Status of Recycling Report 2003

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Recycling is working in Wisconsin. The state's approach of targeted landfill bans and local control, coupled with an emphasis on education, has created a nationally recognized and successful program. The items banned from landfills have a high recycling rate and 94% of our residents recycle.

Since the inception of the Recycling Law in 1990, DNR has used several sources of information to measure the program's success. Responsible Units (local units of government assigned responsibility for recycling) provide us with information on residential recycling, and landfill operators submit information on the tons of material landfilled. In addition, we've contracted with Franklin Associates, Ltd. to do Municipal Solid Waste (MSW) generation and disposition studies for 1990, 1995, and 2000 and with the UW Survey Center to do household recycling phone surveys in 1990 through 1995, 1998 and 2002. Just recently, we contracted with Cascadia Consulting Group, Inc. to conduct a statewide waste characterization study of Wisconsin's MSW landfills.

The Cascadia study involved physically sorting waste from 400 samples collected at 14 Wisconsin MSW landfills and extrapolating from sample results to develop statewide estimates. Franklin used more of a desk-top approach, basing their analysis on secondary data and national trends. In many instances, Franklin recognized the value of Cascadia's real field data and adjusted their database accordingly. This report will focus on the Franklin and Cascadia studies to provide an update on the status of recycling and waste diversion in Wisconsin.

Franklin Associates, Ltd. 2000 MSW Characterization and Disposition Results

Table 1 shows Franklin's current calculations for MSW characterization and disposition for the year 2000. Note that Franklin is continuously updating its database as new and more reliable information on generation and disposition for each waste category becomes available. In June 2003, Franklin revised its Table 2-2, *Estimated Disposition of Wisconsin MSW in 2000*, based on its revised generation data and more accurate landfill estimates from Wisconsin's Waste Sort conducted by Cascadia Consulting Group, Inc. Franklin's original *Waste Characterization and Management Study Update for 2000* and its revised tables can be found on our web site at: http://dnr.wi.gov/topic/Recycling/studies.html.

Table 1 – Estimated Generation and Disposition of Wisconsin MSW in 2000
(Franklin Associates Ltd. Table 2-2 Revised)

Waste Category MSW	Generation (tons/year)	Recovered for Recycling (tons/year)	Combusted with Energy Recovery (tons/year)	Burn Barrels (tons/year)	Landfilled (tons/year)
Newspaper	261,710	176,380	1,400	3,380	80,550
Corrugated containers	661,580	476,000	8,370	1,950	175,260
Magazines and Catalogs	74,850	23,120	640	780	50,310
High grade office paper	159,710	44,410	3,080	3,050	109,170
Mixed waste paper[1]	577,880	172,260	11,560	24,630	369,430
Aluminum beverage cans	32,950	18,220	180	410	14,140
Steel cans	55,310	29,890	490	1,140	23,790
Foam polystyrene packaging	10,160	50	110	260	9,740
Foam polystyrene nondurable goods	12,930	0	140	100	12,690
Plastic containers[2]	70,730	29,250	1,120	2,620	37,740
Other plastic packaging	130,020	1,730	3,420	7,980	116,890
Other plastic nondurable goods	108,580	0	2,900	4,560	101,120
Glass containers[3]	191,270	109,470	2,810	5,010	73,980
Yard trimmings	287,580	225,240	0	0	62,340
Food waste	663,860	6,500	17,540	30,510	609,310
Disposable diapers	57,450	0	1,530	3,990	51,930
Vehicle batteries	38,530	37,340	30	0	1,160
Tires	97,260	6,150	63,410	0	27,700
Textiles, rubber, & leather products	137,530	22,670	3,060	6,380	105,420
Carpets & rugs	49,040	50	1,310	0	47,680
Major appliances	71,310	71,310	0	0	0
Furniture & furnishings	158,800	0	4,240	0	154,560
Miscellaneous durables	220,700	11,700	5,580	13,670	189,750
Consumer electronics[4]	29,870	1,510	760	0	27,600
Wood pallets	154,760	23,630	4,370	0	126,760
Miscellaneous packaging	17,360	0	460	910	15,990
Miscellaneous inorganic wastes	66,710	0	1,780	2,620	62,310
Total MSW	4,398,440	1,486,880	140,290	113,950	2,657,320
Percent of Total Generation		34%	3%	3%	60%

* Items highlighted in yellow (lightly shaded) are changes made by Franklin Associates, Ltd.
Items highlighted in blue (darkly shaded) are changes made by Franklin based on Cascadia's Waste Characterization Study

(1) Includes Cascadia Categories of Mixed paper, Compostable paper, and Boxboard. Does not include Misc. paper

(2) Includes PET bottles, HDPE bottles-natural and colored

(3) Recyclable Glass

(4) Includes Televisions, Computer Monitors and Equipment, and Electronic Equipment

Source: Franklin Associates, Ltd. 2003

The Cascadia Consulting Group, Inc. 2001 Statewide Waste Characterization Results

Cascadia's detailed landfill composition profile in Table 2 includes mean percents and annual tonnage estimates for 62 defined waste categories found in Wisconsin's municipal solid waste stream (excluding out-of-state waste). Cascadia conducted its study in 2002 and applied it to the 2001 landfill tonnage reported to the DNR. The area highlighted in gray is the *mean*, which is the best estimate of the material's presence (percentage by weight) found in Wisconsin landfills. The *low* and the *high* are the confidence intervals around the means, calculated at 90%, which means there is a 90% chance that the actual weight falls within this range. These estimates were calculated based on the sorting of 400 samples at 14 different landfills with waste coming from three different substreams – residential, industrial/commercial/ institutional, and construction/demolition. Cascadia's complete *Wisconsin Statewide Waste Characterization Study* can be found on our web site at: http://dnr.wi.gov/topic/Recycling/studies.html.

Table 2 – 2001 MSW Landfill composition Profile for Wisconsin (Cascadia Consulting Group, Inc. Table 3-3)

Calculated at a 90% confidence level

	Tons	Mean	Conf. Interval Low	Conf. Interval High		Tons	Mean	Conf. Interval Low	Conf. Interval High
Paper	**987,646**	**20.8%**			***C&D***	**1,364,053**	**28.7%**		
Newsprint	92,270	1.9%	1.7%	2.2%	Wood - treated	44,459	0.9%	0.4%	1.4%
High Grade Paper	65,585	1.4%	1.1%	1.7%	Wood - untreated	607,650	12.8%	10.7%	14.9%
Magazines/Catalogs	47,381	1.0%	0.8%	1.1%	Rock/Concrete/Brick	165,727	3.5%	2.2%	4.8%
Cardboard - recyclable	188,176	4.0%	3.0%	4.9%	Drywall	80,164	1.7%	1.1%	2.2%
Cardboard - coated	11,123	0.2%	0.1%	0.4%	Roofing Shingles	284,752	6.0%	4.0%	8.0%
Boxboard	34,835	0.7%	0.7%	0.8%	PVC	2,261	0.0%	0.0%	0.1%
Mixed Recyclable Paper	201,715	4.2%	3.9%	4.6%	Ceramics/Porcelain	15,640	0.3%	0.2%	0.5%
Compostable Paper	228,310	4.8%	4.3%	5.3%	Other C&D	163,399	3.4%	2.1%	4.7%
R/C Paper	118,250	2.5%	1.8%	3.2%	***Problem Wastes***	**367,230**	**7.7%**		
Plastics	**499,313**	**10.5%**			Televisions	23,915	0.5%	0.2%	0.8%
PET Bottles	19,610	0.4%	0.4%	0.5%	Computer Monitors	10,052	0.2%	0.0%	0.4%
HDPE Bottles - natural	8,382	0.2%	0.1%	0.2%	Computer Equipment	2,779	0.1%	0.0%	0.1%
HDPE Bottles - colored	10,373	0.2%	0.2%	0.3%	Electronic Equipment	64,472	1.4%	1.0%	1.7%
#3-#7 Other Plastic Bottles	809	0.0%	0.0%	0.0%	White Goods - refrigerated	13,816	0.3%	0.0%	0.5%
Polystyrene	22,435	0.5%	0.4%	0.5%	White Goods - non-refrigerated	12,132	0.3%	0.0%	0.5%
Other Rigid Plastic Containers	74,119	1.6%	1.1%	2.0%	Lead-Acid Batteries	6,985	0.1%	0.0%	0.3%
Plastic Film	188,990	4.0%	3.6%	4.4%	Other Household Batteries	2,832	0.1%	0.0%	0.1%
R/C Plastic	174,597	3.7%	2.9%	4.4%	Tires	27,701	0.6%	0.2%	1.0%
Metal	**299,245**	**6.3%**			Bulky Items	124,612	2.6%	1.8%	3.4%
Aluminum Cans	16,291	0.3%	0.3%	0.4%	Fluorescent Lights	242	0.0%	0.0%	0.0%
Other Aluminum	15,025	0.3%	0.2%	0.4%	Ballasts	767	0.0%	0.0%	0.0%
Tin Cans	25,715	0.5%	0.4%	0.6%	Pallets	76,926	1.6%	1.0%	2.3%
Ferrous Metals	171,086	3.6%	2.6%	4.6%	***Household Hazardous***	**26,155**	**0.6%**		
Non-Ferrous Metals	5,965	0.1%	0.1%	0.2%	Latex Paint	6,988	0.1%	0.0%	0.3%
R/C Metal	65,163	1.4%	0.9%	1.8%	Oil Paint	1,095	0.0%	0.0%	0.0%
Glass	**107,862**	**2.3%**			Pesticides/Fertilizers	0	0.0%	0.0%	0.0%
Glass - recyclable	42,721	0.9%	0.8%	1.0%	Auto Used Oil Filters	1,874	0.0%	0.0%	0.1%
R/C Glass	65,141	1.4%	0.6%	2.2%	Mercury	6	0.0%	0.0%	0.0%
Organics	**853,914**	**18.0%**			Other Hazardous	16,191	0.3%	0.0%	0.7%
Yard Waste - <6"	56,562	1.2%	0.8%	1.6%	***Other Wastes***	**246,800**	**5.2%**		
Yard Waste - >6"	5,359	0.1%	0.0%	0.2%	Textiles	115,867	2.4%	1.9%	3.0%
Food	486,619	10.2%	9.0%	11.4%	Carpet	116,160	2.4%	1.4%	3.5%
Diapers	85,006	1.8%	1.5%	2.1%	Carpet Padding	14,773	0.3%	0.2%	0.5%
Animal Waste/Kitty Litter	45,260	1.0%	0.7%	1.2%					
Bottom Fines/Dirt	79,296	1.7%	1.4%	1.9%					
R/C Organic	95,812	2.0%	1.5%	2.5%					
Total Tons	**4,752,218**								
Sample Count	**400**								

The top ten items by weight (and the proportion of the total amount landfilled) found in the waste characterization study are:

Waste Category	Tons in Landfill	% of Landfill
untreated wood	607,650 tons	12.8%
food waste	486,619 tons	10.2%
roofing shingles	284,752 tons	6.0%
compostable paper[1]	228,310 tons	4.8%
mixed recyclable paper[2]	201,715 tons	4.2%
plastic film	188,990 tons	4.0%
recyclable cardboard	188,176 tons	4.0%
RC plastic[3]	174,597 tons	3.7%
ferrous metals	171,086 tons	3.6%
rock/concrete/brick	165,727 tons	3.5%

Most of these 10 items appear to be in sufficient quantity to offer significant opportunities for increased diversion of waste material going to our landfills.

Comparing Franklin and Cascadia Results

Table 3 compares Franklin's revised results with Cascadia's. We encountered a number of problems when we tried to match information from the two studies. The Franklin study looked at MSW for 2000 and Cascadia looked at MSW landfilled for 2002 and applied its results to 2001 MSW landfill totals. Franklin uses a more narrow definition of municipal waste, and its study only covers a portion of the material that actually ends up in municipal landfills, while Cascadia samples all of the material that is thrown in municipal landfills. Also, Franklin uses "dry", uncontaminated weight for all of its data while Cascadia uses actual weight, which includes added moisture and contamination. Cascadia tried to use the same definition for individual components in the waste stream in its study with those used by Franklin. In some instances, however, Cascadia split a component into two that Franklin considers as one to better define the recycling potential of that waste material or to give us more detailed information on a specific waste category.

We addressed these problems by lumping some of Cascadia's components, only comparing components covered by Franklin, and using a contamination correction factor developed by the state of Oregon[4]. We decided not to apply another correction factor to account for the difference in the amounts landfilled between 2000 and 2001 since the difference was less than three percent.

[1] Compostable paper is defined as tissues and paper products (including OCC) that are soiled with food, such as: paper plates, paper cups, pizza boxes, popcorn bags, paper towels etc.

[2] Mixed paper is defined as paper that would be included in residential "mixed mail" or commercial "office pack" recycling programs, such as paper bags, envelopes, egg cartons, tissue roles cores, telephone directories, books, "junk" mail, etc.

[3] R/C plastic is defined as all plastic that doesn't fit into the other plastic categories and items that are primarily plastic but include other materials such as paper or metal, such as: molded toys, disposable razors, credit cards, writing pens, etc.

[4] Cascadia was very familiar with the Oregon Waste Composition Study and the development and use of its contamination correction factors. Though Oregon cautions against using these factors in other studies, Cascadia felt confident that they could be applied to its Wisconsin data. Note: many items that retain water when wet have very high negative correction factors (newspapers, corrugated containers, mixed waste paper, carpet, textiles, etc.), while other items actually lose moisture in the landfills so they have positive correction factors (yard and food waste). The Oregon Study can be found at http://www.deq.state.or.us/lq/sw/disposal/wastecompositionstudy.htm.

Table 3 – Comparison of Franklin and Cascadia Results for MSW Landfill Composition in Wisconsin

	A	B	C	D	E
	Franklin (Revised 2003)	**Cascadia Actual** (Wet)	**Cascadia Adjusted with Correction Factor**	**Correction Factor**[1]	**Cascadia Adjusted vs. Franklin** (Col. C vs. Col. A)
	Landfilled (tons)	Landfilled (tons)	Landfilled (tons)	Contamination	% Difference[2]
Newspaper	80,550	92,270	80,164	-13.12%	0%
Corrugated containers	175,260	199,300	175,264	-12.06%	0%
Magazines	50,310	47,380	47,228	-0.32%	-6%
High grade office paper	109,170	65,585	62,142	-5.25%	-55%
Mixed waste paper*	369,430	464,860	372,632	-19.84%	1%
Aluminum beverage cans	14,140	16,291	14,139	-13.21%	0%
Steel cans	23,790	25,715	23,434	-8.87%	-2%
Foam polystyrene[3]	22,430	22,435	22,435	NA	0%
Plastic containers*	37,740	38,365	31,079	-18.99%	-19%
Other plastic packaging	116,890				
Other plastic nondurable goods	101,120				
Glass containers	73,980	42,721	42,537	-0.43%	-54%
Yard trimmings*	62,340	61,921	62,336	0.67%	0%
Food waste	609,310	486,619	502,872	3.34%	-19%
Disposable diapers	51,930	85,006	85,006	0.00%	48%
Vehicle batteries	1,160	6,985	6,985	0.00%	143%
Tires	27,700	27,701	27,701	0.00%	0%
Textiles, rubber, and leather products	105,420	115,867	102,021	-11.95%	-3%
Carpets and rugs	47,680	116,160	95,123	-18.11%	66%
Major appliances	0	25,948	25,948	0.00%	200%
Furniture and furnishings	154,560	124,612	124,612	0.00%	-21%
Miscellaneous durables	189,750				
Consumer electronics*	27,600	101,219	100,925	-0.29%	114%
Wood pallets	126,760	76,926	76,918	-0.01%	-49%
Used Oil filters	1,870	1,874	1,843	-1.67%	-1%
Misc. Packaging	15,990				
Misc. inorganic wastes	62,310				
All other items		1,142,405			
Total MSW w/o C&D	2,659,190	3,388,165			

* Categories from Cascadia have been combined into one Franklin category

[1] Source: Oregon Statewide Waste Compostion Study 2000

[2] Percent Difference [(Cascadia-Franklin)/(1/2(Cascadia+Franklin))]

[3] Includes Foam polystyrene packaging and Foam polystyrene nondurable goods

Column E shows the percent difference between the Cascadia Data (Column C) which has been adjusted to account for moisture and contamination and the Franklin Data (Column A).

The percent difference is zero or very small for half of the items. However, the other half has rather large differences. Based on discussions with Franklin and Cascadia (and looking at the details in their reports), landfill operators, material handlers and DNR staff, we have developed theories on why some of these differences exist.

High grade office paper: Franklin had difficulty gathering recycling information from the commercial sector. Since most of this paper is generated at businesses, Franklin may have underestimated the amount of office paper recycled by this sector.

Plastic and glass containers: We feel that Franklin may be underestimating the recycling rate for both of these categories especially in the commercial sector.

Food waste: Food waste is a very difficult item to gather generation data on, and Franklin may have less information on which to base its estimate than for most other categories. Cascadia found a lot of food waste in its samples (second highest category), and based on methodology, its estimate may be more accurate than Franklin's.

Vehicle batteries (lead-acid): Franklin's and Cascadia's definitions for this category differ. Franklin only includes automotive batteries, while Cascadia includes automotive, tractor, motorcycle and boat batteries. Only three loads out of the 400 Cascadia sampled had batteries in them, and for two of the loads, the batteries found weighed much less (~18 pounds) than the typical lead-acid battery. These batteries came from the commercial sector and were probably used on smaller commercial equipment.

Tires and major appliances: The Cascadia methodology likely overestimated the amount of tires and major appliances in Wisconsin landfills. Cascadia sampled the waste as it came off the delivery truck, but prior to intervention by the landfill operator at the working face. Landfill operators have specific protocols and practices to remove most of the salvageable tires and appliances prior to covering. Based on landfill inspection reports by Department personnel, these measures, coupled with the development of an extensive infrastructure of dealer take-back policies for used appliances and tires, have effectively eliminated these banned items from the landfilling waste stream over the last decade. Note: Franklin used Cascadia's landfill estimates for tires but could not use its estimate for major appliances since Cascadia includes more items in this category than Franklin does.

Carpets and rugs: We cannot account for this difference. Possible explanations: Franklin's generation data may be low, or anecdotal evidence suggests that residents may be replacing carpet with wood and tile floors.

Electronics: The consumer electronics categories could not be compared because by definition they do not include the same items. Franklin considers Cascadia's actual waste sort number to be more reliable.

Pallets: Franklin uses the national recovery average for pallets, but other sources indicate that Wisconsin may have a better infrastructure for back hauling pallets than other states and reuse them more. Also, the wood mulch industry may be using more pallets now and many residents burn pallets for heat. The pallets that are being thrown away are probably the less durable ones, which have an average weight of 30 pounds, whereas reusable pallets have a weight of 55 pounds. Franklin uses both of these weights in its generation, recovery, and disposal estimates, resulting in a possible overestimate for disposal.

Comparison with Neighboring States

We compared Wisconsin landfill data with that from two of our neighboring states, Iowa and Minnesota. Cascadia subcontracted the field work for our study with R.W. Beck, the same company that conducted the Iowa and Minnesota studies, so some of the same personnel conducted the field sort in all three states.

We encountered similar consistency problems when comparing the three landfill data sets; nevertheless, we were able to match many items between the three states. Also, we recognize that these studies were conducted in three different years covering a time span of four years.
Our review of landfilling trends over this period of time (upswing through 2000, then downturn in 2001) indicate that 2001data should be comparable to 1998-999 data.

Table 4 shows the results of the comparison for the items or categories where we could make realistic matches. When you compare the per capita results (pounds per person per year), Wisconsin looks very good. For all the items listed, Wisconsin residents are throwing away much less (24%) than those in Iowa and only slightly more (3%) than those in Minnesota. Wisconsinites are throwing away less, so we're diverting more (assuming generation is the same for all three states) than Iowa and Minnesota for almost all of the materials banned from our landfills (newspaper; office paper; magazines; cardboard; steel and glass containers; and yard waste). Iowa is doing slightly better than us for aluminum beverage containers and PET bottles, and Minnesota is doing slightly better than us for HDPE containers. Note: Our solid waste management systems differ. Wisconsin bans items from landfills and assigns just recycling responsibility local governments, Iowa has a bottle bill, and Minnesota has an aggressive integrated MSW management program.

Table 4 - MSW Landfill Composition Comparison for Wisconsin, Minnesota, and Iowa

	Residential and Commercial Waste Composition Comparison of Wisconsin, Minnesota, and Iowa[1]								
	WI 2002[2]		MN 1999[3]		Iowa 1998[4]		Per Capita(lb./yr.)		
	Tonnage	%	Tonnage	%	Tonnage	%	WI	MN	Iowa
Paper	**393,412**	**18.83%**	**488,684**	**27.55%**	**404,790**	**29.59%**	**144.60**	**204.66**	**282.97**
Newspaper	92,270	4.42%	126,013	7.10%	90,642	6.63%	33.92	52.77	63.36
High Grade Paper	65,585	3.14%	95,278	5.37%	48,965	3.58%	24.11	39.90	34.23
Magazines	47,381	2.27%	76,837	4.33%	57,394	4.20%	17.42	32.18	40.12
Uncoated Cardboard	188,176	9.01%	190,556	10.74%	207,789	15.19%	69.17	79.81	145.25
Plastic	**401,952**	**19.24%**	**304,275**	**17.15%**	**326,776**	**23.89%**	**147.74**	**127.43**	**228.43**
#1 PET Bottles	19,610	0.94%	21,514	1.21%	9,477	0.69%	7.21	9.01	6.62
#2 HDPE Containers	18,755	0.90%	15,367	0.87%	22,590	1.65%	6.89	6.44	15.79
Film	188,990	9.05%	116,793	6.58%	125,196	9.15%	69.47	48.91	87.52
Miscellaneous Plastic	174,597	8.36%	150,601	8.49%	169,513	12.39%	64.18	63.07	118.50
Metal	**219,057**	**10.49%**	**141,379**	**7.97%**	**113,561**	**8.30%**	**80.52**	**59.21**	**79.38**
Aluminum Bev. Containers	16,291	0.78%	21,514	1.21%	5,112	0.37%	5.99	9.01	3.57
Ferrous containers	25,715	1.23%	27,661	1.56%	24,888	1.82%	9.45	11.58	17.40
Other Ferrous	171,086	8.19%	89,131	5.03%	70,682	5.17%	62.89	37.33	49.41
Other Non-Ferrous	5,965	0.29%	3,073	0.17%	12,879	0.94%	2.19	1.29	9.00
Glass	**107,892**	**5.17%**	**82,984**	**4.68%**	**56,361**	**4.12%**	**39.66**	**34.75**	**39.40**
Recyclable Glass	42,751	2.05%	61,470	3.47%	37,673	2.75%	15.71	25.74	26.34
Miscellaneous Glass	65,141	3.12%	21,514	1.21%	18,688	1.37%	23.94	9.01	13.06
Organic Materials	**633,543**	**30.33%**	**516,346**	**29.11%**	**307,957**	**22.51%**	**232.87**	**216.25**	**215.28**
Yard Waste	61,921	2.96%	70,690	3.99%	35,621	2.60%	22.76	29.61	24.90
Food Waste	486,619	23.30%	381,113	21.49%	226,597	16.56%	178.86	159.61	158.40
Diapers	85,003	4.07%	64,543	3.64%	45,739	3.34%	31.24	27.03	31.97
Problem Wastes	**212,999**	**10.20%**	**153,982**	**8.68%**	**81,946**	**5.99%**	**78.29**	**64.49**	**57.28**
Electrical and Household Appliances	**88,387**	**4.23%**	**49,483**	**2.79%**	**28,433**	**2.08%**	**32.49**	**20.72**	**19.88**
Bulky Items	124,612	5.97%	104,499	5.89%	53,513	3.91%	45.80	43.76	37.41
Household Hazardous	**4,083**	**0.20%**	**3,074**	**0.17%**	**3,055**	**0.22%**	**1.50**	**1.29**	**2.14**
Paints and Solvents	4,083	0.20%	3,074	0.17%	2,797	0.20%	1.50	1.29	1.96
Pesticides/Fungicides/Herbicides	0	0.00%	0	0.00%	258	0.02%	0.00	0.00	0.18
Other Wastes	**115,867**	**5.55%**	**82,984**	**4.68%**	**73,669**	**5.38%**	**42.59**	**34.75**	**51.50**
Textiles	115,867	5.55%	82,984	4.68%	73,669	5.38%	42.59	34.75	51.50
Total of Above items	**2,088,805**	**100.00%**	**1,773,708**	**100.00%**	**1,368,115**	**100.00%**	**767.77**	**742.84**	**956.38**

[1] Only comparable items were used

[2] Wisconsin Statewide Waste Characterization Study, Cascadia Consulting Group, 2002

[3] Minnesota State Wide MSW Composition Study, R.W. Beck, Inc., 1999

C&D waste was not included in study, 1.2 million tons were landfilled in Minnesota, 570,000 tons of waste was sent out-of-state to WI, ND, IA, SD, 1.3 million tons were incinerated, 22,000 tons were composted

[4] Iowa Solid Waste Characterization, R.W. Beck, Inc. 1998

C&D waste was calculated based on landfill records, 230,000 tons was sent out-of-state, 35,000 tons was incinerated

Recycling and Diversion

The preceding information focuses on the amount of waste landfilled in Wisconsin, but one of the goals of these studies was to find out how good a job we're doing on recycling and diverting waste from landfills. Previously, we based our overall recycling rate and the rate for each item on the Franklin studies, and the foundation of Franklin's work is its database for generation of materials and responsible unit recycling reports. Cascadia's waste sort gives us the opportunity to look at the other end of the waste spectrum – disposal via landfilling. Using the two studies, we were able to verify Franklin's recycling rates for some of the items banned from landfills in Wisconsin. However, due to different landfill estimates in the two studies for office paper, magazines, plastic containers (#1 & 2), and glass containers, we can only present an estimated range for their recycling rates. As noted earlier, we feel that very few tires and major appliances are being landfilled. We have no estimate for waste oil. Franklin considers this industrial waste, and Cascadia could not measure it (it's considered a contaminant).

Recycling Rate for Banned Materials	
1991 bans	
lead acid batteries	> 95%
major appliances	> 95%
waste oil	no data
1993 bans	
yard waste	78%
1995 bans	
newspaper	67%
corrugated	72%
magazines	31-35%
office paper	28-57%
aluminum containers	55%
steel containers	54%
glass containers	57-74%
plastic containers (#1&2)	41-51%
tires*	> 95%

*Includes tires combusted with energy recovery (65% of tires generated) since this is an accepted way to manage used tires.

Franklin's study is our only source of information on generation, so we used its estimates to calculate a 40.4% diversion rate for Wisconsin's for MSW (excluding C&D).

Diversion Rate Calculation					
	Recovered for Recycling	Combusted with Energy Recovery	Yard Waste Managed at Home	Total Material Diverted	Total Generation
Tons	1,486,880	140,290	250,800	1,877,970	4,649,240
% of Total	32%*	3%	5.4%	40.4%	

* Franklin's recycling estimate of 34% in Table 1 is based on generation total that does not include yard waste managed at home.

Because we used only Franklin's data, we feel this estimate is on the conservative side. Our diversion rate does not include Construction & Demolition materials because Franklin does not define C&D as part of the MSW stream and the EPA and other states do not include it either.

Conclusion

Wisconsin has a successful and popular recycling program. We have a high recycling rate for items banned from landfills, and our overall MSW diversion rate is 40.4%. We appear to be doing as good as Minnesota and better than Iowa in diverting MSW from landfills even though Minnesota has integrated solid waste management system (which includes recycling) with all responsibilities assigned to counties and Iowa has a bottle bill.

The waste sort identified new materials which are found in sufficient quantity to offer significant opportunities for increased diversion. Construction and demolition debris (~30% of material landfilled) and food waste (~10%) appear to have the most potential.

The studies reaffirm our success and identify the areas where we need to improve; they will help DNR and stakeholders address the future direction of the recycling program.

Contact 608/266-2111 or DNRWasteMaterials@Wisconsin.gov for further information.

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