Section 8
RECOMMENDATIONS

8.1 Project Objective and Purpose

In 1997, the IDNR's objective of the Economic Impacts of Recycling in Iowa study was to:

- Measure the current economic impacts of recycling activities (collectors, processors, brokers, end-users, and recycling equipment manufacturers) on Iowa employment, income, and tax revenue; and
- Identify specific recyclable material market development opportunities that maximize beneficial impacts upon Iowa's economy.

R. W. Beck conducted the 1997 study, as well as a follow-up study in 2000, to again assess the economic impacts of recycling on Iowa's economy. Because the recycling industry in Iowa is continually changing, the IDNR chose to again update the study in 2006 to better position itself to assist businesses by:

- Finding additional markets for recyclable materials;
- Fine-tuning its technical assistance;
- Assisting with short- and long-term planning efforts;
- Advocating funding for program support and policy implementation; and
- Promoting the major role Iowa's recycling industry plays in the Iowa economy.

The results of this Study will allow the IDNR to improve current statewide programs of the Department of Natural Resources like Pollution Prevention Services, Iowa Waste Exchange (IWE) and the Solid Waste Alternatives Program (SWAP). These three programs in 2005 saved Iowa businesses over $5 million dollars and invested $3 million dollars in Iowa's recycling industry.

In addition to updating the study and comparing the results to the 2001 Study, this update included two additional tasks:

1. Analyze the impacts of the remanufacturing and reuse industries on Iowa's economy; and
2. Analyze the environmental impacts, in terms of GHG emission reductions, of recycling in Iowa.

8.2 Recommendations

8.2.1 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.

8.2.2 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 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. Potential diversion opportunities for certain C&D material are listed below:
  - Drywall/Gypsum. Recovery and recycling opportunities for drywall are beginning to emerge, as some states are considering banning gypsum drywall from landfills. The reason for the bans is not only because of the development of hydrogen sulfide gas when gypsum is mixed with moisture, but also due to the strong sulfur odor emitted by decaying gypsum.

    Drywall is often ground up and used as a soil fertilizer because the gypsum from drywall is a source of calcium and sulfur similar to agricultural gypsum. Many communities promote donating clean sheets of drywall to building projects such as Habitat for Humanity. Until recycling markets emerge in the region for drywall, it is recommended that the state promote the separation and donation of clean drywall to non-profit construction and renovation projects. Provided below are references to websites regarding gypsum drywall recycling.

    - WasteCap Wisconsin, "Drywall Reuse and Recycling Documents": http://www.wastecapwi.org/drywall.htm
    - California Integrated Waste Management Board, "Wallboard (Drywall) Recycling": http://www.ciwmb.ca.gov/ConDemo/Wallboard/#Processors
  - Non-treated wood. Non-treated wood is typically one of the largest material categories in the C&D waste stream. This subcategory of wood is primarily associated with pallets and crates. The largest barrier associated with the recovery of this material is generally the extent of contamination. Most pallet companies take back old pallets and use the wood in the remanufacturing of new pallets or process the broken pieces into wood chips for mulch or for use in wood burning stoves. Many municipalities accept wooden pallets for grinding or chipping as part of their wood waste and composting program.

    The state may also consider researching and promoting to the business community the use of reusable plastic pallets for shipping. Reusable shipping containers, including plastic pallets, can help businesses reduce their long-term costs while preventing unnecessary waste by reducing packaging costs, reducing damage to goods, reducing labor costs of handling pallet waste, and avoiding disposal costs.

A list of references for reusable shipping container information is provided below.

- State of Oregon Department of Environmental Quality, "Packaging Waste Reduction Best Practices, Plastic Pallets": http://www.deq.state.or.us/lq/pubs/docs/sw/packaging/bpplasticpallets.pdf
- Minnesota Pollution Control Agency, "Reusable Transport Packaging Directory": http://www.pca.state.mn.us/oea/transport/

- Asphalt shingles. The largest barrier associated with the recovery of shingles is generally lack of markets. In certain states, markets exist for asphalt shingles including hot mix asphalt, aggregate road base, dust control on rural roads, and fuel. References to shingle recycling are provided below.
  - Shingle Recycling website: http://www.shinglerecycling.org/
  - Minnesota Pollution Control Agency, "Roofing Shingles into Roads": http://www.moea.state.mn.us/lc/purchasing/shingles.cfm
  - National Association of Home Builders (NAHB) Research Center, "From Roofs to Roads": http://www.epa.gov/epaoswer/non-hw/debris-new/pubs/roof_br.pdf#search=%22shingle%20recycling%22

- 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 and in fiscal year 2006, SWAP identified organics as a specific material in the waste stream to be targeted for increased diversion opportunities. 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.

8.2.3 Financial Incentives

As discussed in Section 6, this Study used an updated modeling system in which the multiplier is referred to as a social account matrix or SAM multiplier rather than the previous Type I and Type II multipliers. The SAM multiplier is preferred within the economic modeling industry because it includes the contributions of households as industries and exchangers of production goods and services when calculating economic impacts.

In order to determine which commodities, when recycled, create the most jobs, the multipliers can be compared. Table 8-1 below lists the jobs multipliers for each commodity, in descending order.

Table 8-1
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 8-1 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 8-1, 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.

8.2.4 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.

8.2.5 Targeted Programs

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

- Solid Waste Alternatives Program;
- Pollution Prevention Services; and
- Iowa Waste Exchange.

The economic impacts of the state's targeted programs in 2005 were calculated using the estimated tons of recyclable material reported by the IDNR that were sent for processing[1] as a result of these programs. These tons were calculated as a fraction of the "All Suppliers" tons in Table 4-2 of this report. The fractions were then multiplied by the "Expected 2005 Gross Receipts" also found in Table 4-2. The economic multipliers used in Tables 8-2 and 8-3 of this section were derived from Table 4-4, "Estimated Economic Impacts of Iowa's Recycled Commodity Processing Industries".

[1] Per the IDNR, the tons provided do not include program numbers on any internal or external material reclaim/reuse projects, waste reduction projects, end-market development projects, or beneficial use activities such as alternative daily cover for landfills. They are limited to the types of diverted materials included for analysis in this economic study. These numbers do include materials reportedly diverted in 2005 from funded projects.

8.2.5.1 Solid Waste Alternatives Program

SWAP works to reduce the amount of solid waste generated and the amount and toxicity of solid waste landfilled in Iowa. Through a competitive process, financial assistance is available for a variety of projects including source reduction, recycling, market development and education.

Recipients of SWAP funding include local government programs, Iowa business and industry projects, market development efforts and educational initiatives aimed to divert waste from being landfilled in Iowa.

The program provides financial assistance in the form of forgivable loans, zero interest loans, and three-percent interest loans. A fifty percent cost share is required through cash and in-kind matches. Projects are selected through a quarterly competitive process.

In 2005, a total of thirty-eight (38) SWAP projects were funded. Nearly $2.4 million dollars were awarded to diversion projects and contractors' matching funds exceeded $4.1 million, bringing SWAP's total financial investment to reduce the quantities of solid waste being generated and landfilled to over $6.5 million, per the IDNR.

Table 8-2 shows the estimated economic impacts of SWAP in 2005, as a percentage of the statewide tons and total receipts.

Table 8-2
Estimated Economic Impacts of the Solid Waste Alternatives Program[1]
(2007 Study)[2]

Old Corrugated Containers	Direct	Indirect	Induced	Total[3]	Multiplier
Industrial Output($)	4,569,132	659,417	416,632	5,645,182	1.24
Value Added($)	3,133,266	859,236	655,058	4,647,560	1.48
Labor Income($)	1,717,089	737,437	554,851	3,009,378	1.75
Jobs	73	32	22	127	1.74
All Other Paper	**Direct**	**Indirect**	**Induced**	**Total[3]**	**Multiplier**
Industrial Output($)	4,003,294	481,463	332,127	4,816,884	1.2
Value Added($)	2,906,310	684,104	568,810	4,159,223	1.43
Labor Income($)	1,663,003	595,174	488,928	2,747,105	1.65
Jobs	74	27	21	122	1.64
Plastics	**Direct**	**Indirect**	**Induced**	**Total[3]**	**Multiplier**
Industrial Output($)	2,870,028	621,303	750,288	4,241,620	1.48
Value Added($)	815,210	189,574	283,167	1,287,950	1.58
Labor Income($)	151,558	97,634	140,406	389,599	2.57
Jobs	7	4	6	17	2.53
Glass	**Direct**	**Indirect**	**Induced**	**Total[3]**	**Multiplier**
Industrial Output($)	138,847	47,555	33,704	220,107	1.59
Value Added($)	84,635	49,738	18,237	152,610	1.8
Labor Income($)	92,679	46,437	17,374	156,490	1.69
Jobs	5	2	1	8	1.69
Aluminum	**Direct**	**Indirect**	**Induced**	**Total[3]**	**Multiplier**
Industrial Output($)	422,032	112,679	73,653	608,365	1.44
Value Added($)	110,787	27,272	22,264	160,323	1.45
Labor Income($)	13,339	10,598	8,250	32,188	2.41
Jobs	0	0	0	1	2.39
All Other Metal	**Direct**	**Indirect**	**Induced**	**Total[3]**	**Multiplier**
Industrial Output($)	1,292,258	372,997	235,549	1,900,804	1.47
Value Added($)	395,961	138,250	107,279	641,490	1.62
Labor Income($)	96,695	83,055	62,460	242,209	2.5
Jobs	3	3	2	8	2.48
All Commodities[4]	**Direct**	**Indirect**	**Induced**	**Total[3]**	**Multiplier**
Industrial Output($)	13,295,593	2,295,415	1,841,954	17,432,961	1.41
Value Added($)	7,446,168	1,948,173	1,654,814	11,049,156	1.53
Labor Income($)	3,734,364	1,570,336	1,272,270	6,576,969	1.92
Jobs	162	69	52	283	1.86

[1] Based on materials processing activities only.

[2] All data is for calendar year 2005. Source of data: Iowa Department of Natural Resources.

[3] Totals may not sum due to rounding.

[4] Wood Scrap was not included in this analysis because the tonnage estimated by the IDNR as diverted through SWAP in 2005 was disproportionate to the other commodities and therefore was considered an outlier.

The economic impacts from these materials processed through SWAP are a subset of the statewide results shown in Table 4-4 of this report. As discussed in Section 4, the direct industrial output corresponds with the expected receipts for that industry that were displayed in Table 4-2. The highest category for industrial output was "Old Corrugated Containers" at $4.5 million in receipts. The indirect values represent industrial inputs into production to produce the direct commodity that we are measuring. Induced activity comes about as a result of workers receiving salaries and

wages and converting them into household spending. The sum of all direct, indirect, and induced values in a category yields the total economic value.

The economic multiplier is simply a ratio of the total economic value in a category to the direct value, or the expected change in the total economy per unit change in the direct value. The multipliers identified in Table 4-4 were used in Table 8-2. For example, 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.

The economic assumptions are the same as developed through the survey process; sales, number of employees, and employee compensation were used to assess the economic impacts of commodity production.

Each year since fiscal year 2003, SWAP has identified specific waste streams to be targeted and seeks out applications for projects that focus on addressing those wastestreams. In fiscal year 2006, SWAP's targeted wastestreams included:

- Electronics waste;
- Organics; and
- Construction and demolition waste.

These are three wastestreams in which diversion opportunities continue to emerge nationwide as communities move toward restricting or banning these materials from being landfilled. Per our survey results, more data is required from collectors and processors of these three material categories to determine the full impact on Iowa's economy.

8.2.5.2 Pollution Prevention Services

Pollution Prevention (P2) Services, and its predecessor, the Waste Reduction Assistance Program (WRAP), were established to help Iowa organizations and companies adopt sustainable business practices. The assistance is offered at no-cost, and is confidential and non-regulatory.

Organizations working with Pollution Prevention Services have access to an assortment of waste reduction assistance, technology transfer opportunities, case studies, vendor lists, technical conferences and workshops, and waste exchange services.

Clients include business and industry, institutions, government agencies with more than 100 employees, Resource Conservation & Recovery Act (RCRA) Large Quantity Generators, and Toxics Release Inventory (TRI) reporting facilities.

The assistance provided by Pollution Prevention Services include:

- Initial consultation;
- Plant-wide or focused assessments;
- Project and program evaluation;

- Pollution prevention program;
- Environmental Management Systems development assistance;
- Source reduction alternatives;
- Educational workshops and training; and
- Pollution Prevention Intern Program.

The Pollution Prevention Intern Program plays a large role in conducting P2 assessments while providing upper-level undergraduate and graduate students from Iowa with hands-on experience in reducing pollution, waste, and toxicity for Iowa companies and public organizations using P2 strategies. The cost savings are typically determined by the reduction of waste being generated (including solid waste, special waste, and hazardous waste), the gallons of water conserved, and the amount of energy reduced. Besides cost savings, other reductions are calculated such as air emissions avoided and green house gas emissions reduced or diverted.

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.

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 include a detailed characterization of the results. Obviously this does not imply the program is not beneficial; the preceding paragraph outlines the positive impacts of P2 Services.

8.2.5.3 Iowa Waste Exchange

The IWE is a no-cost, non-regulatory, confidential service that matches institutions that produce by-products and waste with other groups interested in using or recycling those materials. The program helps businesses, schools, hospitals and communities save disposal money and protect the environment by reducing, reusing and recycling materials.

In 2005, the IWE program assisted 2,212 businesses and diverted nearly 71,000 tons from being landfilled by matching businesses with items available with businesses needing particular items or materials. The cost savings attributed to diversion through the IWE program was estimated by the IDNR at over $2.2 million.

The estimated economic impacts of the IWE in 2005, as a percentage of the total tons and total receipts, are shown below in Table 8-3.

Table 8-3
Estimated Economic Impacts of the Iowa Waste Exchange Program[1]
(2007 Study)[2]

Old Corrugated Containers	Direct	Indirect	Induced	Total[3]	Multiplier
Industrial Output($)	185,720	26,803	16,935	229,458	1.24
Value Added($)	127,357	34,925	26,626	188,908	1.48
Labor Income($)	69,794	29,974	22,553	122,321	1.75
Jobs	3	1	1	5	1.74
All Other Paper	**Direct**	**Indirect**	**Induced**	**Total[3]**	**Multiplier**
Industrial Output($)	268,014	32,233	22,235	322,482	1.2
Value Added($)	194,573	45,799.59	38,081	278,453	1.43
Labor Income($)	111,335	39,845.91	32,733	183,914	1.65
Jobs	5	2	1	8	1.64
Plastics	**Direct**	**Indirect**	**Induced**	**Total[3]**	**Multiplier**
Industrial Output($)	862,440	186,701	225,461	1,274,602	1.48
Value Added($)	244,970	56,967	85,091	387,028	1.58
Labor Income($)	45,543	29,339	42,192	117,074	2.57
Jobs	2	1	2	5	2.53
Glass	**Direct**	**Indirect**	**Induced**	**Total[3]**	**Multiplier**
Industrial Output($)	4,963	1,700	1,205	7,867	1.59
Value Added($)	3,025	1,778	652	5,454	1.8
Labor Income($)	3,312	1,660	621	5,593	1.69
Jobs	0	0	0	0	1.69
Aluminum	**Direct**	**Indirect**	**Induced**	**Total[3]**	**Multiplier**
Industrial Output($)	17,922	4,785	3,128	25,835	1.44
Value Added($)	4,705	1,158	945	6,808	1.45
Labor Income($)	566	450	350	1,367	2.41
Jobs	0	0	0	0	2.39
All Other Metal	**Direct**	**Indirect**	**Induced**	**Total[3]**	**Multiplier**
Industrial Output($)	7,640,842	2,205,452	1,392,750	11,239,043	1.47
Value Added($)	2,341,229	817,444	634,315	3,792,988	1.62
Labor Income($)	571,735	491,085	369,311	1,432,131	2.5
Jobs	19	16	11	46	2.48
Wood Scrap	**Direct**	**Indirect**	**Induced**	**Total[3]**	**Multiplier**
Industrial Output($)	284,517	41,061	18,156	343,734	1.21
Value Added($)	344,112	116,501	61,719	522,332	1.52
Labor Income($)	253,607	108,917	57,352	419,876	1.66
Jobs	11	5	2	19	1.65
All Commodities	**Direct**	**Indirect**	**Induced**	**Total[3]**	**Multiplier**
Industrial Output($)	9,264,416	2,498,735	1,679,869	13,443,021	1.41
Value Added($)	3,259,969	1,074,572	847,430	5,181,971	1.53
Labor Income($)	1,055,894	701,271	525,112	2,282,276	1.92
Jobs	40	26	18	84	1.86

[1] Based on materials processing activities only.

[2] All data is for calendar year 2005. Source of data: Iowa Department of Natural Resources.

[3] Totals may not sum due to rounding.

The highest category for 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.

Determining the economic impacts of diverting C&D, organics, electronics and tires through the SWAP and IWE programs was problematic. As was mentioned in Section 4.6.2, the survey results did not provide a definitive characterization of the overall size of these activities in Iowa, especially on the processing side where the economic impacts are compiled. Because the methodologies used for these materials differed than for the other commodities, we did not estimate economic impacts for these materials.

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 described above, 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.