Final Report

Economic Impacts of Recycling in Iowa

Iowa Department of Natural Resources

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Project Overview

R. W. Beck, Inc., in conjunction with David Swenson Consulting, was retained by the Iowa Department of Natural Resources (IDNR) to study the economic impacts of recycling on Iowa's economy. Specifically, there were four objectives of the Economic Impacts of Recycling in Iowa Study (Study):

- Measure the current economic impacts of recycling activities (collectors, processors, end-users, remanufacturers and reuse establishments, and recycling equipment manufacturers) on Iowa employment, income, and tax revenue;
- Compare the results of the current Study to the results of the Economic Impacts of Recycling Study completed in 2001 (2001 Study);
- Identify specific recyclable material market development opportunities that maximize beneficial economic impacts upon the state of Iowa's economy; and
- Characterize the greenhouse gas savings associated with Iowa's recycling activities.

Overall, in 2005, the Iowa recycling industry reflected the following:

- More than $159 million in commodity gross receipts based on estimated quantities of recyclable materials collected;
- 1,713 direct processing jobs and 3,096 in total recycling-related processing jobs (including organics, construction & demolition debris (C&D), Electronics, and Tires);
- 10,593 in direct end-use recycling industry jobs and more than $4.064 billion in direct-industrial output;
- The remanufacturing and reuse industries provided more than $431 million in total industrial output and 4,363 jobs;
- The recycling equipment industry provided more than $154 million in total industrial output and 994 total jobs;
- For every 100 jobs created in the recycling processing industry, 81 additional jobs are sustained in the Iowa economy; and
- For every dollar in labor income created in the recycling processing industry, $0.73 of additional income is sustained in the Iowa economy.

Recycling Data Collection and Commodity Flow

A comprehensive statewide survey of collectors, processors, end-users, brokers, remanufacturers, reuse establishments, and recycling equipment manufacturers was undertaken to gather recyclable materials quantity and recycling economic-related information. Specifically, the objective of the survey was to gather the following information: contact information; recycling activities conducted; employment, payroll, and gross sales information; recyclable material quantity and pricing information; and perceived barriers and drivers to recycling in Iowa.

Of the approximately 1,365 surveys mailed, 207 were returned for a response rate of fifteen percent. The individual survey responses were input into a materials flow model for collectors, processors, end-users, reamanufacturers/reuse establishments, and brokers. Raw data was summarized by commodity type for each survey group.

The objective of the commodity flow analysis was to utilize the data gathered through the Study's survey efforts to identify potential opportunities for enhancing recycling market development.

To initiate the analysis, the quantitative survey data for the recyclable materials was aggregated by commodity type. Total 2005 tons collected, processed and consumed by Iowa entities was estimated based on the survey responses. Then, the quantities of recyclable materials imported by processors and end-users were calculated. The quantity of in-state commodity purchases was subtracted from the overall total quantities purchased for each individual respondent to calculate the quantity of imports. The imports for individual respondents were summed by commodity type to identify the total imports for each commodity. The commodity imports identified in the recyclable materials flow may represent a supply/demand imbalance.

The following Table ES-1 summarizes the supply/demand assessment.

Table ES-1
Materials Flow Commodity Analysis

Material	Supply/Demand Status
ONP	Excess supply
OCC	Excess demand
High Grade (Office)	More research needed
Other Paper (Mixed)	More research needed
PET Plastics	Excess supply
HDPE Plastics	Supply slightly greater than demand
LDPE Plastics	Excess supply
Mixed Plastics	Excess supply
Container Glass	Excess supply
Steel Cans	Excess supply
Aluminum Cans	Excess supply
Ferrous	More research needed
Non-Ferrous	Excess supply
Wood	Excess supply
Asphalt	More research needed
Concrete	More research needed
Drywall	No data reported
Asphalt Shingles	More research needed
Food Waste	More research needed
Yard Waste	Excess supply
Other Organic By-Products	More research needed
End-of-Life Electronics	Excess supply
Tires	Excess supply

With the exception of old corrugated containers (OCC) and those commodities requiring more research, it appears that there is excess supply to meet the present demand for most recycled material commodities in Iowa.

Recycling Industry Economic Values in Iowa

The Project Team used an input-output (I-O) model to conduct the economic impact analysis. I-O models are highly detailed accountings of the flow of commodities and finished goods among industries and, ultimately, to final consumers.

The survey data of estimated tonnage collected, processed, or consumed, along with sales, employees, and employee compensation were compiled and introduced into the modeling system to assess both the economic impacts of commodity production and

the estimated economic value to the state of Iowa of end-use manufacturing activities. The economic impact can be defined as a place where a discernible and measurable change in economic activity in a region is occurring.

Table ES-2 displays the economic impacts of recycling commodity processors in Iowa. This summary table displays several dimensions of information about Iowa's recycled commodity processing industries including: industrial output; value added; labor income; jobs; and economic multipliers.

Table ES-2
Estimated Economic Impacts of Recyclable Materials Processing in Iowa
(2007 Study)[1]

	Direct	Indirect	Induced	Total[2]	Multiplier
Industrial Output($)	232,333,810	54,987,935	48,285,795	335,607,542	1.44
Value Added($)	96,357,096	27,599,139	27,690,970	151,647,205	1.57
Labor Income($)	49,108,400	18,986,942	17,101,120	85,196,464	1.73
Jobs	1,713	735	649	3,096	1.81

[1] All data is for calendar year 2005.
[2] Totals may not sum due to rounding.

Provided below in Table ES-3 are the results of the economic impacts of end-use manufacturing in Iowa.

Table ES-3
Estimated Economic Impacts of End-Use Manufacturing in Iowa
(2007 Study)[1]

	Direct	Indirect	Induced	Total[2]	Multiplier
Output($)	4,064,537,757	882,048,068	701,859,826	5,648,445,770	1.39
Value Added($)	939,365,397	473,222,768	399,795,684	1,812,383,897	1.93
Labor Income($)	655,676,815	281,472,233	212,395,080	1,149,544,119	1.75
Jobs	10,593	7,273	7,843	25,709	2.43

[1] All data is for calendar year 2005.
[2] Totals may not sum due to rounding.

The following Table ES-4 lists the economic impacts for all remanufacturing and reuse industries in Iowa. These businesses repair and re-sell used commodities or re-usable items. The industries assessed include wood reuse, computer and peripheral repair, motor vehicle parts, tire retreading, and used goods retail.

Table ES-4
Estimated Economic Impacts of Remanufacturing and Reuse Industries in Iowa
(2007 Study)[1]

	Direct	Indirect	Induced	Total[2]	Multiplier
Output($)	272,503,619	88,712,500	70,248,674	431,464,789	1.58
Value Added($)	105,665,050	42,128,375	40,012,771	187,806,197	1.78
Labor Income($)	68,403,481	25,145,034	21,257,951	114,806,469	1.68
Jobs	2,855	723	785	4,363	1.53

[1] All data is for calendar year 2005. Source of data: U.S. Census Bureau and the Iowa Department of Workforce Development.
[2] Totals may not sum due to rounding.

Table ES-5 provides a summary of the economic impacts of the recycling equipment manufacturing industry in Iowa.

Table ES-5
Recycling Equipment Manufacturers Economic Values
(2007 Study)[1]

	Direct	Indirect	Induced	Total[2]	Multiplier
Industrial Output($)	106,577,805	22,418,962	25,667,610	154,664,377	1.45
Value Added($)	35,904,400	11,922,702	14,618,915	62,446,017	1.74
Labor Income($)	27,094,544	7,328,191	7,767,316	42,190,051	1.56
Jobs	523	184	287	994	1.90

[1] All data is for calendar year 2005.
[2] Totals may not sum due to rounding.

Fiscal Impacts Analysis

When conducting an analysis of the economic values of specific kinds of industrial activity in a region or a state, it is instructive to look at the impacts of industrial change and growth on the flow of revenues into local governments and state governments.

Fiscal impact models are designed to use the findings of an input-output assessment to translate the job and income growth into household impacts, and then analyze those changes within the context of local government operations and state government receipts. For purposes of this Study, the jobs and income findings of the economic impacts analysis for recycling processing, end-use, remanufacturing, and equipment manufacturing were used to estimate the projected fiscal outcomes for these specific recycling activities. Fiscal impacts were estimated for Iowa's urban counties (its 20 metropolitan counties) and its rural counties (its 79 non-metropolitan counties).

The net fiscal impacts (revenues less expenses) for the processing, end-use and remanufacturing/reuse industries are provided in the tables below.

Table ES-6
Net Fiscal Impacts Associated with Recyclable Materials Processing in Iowa
(2007 Study)[1]

Government Type	Urban	Rural	Total[2]
State	$3,600,530	$4,081,420	$7,681,950
Local	2,794,747	3,168,016	5,962,762
Total[2]	$6,395,277	$7,249,436	$13,644,712

[1] Data is in 2005 dollars.
[2] Totals may not sum due to rounding.

Table ES-7
Net Fiscal Impacts Associated with Recyclable Materials End-Use Manufacturing in Iowa
(2007 Study)[1]

Government Type	Urban	Rural	Total[2]
State	$48,581,450	$55,070,033	$103,651,483
Local	37,709,132	42,745,598	80,454,730
Total[2]	$86,290,582	$97,815,631	$184,106,213

[1] Data is in 2005 dollars.
[2] Totals may not sum due to rounding.

Table ES-8
Net Fiscal Impacts Associated with Remanufacturing and Reuse Industries In Iowa
(2007 Study)[1]

Government Type	Urban	Rural	Total[2]
State	$4,851,893	$5,499,916	$10,351,809
Local	3,766,060	4,269,059	8,035,119
Total[2]	$8,617,953	$9,768,975	$18,386,928

[1] Data is in 2005 dollars.
[2] Totals may not sum due to rounding.

The comparisons of the fiscal impacts of the processing, end-use, and remanufacturing/reuse industries in Iowa, reflect the following:

- End-use fiscal impacts, measured using revenues from own-sources and property taxes, greatly exceed the fiscal impacts for all of the other recycling activities combined.
- The remanufacturing and reuse industry's fiscal impacts exceed the fiscal impacts for the processing industry.

Comparison of the 2001 Study and 2007 Study Impacts

This section compares the major findings of the 2001 Study with the current Study.

As in the previous study in which we compared two study results, there have been changes in the recycling industry, changes in how the nation characterizes recycling activities, changes in our computing technology and our approaches to measuring the Iowa recycling industry. These changes can make it difficult to compare the studies.

For our comparison, only the multipliers for jobs are compared. The output multiplier varies strongly from year to year, depending on the overall prices of inputs or the prices received for the commodity under study. This may have little effect on overall labor incomes and jobs.

At the outset, there are two economic factors that are different in the current Study than in the 2001 Study. They include the following:

- Prices paid for most commodities have changed; and
- The modeling system and its underlying foundation data have been modified and improved.

Table ES-9 shows the summaries of processed commodities and receipts and displays the major changes as related to the two factors listed above. There are some substantial differences in the amounts of commodities collected by material category, the amounts received per ton, and the overall gross output of Iowa's recycling processing industry. The data in this table are not adjusted for inflationary changes, but during the 1999 to 2005 period, consumer prices rose by 17 percent.

Table ES-9
Comparison of the 2001 Study and 2007 Study Estimated Recyclable Materials Processed and Receipts[1,2]

Material Types	2001 Study (1999 data)		2007 Study (2005 data)[3]				
	All Suppliers (Tons)	Expected Gross Receipts	All Suppliers (Tons)	Expected Gross Receipts	Pct. Change in Tons	Pct. Change in Receipts	Pct. Change $ Per Ton
All Paper	341,691	$27,694,753	581,628	$36,987,435	70%	34%	-22%
OCC	163,865	9,720,018	156,891	11,296,117	-4%	16%	21%
All Other Paper	177,826	17,974,735	424,737	25,691,318	139%	43%	-40%
Plastics	29,724	3,665,062	48,916	17,928,088	65%	389%	197%
Glass	47,409	1,386,288	63,499	1,125,407	34%	-19%	-39%
All Metals	608,627	71,565,587	239,353	119,531,111	-61%	67%	325%
Alum Cans	7,058	6,838,794	22,010	25,531,670	212%	273%	20%
All Other Metal	601,569	64,726,793	217,343	93,999,441	-64%	45%	302%
Wood Wastes	103,194	8,977,906	193,183	5,022,769	87%	-44%	-70%
Total Quantity	1,130,646	$113,289,596	1,126,579	$180,594,810	0%	59%	60%

[1] All data is for calendar years 1999 and 2005.
[2] Totals may not sum due to rounding.
[3] Source: Table 4-2 of this report.

One noticeable difference is in the estimate of the amount of processed commodities. The amount processed in 2005 is just slightly less than estimated in 1999. Only one material category had a noticeable decrease in tons since the last study and that was the metals, excluding aluminum cans. This could be attributed to the difference in surveys returned for this Study compared to the 2001 Study.

Receipts, however, are much higher. On a gross, before inflation basis, they were 59 percent higher, and on a weighted-average basis per commodity ton they were 60 percent higher. Overall receipts to paper processors increased even though lower prices per ton were received, while plastics receipts appreciated sharply on both total receipts and on a price per ton basis. The prices received for metals processing were high, gaining 67 percent in total, led strongly by gains in the prices received for all other non-ferrous metals.

Next we compared the estimated total economic values of the processors. The direct commodity values in Table ES-10 align with the expected gross receipts that were just presented in Table ES-9. Table ES-10 below provides the direct values, the total values considering all multiplied-through considerations, and the total multiplier value for jobs.

Table ES-10
Comparison of the 2001 Study and 2007 Study Estimated Processor Economic Values

	2001 Study (1999 Processors)			2007 Study (2005 Processors)		
	Direct	Total	Multiplier	Direct	Total	Multiplier
OCC						
Industrial Output($)	9,720,018	16,246,095		11,296,117	13,956,398	
Value Added($)	4,211,020	7,949,224		7,746,271	11,490,011	
Jobs	163	254	1.55	181	315	1.74
All Other Paper						
Industrial Output($)	17,974,735	29,694,089		25,691,318	30,912,567	
Value Added($)	6,637,412	13,330,311		18,651,373	26,691,999	
Jobs	206	367	1.78	478	784	1.64
Plastics						
Industrial Output($)	3,665,062	5,514,626		17,928,088	26,495,953	
Value Added($)	866,208	1,912,058		5,092,339	8,045,388	
Jobs	34	59	1.73	41	105	2.53
Glass						
Industrial Output($)[1]	1,386,288	2,566,399		2,305,071	3,654,094	
Value Added($)	1,088,855	1,778,998		1,905,071	3,033,548	
Jobs	40	57	1.42	77	129	1.69
Aluminum						
Industrial Output($)	6,838,794	9,781,220		25,531,670	36,804,220	
Value Added($)	1,030,635	2,673,364		6,702,254	9,699,070	
Jobs	42	81	1.91	27	63	2.39
All Other Metal						
Industrial Output($)	64,726,793	102,115,423		93,999,441	138,265,365	
Value Added($)	18,875,302	40,113,389		28,802,350	46,662,235	
Jobs	665	1,175	1.77	228	565	2.48
Wood						
Industrial Output($)	8,977,906	14,359,019		5,022,769	6,068,184	
Value Added($)	2,658,061	5,702,088		6,074,846	9,221,088	
Jobs	119	192	1.61	202	334	1.65
All Commodity Processors[2]						
Industrial Output($)[1]	113,289,596	180,276,872		181,774,474	256,156,781	
Value Added($)	35,367,494	73,459,432		74,974,504	114,843,339	
Jobs	1,271	2,185	1.72	1,234	2,295	1.86

[1] The 2005 industrial output for glass does not match the gross receipts in Table 6-1 as all of the other values do. This sector, owing to low prices, appears to not cover its costs without some subsidies. This value represents the total estimated costs of production (or processing), not its receipts. This effects the 2005 All Commodity Processors' direct output total as well.
[2] Totals may not sum due to rounding.

This comparison to the 2001 Study, considers paper, plastics, glass, metals and wood processing only. The estimated total industrial output economic values increased to $256.2 million from $180.3 million in 1999. Value added total economic effects also appreciated from $73.5 million to an estimated $114.8 million. The estimated direct jobs declined slightly to 1,234 from 1,271, and the total jobs estimated to be supported by recyclable materials processing increased from 2,185 to 2,295.

Old corrugated containers and wood processing reflected strong declines in total output effects, although the overall total job impact changes were up slightly for OCC processing. Plastics reflected strong increases in value added, output, and in the total number of jobs.

The all other metals processing component saw total output impacts increase from $102.1 million in 1999 to $138.3 million in 2005, but the estimated job requirements declined sharply.

Greenhouse Gas Emissions Impact Analysis

In this Study, an analysis of the environmental impact of recycling in Iowa was provided, in terms of greenhouse gas (GHG) emission reductions. The analysis presented in this section considers the recycling and composting activities that contribute to GHG emission reductions throughout the materials use cycle.

The methodology used to estimate the GHG emission reductions in Iowa as a result of recycling efforts, was based on application of the Waste Reduction Model (WARM) developed by the United States Environmental Protection Agency (EPA).

Table ES-11 shows the greenhouse gas emissions of each waste management practice,[1] based on the WARM model results for the state of Iowa. The annual GHG emissions are reported as Metric Tons of Carbon Equivalent (MTCE). A negative value (i.e., a value in parentheses) indicates an emission reduction; a positive value indicates an emission increase.

Environmental impacts beyond greenhouse gas emissions were not evaluated. It also should be noted that this analysis does not constitute a full-fledged environmental life-cycle analysis study, but rather only an inventory of impacts based on WARM model results.

[1] The model results are based on tons recycled, landfilled, combusted, and composted. Source Reduction was not included in the analysis.

Table ES-11
Iowa Greenhouse Gas Emissions[1] From Baseline Management of Municipal Solid Wastes

Material	Baseline Generation of Material (Tons)	Estimated Recycling (Tons)	Annual GHG Emissions from Recycling (MTCE)	Estimated Landfilling (Tons)	Annual GHG Emissions from Landfilling (MTCE)	Estimated Combustion (Tons)	Annual GHG Emissions from Combustion (MTCE)	Estimated Composting (Tons)	Annual GHG Emissions from Composting (MTCE)	Total Annual GHG Emissions (MTCE)
Aluminum Cans	28,411	21,979	(81,341)	6,432	67	0	0	NA	NA	(81,274)
Steel Cans	31,418	10,516	(5,145)	20,902	217	0	0	NA	NA	(4,929)
Copper Wire	0	0	0	0	0	0	0	NA	NA	0
Glass	99,872	63,428	(4,807)	36,444	378	0	0	NA	NA	(4,429)
HDPE	26,438	5,000	(1,898)	21,438	222	0	0	NA	NA	(1,676)
LDPE	610	610	(282)	0	0	0	0	NA	NA	(282)
PET	25,139	11,740	(4,924)	13,399	139	0	0	NA	NA	(4,785)
Corrugated Cardboard	330,237	149,625	(126,961)	180,612	19,718	0	0	NA	NA	(107,243)
Magazines/third-class mail	186,775	0	0	186,775	(15,337)	0	0	NA	NA	(15,337)
Newspaper	325,214	240,000	(182,719)	85,214	(20,176)	0	0	NA	NA	(202,895)
Office Paper	55,004	2,750	(2,139)	52,254	27,683	0	0	NA	NA	25,544
Phonebooks	0	0	0	0	0	0	0	NA	NA	0
Textbooks	0	0	0	0	0	0	0	NA	NA	0
Dimensional Lumber	344,525	167,665	(112,302)	176,860	(23,523)	0	0	NA	NA	(135,825)
Medium Density Fiberboard	0	0	0	0	0	0	0	NA	NA	0
Food Scraps	225,595	NA	NA	225,095	44,428	0	0	500	(27)	44,401
Yard Trimmings	101,573	NA	NA	34,300	(2,049)	0	0	67,273	(3,643)	(5,692)
Grass	0	NA	NA	0	0	0	0	0	0	0
Leaves	0	NA	NA	0	0	0	0	0	0	0

Table ES-11
Iowa Greenhouse Gas Emissions[1] From Baseline Management of Municipal Solid Wastes

Material	Baseline Generation of Material (Tons)	Estimated Recycling (Tons)	Annual GHG Emissions from Recycling (MTCE)	Estimated Landfilling (Tons)	Annual GHG Emissions from Landfilling (MTCE)	Estimated Combustion (Tons)	Annual GHG Emissions from Combustion (MTCE)	Estimated Composting (Tons)	Annual GHG Emissions from Composting (MTCE)	Total Annual GHG Emissions (MTCE)
Branches	0	NA	NA	0	0	0	0	0	0	0
Mixed Paper, Broad	349,636	153,214	(147,793)	196,422	18,653	0	0	NA	NA	(129,140)
Mixed Paper, Resid.	0	0	0	0	0	0	0	NA	NA	0
Mixed Paper, Office	0	0	0	0	0	0	0	NA	NA	0
Mixed Metals	250,620	178,000	(255,225)	72,620	753	0	0	NA	NA	(254,472)
Mixed Plastics	298,059	16,959	(6,911)	281,100	2,914	0	0	NA	NA	(3,997)
Mixed Recyclables	0	0	0	0	0	0	0	NA	NA	0
Mixed Organics	44,301	0	NA	31,620	2,037	0	0	12,681	(687)	1,351
Mixed MSW	1,007,566	0	NA	1,007,566	116,498	0	0	NA	NA	116,498
Carpet	575	575	(1,126)	0	0	0	0	NA	NA	(1,126)
Personal Computers	51,281	634	(391)	50,647	525	0	0	NA	NA	134
Clay Bricks	0	0	NA	0	0	NA	NA	NA	NA	0
Concrete	5,382	5,382	(11)	0	0	NA	NA	NA	NA	(11)
Fly Ash	0	0	0	0	0	NA	NA	NA	NA	0
Tires	0	0	0	0	0	0	0	NA	NA	0
Total	3,788,231	1,028,077	(933,975)	2,679,700	173,146	0	0	80,454	(4,357)	(765,185)

[1] The annual GHG emissions are reported as Metric Tons of Carbon Equivalent (MTCE). A negative value (i.e., a value in parentheses) indicates an emission reduction; a positive value indicates an emission increase.

Based on the WARM model results presented in Table ES-11, by recycling and composting in 2005, GHG emissions were reduced in Iowa by a net total of 765,185 MTCE.

The material types that provided the most net benefit in terms of reducing GHG emissions include:

1. Mixed Metals – 254,472 MTCE;
2. Newspaper – 202,895 MTCE;
3. Dimensional Lumber – 135,825 MTCE;
4. Mixed Paper – 129,140 MTCE; and
5. Corrugated Cardboard – 107,243 MTCE.

Recommendations

Overview

The following criteria were used in developing these recommendations:

- Projected economic impacts by commodity type;
- Supply/demand recyclable materials balance comparing materials processed and consumed;
- Calculated change in the quantities of materials recycled when comparing the 2001 Study results to the current Study results; and
- Industry knowledge and experience.

The recommendations have been organized into four groups as identified below:

- Facilitation and Analysis;
- Financial Incentives;
- Regulation; and
- Targeted Programs.

Facilitation and Analysis

Because of the IDNR's well-established role and involvement with recycling in Iowa, its access to key recycling industry players and relevant information/analysis can be leveraged to promote recycling market development. Provided below are recommended initiatives.

- Meet with key end-users of OCC to discuss the economic benefits of increasing the use of Iowa OCC in their manufacturing processes. Per the survey results (Section 3 of this report), eighty-five percent of the OCC consumed by end-users in 2005 was imported from outside Iowa. Following discussions with end-users,

evaluate the potential benefits and drawbacks of establishing regional recyclable materials market development consortiums to enhance the collection and marketing of Iowa OCC within the State.

- Conduct additional research to determine the specific quality of old newspaper (ONP) being generated by Iowa processors to identify the compatible end-uses (i.e., newspaper, boxboard, animal bedding, etc.). Per the survey results of those who responded, 61,350 tons of ONP was processed, however only 14,400 tons were reported consumed by end-users in 2005. Based on the results of this analysis, continue to research end-users of ONP, especially those who are importing ONP from out of the state.
- Monitor and facilitate additional growth in the recycling equipment manufacturing industry because of the unique niche composed by this sub-industry of recycling. The number of direct jobs associated with the recycling equipment manufacturing industry in 2005 was estimated to be 523, up from 360 in 2001.
- Continue to gather recycling data as related to the processing and end-use of C&D debris. More tons were reported processed than reported consumed in 2005. Gather more information on end-users in the state in an attempt to match them with processors of C&D debris.
- Develop an informational campaign targeted toward Iowa's construction industry to promote the recycling of C&D materials at large job sites.
- Continue to gather recycling data as related to the processing and end-use of organics, especially food residuals. This is an area of waste diversion that is growing nationwide. Per the survey respondents, 11,000 tons of food residuals were processed in 2005, however no end-users were identified. It is likely most of the food is being composted with yard trimmings. Upon gathering additional organics processing and end-use data, revisit the economic impacts of this diversion activity.
- Monitor the growth in the end-of-life electronics recycling industry, as this continues to be a growing part of the waste stream. Consider development of a business prospectus that highlights the opportunities for electronics processing and end-use in the state.
- Recycled plastic continues to be an underutilized commodity based on the materials commodity flow analyses. In 2005, more tons of plastic (specifically PET and mixed plastics) were processed than consumed by end-users in Iowa. Because average prices paid by end-users have increased dramatically since the 2001 Study, overall economic impacts are greater. The plastics processing industry had the highest jobs multiplier in this Study at 2.53, compared to the fourth highest at 1.73 in the 2001 Study. We recommend enhancing additional processing and end-use opportunities for plastics in Iowa.
- Include the recycling survey as part of the comprehensive solid waste management planning requirements. It would be in each planning area's best interest to encourage their municipalities and businesses associated with

recycling to respond to the survey. If the survey is periodically required, respondents may be more likely to complete it.

Financial Incentives

In order to determine which commodities, when recycled, create the most jobs, the multipliers can be compared. Table ES-12 below lists the jobs multipliers for each commodity, in descending order.

Table ES-12
Total Jobs Multipliers
(2007 Study)

Commodity	Jobs Multiplier
Plastics	2.53
All Other Metal	2.48
Aluminum	2.39
Old Corrugated Containers	1.74
Glass	1.69
Wood	1.65
All Other Paper	1.64

Table ES-12 shows that for every 100 jobs directly created in the plastics recycling industry, 153 additional jobs are created through supporting economic activity. This is followed by metal (other than aluminum), aluminum, and OCC.

The collection and processing infrastructure for aluminum beverage containers is well established in Iowa as a result of the Iowa "bottle bill". Thus, even though the jobs multipliers for aluminum are third highest of the commodities, we would not recommend resources be put towards enhancing the processing of aluminum scrap.

The materials flow analysis identified excess supply of most recycled plastics. As shown in Table ES-12, plastics represents the largest jobs multiplier. Therefore, we recommend that resources be put forth to promote increased end-use of various plastics, especially PET and mixed plastics.

The following represents additional financial program incentives that should be considered by the IDNR to address commodity flow to balance supply and demand:

- Offer an OCC processing subsidy to Iowa processors to promote an increase in the supply of OCC. This subsidy would be offered directly to processors for marketing Iowa-generated OCC to Iowa end-users.
- Enhance the end-use of wood waste by providing additional targeted grants to other potential end-users of wood waste.

- Develop and distribute a business prospectus for attracting a large user of ONP to the state of Iowa upon identifying the end-use most compatible with the ONP supply.

Regulation

The use of various regulatory approaches can be used to stimulate the market. Some approaches for consideration include:

- State-wide landfill disposal ban of OCC to generate an increased supply of OCC.
- State-wide landfill disposal ban of selected wood waste items, such as pallets.
- Expand the beverage container deposit law to include non-carbonated beverages, to capture the increasing number of PET and HDPE single-serve, plastic containers from water, juice and sports drinks.

Targeted Programs

The IDNR has several state programs that are designed to reduce waste and promote recycling in Iowa including:

- Solid Waste Alternatives Program (SWAP);
- Pollution Prevention Services (P2); and
- Iowa Waste Exchange (IWE).

R. W. Beck has reviewed these programs and identified the economic impacts these programs had on the recycling industry in Iowa in 2005.

Solid Waste Alternatives Program

The economic impacts from the recyclable materials processed through SWAP are a subset of the statewide results shown in Section 4 of this report. The SWAP material category with the highest industrial output was "Old Corrugated Containers" at $4.5 million in receipts. The labor income multiplier for OCC of 1.75 means that for every dollar in labor income in the direct sector, $0.75 in additional income is sustained in the rest of the economy. The total labor income from processing OCC through SWAP was estimated to provide over $3 million in 2005.

Pollution Prevention Services

When calculated as a percentage of the total tons and total receipts in 2005, the estimated economic impacts of P2 Services was very small. The estimate only included quantities recycled, and did not reflect the program's impacts realized through the energy, water, and air emissions savings generated. The total number of jobs for all commodities combined was calculated to be less than two; therefore R. W. Beck did not provide a detailed characterization of the P2 results. This does not imply the program is not beneficial. Per the IDNR, in 2005, the P2 Intern Program assisted approximately 27 businesses, resulting in overall cost savings of over $4.1 million, averaging more than $150,000 in cost savings per company.

Iowa Waste Exchange

The IWE material category with the highest industrial output was "All Other Metal" at $7.6 million in receipts. The labor income multiplier for "All Other Metal" of 2.5 means that for every dollar in labor income in the direct sector, $1.50 in additional income is sustained in the rest of the economy. The total estimated labor income from processing metals (other than aluminum) through IWE resulted in $1.4 million in 2005.

Impacts of Targeted Programs

Each of the IDNR's targeted programs positively impact Iowa's recycling industry. Because of their different objectives, the programs cannot be easily compared in terms of their level of success. R. W. Beck's analysis was based solely on tons processed. The SWAP program had the largest impact on landfill diversion.

The P2 program and the IWE both result in cost savings while SWAP projects tend to finance diversion and recycling infrastructure, which will result in cost savings in the future.

Of the three programs, SWAP made the largest monetary contribution to source reduction, recycling, and education programs in 2005, while the IWE provided support to the greatest number of entities, by assisting over 2,000 businesses. In general, it is more difficult to measure quantities of waste reduced compared to quantities of waste recycled.

It is our recommendation that the State continue to support these three important programs, as each program has proven to be successful in helping reduce the amount of waste generated in Iowa, as well as increase the quantities of materials recycled.

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