	1,026	1,527	2,554	9,979
	Receipts ($1,000)	21,352	0.1952	0.2992	0.4944	4,167	6,389	10,556	31,908
23 Tire Retreaders	Establishments (#)	1							
	Employment (#)	(D)							
	Annual Payroll ($1,000)	(D)							
	Receipts ($1,000)	(D)							
24 Wood Reuse	Establishments (#)	8							
	Employment (#)	72	0.4804	0.4724	0.9528	35	34	69	141
	Annual Payroll ($1,000)	3,400	0.4102	0.2515	0.6617	1,395	855	2,250	5,650
	Receipts ($1,000)	10,200	0.3014	0.1333	0.4348	3,075	1,360	4,435	14,635
25 Materials Exchange	Establishments (#)	-							
Services	Employment (#)	-							
	Annual Payroll ($1,000)	-							
	Receipts ($1,000)	-							
26 Other Reuse	Establishments (#)	-							
	Employment (#)	-							
	Annual Payroll ($1,000)	-							
	Receipts ($1,000)	-							

Table 7.2a
Maine Indirect and Induced Impacts

Sector # and Description	*Data Type*	ME	MULTIPLIERS			IMPACTS			
RECYCLING INDUSTRY:		DIRECT IMPACTS	Indirect	Induced	Indirect + Induced	Indirect	Induced	Indirect + Induced	Total
1 Municipal Residential	Establishments (#)	194							
Curbside and Drop-Off	Employment (#)	300	0.4724	0.3588	0.8312	142	107	249	549
Collection	Annual Payroll ($1,000)	8,749	0.4687	0.3133	0.7819	4,100	2,741	6,841	15,589
	Receipts ($1,000)	23,818	0.3590	0.2358	0.5948	8,550	5,616	14,166	37,984
2 Private Residential and	Establishments (#)	880							
Commercial Collection	Employment (#)	868	0.4724	0.3588	0.8312	410	312	722	1,590
	Annual Payroll ($1,000)	19,968	0.4687	0.3133	0.7819	9,358	6,255	15,614	35,582
	Receipts ($1,000)	38,162	0.3590	0.2358	0.5948	13,699	8,999	22,698	60,860
3 Compost and Misc.	Establishments (#)	85							
Organics Producers	Employment (#)	474	0.0108	0.1295	0.1402	5	61	66	540
	Annual Payroll ($1,000)	10,612	0.0185	0.2190	0.2375	196	2,324	2,520	13,133
	Receipts ($1,000)	37,023	0.0678	0.6521	0.7199	2,510	24,144	26,654	63,677
4 Materials Recovery	Establishments (#)	6							
Facilities (MRFs)	Employment (#)	34	0.4724	0.3588	0.8312	16	12	28	61
	Annual Payroll ($1,000)	722	0.4687	0.3133	0.7819	338	226	565	1,287
	Receipts ($1,000)	3,895	0.3590	0.2358	0.5948	1,398	918	2,317	6,212
5 Recyclable Material	Establishments (#)	36							
Wholesalers	Employment (#)	421	0.3085	0.4468	0.7553	130	188	318	739
	Annual Payroll ($1,000)	14,690	0.2190	0.2598	0.4787	3,216	3,816	7,033	21,723
	Receipts ($1,000)	256,868	0.2295	0.3015	0.5311	58,964	77,457	136,420	393,289
14 Plastics Reclaimers	Establishments (#)	-							
	Employment (#)	-							
	Annual Payroll ($1,000)	-							
	Receipts ($1,000)	-							

Table 7.2b
Maine Indirect and Induced Impacts

Sector # and Description	*Data Type*	ME	MULTIPLIERS			IMPACTS			
RECYCLING RELIANT INDUSTRIES:		DIRECT IMPACTS	Indirect	Induced	Indirect + Induced	Indirect	Induced	Indirect + Induced	TOTAL
6 Glass Container	Establishments (#)	-							
Manufacturing Plants	Employment (#)	-							
	Annual Payroll ($1,000)	-							
	Receipts ($1,000)	-							
7 Glass Product Producers	Establishments (#)	-							
(other recycled uses)	Employment (#)	-							
	Annual Payroll ($1,000)	-							
	Receipts ($1,000)	-							
8 Nonferrous Secondary	Establishments (#)	-							
Smelting and Refining	Employment (#)	-							
Mills	Annual Payroll ($1,000)	-							
	Receipts ($1,000)	-							
9 Nonferrous Product	Establishments (#)	1							
Producers	Employment (#)	182	0.3821	0.7198	1.1019	70	131	201	383
	Annual Payroll ($1,000)	5,938	0.2044	0.2667	0.4711	1,214	1,584	2,797	8,736
	Receipts ($1,000)	42,672	0.2176	0.3061	0.5236	9,283	13,060	22,344	65,015
10 Nonferrous Foundries	Establishments (#)	5							
	Employment (#)	19	0.3821	0.7198	1.1019	7	14	21	40
	Annual Payroll ($1,000)	675	0.2044	0.2667	0.4711	138	180	318	994
	Receipts ($1,000)	3,445	0.2176	0.3061	0.5236	749	1,054	1,804	5,249
11 Paper and Paperboard	Establishments (#)	6							
Mills / Deinked Market	Employment (#)	438	0.5797	0.6695	1.2492	254	293	547	985
Pulp Producers	Annual Payroll ($1,000)	24,972	0.3365	0.2882	0.6248	8,403	7,198	15,601	40,573
	Receipts ($1,000)	197,111	0.2276	0.1964	0.4240	44,855	38,711	83,566	280,677
12 Paper-Based Product	Establishments (#)	2							
Manufacturers	Employment (#)	465	0.5797	0.6695	1.2492	270	311	581	1,046
	Annual Payroll ($1,000)	17,438	0.3365	0.2882	0.6248	5,868	5,026	10,894	28,332
	Receipts ($1,000)	63,875	0.2276	0.1964	0.4240	14,536	12,545	27,080	90,955
13 Pavement Mix Producers	Establishments (#)	23							
(asphalt and aggregate)	Employment (#)	168	0.4608	0.8638	1.3246	77	145	223	391
	Annual Payroll ($1,000)	4,754	0.2292	0.2720	0.5012	1,089	1,293	2,383	7,137
	Receipts ($1,000)	2,667	0.2635	0.1642	0.4278	703	438	1,141	3,808
15 Plastic Product Manufacturers	Establishments (#)	3							
	Employment (#)	105	0.4384	0.5265	0.9649	46	55	101	207
	Annual Payroll ($1,000)	2,569	0.3135	0.2791	0.5926	805	717	1,522	4,091
	Receipts ($1,000)	41,920	0.1749	0.1389	0.3138	7,330	5,822	13,153	55,073
16 Rubber Product	Establishments (#)	-							
Manufacturers	Employment (#)	-							
	Annual Payroll ($1,000)	-							
	Receipts ($1,000)	-							
17 Steel Mills	Establishments (#)	-							
	Employment (#)	-							
	Annual Payroll ($1,000)	-							
	Receipts ($1,000)	-							
18 Iron and Steel Foundries	Establishments (#)	2							
	Employment (#)	7	0.4601	0.8637	1.3239	3	6	10	17
	Annual Payroll ($1,000)	256	0.1918	0.2659	0.4577	49	68	117	373
	Receipts ($1,000)	1,305	0.2164	0.3048	0.5212	282	398	680	1,985
19 Other Recycling	Establishments (#)	-							
Processors /	Employment (#)	-							
Manufacturers	Annual Payroll ($1,000)	-							
	Receipts ($1,000)	-							

Table 7.2c
Maine Indirect and Induced Impacts

Sector # and Description	*Data Type*	ME	MULTIPLIERS			IMPACTS			
REUSE AND REMANUFACTURING INDUSTRIES:		**DIRECT IMPACTS**	Indirect	Induced	Indirect + Induced	Indirect	Induced	Indirect + Induced	**TOTAL**
20 Computer and Electronic	Establishments (#)	1							
Appliance	Employment (#)	(D)							
Demanufacturers	Annual Payroll ($1,000)	(D)							
	Receipts ($1,000)	(D)							
21 Motor Vehicle Parts	Establishments (#)	40							
(used)	Employment (#)	263	0.3085	0.4468	0.7553	81	117	198	461
	Annual Payroll ($1,000)	4,503	0.2190	0.2598	0.4787	986	1,170	2,156	6,659
	Receipts ($1,000)	32,508	0.2295	0.3015	0.5311	7,462	9,802	17,265	49,772
22 Retail Used Merchandise	Establishments (#)	137							
Sales	Employment (#)	651	0.0595	0.1131	0.1727	39	74	112	763
	Annual Payroll ($1,000)	9,977	0.1369	0.2453	0.3822	1,365	2,448	3,813	13,790
	Receipts ($1,000)	50,172	0.2010	0.3613	0.5624	10,086	18,128	28,215	78,387
23 Tire Retreaders	Establishments (#)	9							
	Employment (#)	100	0.5345	0.3948	0.9292	53	39	93	193
	Annual Payroll ($1,000)	3,424	0.6402	0.3489	0.9892	2,192	1,195	3,386	6,810
	Receipts ($1,000)	5,802	0.2490	0.1299	0.3789	1,444	754	2,198	8,000
24 Wood Reuse	Establishments (#)	1							
	Employment (#)	(D)							
	Annual Payroll ($1,000)	(D)							
	Receipts ($1,000)	(D)							
25 Materials Exchange	Establishments (#)	2							
Services	Employment (#)	3	0.3962	0.3483	0.7445	1	1	2	5
	Annual Payroll ($1,000)	60	0.3242	0.2855	0.6097	19	17	37	97
	Receipts ($1,000)	113	0.1374	0.1233	0.2607	15	14	29	142
26 Other Reuse	Establishments (#)	1							
	Employment (#)	(D)							
	Annual Payroll ($1,000)	(D)							
	Receipts ($1,000)	(D)							

Table 7.3a
Massachusetts Indirect and Induced Impacts

Sector # and Description	*Data Type*	MA	MULTIPLIERS			IMPACTS			
RECYCLING INDUSTRY:			Indirect	Induced	Indirect + Induced	Indirect	Induced	Indirect + Induced	Total
1 Municipal Residential	Establishments (#)	334							
Curbside and Drop-Off	Employment (#)	431	0.5732	0.4945	1.0677	247	213	460	891
Collection	Annual Payroll ($1,000)	21,162	0.5261	0.3536	0.8797	11,133	7,483	18,616	39,779
	Receipts ($1,000)	54,542	0.4297	0.3094	0.7391	23,438	16,874	40,312	94,854
2 Private Residential and	Establishments (#)	597							
Commercial Collection	Employment (#)	1,284	0.5732	0.4945	1.0677	736	635	1,371	2,656
	Annual Payroll ($1,000)	36,139	0.5261	0.3536	0.8797	19,012	12,778	31,791	67,929
	Receipts ($1,000)	81,442	0.4297	0.3094	0.7391	34,997	25,197	60,194	141,636
3 Compost and Misc.	Establishments (#)	267							
Organics Producers	Employment (#)	1,408	0.0091	0.2060	0.2151	13	290	303	1,710
	Annual Payroll ($1,000)	39,776	0.0142	0.2354	0.2497	567	9,365	9,931	49,707
	Receipts ($1,000)	111,906	0.0370	0.6825	0.7195	4,141	76,373	80,514	192,420
4 Materials Recovery	Establishments (#)	10							
Facilities (MRFs)	Employment (#)	286	0.5732	0.4945	1.0677	164	141	305	591
	Annual Payroll ($1,000)	11,497	0.5261	0.3536	0.8797	6,049	4,065	10,114	21,611
	Receipts ($1,000)	33,221	0.4297	0.3094	0.7391	14,276	10,278	24,554	57,775
5 Recyclable Material	Establishments (#)	154							
Wholesalers	Employment (#)	1,753	0.4541	0.5732	1.0273	796	1,005	1,801	3,554
	Annual Payroll ($1,000)	66,161	0.3306	0.3081	0.6387	21,872	20,387	42,259	108,420
	Receipts ($1,000)	874,083	0.3103	0.3371	0.6474	271,242	294,625	565,867	1,439,950
14 Plastics Reclaimers	Establishments (#)	19							
	Employment (#)	290	1.0676	0.8543	1.9219	310	248	557	847
	Annual Payroll ($1,000)	14,237	0.9935	0.4643	1.4578	14,144	6,610	20,754	34,990
	Receipts ($1,000)	124,033	0.4901	0.2256	0.7158	60,793	27,986	88,779	212,811

Table 7.3b
Massachusetts Indirect and Induced Impacts

Sector # and Description	*Data Type*	MA	MULTIPLIERS			IMPACTS			
RECYCLING RELIANT INDUSTRIES:		DIRECT IMPACTS	Indirect	Induced	Indirect + Induced	Indirect	Induced	Indirect + Induced	TOTAL
6 Glass Container	Establishments (#)	1							
Manufacturing Plants	Employment (#)	(D)							
	Annual Payroll ($1,000)	(D)							
	Receipts ($1,000)	(D)							
7 Glass Product Producers	Establishments (#)	2							
(other recycled uses)	Employment (#)	11	0.6394	0.6287	1.2681	7	7	14	25
	Annual Payroll ($1,000)	525	0.5880	0.3768	0.9648	309	198	507	1,032
	Receipts ($1,000)	525	0.4196	0.2526	0.6722	220	133	353	878
8 Nonferrous Secondary	Establishments (#)	9							
Smelting and Refining	Employment (#)	554	0.4152	0.4926	0.9077	230	273	503	1,057
Mills	Annual Payroll ($1,000)	30,419	0.4105	0.3381	0.7486	12,486	10,285	22,771	53,190
	Receipts ($1,000)	186,106	0.3550	0.3058	0.6608	66,066	56,907	122,974	309,080
9 Nonferrous Product	Establishments (#)	11							
Producers	Employment (#)	433	0.4152	0.4926	0.9077	180	213	393	826
	Annual Payroll ($1,000)	15,672	0.4105	0.3381	0.7486	6,433	5,299	11,732	27,403
	Receipts ($1,000)	260,500	0.3550	0.3058	0.6608	92,475	79,656	172,131	432,630
10 Nonferrous Foundries	Establishments (#)	37							
	Employment (#)	612	0.4152	0.4926	0.9077	254	302	556	1,168
	Annual Payroll ($1,000)	22,990	0.4105	0.3381	0.7486	9,437	7,773	17,210	40,200
	Receipts ($1,000)	89,110	0.3550	0.3058	0.6608	31,633	27,248	58,881	147,991
11 Paper and Paperboard	Establishments (#)	15							
Mills / Deinked Market	Employment (#)	2,089	0.5918	0.5376	1.1294	1,236	1,123	2,359	4,448
Pulp Producers	Annual Payroll ($1,000)	106,018	0.6210	0.3759	0.9969	65,836	39,856	105,692	211,710
	Receipts ($1,000)	732,442	0.3391	0.2137	0.5529	248,404	156,530	404,934	1,137,376
12 Paper-Based Product	Establishments (#)	1							
Manufacturers	Employment (#)	(D)							
	Annual Payroll ($1,000)	(D)							
	Receipts ($1,000)	(D)							
13 Pavement Mix Producers	Establishments (#)	44							
(asphalt and aggregate)	Employment (#)	210	0.6416	1.2566	1.8982	135	264	399	609
	Annual Payroll ($1,000)	9,473	0.2528	0.2989	0.5517	2,395	2,831	5,226	14,699
	Receipts ($1,000)	61,200	0.1845	0.1986	0.3831	11,292	12,156	23,447	84,647
15 Plastic Product Manufacturers	Establishments (#)	27							
	Employment (#)	620	0.4986	0.5285	1.0271	309	328	637	1,257
	Annual Payroll ($1,000)	19,371	0.4873	0.3435	0.8307	9,439	6,653	16,092	35,463
	Receipts ($1,000)	134,728	0.2829	0.1734	0.4563	38,119	23,361	61,479	196,207
16 Rubber Product	Establishments (#)	13							
Manufacturers	Employment (#)	151	0.5757	0.4939	1.0696	87	75	162	313
	Annual Payroll ($1,000)	4,581	0.6825	0.3888	1.0713	3,126	1,781	4,907	9,488
	Receipts ($1,000)	17,317	0.3306	0.1818	0.5124	5,726	3,148	8,873	26,190
17 Steel Mills	Establishments (#)	-							
	Employment (#)	-							
	Annual Payroll ($1,000)	-							
	Receipts ($1,000)	-							
18 Iron and Steel Foundries	Establishments (#)	20							
	Employment (#)	414	0.4756	0.6523	1.1280	197	270	467	881
	Annual Payroll ($1,000)	16,650	0.3732	0.3445	0.7177	6,213	5,736	11,949	28,599
	Receipts ($1,000)	56,430	0.3380	0.3293	0.6673	19,075	18,583	37,658	94,088
19 Other Recycling	Establishments (#)	11							
Processors /	Employment (#)	134	0.5732	0.4945	1.0677	77	66	143	277
Manufacturers	Annual Payroll ($1,000)	6,563	0.5261	0.3536	0.8797	3,453	2,321	5,773	12,336
	Receipts ($1,000)	22,969	0.4297	0.3094	0.7391	9,870	7,106	16,976	39,945

Table 7.3c
Massachusetts Indirect and Induced Impacts

Sector # and Description	*Data Type*	MA	MULTIPLIERS			IMPACTS			
REUSE AND REMANUFACTURING INDUSTRIES:		DIRECT IMPACTS	Indirect	Induced	Indirect + Induced	Indirect	Induced	Indirect + Induced	TOTAL
20 Computer and Electronic	Establishments (#)	9							
Appliance	Employment (#)	121	0.5732	0.4945	1.0677	69	60	129	250
Demanufacturers	Annual Payroll ($1,000)	1,884	0.5261	0.3536	0.8797	991	666	1,657	3,541
	Receipts ($1,000)	11,052	0.4297	0.3094	0.7391	4,749	3,419	8,168	19,220
21 Motor Vehicle Parts	Establishments (#)	117							
(used)	Employment (#)	894	0.1981	0.3101	0.5082	177	277	454	1,348
	Annual Payroll ($1,000)	26,357	0.2248	0.2834	0.5082	5,924	7,470	13,394	39,750
	Receipts ($1,000)	105,171	0.2920	0.3860	0.6780	30,712	40,593	71,306	176,477
22 Retail Used Merchandise	Establishments (#)	303							
Sales	Employment (#)	1,919	0.0824	0.1369	0.2193	158	263	421	2,340
	Annual Payroll ($1,000)	37,865	0.2085	0.2830	0.4916	7,897	10,717	18,614	56,479
	Receipts ($1,000)	155,099	0.2652	0.3773	0.6424	41,127	58,515	99,642	254,741
23 Tire Retreaders	Establishments (#)	8							
	Employment (#)	60	0.5757	0.4939	1.0696	35	30	64	124
	Annual Payroll ($1,000)	1,794	0.6825	0.3888	1.0713	1,224	697	1,922	3,716
	Receipts ($1,000)	28,259	0.3306	0.1818	0.5124	9,343	5,137	14,480	42,739
24 Wood Reuse	Establishments (#)	7							
	Employment (#)	204	0.6268	0.5008	1.1276	128	102	230	434
	Annual Payroll ($1,000)	6,848	0.5748	0.3662	0.9410	3,936	2,508	6,444	13,292
	Receipts ($1,000)	20,584	0.3234	0.1690	0.4924	6,657	3,479	10,135	30,719
25 Materials Exchange	Establishments (#)	2							
Services	Employment (#)	4	0.7675	0.5886	1.3561	3	2	5	9
	Annual Payroll ($1,000)	80	0.5644	0.3665	0.9309	45	29	74	154
	Receipts ($1,000)	150	0.1968	0.1433	0.3401	30	21	51	201
26 Other Reuse	Establishments (#)	-							
	Employment (#)	-							
	Annual Payroll ($1,000)	-							
	Receipts ($1,000)	-							

Table 7.4a
New York Indirect and Induced Impacts

Sector # and Description	*Data Type*	NY	MULTIPLIERS			IMPACTS			
RECYCLING INDUSTRY:		DIRECT IMPACTS	Indirect	Induced	Indirect + Induced	Indirect	Induced	Indirect + Induced	Total
1 Municipal Residential	Establishments (#)	860							
Curbside and Drop-Off	Employment (#)	1,555	0.5047	0.3762	0.8809	785	585	1,369	2,924
Collection	Annual Payroll ($1,000)	109,094	0.5351	0.3098	0.8449	58,380	33,795	92,175	201,269
	Receipts ($1,000)	268,841	0.4263	0.2696	0.6959	114,608	72,472	187,081	455,921
2 Private Residential and	Establishments (#)	879							
Commercial Collection	Employment (#)	3,798	0.5047	0.3762	0.8809	1,917	1,429	3,346	7,143
	Annual Payroll ($1,000)	93,529	0.5351	0.3098	0.8449	50,051	28,974	79,024	172,554
	Receipts ($1,000)	178,145	0.4263	0.2696	0.6959	75,944	48,023	123,967	302,111
3 Compost and Misc.	Establishments (#)	137							
Organics Producers	Employment (#)	767	0.0077	0.1040	0.1117	6	80	86	853
	Annual Payroll ($1,000)	22,518	0.0204	0.2112	0.2316	460	4,756	5,216	27,734
	Receipts ($1,000)	66,083	0.0559	0.6027	0.6586	3,697	39,826	43,524	109,607
4 Materials Recovery	Establishments (#)	41							
Facilities (MRFs)	Employment (#)	1,244	0.5047	0.3762	0.8809	628	468	1,096	2,340
	Annual Payroll ($1,000)	40,979	0.5351	0.3098	0.8449	21,929	12,695	34,624	75,604
	Receipts ($1,000)	166,810	0.4263	0.2696	0.6959	71,112	44,967	116,079	282,889
5 Recyclable Material	Establishments (#)	455							
Wholesalers	Employment (#)	6,732	0.3865	0.4399	0.8264	2,602	2,961	5,563	12,294
	Annual Payroll ($1,000)	240,056	0.3362	0.2693	0.6055	80,697	64,656	145,353	385,409
	Receipts ($1,000)	3,009,357	0.3129	0.2995	0.6124	941,652	901,426	1,843,078	4,852,434
14 Plastics Reclaimers	Establishments (#)	20							
	Employment (#)	440	1.0397	0.8040	1.8436	457	354	811	1,250
	Annual Payroll ($1,000)	17,671	0.8080	0.3648	1.1728	14,278	6,447	20,725	38,396
	Receipts ($1,000)	168,681	0.4825	0.2142	0.6966	81,387	36,124	117,511	286,192

Table 7.4b
New York Indirect and Induced Impacts

Sector # and Description	*Data Type*	NY	MULTIPLIERS			IMPACTS			
RECYCLING RELIANT INDUSTRIES:		DIRECT IMPACTS	Indirect	Induced	Indirect + Induced	Indirect	Induced	Indirect + Induced	TOTAL
6 Glass Container	Establishments (#)	2							
Manufacturing Plants	Employment (#)	303	0.6057	0.4953	1.1010	183	150	333	636
	Annual Payroll ($1,000)	16,500	0.6084	0.3273	0.9357	10,039	5,400	15,440	31,940
	Receipts ($1,000)	67,375	0.4358	0.2213	0.6571	29,360	14,913	44,272	111,647
7 Glass Product Producers	Establishments (#)	7							
(other recycled uses)	Employment (#)	283	0.6057	0.4953	1.1010	171	140	311	594
	Annual Payroll ($1,000)	14,140	0.6084	0.3273	0.9357	8,603	4,628	13,231	27,371
	Receipts ($1,000)	56,788	0.4358	0.2213	0.6571	24,746	12,569	37,315	94,103
8 Nonferrous Secondary	Establishments (#)	25							
Smelting and Refining	Employment (#)	953	2.0174	1.1336	3.1510	1,922	1,080	3,002	3,955
Mills	Annual Payroll ($1,000)	39,473	2.1355	0.7717	2.9071	84,293	30,460	114,752	154,225
	Receipts ($1,000)	349,038	0.4232	0.1589	0.5821	147,715	55,465	203,180	552,218
9 Nonferrous Product	Establishments (#)	27							
Producers	Employment (#)	2,378	0.3944	0.4310	0.8253	938	1,025	1,963	4,341
	Annual Payroll ($1,000)	112,884	0.3743	0.2794	0.6537	42,247	31,540	73,788	186,672
	Receipts ($1,000)	1,150,437	0.3505	0.2764	0.6269	403,228	318,013	721,241	1,871,678
10 Nonferrous Foundries	Establishments (#)	53							
	Employment (#)	1,864	0.3944	0.4310	0.8253	735	803	1,539	3,403
	Annual Payroll ($1,000)	90,060	0.3743	0.2794	0.6537	33,705	25,163	58,869	148,929
	Receipts ($1,000)	365,180	0.3505	0.2764	0.6269	127,996	100,946	228,942	594,122
11 Paper and Paperboard	Establishments (#)	25							
Mills / Deinked Market	Employment (#)	3,767	0.5387	0.5228	1.0615	2,029	1,969	3,999	7,766
Pulp Producers	Annual Payroll ($1,000)	206,411	0.4673	0.3015	0.7688	96,463	62,231	158,694	365,105
	Receipts ($1,000)	1,699,767	0.3036	0.2119	0.5155	515,969	360,225	876,194	2,575,961
12 Paper-Based Product	Establishments (#)	3							
Manufacturers	Employment (#)	318	0.5387	0.5228	1.0615	171	166	338	656
	Annual Payroll ($1,000)	6,650	0.4673	0.3015	0.7688	3,108	2,005	5,113	11,763
	Receipts ($1,000)	47,563	0.3036	0.2119	0.5155	14,438	10,080	24,517	72,080
13 Pavement Mix Producers	Establishments (#)	18							
(asphalt and aggregate)	Employment (#)	200	0.1710	0.2311	0.4021	34	46	80	280
	Annual Payroll ($1,000)	9,029	0.1954	0.2658	0.4612	1,764	2,400	4,164	13,194
	Receipts ($1,000)	150,000	0.1466	0.1963	0.3430	21,992	29,452	51,444	201,444
15 Plastic Product Manufacturers	Establishments (#)	36							
	Employment (#)	1,059	0.4262	0.3511	0.7773	451	372	823	1,882
	Annual Payroll ($1,000)	29,804	0.5842	0.3191	0.9033	17,410	9,512	26,922	56,726
	Receipts ($1,000)	194,825	0.2840	0.1375	0.4215	55,337	26,787	82,125	276,950
16 Rubber Product	Establishments (#)	12							
Manufacturers	Employment (#)	143	0.5126	0.3945	0.9071	73	56	130	273
	Annual Payroll ($1,000)	4,352	0.6679	0.3357	1.0036	2,907	1,461	4,368	8,720
	Receipts ($1,000)	16,451	0.3232	0.1586	0.4818	5,317	2,609	7,925	24,376
17 Steel Mills	Establishments (#)	12							
	Employment (#)	1,969	1.9531	0.9862	2.9393	3,846	1,942	5,789	7,758
	Annual Payroll ($1,000)	120,754	1.7415	0.5873	2.3288	210,296	70,914	281,210	401,964
	Receipts ($1,000)	1,078,156	0.4463	0.1490	0.5954	481,233	160,666	641,899	1,720,055
18 Iron and Steel Foundries	Establishments (#)	17							
	Employment (#)	642	0.4057	0.3755	0.7812	260	241	501	1,143
	Annual Payroll ($1,000)	24,030	0.5227	0.3160	0.8387	12,561	7,592	20,154	44,184
	Receipts ($1,000)	79,020	0.3849	0.2511	0.6360	30,411	19,842	50,253	129,273
19 Other Recycling	Establishments (#)	15							
Processors /	Employment (#)	185	0.5047	0.3762	0.8809	93	70	163	348
Manufacturers	Annual Payroll ($1,000)	9,063	0.5351	0.3098	0.8449	4,850	2,808	7,657	16,720
	Receipts ($1,000)	31,719	0.4263	0.2696	0.6959	13,522	8,551	22,073	53,792

Table 7.4c
New York Indirect and Induced Impacts

Sector # and Description	*Data Type*	NY	MULTIPLIERS			IMPACTS			
REUSE AND REMANUFACTURING INDUSTRIES:		DIRECT IMPACTS	Indirect	Induced	Indirect + Induced	Indirect	Induced	Indirect + Induced	TOTAL
20 Computer and Electronic	Establishments (#)	10							
Appliance	Employment (#)	148	NA	NA	NA	NA	NA	NA	NA
Demanufacturers	Annual Payroll ($1,000)	2,305	NA	NA	NA	NA	NA	NA	NA
	Receipts ($1,000)	13,518	NA	NA	NA	NA	NA	NA	NA
21 Motor Vehicle Parts	Establishments (#)	295							
(used)	Employment (#)	2,076	0.1691	0.2522	0.4214	351	524	875	2,951
	Annual Payroll ($1,000)	51,252	0.2226	0.2470	0.4696	11,407	12,660	24,067	75,318
	Receipts ($1,000)	244,662	0.2942	0.3435	0.6377	71,969	84,043	156,012	400,674
22 Retail Used Merchandise	Establishments (#)	959							
Sales	Employment (#)	1,919	0.0863	0.1378	0.2241	166	264	430	2,349
	Annual Payroll ($1,000)	129,862	0.2045	0.2462	0.4507	26,559	31,971	58,531	188,393
	Receipts ($1,000)	569,026	0.2665	0.3378	0.6043	151,634	192,212	343,846	912,872
23 Tire Retreaders	Establishments (#)	24							
	Employment (#)	175	0.5126	0.3945	0.9071	90	69	159	334
	Annual Payroll ($1,000)	5,233	0.6679	0.3357	1.0036	3,495	1,757	5,252	10,485
	Receipts ($1,000)	84,754	0.3232	0.1586	0.4818	27,391	13,440	40,831	125,585
24 Wood Reuse	Establishments (#)	12							
	Employment (#)	365	0.6901	0.3538	1.0438	252	129	381	746
	Annual Payroll ($1,000)	12,252	0.7460	0.3567	1.1027	9,140	4,370	13,511	25,763
	Receipts ($1,000)	36,830	0.3910	0.1495	0.5404	14,399	5,505	19,904	56,734
25 Materials Exchange	Establishments (#)	2							
Services	Employment (#)	4	0.6844	0.5131	1.1975	3	2	5	9
	Annual Payroll ($1,000)	50	0.5567	0.3204	0.8771	28	16	44	94
	Receipts ($1,000)	100	0.1975	0.1293	0.3267	20	13	33	133
26 Other Reuse	Establishments (#)	2							
	Employment (#)	4	NA	NA	NA	NA	NA	NA	NA
	Annual Payroll ($1,000)	50	NA	NA	NA	NA	NA	NA	NA
	Receipts ($1,000)	100	NA	NA	NA	NA	NA	NA	NA

Table 7.5a
Pennsylvania Indirect and Induced Impacts

Sector # and Description	*Data Type*	PA	MULTIPLIERS			IMPACTS			
RECYCLING INDUSTRY:		DIRECT IMPACTS	Indirect	Induced	Indirect + Induced	Indirect	Induced	Indirect + Induced	TOTAL
1 Municipal Residential	Establishments (#)	1,068							
Curbside and Drop-Off	Employment (#)	1,326	0.6114	0.5074	1.1189	811	673	1,484	2,810
Collection	Annual Payroll ($1,000)	47,115	0.5783	0.3751	0.9534	27,246	17,673	44,918	92,034
	Receipts ($1,000)	53,316	0.4849	0.3399	0.8249	25,855	18,125	43,980	97,296
2 Private Residential and	Establishments (#)	287							
Commercial Collection	Employment (#)	1,207	0.6114	0.5074	1.1189	738	612	1,350	2,557
	Annual Payroll ($1,000)	44,927	0.5783	0.3751	0.9534	25,980	16,852	42,832	87,759
	Receipts ($1,000)	115,216	0.4849	0.3399	0.8249	55,873	39,167	95,041	210,256
3 Compost and Misc.	Establishments (#)	446							
Organics Producers	Employment (#)	1,278	0.0105	0.1496	0.1601	13	191	205	1,483
	Annual Payroll ($1,000)	26,255	0.0229	0.2462	0.2691	602	6,465	7,066	33,321
	Receipts ($1,000)	88,590	0.0701	0.7650	0.8350	6,209	67,767	73,976	162,566
4 Materials Recovery	Establishments (#)	48							
Facilities (MRFs)	Employment (#)	870	0.6114	0.5074	1.1189	532	441	973	1,843
	Annual Payroll ($1,000)	28,684	0.5783	0.3751	0.9534	16,587	10,759	27,346	56,030
	Receipts ($1,000)	50,859	0.4849	0.3399	0.8249	24,664	17,289	41,953	92,811
5 Recyclable Material	Establishments (#)	397							
Wholesalers	Employment (#)	5,126	0.4410	0.5752	1.0162	2,261	2,948	5,209	10,335
	Annual Payroll ($1,000)	166,087	0.3346	0.3168	0.6514	55,566	52,618	108,184	274,272
	Receipts ($1,000)	5,504,777	0.3344	0.3821	0.7165	1,840,572	2,103,541	3,944,112	9,448,890
14 Plastics Reclaimers	Establishments (#)	19							
	Employment (#)	364	1.2544	1.2237	2.4781	457	445	902	1,266
	Annual Payroll ($1,000)	13,643	0.8495	0.4432	1.2927	11,589	6,047	17,636	31,278
	Receipts ($1,000)	138,252	0.5782	0.2840	0.8622	79,942	39,265	119,206	257,459

Table 7.5b
Pennsylvania Indirect and Induced Impacts

Sector # and Description	*Data Type*	PA	MULTIPLIERS			IMPACTS			
RECYCLING RELIANT INDUSTRIES:		DIRECT IMPACTS	Indirect	Induced	Indirect + Induced	Indirect	Induced	Indirect + Induced	TOTAL
6 Glass Container	Establishments (#)	5							
Manufacturing Plants	Employment (#)	871	0.7410	0.7360	1.4770	645	641	1,286	2,156
	Annual Payroll ($1,000)	61,127	0.7376	0.4155	1.1531	45,089	25,397	70,487	131,614
	Receipts ($1,000)	183,946	0.4701	0.2856	0.7557	86,478	52,526	139,004	322,950
7 Glass Product Producers	Establishments (#)	2							
(other recycled uses)	Employment (#)	153	0.7410	0.7360	1.4770	113	113	226	379
	Annual Payroll ($1,000)	6,504	0.7376	0.4155	1.1531	4,798	2,702	7,500	14,004
	Receipts ($1,000)	24,313	0.4701	0.2856	0.7557	11,430	6,943	18,373	42,686
8 Nonferrous Secondary	Establishments (#)	46							
Smelting and Refining	Employment (#)	2,610	0.4812	0.5986	1.0798	1,256	1,562	2,818	5,428
Mills	Annual Payroll ($1,000)	100,188	0.3775	0.3453	0.7227	37,817	34,590	72,408	172,595
	Receipts ($1,000)	741,938	0.3879	0.3335	0.7214	287,784	247,434	535,218	1,277,156
9 Nonferrous Product	Establishments (#)	38							
Producers	Employment (#)	3,265	0.4812	0.5986	1.0798	1,571	1,955	3,526	6,791
	Annual Payroll ($1,000)	143,736	0.3775	0.3453	0.7227	54,255	49,626	103,881	247,616
	Receipts ($1,000)	955,835	0.3879	0.3335	0.7214	370,750	318,768	689,518	1,645,353
10 Nonferrous Foundries	Establishments (#)	77							
	Employment (#)	4,469	0.4812	0.5986	1.0798	2,150	2,675	4,826	9,294
	Annual Payroll ($1,000)	187,340	0.3775	0.3453	0.7227	70,714	64,680	135,395	322,735
	Receipts ($1,000)	494,475	0.3879	0.3335	0.7214	191,797	164,906	356,703	851,178
11 Paper and Paperboard	Establishments (#)	22							
Mills / Deinked Market	Employment (#)	2,319	0.6723	0.6560	1.3284	1,559	1,521	3,080	5,399
Pulp Producers	Annual Payroll ($1,000)	143,977	0.5836	0.3768	0.9604	84,023	54,248	138,270	282,247
	Receipts ($1,000)	2,106,234	0.3518	0.2445	0.5963	740,920	514,987	1,255,907	3,362,141
12 Paper-Based Product	Establishments (#)	6							
Manufacturers	Employment (#)	900	0.6723	0.6560	1.3284	605	590	1,196	2,096
	Annual Payroll ($1,000)	31,995	0.5836	0.3768	0.9604	18,672	12,055	30,727	62,722
	Receipts ($1,000)	156,644	0.3518	0.2445	0.5963	55,103	38,300	93,404	250,048
13 Pavement Mix Producers	Establishments (#)	86							
(asphalt and aggregate)	Employment (#)	376	0.6769	0.9538	1.6307	255	359	613	989
	Annual Payroll ($1,000)	13,062	0.4571	0.3496	0.8067	5,971	4,566	10,537	23,599
	Receipts ($1,000)	234,000	0.5104	0.2310	0.7414	119,431	54,056	173,487	407,487
15 Plastic Product Manufacturers	Establishments (#)	19							
	Employment (#)	1,110	0.5530	0.5797	1.1327	614	643	1,257	2,367
	Annual Payroll ($1,000)	29,989	0.5347	0.3652	0.8999	16,035	10,953	26,989	56,978
	Receipts ($1,000)	241,861	0.3159	0.1892	0.5051	76,393	45,769	122,161	364,022
16 Rubber Product	Establishments (#)	34							
Manufacturers	Employment (#)	400	0.6583	0.6545	1.3128	263	262	525	925
	Annual Payroll ($1,000)	12,139	0.5710	0.3734	0.9443	6,931	4,532	11,463	23,602
	Receipts ($1,000)	45,889	0.3336	0.2134	0.5470	15,308	9,794	25,102	70,991
17 Steel Mills	Establishments (#)	58							
	Employment (#)	11,886	2.5883	1.7237	4.3120	30,765	20,488	51,253	63,139
	Annual Payroll ($1,000)	728,795	1.3845	0.5966	1.9811	1,009,015	434,775	1,443,790	2,172,585
	Receipts ($1,000)	8,167,198	0.5022	0.2108	0.7130	4,101,469	1,721,457	5,822,926	13,990,124
18 Iron and Steel Foundries	Establishments (#)	73							
	Employment (#)	5,450	0.5243	0.6375	1.1617	2,857	3,474	6,332	11,782
	Annual Payroll ($1,000)	215,640	0.4268	0.3484	0.7752	92,027	75,134	167,160	382,800
	Receipts ($1,000)	611,550	0.3895	0.3378	0.7272	238,174	206,565	444,739	1,056,289
19 Other Recycling	Establishments (#)	18							
Processors /	Employment (#)	230	0.6114	0.5074	1.1189	141	117	257	487
Manufacturers	Annual Payroll ($1,000)	11,250	0.5783	0.3751	0.9534	6,506	4,220	10,725	21,975
	Receipts ($1,000)	39,375	0.4849	0.3399	0.8249	19,095	13,385	32,480	71,855

Table 7.5c
Pennsylvania Indirect and Induced Impacts

Sector # and Description	*Data Type*	PA	MULTIPLIERS			IMPACTS			
REUSE AND REMANUFACTURING INDUSTRIES:		DIRECT IMPACTS	Indirect	Induced	Indirect + Induced	Indirect	Induced	Indirect + Induced	TOTAL
20 Computer and Electronic	Establishments (#)	7							
Appliance	Employment (#)	103	0.2091	0.3207	0.5298	22	33	55	158
Demanufacturers	Annual Payroll ($1,000)	1,604	0.2391	0.2945	0.5336	384	472	856	2,460
	Receipts ($1,000)	9,408	0.3296	0.4363	0.7659	3,101	4,105	7,206	16,614
21 Motor Vehicle Parts	Establishments (#)	270							
(used)	Employment (#)	1,889	0.2091	0.3207	0.5298	395	606	1,001	2,890
	Annual Payroll ($1,000)	43,239	0.2391	0.2945	0.5336	10,338	12,735	23,073	66,312
	Receipts ($1,000)	238,144	0.3296	0.4363	0.7659	78,499	103,906	182,404	420,548
22 Retail Used Merchandise	Establishments (#)	670							
Sales	Employment (#)	4,834	0.0720	0.1248	0.1969	348	603	952	5,786
	Annual Payroll ($1,000)	69,839	0.2040	0.2890	0.4930	14,246	20,181	34,427	104,266
	Receipts ($1,000)	241,088	0.2841	0.4325	0.7166	68,491	104,277	172,768	413,856
23 Tire Retreaders	Establishments (#)	76							
	Employment (#)	646	0.6583	0.6545	1.3128	425	423	848	1,494
	Annual Payroll ($1,000)	22,116	0.5710	0.3734	0.9443	12,627	8,257	20,885	43,001
	Receipts ($1,000)	56,205	0.3336	0.2134	0.5470	18,749	11,996	30,745	86,950
24 Wood Reuse	Establishments (#)	19							
	Employment (#)	577	0.8192	0.5640	1.3832	473	325	798	1,375
	Annual Payroll ($1,000)	19,368	0.8014	0.4302	1.2316	15,521	8,332	23,853	43,221
	Receipts ($1,000)	58,221	0.4765	0.2019	0.6784	27,745	11,753	39,498	97,719
25 Materials Exchange	Establishments (#)	2							
Services	Employment (#)	4	0.6249	0.5119	1.1368	2	2	5	9
	Annual Payroll ($1,000)	50	0.5109	0.3625	0.8734	26	18	44	94
	Receipts ($1,000)	100	0.2004	0.1591	0.3596	20	16	36	136
26 Other Reuse	Establishments (#)	10							
	Employment (#)	53	0.6583	0.6545	1.3128	35	35	70	123
	Annual Payroll ($1,000)	1,988	0.5710	0.3734	0.9443	1,135	742	1,877	3,865
	Receipts ($1,000)	8,248	0.3336	0.2134	0.5470	2,751	1,760	4,512	12,760

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APPENDICES

A: Detailed Reporting Form, All States

B: Sector NAICS Code Assignments and Research Methodology

APPENDIX A:
Detailed Reporting Form, All States

Detailed State-by-State tables are included in this Appendix and present the data sources used for each sector in each Participant State. These tables follow the same three-tier reporting format included in the 2000 Report. A summary of the three tiers is excerpted from the 2000 Report and included here for reference. Following this summary is a glossary of abbreviations for use in interpreting the data in the Tables.

Three-Tiered Approach to Data Presentation[26]

Three facts about recycling and reuse business complicate recycling economic information studies and have led to inconsistency in past efforts:

1. Most establishments involved in recycling and reuse are part of industries in which many establishments do not recycle or reuse recovered materials or products at all;
2. Some establishments involved in recycling or reuse are also involved in non-recycling activities not intended to be covered in this study; and
3. Many recycling manufacturers use less than 100 percent recycled feedstock and/or adjust the percentage of recycled feedstock throughout the year.

Past studies have handled each of these challenges differently. In an effort to exclude non-recycling activities, some studies relied on survey respondents to estimate recycling activities. Other studies have targeted all facilities involved in recycling and did not attempt to adjust the statistics to account for non-recycling activities. Various industry and recycling experts have criticized both approaches.

To overcome these challenges, both the 2000 Report, and this Study Update, report three tiers of statistics. The goals of this approach are:

- To report statistics on recycling and reuse-related businesses as they actually exist in the economy (i.e., as part of the industries and establishments that do not always involve recycling); and,

- To derive conservative estimates for the amount of economic activity that can "reasonably" be attributed exclusively to recycling. The three tiers of statistics are described below.

TIER ONE – Statistics on All Industry Establishments

Tier One statistics are reported only for certain business categories where data are available from a source that included all establishments in the category, even though some of them may not do any recycling. This information typically comes from Economic Census data by NAICS code. For example, data for all paper mills in a given state will be shown even though some of those establishments do not utilize recovered paper.

[26] Excerpted from the *Final Report: Recycling Economic Information Study, Prepared for the Northeast Recycling Council, R.W. Beck, June 2000.*

TIER TWO – Statistics on Establishments Involved in Recycling

Like Tier One, Tier Two statistics are only reported for certain business categories where data are available from a source that aggregated data for recycling and non-recycling establishments. The data covers only those establishments that have some involvement in recycling, and attempts to exclude data on establishments with no recycling activities. Although all of these establishments perform some amount of recycling or reuse activity, they may also perform non-recycling activities not covered in this report. For example, information on all paper mills that utilize recovered paper would be included here, even though some of these establishments may also be involved in non-covered activities like production of wood pulp.

TIER THREE – Statistics on Covered Recycling Activities

Tier Three statistics are the heart of this study and are reported for all business categories. They are estimates of the portion of economic activity in Tier One or Tier Two that can be reasonably attributed to the recycling activities covered in the study. Most Tier Three estimates are derived from survey results in which respondents, or in some cases trade organizations representing the industry are asked to identify what percentage of their facility's activities involve use of recycled materials.

The exact approach used for each sector is documented in detail in the description of the sector, or in the detailed table footnotes.

Additionally, Tier Three statistics are reported in two columns, depending on whether the establishments in the sector are "100 percent dependent on recycling," or simply "undertaking recycling activities." Those establishments that are dependent on recycling have 100 percent of employment and revenues derived from recycling activities; while those are "undertaking recycling activities" have only a portion of economic activity derived from recycling.

Glossary to the Data Tables

Descriptions of the column headings used in the detailed state data tables are outlined in Table A.1 below. These follow the same format as used in the 2000 Report.

Table A.2 presents a list of abbreviations used in the data tables.

Table A.1
Definitions of Column Headings in the Detailed Data Tables

Column Header	Description
A. Business Category	For a completed description of business category definitions (e.g. Sectors), refer to Table 1 of the report.
B. Data Type	
Establishments (#)	A single physical location of a company or government. A company or government may have multiple establishments (e.g. physical locations).
Employment (#)	Total number of employees for all establishments in that category
Annual Payroll ($1,000)	Total annual payroll for all employees in each category, reported in thousands of dollars.
Receipts ($1,000)	Total annual estimated receipts for all establishments in a category, reported in thousands of dollars.
Throughput (1,000 tons)	Where data available, total tons of materials processed is estimated, reported in thousands of tons. Note that subtotals and grand totals for throughput are not shown due to the potential for triple counting of material by adding tons of the same material at three different stages - collection, processing and end use.
C. Total Statistics on All Industry Establishments	Combined statistics on Tier One establishments where data was available and collected.
D. Total Statistics on Establishments Undertaking Some Recycling or Reuse Activities	Subset of Column C and reports statistics for those establishments with some portion of operations in covered recycling activities.
E. Statistics on Employees Undertaking Recycling or Reuse Activities	Subset of Column D and reports total recycling related statistics (e.g. employment, payroll and gross receipts) for establishments with less than 100 percent of operations involved in recycling or reuse-related activities.
F. Statistics on Establishments 100% Recycling or Reuse-Dependent	Presents estimates for establishments with 100 percent of operations dependent on recycling or reuse.

Table A.2
Symbols and Abbreviations Used in the Detailed Data Tables

Symbols and Abbreviations:	
n = #	Refers to number of surveys conducted to develop estimates.
(D)	Indicates data was suppressed to follow disclosure agreements. Figures suppressed have been aggregated and reported in all totals.
Census	U.S. Economic Census (2002, the most recent at the date of report publication)
CBP	County Business Patterns (2006, or the most recent available)
BLS	Bureau of Labor Statistics (2006, most recent available for limited sectors)
AISI	American Iron and Steel Institute
ASM	Annual Survey of Manufacturers (2006)
AFS	American Foundry Society
AFandPA	American Forest and Paper Association
GAA	Government Advisory Associates, MRF Database 2006
GPI	Glass Packaging Institute
ISRI	Institute of Scrap Recycling Industries
NAIM	North American Insulation Manufacturers Association
NAICS	North American Industry Classification System
SRI	Steel Recycling Institute
RR	Resource Recycling Magazine
TRIB	Tire Retread Information Bureau
USGS	United States Geological Survey

		Delaware								
		Tier One		Tier Two		Tier Three				
		C. Total Statistics on All Industry Establishments (not all perform recycling or reuse-related activities)		D. Total Statistics on Establishments Undertaking Some Recycling or Reuse Activities (includes recycling and non-recycling activities)		E. Statistics on Employees Undertaking Recycling or Reuse Activities (excluding virgin material preparation and downstream conversion activities)		F. Statistics on Establishments 100% Recycling or Reuse-Dependent (No virgin material)		G. Estimates of Total Recycling-Related Economic Activity (Sum of columns E and F)
A. Business Category	B. Data Type	Estimates	Sources	Estimates	Sources	Estimates	Sources	Estimates	Sources	
RECYCLING INDUSTRY: Categories 1-19										
1 Municipal Residential Curbside and Drop-Off Collection	Establishments (#)							2	Survey (n = 2)	2
	Employment (#)							47	Survey	47
	Annual Payroll ($1,000)							1,221	Survey	1,221
	Receipts ($1,000)							8,543	Survey	8,543
	Throughput (1,000 tons)							43	Survey	43
2 Private Residential and Commercial Collection	Establishments (#)			28	DSWA Licenses			21	DNREC Hauler Licneses (2)	21
	Employment (#)							19	Dervied (2)	19
	Annual Payroll ($1,000)							870	BLS Average Wages	870
	Receipts ($1,000)							4,444	Dervied (2)	4,444
	Throughput (1,000 tons)							87	RPAC Report	87
3 Compost and Miscellaneous Organics Producers	Establishments (#)							28		28
	Employment (#)							217	Survey results	217
	Annual Payroll ($1,000)							5,635	extrapolated based	5,635
	Receipts ($1,000)							20,003	on regional responses (n=63)	20,003
	Throughput (1,000 tons)							512		512
4 Materials Recovery Facilities (MRFs)	Establishments (#)							2	Economic Census 2002, GAA	2
	Employment (#)							26	GAA	26
	Annual Payroll ($1,000)							528	GAA	528
	Receipts ($1,000)							2,913	Derived	2,913
	Throughput (1,000 tons)							61	RPAC Recycling Study 2007	61
5 Recyclable Material Wholesalers	Establishments (#)							19	Economic Census 2002	19
	Employment (#)							248	Economic Census 2002	248
	Annual Payroll ($1,000)							7,446	Economic Census 2002	7,446
	Receipts ($1,000)							154,498	Modeled (5)	154,498
	Throughput (1,000 tons)							148	RPAC Recycling Study 2007	148
6 Glass Container Manufacturing Plants	Establishments (#)					0	None identified			-
	Employment (#)									-
	Annual Payroll ($1,000)									-
	Receipts ($1,000)									-
	Throughput (1,000 tons)									-
7 Glass Product Producers (other recycled uses)	Establishments (#)					1	Survey			1
	Employment (#)					(D)	Survey			(D)
	Annual Payroll ($1,000)					(D)	Survey			(D)
	Receipts ($1,000)					(D)	Survey			(D)
	Throughput (1,000 tons)					(D)				(D)
8 Nonferrous Secondary Smelting and Refining Mills	Establishments (#)			0						-
	Employment (#)				Census (2002) for NAICS 331314, 331423, 331492.					-
	Annual Payroll ($1,000)									-
	Receipts ($1,000)									-
	Throughput (1,000 tons)									-
9 Nonferrous Product Producers	Establishments (#)	0								
	Employment (#)		Census (2002) for NAICS 331315, 331421, 331316, 331319, 331491.							-
	Annual Payroll ($1,000)									-
	Receipts ($1,000)									-
	Throughput (1,000 tons)									-
10 Nonferrous Foundries	Establishments (#)	0	None identified							-
	Employment (#)									-
	Annual Payroll ($1,000)									-
	Receipts ($1,000)									-
	Throughput (1,000 tons)									-

		Delaware								
		Tier One		Tier Two		Tier Three				
		C. Total Statistics on All Industry Establishments (not all perform recycling or reuse-related activities)		D. Total Statistics on Establishments Undertaking Some Recycling or Reuse Activities (includes recycling and non-recycling activities)		E. Statistics on Employees Undertaking Recycling or Reuse Activities (excluding virgin material preparation and downstream conversion activities)		F. Statistics on Establishments 100% Recycling or Reuse-Dependent (No virgin material)		G. Estimates of Total Recycling-Related Economic Activity (Sum of columns E and F)
A. Business Category	*B. Data Type*	*Estimates*	*Sources*	*Estimates*	*Sources*	*Estimates*	*Sources*	*Estimates*	*Sources*	
11 Paper and Paperboard Mills/	Establishments (#)	0	None identified							-
Deinked Market Pulp Producers	Employment (#)									-
	Annual Payroll ($1,000)									-
	Receipts ($1,000)									-
	Throughput (1,000 tons)									-
12 Paper-Based Product	Establishments (#)							0	None identified	-
Manufacturers	Employment (#)									-
	Annual Payroll ($1,000)									-
	Receipts ($1,000)									-
	Throughput (1,000 tons)									-
13 Pavement Mix Producers	Establishments (#)					7	Survey			7
(asphalt and aggregate)	Employment (#)					180	Survey			180
	Annual Payroll ($1,000)					2,400	Survey			2,400
	Receipts ($1,000)					24,750	Survey			24,750
	Throughput (1,000 tons)					512	Survey			512
14 Plastics Reclaimers	Establishments (#)							1	Survey	1
	Employment (#)							(D)	Survey	(D)
	Annual Payroll ($1,000)							(D)	Existing data	(D)
	Receipts ($1,000)							(D)	Existing data	(D)
	Throughput (1,000 tons)							(D)	Survey	(D)
15 Plastic Product Manufacturers	Establishments (#)					4	Survey			4
	Employment (#)					22	Survey			22
	Annual Payroll ($1,000)					550	Survey			550
	Receipts ($1,000)					9,900	Survey			9,900
	Throughput (1,000 tons)					2	Survey			2
16 Rubber Product Manufacturers	Establishments (#)					1	Existing Data			1
	Employment (#)					(D)	Existing Data			(D)
	Annual Payroll ($1,000)					(D)	Existing Data			(D)
	Receipts ($1,000)					(D)	Existing Data			(D)
	Throughput (1,000 tons)					(D)	Existing Data			(D)
17 Steel Mills	Establishments (#)			1	Survey	1	Survey			1
	Employment (#)			(D)	Survey	(D)	Adjusted for non covered activities (17)			(D)
	Annual Payroll ($1,000)			(D)	Survey	(D)				(D)
	Receipts ($1,000)			(D)	Survey	(D)				(D)
	Throughput (1,000 tons)			(D)	Survey	(D)				(D)
18 Iron and Steel Foundries	Establishments (#)	0	None identified							-
	Employment (#)									-
	Annual Payroll ($1,000)									-
	Receipts ($1,000)									-
	Throughput (1,000 tons)									-
19 Other Recycling	Establishments (#)					4	Survey			4
Processors/Manufacturers	Employment (#)					19	Survey			19
	Annual Payroll ($1,000)					256	Survey			256
	Receipts ($1,000)					546	Survey			546
	Throughput (1,000 tons)					3	Survey			3
RECYCLING SUBTOTALS	Establishments (#)					19		72		91
	Employment (#)					620		557		1,177
	Annual Payroll ($1,000)					26,381		15,700		42,081
	Receipts ($1,000)					102,496		190,401		292,897

		Delaware								
		Tier One		Tier Two		Tier Three				
		C. Total Statistics on All Industry Establishments (not all perform recycling or reuse-related activities)		D. Total Statistics on Establishments Undertaking Some Recycling or Reuse Activities (includes recycling and non-recycling activities)		E. Statistics on Employees Undertaking Recycling or Reuse Activities (excluding virgin material preparation and downstream conversion activities)		F. Statistics on Establishments 100% Recycling or Reuse-Dependent (No virgin material)		G. Estimates of Total Recycling-Related Economic Activity (Sum of columns E and F)
A. Business Category	*B. Data Type*	*Estimates*	*Sources*	*Estimates*	*Sources*	*Estimates*	*Sources*	*Estimates*	*Sources*	
REUSE AND REMANUFACTURING INDUSTRY: Categories 20-26										
20 Computer and Electronic	Establishments (#)					0	None identified			-
Appliance Demanufacturers	Employment (#)									-
	Annual Payroll ($1,000)									-
	Receipts ($1,000)									-
	Throughput (1,000 tons)									-
21 Motor Vehicle Parts (used)	Establishments (#)							19		19
	Employment (#)							162		162
	Annual Payroll ($1,000)							3,719	CBP 2005 and Economic Census 2002 (21)	3,719
	Receipts ($1,000)							17,862		17,862
	Throughput (1,000 tons)									-
22 Retail Used Merchandise Sales	Establishments (#)					56				56
	Employment (#)					459				459
	Annual Payroll ($1,000)					7,425	CBP (2006) for NAICS 453310			7,425
	Receipts ($1,000)					21,352	Economic Census 2002			21,352
	Throughput (1,000 tons)						NA			-
23 Tire Retreaders	Establishments (#)					1	TRIB Listing 2007			1
	Employment (#)					(D)	CBP 2006			(D)
	Annual Payroll ($1,000)					(D)	CBP 2006			(D)
	Receipts ($1,000)					(D)	Economic Census 2002 derived (23)			(D)
	Throughput (1,000 tons)									(D)
24 Wood Reuse	Establishments (#)					8	Survey			8
	Employment (#)					72	Survey			72
	Annual Payroll ($1,000)					3,400	Survey			3,400
	Receipts ($1,000)					10,200	Survey			10,200
	Throughput (1,000 tons)					38	Survey			38
25 Materials Exchange Services	Establishments (#)							0	None identified	-
	Employment (#)									-
	Annual Payroll ($1,000)									-
	Receipts ($1,000)									-
	Throughput (1,000 tons)									-
26 Other Reuse	Establishments (#)							0	None identified	-
	Employment (#)									-
	Annual Payroll ($1,000)									-
	Receipts ($1,000)									-
	Throughput (1,000 tons)									-
REUSE AND REMANUFACTURING SUBTOTALS	Establishments (#)					65		19		84
	Employment (#)					541		162		703
	Annual Payroll ($1,000)					11,167		3,719		14,886
	Receipts ($1,000)					35,299		17,862		53,161
GRAND TOTALS Recycling, Reuse, & Remanufacturing	Establishments (#)					84		91		175
	Employment (#)					1,161		719		1,880
	Annual Payroll ($1,000)					37,548		19,419		56,968
	Receipts ($1,000)					137,795		208,262		346,057

		Maine								
		Tier 1		Tier 2		Tier 3				
		C. Total Statistics on All Industry Establishments (not all perform recycling or reuse-related activities)		D. Total Statistics on Establishments Undertaking Some Recycling or Reuse Activities (includes recycling and non-recycling activities)		E. Statistics on Employees Undertaking Recycling or Reuse Activities (excluding virgin material preparation and downstream conversion activities)		F. Statistics on Establishments 100% Recycling or Reuse-Dependent (No virgin material)		G. Estimates of Total Recycling-Related Economic Activity (Sum of columns E and F)
A. Business Category	*B. Data Type*	*Estimates*	*Sources*	*Estimates*	*Sources*	*Estimates*	*Sources*	*Estimates*	*Sources*	
RECYCLING INDUSTRY: Categories 1-19										
1 Municipal Residential Curbside and Drop-Off Collection	Establishments (#)							194	ME State Planning Office	194
	Employment (#)							300	Derivation and Survey. Survey results extrapolated based on regional responses (n = 39). (1)	300
	Annual Payroll ($1,000)							8,749		8,749
	Receipts ($1,000)							23,818		23,818
	Throughput (1,000 tons)							98		98
2 Private Residential and Commercial Collection	Establishments (#)							880	CBP 2005 (2)	880
	Employment (#)							868	Dervied (2)	868
	Annual Payroll ($1,000)							19,968	(2)	19,968
	Receipts ($1,000)							38,162	(2)	38,162
	Throughput (1,000 tons)							252	(2)	252
3 Compost and Miscellaneous Organics Producers	Establishments (#)							85	(3)	85
	Employment (#)							474	Survey results extrapolated based on regional responses (n=63)	474
	Annual Payroll ($1,000)							10,612		10,612
	Receipts ($1,000)							37,023		37,023
	Throughput (1,000 tons)							436		436
4 Materials Recovery Facilities (MRFs)	Establishments (#)							6	GAA	6
	Employment (#)							34	GAA	34
	Annual Payroll ($1,000)							722	Economic Census 2002	722
	Receipts ($1,000)							3,895	2007 material prices	3,895
	Throughput (1,000 tons)							81	GAA	81
5 Recyclable Material Wholesalers	Establishments (#)							36	Economic Census 2002	36
	Employment (#)							421	Economic Census 2002 Updated (5)	421
	Annual Payroll ($1,000)							14,690		14,690
	Receipts ($1,000)							256,868		256,868
	Throughput (1,000 tons)									-
6 Glass Container Manufacturing Plants	Establishments (#)					0	None identified			-
	Employment (#)									-
	Annual Payroll ($1,000)									-
	Receipts ($1,000)									-
	Throughput (1,000 tons)									-
7 Glass Product Producers (other recycled uses)	Establishments (#)					0	None identified			-
	Employment (#)									-
	Annual Payroll ($1,000)									-
	Receipts ($1,000)									-
	Throughput (1,000 tons)									-
8 Nonferrous Secondary Smelting and Refining Mills	Establishments (#)			0	Economic Census (2002) for NAICS 331314, 331423, 331492.			0		-
	Employment (#)							0		-
	Annual Payroll ($1,000)							0		-
	Receipts ($1,000)							0		-
	Throughput (1,000 tons)									-
9 Nonferrous Product Producers	Establishments (#)	2	Economic Census (2002) for NAICS 331315, 331421, 331316, 331319, 331491.					1	Adjusted for non covered	1
	Employment (#)	375						182		182
	Annual Payroll ($1,000)	12,214						5,938		5,938
	Receipts ($1,000)	87,770						42,672		42,672
	Throughput (1,000 tons)									-
10 Nonferrous Foundries	Establishments (#)			5	AFS (10)	5	From column D			5
	Employment (#)			20	Derived (10)	19	Adjusted for non covered activities (10)			19
	Annual Payroll ($1,000)			711		675				675
	Receipts ($1,000)			3,626		3,445				3,445
	Throughput (1,000 tons)									-

		Maine								
		Tier 1		Tier 2		Tier 3				
		C. Total Statistics on All Industry Establishments (not all perform recycling or reuse-related activities)		D. Total Statistics on Establishments Undertaking Some Recycling or Reuse Activities (includes recycling and non-recycling activities)		E. Statistics on Employees Undertaking Recycling or Reuse Activities (excluding virgin material preparation and downstream conversion activities)		F. Statistics on Establishments 100% Recycling or Reuse-Dependent (No virgin material)		G. Estimates of Total Recycling-Related Economic Activity (Sum of columns E and F)
A. Business Category	*B. Data Type*	*Estimates*	*Sources*	*Estimates*	*Sources*	*Estimates*	*Sources*	*Estimates*	*Sources*	
11 Paper and Paperboard Mills/	Establishments (#)	14	AF&PA, 2007			6	MA State Planning Office			6
Deinked Market Pulp Producers	Employment (#)	6,101				438				438
	Annual Payroll ($1,000)	347,960	AMS, 2006			24,972	(11) Adjusted for non			24,972
	Receipts ($1,000)	2,746,503				197,111	covered activities			197,111
	Throughput (1,000 tons)					317				317
12 Paper-Based Product	Establishments (#)							2	Survey	2
Manufacturers	Employment (#)							465	(n=2)	465
	Annual Payroll ($1,000)							17,438		17,438
	Receipts ($1,000)							63,875		63,875
	Throughput (1,000 tons)							93		93
13 Pavement Mix Producers	Establishments (#)			27	(13)	23				23
(asphalt and aggregate)	Employment (#)			1,680		168	Adjusted for non covered			168
	Annual Payroll ($1,000)			47,542		4,754	activities (13)			4,754
	Receipts ($1,000)			88,860		2,667				2,667
	Throughput (1,000 tons)			1,481		148				148
14 Plastics Reclaimers	Establishments (#)							0	None identified	-
	Employment (#)									-
	Annual Payroll ($1,000)									-
	Receipts ($1,000)									-
	Throughput (1,000 tons)									-
15 Plastic Product Manufacturers	Establishments (#)			3		3				3
	Employment (#)			150	Survey results	105	Adjusted for non covered			105
	Annual Payroll ($1,000)			5,087	extrapolated	2,569	activities			2,569
	Receipts ($1,000)			44,848	based on regional	41,920				41,920
	Throughput (1,000 tons)			16		15				15
16 Rubber Product Manufacturers	Establishments (#)					0	None identified			-
	Employment (#)									-
	Annual Payroll ($1,000)									-
	Receipts ($1,000)									-
	Throughput (1,000 tons)									-
17 Steel Mills	Establishments (#)			0	SRI Data, 2007	0				-
	Employment (#)					0				-
	Annual Payroll ($1,000)					0				-
	Receipts ($1,000)					0				-
	Throughput (1,000 tons)									-
18 Iron and Steel Foundries	Establishments (#)			2	AFS (10)	2	AFS (10)			2
	Employment (#)			8	Derived (10)	7	Adjusted (10)			7
	Annual Payroll ($1,000)			284		256				256
	Receipts ($1,000)			1,450		1,305				1,305
	Throughput (1,000 tons)									-
19 Other Recycling	Establishments (#)							0	None identified	-
Processors/Manufacturers	Employment (#)									-
	Annual Payroll ($1,000)									-
	Receipts ($1,000)									-
	Throughput (1,000 tons)									-
RECYCLING SUBTOTALS	Establishments (#)					39		1,204		1,243
	Employment (#)					737		2,744		3,481
	Annual Payroll ($1,000)					33,226		78,117		111,343
	Receipts ($1,000)					246,448		466,312		712,760

		Maine								
		Tier 1		Tier 2		Tier 3				
		C. Total Statistics on All Industry Establishments (not all perform recycling or reuse-related activities)		D. Total Statistics on Establishments Undertaking Some Recycling or Reuse Activities (includes recycling and non-recycling activities)		E. Statistics on Employees Undertaking Recycling or Reuse Activities (excluding virgin material preparation and downstream conversion activities)		F. Statistics on Establishments 100% Recycling or Reuse-Dependent (No virgin material)		G. Estimates of Total Recycling-Related Economic Activity (Sum of columns E and F)
A. Business Category	*B. Data Type*	*Estimates*	*Sources*	*Estimates*	*Sources*	*Estimates*	*Sources*	*Estimates*	*Sources*	
REUSE AND REMANUFACTURING INDUSTRY: Categories 20-26										
20 Computer and Electronic	Establishments (#)					1				1
Appliance Demanufacturers	Employment (#)					(D)				(D)
	Annual Payroll ($1,000)					(D)	Survey results extrapolated			(D)
	Receipts ($1,000)					(D)	based on regional average			(D)
	Throughput (1,000 tons)					(D)	(n=9)			-
21 Motor Vehicle Parts (used)	Establishments (#)							40		40
	Employment (#)							263		263
	Annual Payroll ($1,000)							4,503	CBP 2005 and Economic Census	4,503
	Receipts ($1,000)							32,508	2002 (21)	32,508
	Throughput (1,000 tons)									-
22 Retail Used Merchandise Sales	Establishments (#)							137		137
	Employment (#)							651	CBP (2006) for NAICS 453310	651
	Annual Payroll ($1,000)							9,977		9,977
	Receipts ($1,000)							50,172	Economic Census 2002	50,172
	Throughput (1,000 tons)								NA	-
23 Tire Retreaders	Establishments (#)							9	TRIB Listing 2007	9
	Employment (#)							100	CBP 2006	100
	Annual Payroll ($1,000)							3,424	CBP 2006	3,424
	Receipts ($1,000)							5,802	Economic Census 2002 derived (	5,802
	Throughput (1,000 tons)									-
24 Wood Reuse	Establishments (#)					1				1
	Employment (#)					(D)	Survey results extrapolated			(D)
	Annual Payroll ($1,000)					(D)	based on regional average			(D)
	Receipts ($1,000)					(D)	(n=9)			(D)
	Throughput (1,000 tons)					(D)				-
25 Materials Exchange Services	Establishments (#)							2		2
	Employment (#)							3	Survey results extrapolated	3
	Annual Payroll ($1,000)							60	based on regional average.	60
	Receipts ($1,000)							113	(n=3)	113
	Throughput (1,000 tons)									-
26 Other Reuse	Establishments (#)					1				1
	Employment (#)					(D)	Survey			(D)
	Annual Payroll ($1,000)					(D)				(D)
	Receipts ($1,000)					(D)				(D)
	Throughput (1,000 tons)					(D)				-
REUSE AND REMANUFACTURING SUBTOTALS	Establishments (#)					3		188		191
	Employment (#)					46		1,017		1,063
	Annual Payroll ($1,000)					1,250		17,964		19,214
	Receipts ($1,000)					4,356		88,594		92,950
GRAND TOTALS Recycling, Reuse, & Remanufacturing	Establishments (#)					42		1,392		1,434
	Employment (#)					783		3,760		4,544
	Annual Payroll ($1,000)					34,476		96,081		130,557
	Receipts ($1,000)					250,804		554,906		805,710

		Massachusetts								
		Tier 1		Tier 2		Tier 3				
		C. Total Statistics on All Industry Establishments (not all perform recycling or reuse-related activities)		D. Total Statistics on Establishments Undertaking Some Recycling or Reuse Activities (includes recycling and non-recycling activities)		E. Statistics on Employees Undertaking Recycling or Reuse Activities (excluding virgin material preparation and downstream conversion activities)		F. Statistics on Establishments 100% Recycling or Reuse-Dependent (No virgin material)		G. Estimates of Total Recycling-Related Economic Activity (Sum of columns E and F)
A. Business Category	*B. Data Type*	*Estimates*	*Sources*	*Estimates*	*Sources*	*Estimates*	*Sources*	*Estimates*	*Sources*	
RECYCLING INDUSTRY: Categories 1-19										
1 Municipal Residential Curbside and Drop-Off Collection	Establishments (#)							334	MA DEP	334
	Employment (#)							431	Modeled (curbside) and	431
	Annual Payroll ($1,000)							21,162	survey (drop-off). Survey	21,162
	Receipts ($1,000)							54,542	results extrapolated based	54,542
	Throughput (1,000 tons)							276	on regional responses (n =	276
2 Private Residential and Commercial Collection	Establishments (#)							597	CBP 2005 (2)	597
	Employment (#)							1,284	(2)	1,284
	Annual Payroll ($1,000)							36,139		36,139
	Receipts ($1,000)							81,442		81,442
	Throughput (1,000 tons)							908		908
3 Compost and Miscellaneous Organics Producers	Establishments (#)							267	(3)	267
	Employment (#)							1,408	Survey results extrapolated	1,408
	Annual Payroll ($1,000)							39,776	based on regional results	39,776
	Receipts ($1,000)							111,906	(n=63)	111,906
	Throughput (1,000 tons)							1,376		1,376
4 Materials Recovery Facilities (MRFs)	Establishments (#)							10	GAA	10
	Employment (#)							286	GAA	286
	Annual Payroll ($1,000)							11,497	Census	11,497
	Receipts ($1,000)							33,221	2007 material prices	33,221
	Throughput (1,000 tons)							604	GAA	604
5 Recyclable Material Wholesalers	Establishments (#)							154	Economic Census 2002	154
	Employment (#)							1,753		1,753
	Annual Payroll ($1,000)							66,161	Economic Census 2002	66,161
	Receipts ($1,000)							874,083	Updated (5)	874,083
	Throughput (1,000 tons)									-
6 Glass Container Manufacturing Plants	Establishments (#)					1				1
	Employment (#)					(D)	Survey			(D)
	Annual Payroll ($1,000)					(D)	(n = 1)			(D)
	Receipts ($1,000)					(D)				(D)
	Throughput (1,000 tons)					(D)				(D)
7 Glass Product Producers (other recycled uses)	Establishments (#)					2				2
	Employment (#)					11	Survey			11
	Annual Payroll ($1,000)					525	(n = 2)			525
	Receipts ($1,000)					525				525
	Throughput (1,000 tons)					66				66
8 Nonferrous Secondary Smelting and Refining Mills	Establishments (#)			9				9		9
	Employment (#)			583				554	Adjusted for non covered	554
	Annual Payroll ($1,000)			32,020	Economic Census (2002) for NAICS 331314,			30,419	activities (8)	30,419
	Receipts ($1,000)			195,901	331423, 331492.			186,106		186,106
	Throughput (1,000 tons)									-
9 Nonferrous Product Producers	Establishments (#)	22						11		11
	Employment (#)	1,041	Economic Census (2002)					433	Adjusted for non covered	433
	Annual Payroll ($1,000)	38,678	for NAICS 331315, 331421,					15,672	activities (9)	15,672
	Receipts ($1,000)	730,285	331316, 331319, 331491.					260,500		260,500
	Throughput (1,000 tons)									-
10 Nonferrous Foundries	Establishments (#)			37	AFS and Census (10)	37				37
	Employment (#)			644		612	Adjusted for non covered			612
	Annual Payroll ($1,000)			24,200	AMS 2006 adjusted (10)	22,990	activities (10)			22,990
	Receipts ($1,000)			93,800		89,110				89,110
	Throughput (1,000 tons)									-

		Massachusetts								
		Tier 1		Tier 2		Tier 3				
		C. Total Statistics on All Industry Establishments (not all perform recycling or reuse-related activities)		D. Total Statistics on Establishments Undertaking Some Recycling or Reuse Activities (includes recycling and non-recycling activities)		E. Statistics on Employees Undertaking Recycling or Reuse Activities (excluding virgin material preparation and downstream conversion activities)		F. Statistics on Establishments 100% Recycling or Reuse-Dependent (No virgin material)		G. Estimates of Total Recycling-Related Economic Activity (Sum of columns E and F)
A. Business Category	*B. Data Type*	*Estimates*	*Sources*	*Estimates*	*Sources*	*Estimates*	*Sources*	*Estimates*	*Sources*	
11 Paper and Paperboard Mills/	Establishments (#)	19	AF&PA, 2007			15				15
Deinked Market Pulp Producers	Employment (#)	2,439				2,089	Adjusted for non covered activities (11)			2,089
	Annual Payroll ($1,000)	123,791	AMS, 2006			106,018				106,018
	Receipts ($1,000)	855,230				732,442				732,442
	Throughput (1,000 tons)		AF&PA, 2006			513				513
12 Paper-Based Product	Establishments (#)					1	Survey			1
Manufacturers	Employment (#)					(D)				(D)
	Annual Payroll ($1,000)					(D)				(D)
	Receipts ($1,000)					(D)				(D)
	Throughput (1,000 tons)					(D)				(D)
13 Pavement Mix Producers	Establishments (#)			45	Industry Data	44				44
(asphalt and aggregate)	Employment (#)			1,400	Survey (n = 16)	210	Adjusted for non covered activities (13)			210
	Annual Payroll ($1,000)			63,154	(13)	9,473				9,473
	Receipts ($1,000)			408,000		61,200				61,200
	Throughput (1,000 tons)			6,800		1,020				1,020
14 Plastics Reclaimers	Establishments (#)							19		19
	Employment (#)							290	Survey results extrapolated	290
	Annual Payroll ($1,000)							14,237	based on regional results	14,237
	Receipts ($1,000)							124,033	(n=63)	124,033
	Throughput (1,000 tons)							122		122
15 Plastic Product Manufacturers	Establishments (#)			27		27				27
	Employment (#)			2,083		620	Adjusted for non covered activities			620
	Annual Payroll ($1,000)			111,290	Extrapolate based on regional surveys	19,371				19,371
	Receipts ($1,000)			213,312	(n=17)	134,728				134,728
	Throughput (1,000 tons)			108		77				77
16 Rubber Product Manufacturers	Establishments (#)					13				13
	Employment (#)					151	Survey results extrapolated			151
	Annual Payroll ($1,000)					4,581	based on regional responses.			4,581
	Receipts ($1,000)					17,317	(n=5).			17,317
	Throughput (1,000 tons)					20				20
17 Steel Mills	Establishments (#)			0	SRI Data, 2007					-
	Employment (#)									-
	Annual Payroll ($1,000)									-
	Receipts ($1,000)									-
	Throughput (1,000 tons)									-
18 Iron and Steel Foundries	Establishments (#)			20	AFS and Census (10)	20				20
	Employment (#)			460		414	Adjusted for non covered activities (18)			414
	Annual Payroll ($1,000)			18,500		16,650				16,650
	Receipts ($1,000)			62,700		56,430				56,430
	Throughput (1,000 tons)									-
19 Other Recycling	Establishments (#)					11				11
Processors/Manufacturers	Employment (#)					134	Survey results extrapolated			134
	Annual Payroll ($1,000)					6,563	based on regional averages			6,563
	Receipts ($1,000)					22,969	(n=4)			22,969
	Throughput (1,000 tons)									-
RECYCLING SUBTOTALS	Establishments (#)					172		1,401		1,572
	Employment (#)					4,265		6,439		10,703
	Annual Payroll ($1,000)					187,658		235,063		422,721
	Receipts ($1,000)					1,122,159		1,725,834		2,847,993

		Massachusetts								
		Tier 1		Tier 2		Tier 3				
		C. Total Statistics on All Industry Establishments (not all perform recycling or reuse-related activities)		D. Total Statistics on Establishments Undertaking Some Recycling or Reuse Activities (includes recycling and non-recycling activities)		E. Statistics on Employees Undertaking Recycling or Reuse Activities (excluding virgin material preparation and downstream conversion activities)		F. Statistics on Establishments 100% Recycling or Reuse-Dependent (No virgin material)		G. Estimates of Total Recycling-Related Economic Activity (Sum of columns E and F)
A. Business Category	*B. Data Type*	*Estimates*	*Sources*	*Estimates*	*Sources*	*Estimates*	*Sources*	*Estimates*	*Sources*	
REUSE AND REMANUFACTURING INDUSTRY: Categories 20-26										
20 Computer and Electronic	Establishments (#)					9				9
Appliance Demanufacturers	Employment (#)					121	Survey results extrapolated			121
	Annual Payroll ($1,000)					1,884	based on regional average.			1,884
	Receipts ($1,000)					11,052	(n=9)			11,052
	Throughput (1,000 tons)									-
21 Motor Vehicle Parts (used)	Establishments (#)							117		117
	Employment (#)							894		894
	Annual Payroll ($1,000)							26,357	CBP 2005 and Economic	26,357
	Receipts ($1,000)							105,171	Census 2002 (21)	105,171
	Throughput (1,000 tons)									-
22 Retail Used Merchandise Sales	Establishments (#)							303		303
	Employment (#)							1,919	CBP (2006) for NAICS 453310	1,919
	Annual Payroll ($1,000)							37,865		37,865
	Receipts ($1,000)							155,099	Economic Census 2002	155,099
	Throughput (1,000 tons)								NA	-
23 Tire Retreaders	Establishments (#)							8	TRIB Listing 2007	8
	Employment (#)							60	CBP 2006	60
	Annual Payroll ($1,000)							1,794	CBP 2006	1,794
	Receipts ($1,000)							28,259	Economic Census 2002 deriv.	28,259
	Throughput (1,000 tons)									-
24 Wood Reuse	Establishments (#)					7				7
	Employment (#)					204	Survey results extrapolated			204
	Annual Payroll ($1,000)					6,848	based on regional average			6,848
	Receipts ($1,000)					20,584	(n=9)			20,584
	Throughput (1,000 tons)									-
25 Materials Exchange Services	Establishments (#)							2		2
	Employment (#)							4	Survey results extrapolated	4
	Annual Payroll ($1,000)							80	based on regional average.	80
	Receipts ($1,000)							150	(n=5)	150
	Throughput (1,000 tons)									-
26 Other Reuse	Establishments (#)					0	None identified			-
	Employment (#)									-
	Annual Payroll ($1,000)									-
	Receipts ($1,000)									-
	Throughput (1,000 tons)									-
REUSE AND REMANUFACTURING SUBTOTALS	Establishments (#)					16		430		446
	Employment (#)					325		2,877		3,202
	Annual Payroll ($1,000)					8,732		66,096		74,828
	Receipts ($1,000)					31,636		288,679		320,315
GRAND TOTALS Recycling, Reuse, & Remanufacturing	Establishments (#)					188		1,831		2,018
	Employment (#)					4,590		9,316		13,905
	Annual Payroll ($1,000)					196,390		301,158		497,549
	Receipts ($1,000)					1,153,795		2,014,513		3,168,308

		New York								
		Tier 1		Tier 2		Tier 3				
		C. Total Statistics on All Industry Establishments (not all perform recycling or reuse-related activities)		D. Total Statistics on Establishments Undertaking Some Recycling or Reuse Activities (includes recycling and non-recycling activites)		E. Statistics on Employees Undertaking Recycling or Reuse Activities (excluding virgin material preparation and downstream conversion activities)		F. Statistics on Establishments 100% Recycling or Reuse-Dependent (No virgin material)		G. Estimates of Total Recycling-Related Economic Activity (Sum of columns E and F)
A. Business Category	*B. Data Type*	*Estimates*	*Sources*	*Estimates*	*Sources*	*Estimates*	*Sources*	*Estimates*	*Sources*	
RECYCLING INDUSTRY: Categories 1-19										
1 Municipal Residential Curbside	Establishments (#)							860	NYDEC	860
and Drop-Off Collection	Employment (#)							1,555		1,555
	Annual Payroll ($1,000)							109,094	Modeled (cubside) and surved	109,094
	Receipts ($1,000)							268,841	(drop-off) (1)	268,841
	Throughput (1,000 tons)							714		714
2 Private Residential and	Establishments (#)							879	CBP 2005 (2)	879
Commercial Collection	Employment (#)							2,749	(2)	2,749
	Annual Payroll ($1,000)							71,712		71,712
	Receipts ($1,000)							140,529		140,529
	Throughput (1,000 tons)							2,316		2,316
3 Compost and Miscellaneous	Establishments (#)							137	(3)	137
Organics Producers	Employment (#)							767	Survey results extrapolated	767
	Annual Payroll ($1,000)							22,518	based on regional responses	22,518
	Receipts ($1,000)							66,083	(n=63)	66,083
	Throughput (1,000 tons)							1,216		1,216
4 Materials Recovery Facilities	Establishments (#)							41	GAA	41
(MRFs)	Employment (#)							1,244	GAA	1,244
	Annual Payroll ($1,000)							40,979	CBP wages 2005	40,979
	Receipts ($1,000)							166,810	2007 materials prices	166,810
	Throughput (1,000 tons)							2,229	GAA	2,229
5 Recyclable Material Wholesalers	Establishments (#)							455	Economic Census 2002	455
	Employment (#)							6,732		6,732
	Annual Payroll ($1,000)							240,056	Economic Census 2002 Updated	240,056
	Receipts ($1,000)							3,009,357	(5)	3,009,357
	Throughput (1,000 tons)									-
6 Glass Container	Establishments (#)					2				2
Manufacturing Plants	Employment (#)					303	Survey			303
	Annual Payroll ($1,000)					16,500	(n = 2)			16,500
	Receipts ($1,000)					67,375				67,375
	Throughput (1,000 tons)					151				151
7 Glass Product Producers	Establishments (#)					7	Survey			7
(other recycled uses)	Employment (#)					283	(n = 3)			283
	Annual Payroll ($1,000)					14,140				14,140
	Receipts ($1,000)					56,788				56,788
	Throughput (1,000 tons)					42				42
8 Nonferrous Secondary Smelting	Establishments (#)			25				25		25
and Refining Mills	Employment (#)			1,003				953		953
	Annual Payroll ($1,000)			41,550	Economic Census (2002) for NAICS			39,473	Adjusted for non covered activities (8)	39,473
	Receipts ($1,000)			367,408	331314, 331423, 331492.			349,039		349,039
	Throughput (1,000 tons)									-
9 Nonferrous Product Producers	Establishments (#)	53						27		27
	Employment (#)	6,698	Economic Census (2002)					2,378	Adjusted for non covered	2,378
	Annual Payroll ($1,000)	322,879	for NAICS 331315, 331421,					112,884	activities (9)	112,884
	Receipts ($1,000)	3,334,941	331316, 331319, 331491.					1,150,437		1,150,437
	Throughput (1,000 tons)									-
10 Nonferrous Foundries	Establishments (#)			53	AFS and Census (10)	53				53
	Employment (#)			1,962		1,864	Adjusted for non covered			1,864
	Annual Payroll ($1,000)			94,800	AMS 2006 adjusted (10)	90,060	activities (10)			90,060
	Receipts ($1,000)			384,400		365,180				365,180
	Throughput (1,000 tons)									-

		New York								
		Tier 1		Tier 2		Tier 3				
		C. Total Statistics on All Industry Establishments (not all perform recycling or reuse-related activities)		D. Total Statistics on Establishments Undertaking Some Recycling or Reuse Activities (includes recycling and non-recycling activites)		E. Statistics on Employees Undertaking Recycling or Reuse Activities (excluding virgin material preparation and downstream conversion activities)		F. Statistics on Establishments 100% Recycling or Reuse-Dependent (No virgin material)		G. Estimates of Total Recycling-Related Economic Activity (Sum of columns E and F)
A. Business Category	*B. Data Type*	*Estimates*	*Sources*	*Estimates*	*Sources*	*Estimates*	*Sources*	*Estimates*	*Sources*	
11 Paper and Paperboard Mills/	Establishments (#)	31	AF&PA, 2007			25				25
Deinked Market Pulp Producers	Employment (#)	5,493				3,767	Adjusted for non covered			3,767
	Annual Payroll ($1,000)	300,960	AMS, 2006			206,411	activities (11)			206,411
	Receipts ($1,000)	2,478,364				1,699,767				1,699,767
	Throughput (1,000 tons)		AF&PA, 2006			1,991				1,991
12 Paper-Based Product	Establishments (#)							3	Survey	3
Manufacturers	Employment (#)							318	(n=3)	318
	Annual Payroll ($1,000)							6,650		6,650
	Receipts ($1,000)							47,563		47,563
	Throughput (1,000 tons)							75		75
13 Pavement Mix Producers	Establishments (#)			72		18				18
(asphalt and aggregate)	Employment (#)			2,000	Industry data (NY Construction	200	Adjusted for non covered			200
	Annual Payroll ($1,000)			90,294	Materials Association) (13)	9,029	activities (13)			9,029
	Receipts ($1,000)			1,500,000		150,000				150,000
	Throughput (1,000 tons)			22,000		2,200				2,200
14 Plastics Reclaimers	Establishments (#)							20		20
	Employment (#)							440	Survey results extrapolated	440
	Annual Payroll ($1,000)							17,671	based on regional responses	17,671
	Receipts ($1,000)							168,681	(n=20)	168,681
	Throughput (1,000 tons)							225		225
15 Plastic Product Manufacturers	Establishments (#)			36		36				36
	Employment (#)			2,721	Survey results extrapolated	1,059	Adjusted for non covered			1,059
	Annual Payroll ($1,000)			119,701	based on regional responses.	29,804	activities			29,804
	Receipts ($1,000)			322,501	(n=17)	194,825				194,825
	Throughput (1,000 tons)			201		149				149
16 Rubber Product Manufacturers	Establishments (#)					12				12
	Employment (#)					143	Survey results extrapolated			143
	Annual Payroll ($1,000)					4,352	based on regional responses.			4,352
	Receipts ($1,000)					16,451	(n=5).			16,451
	Throughput (1,000 tons)					19				19
17 Steel Mills	Establishments (#)			12	ASM 2006	12				12
	Employment (#)			2,379	AISI Employment Data 2007 (17)	1,969	Adjusted for non covered			1,969
	Annual Payroll ($1,000)			145,838	AISI Employment Data 2007 (17)	120,754	activities (17)			120,754
	Receipts ($1,000)			1,302,121	ASM 2006	1,078,156				1,078,156
	Throughput (1,000 tons)				NA	1,232	SRI 2007			1,232
18 Iron and Steel Foundries	Establishments (#)			17	AFS and Census (10)	17				17
	Employment (#)			713	ASM data (2006) (18)	642				642
	Annual Payroll ($1,000)			26,700		24,030	Adjusted for non covered			24,030
	Receipts ($1,000)			87,800		79,020	activities (18)			79,020
	Throughput (1,000 tons)									-
19 Other Recycling	Establishments (#)					15				15
Processors/Manufacturers	Employment (#)					185	Survey results extrapolated			185
	Annual Payroll ($1,000)					9,063	based on regional responses.			9,063
	Receipts ($1,000)					31,719	(n=4)			31,719
	Throughput (1,000 tons)									-
RECYCLING SUBTOTALS	Establishments (#)					197		2,447		2,644
	Employment (#)					10,414		17,134		27,549
	Annual Payroll ($1,000)					524,143		661,038		1,185,181
	Receipts ($1,000)					3,739,280		5,367,338		9,106,618

		New York								
		Tier 1		Tier 2		Tier 3				
		C. Total Statistics on All Industry Establishments (not all perform recycling or reuse-related activities)		D. Total Statistics on Establishments Undertaking Some Recycling or Reuse Activities (includes recycling and non-recycling activites)		E. Statistics on Employees Undertaking Recycling or Reuse Activities (excluding virgin material preparation and downstream conversion activities)		F. Statistics on Establishments 100% Recycling or Reuse-Dependent (No virgin material)		G. Estimates of Total Recycling-Related Economic Activity (Sum of columns E and F)
A. Business Category	*B. Data Type*	*Estimates*	*Sources*	*Estimates*	*Sources*	*Estimates*	*Sources*	*Estimates*	*Sources*	
REUSE AND REMANUFACTURING INDUSTRY: Categories 20-26										
20 Computer and Electronic	Establishments (#)					10				10
Appliance Demanufacturers	Employment (#)					148	Survey results extrapolated			148
	Annual Payroll ($1,000)					2,305	based on regional average.			2,305
	Receipts ($1,000)					13,518	(n=9).			13,518
	Throughput (1,000 tons)									-
21 Motor Vehicle Parts (used)	Establishments (#)							295		295
	Employment (#)							2,076		2,076
	Annual Payroll ($1,000)							51,252	CBP 2005 and Economic	51,252
	Receipts ($1,000)							244,662	Census 2002 (21)	244,662
	Throughput (1,000 tons)									-
22 Retail Used Mechandise Sales	Establishments (#)							959		959
	Employment (#)							1,919	CBP (2006) for NAICS 453310	1,919
	Annual Payroll ($1,000)							129,862		129,862
	Receipts ($1,000)							569,026	Economic Census 2002	569,026
	Throughput (1,000 tons)								NA	-
23 Tire Retreaders	Establishments (#)							24	TRIB Listing 2007	24
	Employment (#)							175	CBP 2006	175
	Annual Payroll ($1,000)							5,233	CBP 2006	5,233
	Receipts ($1,000)							84,754	Economic Census 2002 derived (	84,754
	Throughput (1,000 tons)									-
24 Wood Reuse	Establishments (#)					12				12
	Employment (#)					365	Survey results extrapolated			365
	Annual Payroll ($1,000)					12,252	based on regional responses			12,252
	Receipts ($1,000)					36,830	(n=9)			36,830
	Throughput (1,000 tons)									-
25 Materials Exchange Services	Establishments (#)							2		2
	Employment (#)							4	Survey results extrapolated	4
	Annual Payroll ($1,000)							50	based on regional average.	50
	Receipts ($1,000)							100	(n=3).	100
	Throughput (1,000 tons)									-
26 Other Reuse	Establishments (#)							2		2
	Employment (#)							4	Survey	4
	Annual Payroll ($1,000)							50	(n=2)	50
	Receipts ($1,000)							100		100
	Throughput (1,000 tons)									-
REUSE AND REMANUFACTURING SUBTOTALS	Establishments (#)					22		1,282		1,304
	Employment (#)					513		4,178		4,691
	Annual Payroll ($1,000)					14,557		186,447		201,004
	Receipts ($1,000)					50,348		898,642		948,990
GRAND TOTALS Recycling, Reuse, & Remanufacturing	Establishments (#)					219		3,729		3,948
	Employment (#)					10,927		21,312		32,240
	Annual Payroll ($1,000)					538,700		847,485		1,386,185
	Receipts ($1,000)					3,789,628		6,265,980		10,055,608

		Pennsylvania								
		Tier 1		Tier 2		Tier 3				
		C. Total Statistics on All Industry Establishments (not all perform recycling or reuse-related activities)		D. Total Statistics on Establishments Undertaking Some Recycling or Reuse Activities (includes recycling and non-recycling activites)		E. Statistics on Employees Undertaking Recycling or Reuse Activities (excluding virgin material preparation and downstream conversion activities)		F. Statistics on Establishments 100% Recycling or Reuse-Dependent (No virgin material)		G. Estimates of Total Recycling-Related Economic Activity (Sum of columns E and F)
A. Business Category	*B. Data Type*	*Estimates*	*Sources*	*Estimates*	*Sources*	*Estimates*	*Sources*	*Estimates*	*Sources*	
RECYCLING INDUSTRY: Categories 1-19										
1 Residential Curbside	Establishments (#)							1,068	PA DEP 2005 data	1,068
and Drop-Off Collection	Employment (#)							1,326	Survey	1,326
	Annual Payroll ($1,000)							47,115	Derivation (1)	47,115
	Receipts ($1,000)							53,316	Survey	53,316
	Throughput (1,000 tons)							686	PA DEP 2005 data escalated to 2007	686
2 Commercial Recyclables Collection	Establishments (#)							287	CBP 2005 (2)	287
	Employment (#)							1,207	(2)	1,207
	Annual Payroll ($1,000)							44,927		44,927
	Receipts ($1,000)							115,216		115,216
	Throughput (1,000 tons)							1,619	PA DEP 2005 data escalated to 2007	1,619
3 Compost and Miscellaneous	Establishments (#)							446	PA DEP (3)	446
Organics Producers	Employment (#)							1278	Survey [n=40]	1,278
	Annual Payroll ($1,000)							$26,255	Survey [n=40]	26,255
	Receipts ($1,000)							$88,590	Survey [n=40]	88,590
	Throughput (1,000 tons)							955	PA DEP 2005 data escalated to 2007 (3b)	955
4 Materials Recovery Facilities	Establishments (#)							48	GAA	48
(MRFs)	Employment (#)							870	GAA	870
	Annual Payroll ($1,000)							28,684	CBP wages 2005	28,684
	Receipts ($1,000)							50,859	2007 material prices	50,859
	Throughput (1,000 tons)							1,004	GAA	1,004
5 Recyclable Material Wholesalers	Establishments (#)							397	Economic Census 2002	397
	Employment (#)							5,126		5,126
	Annual Payroll ($1,000)							166,087		166,087
	Receipts ($1,000)							5,504,777	Economic Census 2002 Updated (5)	5,504,777
	Throughput (1,000 tons)							2,011	(5)	2,011
6 Glass Container	Establishments (#)					5				5
Manufacturing Plants	Employment (#)					871	Survey results extrapolated			871
	Annual Payroll ($1,000)					61,127	based on regional responses.			61,127
	Receipts ($1,000)					183,946	(n=3)			183,946
	Throughput (1,000 tons)					686				686
7 Glass Product Producers	Establishments (#)					2				2
(other recycled uses)	Employment (#)					153	Survey results extrapolated			153
	Annual Payroll ($1,000)					6,504	based on regional responses.			6,504
	Receipts ($1,000)					24,313	(n=5)			24,313
	Throughput (1,000 tons)					9				9
8 Nonferrous Secondary Smelting	Establishments (#)			46				46	From column D	46
and Refining Mills	Employment (#)			2,747				2,610		2,610
	Annual Payroll ($1,000)			105,461	Economic Census (2002) for NAICS			100,188	Adjusted for non covered activities (8)	100,188
	Receipts ($1,000)			780,988	331314, 331423, 331492.			741,938		741,938
	Throughput (1,000 tons)									-
9 Nonferrous Product Producers	Establishments (#)	75	Economic Census (2002) for NAICS 331315, 331421, 331316, 331319, 331491.		Not Available			38		38
	Employment (#)	9,415						3,265		3,265
	Annual Payroll ($1,000)	413,465						143,736	Adjusted for non covered activities (9)	143,736
	Receipts ($1,000)	2,746,179						955,835		955,835
	Throughput (1,000 tons)									-
10 Nonferrous Foundries	Establishments (#)			77	AFS and Census (10)	77	From column D			77
	Employment (#)			4,704		4,469	Adjusted for non covered activities (10)			4,469
	Annual Payroll ($1,000)			197,200	AMS 2006 adjusted (10)	187,340				187,340
	Receipts ($1,000)			520,500		494,475				494,475

		Pennsylvania								
		Tier 1		Tier 2		Tier 3				
		C. Total Statistics on All Industry Establishments (not all perform recycling or reuse-related activities)		D. Total Statistics on Establishments Undertaking Some Recycling or Reuse Activities (includes recycling and non-recycling activites)		E. Statistics on Employees Undertaking Recycling or Reuse Activities (excluding virgin material preparation and downstream conversion activities)		F. Statistics on Establishments 100% Recycling or Reuse-Dependent (No virgin material)		G. Estimates of Total Recycling-Related Economic Activity (Sum of columns E and F)
A. Business Category	*B. Data Type*	*Estimates*	*Sources*	*Estimates*	*Sources*	*Estimates*	*Sources*	*Estimates*	*Sources*	
11 Paper and Paperboard Mills/	Establishments (#)	24	AF&PA, 2007			22				22
Deinked Market Pulp Producers	Employment (#)	5,927				2,319	Adjusted for non covered			2,319
	Annual Payroll ($1,000)	368,016	AMS, 2006			143,977	activities (11)			143,977
	Receipts ($1,000)	5,383,703				2,106,234				2,106,234
	Throughput (1,000 tons)		AF&PA, 2006			847				847
12 Paper-Based Product	Establishments (#)					6	Survey			6
Manufacturers	Employment (#)					900	Survey results extrapolated			900
	Annual Payroll ($1,000)					31,995	based on regional average			31,995
	Receipts ($1,000)					156,644	(n=9)			156,644
	Throughput (1,000 tons)					229				229
13 Pavement Mix Producers	Establishments (#)			106		86				86
(asphalt and aggregate)	Employment (#)			2,507		376				376
	Annual Payroll ($1,000)			87,081		13,062				13,062
	Receipts ($1,000)			1,560,000		234,000				234,000
	Throughput (1,000 tons)			26,000		3,900	PA Asphalt Pavement Assoc			3,900
14 Plastics Reclaimers	Establishments (#)							19		19
	Employment (#)							364	Survey results extrapolated	364
	Annual Payroll ($1,000)							13,643	based on regional responses	13,643
	Receipts ($1,000)							138,252	(n=20)	138,252
	Throughput (1,000 tons)							186		186
15 Plastic Product Manufacturers	Establishments (#)			19		19				19
	Employment (#)			3,082	Survey results extrapolated	1,110	Adjusted for non covered			1,110
	Annual Payroll ($1,000)			136,824	based on regional responses	29,989	activities			29,989
	Receipts ($1,000)			378,060	(n=20)	241,861				241,861
	Throughput (1,000 tons)			150		111				111
16 Rubber Product Manufacturers	Establishments (#)					34				34
	Employment (#)					400	Survey results extrapolated			400
	Annual Payroll ($1,000)					12,139	based on regional responses			12,139
	Receipts ($1,000)					45,889	(n=5)			45,889
	Throughput (1,000 tons)					52				52
17 Steel Mills	Establishments (#)			58	ASM 2006	58				58
	Employment (#)			23,916	AISI Employment Data 2007 (17)	11,886	Adjusted for non covered			11,886
	Annual Payroll ($1,000)			1,466,389	AISI Employment Data 2007 (17)	728,795				728,795
	Receipts ($1,000)			16,432,994	ASM 2006	8,167,198				8,167,198
	Throughput (1,000 tons)				NA	2,909	SRI 2007			2,909
18 Iron and Steel Foundries	Establishments (#)			73		73				73
	Employment (#)			6,056		5,450	Adjusted for non covered			5,450
	Annual Payroll ($1,000)			239,600		215,640				215,640
	Receipts ($1,000)			679,500		611,550				611,550
	Throughput (1,000 tons)									-
19 Other Recycling	Establishments (#)					18				18
Processors/Manufacturers	Employment (#)					230	Survey results extrapolated			230
	Annual Payroll ($1,000)					11,250	based on regional responses.			11,250
	Receipts ($1,000)					39,375	(n=4)			39,375
	Throughput (1,000 tons)									-
RECYCLING SUBTOTALS	Establishments (#)					400		2,349		2,749
	Employment (#)					28,164		16,046		44,210
	Annual Payroll ($1,000)					1,441,819		570,634		2,012,453
	Receipts ($1,000)					12,305,485		7,648,783		19,954,268

		Pennsylvania								
		Tier 1		Tier 2		Tier 3				
		C. Total Statistics on All Industry Establishments (not all perform recycling or reuse-related activities)		D. Total Statistics on Establishments Undertaking Some Recycling or Reuse Activities (includes recycling and non-recycling activites)		E. Statistics on Employees Undertaking Recycling or Reuse Activities (excluding virgin material preparation and downstream conversion activities)		F. Statistics on Establishments 100% Recycling or Reuse-Dependent (No virgin material)		G. Estimates of Total Recycling-Related Economic Activity (Sum of columns E and F)
A. Business Category	*B. Data Type*	*Estimates*	*Sources*	*Estimates*	*Sources*	*Estimates*	*Sources*	*Estimates*	*Sources*	
REUSE AND REMANUFACTURING INDUSTRY: Categories 20-26										
20 Computer and Electronic	Establishments (#)					7				7
Appliance Demanufacturers	Employment (#)					103	Survey results extrapolated			103
	Annual Payroll ($1,000)					1,604	based on regional responses			1,604
	Receipts ($1,000)					9,408	(n=9)			9,408
	Throughput (1,000 tons)									-
21 Motor Vehicle Parts (used)	Establishments (#)							270		270
	Employment (#)							1,889		1,889
	Annual Payroll ($1,000)							43,239		43,239
	Receipts ($1,000)							238,144	CBP 2005 and Economic Census 2002 (21)	238,144
	Throughput (1,000 tons)									-
22 Retail Used Mechandise Sales	Establishments (#)							670		670
	Employment (#)							4,834	CBP (2006) for NAICS 453310	4,834
	Annual Payroll ($1,000)							69,839		69,839
	Receipts ($1,000)							241,088	Economic Census 2002	241,088
	Throughput (1,000 tons)								NA	-
23 Tire Retreaders	Establishments (#)							76	TRIB Listing 2007	76
	Employment (#)							646	CBP 2006	646
	Annual Payroll ($1,000)							22,116	CBP 2006	22,116
	Receipts ($1,000)							56,205	Economic Census 2002	56,205
	Throughput (1,000 tons)									-
24 Wood Reuse	Establishments (#)					19				19
	Employment (#)					577	Survey results extrapolated			577
	Annual Payroll ($1,000)					19,368	based on regional average.			19,368
	Receipts ($1,000)					58,221	(n=9)			58,221
	Throughput (1,000 tons)									-
25 Materials Exchange Services	Establishments (#)							2		2
	Employment (#)							4	Survey results extrapolated	4
	Annual Payroll ($1,000)							50	based on regional average	50
	Receipts ($1,000)							100	(n=5)	100
	Throughput (1,000 tons)									-
26 Other Reuse	Establishments (#)							10		10
	Employment (#)							53	Survey results extrapolated	53
	Annual Payroll ($1,000)							1,988	based on PA responses.	1,988
	Receipts ($1,000)							8,248	(n=4)	8,248
	Throughput (1,000 tons)									-
REUSE AND REMANUFACTURING SUBTOTALS	Establishments (#)					26		1,028		1,054
	Employment (#)					680		7,426		8,106
	Annual Payroll ($1,000)					20,972		137,232		158,204
	Receipts ($1,000)					67,629		543,785		611,414

GRAND TOTALS Recycling, Reuse, & Remanufacturing	Establishments (#)					426		3,376		3,803
	Employment (#)					28,844		23,472		52,316
	Annual Payroll ($1,000)					1,462,791		707,866		2,170,657
	Receipts ($1,000)					12,373,114		8,192,568		20,565,682

APPENDIX B:
Sector NAICS Code Assignments and Research Methodology

		Sector	NAICS Code Assignments	Methodology
RECYCLING INDUSTRIES (Supply Side)	1	Government Staffed Residential Collection	562111	Survey drop-offs in all states and curbside programs in PA. Modeling of curbside collection using state maintained data on tons collected, program type and households served in all other states.
	2	Private Staffed Collection: Residential, Commercial and Redemption	562111	Modeling of costs using County Business Patterns (CBP) data on collection establishments and average wages (excluding redemption), use of state maintained data on tons collected (by material type for commercial), households served, and cost modeling. Sta
	3	Compost/organics Processors	325311, 325314	Survey by type of composting (e.g. leaf and yard waste, commercial food waste and other organics, biosolids)
	4	Materials Recovery Facilities	56292	GAA database with payroll data from Economic Census (2002) and CBP (2005)
	5	Recyclables Material Wholesalers	42393	Economic Census data (2002) updated based on 2007 material values by wholesaler type for metals and paper
	14	Plastics Reclaimers	325991	Survey
RECYCLING RELIANT INDUSTRIES (Demand Side)	6	Glass Container Manufacturing Plants	327213	Survey
	7	Glass Product Producers	327211, 327212, 327993	Survey
	8	Nonferrous Secondary Smelting and Refining Mills	331314, 331423, 331492	Economic Census data (2002) with industry input for recycled content
	9	Nonferrous Product Producers	331315, 331316, 331319, 331421, 331, 491	Economic Census data (2002) with industry input for recycled content
	10	Nonferrous Foundries	33152	Economic Census data (2002) supplemented by industry input on scrap percentage and industry size
	11	Paper and Paperboard Mills/Deinkled Market Pulp Producers	3221	Economic Census and ASM data (2006) with industry data on % recovered paper use
	12	Paper-based Product Manufacturers	322215, 322299	Survey
	13	Pavement Mix Producers (asphalt and aggregate)	324121	Economic Census (2002), industry data and survey (DE only)
	14	Plastics Reclaimers	325991	Survey
	15	Plastic Product Manufacturers	32611, 32612, 326160, 32619	Survey
	16	Rubber Product Manufacturers	326299	Survey
	17	Steel Mills	33111	Industry data coupled with ASM (2006) data
	18	Iron and Steel Foundries	33151	Economic Census data (2002) supplemented by industry input on scrap percentage use and industry size
	19	Other Recycling Processors/Manufacturers	Varies	Survey
REUSE / REMANUFACTURING	20	Computer and Electronic Appliance Demanufacturers	N/A	Survey
	21	Motor Vehicle Parts (used)	423140	2005 CBP data for 423140 and Economic Census data (2002) for 441310 adjusted for used retail merchandise sales
	22	Retail Used Merchandise Sales	453310 and 4413105	County Business Patterns (2006)
	23	Tire Retreaders	326212	Economic Census data (2002) with industry input on number of establishments
	24	Wood Reuse	321920, 321219	Survey
	25	Material Exchange Services	N/A	Survey
	26	Other Reuse		Survey