

Contractor's Report to the Board

Executive Summary and Excerpts

*Targeted Statewide Waste Characterization
Study:*

Waste Disposal and Diversion Findings for Selected Industry Groups

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Cascadia Consulting Group



The complete study can be found on the Board's website at
www.ciwmb.ca.gov/Publications/default.asp?pubid=1184

Executive Summary

Summary of Objectives

The California Integrated Waste Management Board (CIWMB) commissioned a study of waste disposal and diversion practices by key types of commercial establishment. The study entailed quantifying and characterizing the material that is disposed as well as the material that is recycled or otherwise diverted. The study represents the largest effort conducted in the United States thus far to understand waste disposal and diversion practices simultaneously for major industry groups. The CIWMB conducted a study on industry groups in 1999 which characterized waste disposed only. The results of the present study provide a complete picture of waste management practices that are typical of the targeted industry groups. This information will be useful to local governments as well as businesses as they implement or refine their diversion programs.

Summary of Approach

A total of 371 commercial sites belonging to 14 industry groups participated in the study. Sites were recruited in the heavily urbanized areas of Los Angeles, Sacramento, San Diego, and San Francisco. In general, data was gathered from each participating site to confirm its industry group and size (in terms of numbers of employees, numbers of hotel rooms, numbers of visitors, or square footage), to quantify and characterize the materials that are diverted, and to quantify and characterize the materials that are disposed.

The study addressed the following 14 industry groups:

- Fast-food restaurants
- Full-service restaurants
- Food stores
- Durable wholesale goods distributors (e.g., warehouses and distributors of non-perishable items)
- Non-durable wholesale goods distributors (e.g., food warehouses and distributors)
- Large hotels
- Building material and garden stores belonging to certain "big box" chains
- Other building material and garden stores
- Retail stores belonging to certain "big box" chains
- Other retail stores
- Shopping malls
- Anchor stores at shopping malls
- Public venues and events
- Large office buildings

Diversion was documented through interviews with employees at the businesses and inspection of recycling and diversion systems during on-site visits. Disposal was quantified through

measurements of waste accumulation in dumpsters or through interviews and examination of waste disposal records. Disposed waste was characterized by obtaining one or more 200-pound samples from each site and hand-sorting it into 74 material categories. Both disposal and diversion rates were determined, either on a per-employee basis (pounds per employee per year), or per room, per thousand square feet, or per visitor, as appropriate to the nature of the business.

Summary of Findings

The industry groups addressed by this study that achieve the highest diversion rates do so mainly by implementing effective programs to recycle corrugated cardboard boxes and other cardboard packaging. Of the groups addressed in this study, food stores have the highest diversion rate, with an average of 71 percent of all waste material (mostly cardboard) being diverted. They are followed by retail big-box stores, with an estimated 64 percent diversion rate (again, mostly cardboard). Non-durable goods wholesale distributors on average divert 59 percent of waste materials (mainly achieved through cardboard recycling and through the reuse of wood shipping pallets). The group with the fourth-highest diversion rate is other retail stores at 54 percent, which mostly reflects cardboard recycling.

Four of the industry groups addressed in this study divert less than a quarter of their solid waste. Other building material and garden stores divert an average of 24 percent of their waste, and large hotels divert approximately 23 percent. Public venues and events were found to divert about 11 percent of their waste. The diversion rate for large office buildings is estimated to be about 7 percent, although the estimate does not take into account any diversion (e.g., recycling of computer equipment, furniture, etc.) that might be done by tenants of the office buildings independently of the buildings' management and custodial services.

Based on the findings of the study, key opportunities for additional diversion are presented below in Table ES-1. For each industry sector, groups of divertible materials are listed starting with those that are most prevalent in the disposed waste by that industry sector, and proceeding in rank order.

In general, compostable materials such as food, leaves and grass, and lower grade compostable papers present opportunity to greatly increase diversion for most of the industry groups. Recyclable papers such as cardboard, newspaper, and other recyclable types also show significant potential for further recycling, as does lumber, for several industry groups.

Table ES-1: Opportunities for Diversion, by Industry Group

Industry Group	Key Opportunities for Additional Diversion (Figure in parentheses indicates percent of disposed waste stream by weight)
Fast-food restaurants	• Food and compostable paper (up to 73%) • Cardboard (5%) • Newspaper and other recyclable papers (3%) • Plastic bottles and containers, tin/steel cans, aluminum cans (3%)
Full-service restaurants	• Food and compostable paper (up to 74%) • Cardboard (4%) • Plastic bottles and containers, tin/steel cans, aluminum cans (3%) • Newspaper and other recyclable papers (3%) • Glass bottles and containers (2%)
Food stores	• Food, compostable paper, and leaves and grass (up to 75%) • Cardboard (4%) • Lumber (4%) • Recyclable papers (2%)
Durable goods wholesale distributors	• Lumber (29%) • Cardboard (10%) • Recyclable papers (6%) • Ferrous metal (5%) • Industrial plastic packaging film (4%) • Gypsum board (3%)
Nondurable goods wholesale distributors	• Food, leaves and grass, prunings and trimmings (31%) • Cardboard (11%) • Lumber (10%) • Recyclable papers (4%) • Industrial plastic packaging film (3%)
Large hotels	• Food, leaves and grass, prunings and trimmings, compostable paper (up to 49%) • Newspaper (9%) • Recyclable papers (7%) • Glass bottles and containers (4%) • Cardboard (3%) • Plastic bottles and containers, tin/steel cans, aluminum cans (3%) • Lumber (3%)

Table ES-1, continued: Opportunities for Diversion, by Industry Group

Industry Group	Key Opportunities for Additional Diversion (Figure in parentheses indicates percent of disposed waste stream by weight)
Building material and garden, big-box stores	• Lumber (23%) • Concrete (9%) • Gypsum board (6%) • Cardboard (6%) • Ferrous metal (4%) • Carpet (4%) • Industrial plastic packaging film (2%) • Recyclable papers (2%)
Building material and garden, other stores (not big-box)	• Lumber (23%) • Food, leaves and grass, prunings and trimmings (11%) • Concrete (8%) • Carpet (7%) • Recyclable papers (6%) • Gypsum board (5%) • Flat glass (4%) • Cardboard (3%) • Ferrous metal (2%) • Plastic bottles and containers, tin/steel cans, aluminum cans (2%)
Retail, big-box stores	• Food, leaves and grass, prunings and trimmings (21%) • Lumber (14%) • Cardboard (6%) • Recyclable papers (4%) • Ferrous metal (3%) • Industrial plastic packaging film (2%)
Retail, other stores (not big-box)	• Food, leaves and grass (12%) • Lumber (11%) • Recyclable papers (10%) • Cardboard (8%) • Ferrous metals (5%) • Industrial plastic packaging film (2%)
Anchor stores at shopping malls	• Food, leaves and grass, prunings and trimmings (13%) • Cardboard (7%) • Gypsum board (6%) • Recyclable papers (4%) • Ferrous metal (2%)

Table ES-1, continued: Opportunities for Diversion, by Industry Group

Industry Group	Key Opportunities for Additional Diversion (Figure in parentheses indicates percent of disposed waste stream by weight)
Other parts of shopping malls (not including anchor stores)	• Food, leaves and grass, prunings and trimmings, compostable paper (up to 46%) • Cardboard (8%) • Lumber (5%) • Recyclable papers (5%) • Plastic bottles and containers, tin/steel cans, aluminum cans (2%)
Public venues and events	• Food, leaves and grass, prunings and trimmings, compostable paper (up to 54%) • Recyclable papers (8%) • Plastic bottles and containers, tin/steel cans, aluminum cans (5%) • Cardboard (4%) • Glass bottles and containers (4%)
Large office buildings	• Recyclable papers (22%) • Food, leaves and grass (19%) • Cardboard (3%) • Plastic bottles and containers, tin/steel cans, aluminum cans (3%)

Excerpts

Table 2: Industry Group Summary: Disposal, Diversion, Generation, and Diversion Rate

Industry Group	Disposal (pounds per employee)	Diversion (pounds per employee)	Waste Generation (pounds per employee)	Diversion Rate
Food Stores	4,754	11,825	16,578	71.3%
Retail, Big Box Stores	2,866	4,932	7,798	63.3%
Non-Durable Wholesale Distributors	2,861	4,070	6,931	58.7%
Retail, Other Stores	1,719	1,995	3,714	53.7%
Durable Wholesale Distributors	2,460	2,259	4,719	47.9%
Anchor Stores at Shopping Malls (pounds per 1,000 sq ft)	2,103	1,418	3,520	40.3%
Fast-Food Restaurants	4,262	2,267	6,528	34.7%
Full-Service Restaurants	4,403	2,034	6,437	31.6%
Building Material & Gardening, Big Box Stores	6,343	2,689	9,031	29.8%
Public Venues & Events (pounds per 100 visitors)	172	72	244	29.0%
Building Material & Gardening, Other Stores	3,481	1,118	4,599	24.3%
Large Hotels	3,903	1,145	5,049	22.7%
Shopping Malls (pounds per 1,000 sq ft)	2,028	471	2,499	18.9%
Large Office Buildings (pounds per 1,000 sq ft)	1,866	132	1,998	6.6%

Note: More detailed information on disposal rates can be found in Table 21 of Appendix A of the complete report.

Example Data Section for One of 14 Industry Groups

Findings for Large Hotels

Disposal, diversion, and total generated waste composition results for large hotels are detailed in Table 8. Large hotels on average generate 5,049 pounds of waste material per employee per year. Of the total waste generation, less than 25 percent, or 1,145 pounds, is diverted per employee per year.

While large hotels divert approximately 412 pounds of paper per employee per year, they dispose of over 945 pounds of paper per employee per year that could be recycled, most of which is newspaper. An additional 308 pounds of remainder/composite paper is disposed of per employee per year, some of which is believed to be divertible through a composting program.

On average, large hotels divert almost a third of the total amount of glass generated, and they dispose of approximately 183 pounds of glass per employee per year. Nearly all of the disposed glass (172 pounds per employee per year) is easily recyclable bottles and containers.

Large hotels participate in very little metal diversion activities. On average, nine pounds of metal per employee per year is diverted, compared to over 145 pounds of metal disposed per employee per year.

Like most industry groups, large hotels divert very little plastic materials. Approximately 379 pounds of plastic per employee per year is disposed (9.7 percent of disposed materials). Of the disposed plastic material 1 percent is recyclable plastic film (about 39 pounds per employee per year), none of which is being diverted.

Annually, 1,421 pounds of food waste per employee is disposed at large hotels. Less than a third of all the food that is generated as waste is being diverted (562 pounds per employee per year).

A small number of large hotels participate in lumber and treated wood diversion. On average 21 pounds per employee per year is diverted. Most large hotels are disposing of a sizable quantity of wood waste that could be diverted (144 pounds per employee per year).

Figure F represents the portion of the waste stream that is currently being diverted, as well as what could easily be diverted or potentially be diverted, and the remaining disposed portion.

REASONS THESE SITES DIVERT WASTE

Approximately 82 percent of the large hotels surveyed about their diversion practices had some type of diversion program in place. Businesses were asked about their reasons for participating or not participating in a recycling/diversion program. The range of responses is presented below:

Participants said:

- The city has a recycling program that is easy to participate in.
- They participate because they believe it is a good thing to do.
- They would recycle more, but costs are prohibitive.

Non-participants said:

- They felt recycling was too expensive.
- There is limited space to store recyclables.
- They do not have enough time for recycling.
- They don't recycle because they haven't set up a recycling program.

Figure F: Large Hotels: Diverted and Divertible Waste Material, 2005

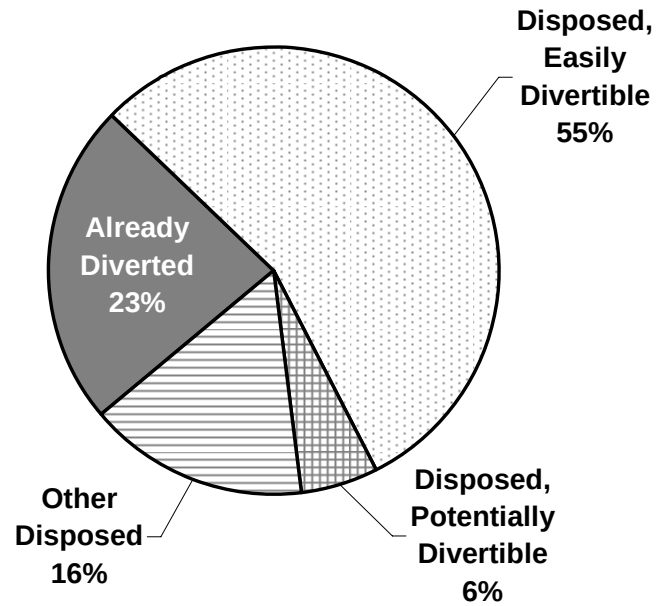


Table 8: Large Hotels: Waste Disposal, Diversion, and Total Generation Composition, 2005

Material	Disposed Waste		Diverted Waste	Total Generated
	Est. Percent	+ / -	Est. Percent	Waste Est. Percent
Paper	32.3%		36.0%	33.2%
Uncoated Corrugated Cardboard	3.2%	0.9%	18.9%	6.8%
Paper Bags/Kraft	0.3%	0.1%	0.0%	0.3%
Newspaper	9.0%	2.1%	10.5%	9.4%
White Ledger	2.2%	1.2%	6.5%	3.2%
Other Office Paper & Colored Ledger Paper	2.7%		0.0%	2.1%
<i>Colored Ledger</i>	0.1%	0.1%		
<i>Other Office Paper</i>	2.7%	2.5%		
Computer Paper	0.3%	0.4%	0.0%	0.3%
Magazines & Catalogs	1.0%	0.5%	0.0%	0.7%
Phone Books & Directories	0.1%	0.1%	0.0%	0.1%
Other Miscellaneous Paper	5.5%	1.3%	0.0%	4.3%
Remainder/Composite Paper	7.9%	1.6%	0.0%	6.1%
Glass	4.7%		7.5%	5.3%
Glass Bottles & Containers (colors not specified)	4.4%		7.5%	5.1%
<i>Clear Glass Bottles & Containers</i>	2.0%	0.5%		
<i>Green Glass Bottles & Containers</i>	1.4%	0.5%		
<i>Brown Glass Bottles & Containers</i>	0.9%	0.3%		
<i>Other Colored Glass Bottles & Containers</i>	0.0%	0.0%		
Flat Glass	0.0%	0.0%	0.0%	0.0%
Remainder/Composite Glass	0.3%	0.2%	0.0%	0.2%
Metal	3.8%		0.8%	3.1%
Tin/Steel Cans	0.5%	0.2%	0.0%	0.4%
Major Appliances	0.4%	0.6%	0.0%	0.3%
Used Oil Filters	0.0%	0.0%	0.0%	0.0%
Other Ferrous	0.6%	0.6%	0.0%	0.5%
Aluminum Cans	0.2%	0.1%	0.8%	0.3%
Other Non-Ferrous	0.1%	0.1%	0.0%	0.1%
Remainder/Composite Metal	2.0%	1.7%	0.0%	1.5%
Plastic	9.7%		1.2%	7.8%
PETE & HDPE Bottles, Buckets, & Containers	1.6%		1.2%	1.5%
<i>PETE Bottles</i>	0.8%	0.3%		
<i>Other PETE Containers</i>	0.1%	0.0%		
<i>HDPE Natural Bottles</i>	0.3%	0.1%		
<i>HDPE Colored Bottles</i>	0.1%	0.0%		
<i>HDPE 5-gallon Buckets — food</i>	0.0%	0.1%		
<i>HDPE 5-gallon Buckets — non-food</i>	0.1%	0.2%		
<i>Other HDPE Containers</i>	0.2%	0.1%		
#3-#7 Bottles & Containers	0.5%		0.0%	0.4%
<i>#3-#7 Bottles</i>	0.0%	0.0%		
<i>#3-#7 Other Containers</i>	0.5%	0.2%		
Plastic Film	3.7%		0.0%	2.9%
<i>Plastic Trash Bags</i>	1.7%	0.4%		
<i>Plastic Grocery & Other Merchandise Bags</i>	0.3%	0.1%		
<i>Non-Bag Comm. & Indust. Packg Film</i>	0.2%	0.1%		
<i>Film Products</i>	0.2%	0.4%		
<i>Other Film</i>	1.3%	0.2%		
Durable Plastic Items	1.0%	0.8%	0.0%	0.8%
Remainder/Composite Plastic	2.8%	0.9%	0.0%	2.2%

Table 8, continued: Large Hotels: Waste Disposal, Diversion, and Total Generation Composition, 2005

Material	Disposed Waste		Diverted Waste	Total Generated
	Est. Percent	+ / -	Est. Percent	Waste Est. Percent
Electronics	0.4%		0.0%	0.3%
Brown Goods	0.3%	0.5%	0.0%	0.2%
Computer-related Electronics	0.0%	0.0%	0.0%	0.0%
Other Small Consumer Electronics	0.0%	0.0%	0.0%	0.0%
Televisions & Other Items with CRTs	0.0%	0.0%	0.0%	0.0%
Organics	44.2%		49.1%	45.3%
Food	36.4%	6.6%	49.1%	39.3%
Leaves, Grass, Prunings, & Trimmings	4.2%		0.0%	3.2%
<i>Leaves & Grass</i>	3.9%	3.7%		
<i>Prunings & Trimmings</i>	0.2%	0.3%		
Branches & Stumps	0.0%	0.0%	0.0%	0.0%
Agricultural Crop Residues	0.0%	0.0%	0.0%	0.0%
Manures	0.0%	0.0%	0.0%	0.0%
Textiles	1.1%	0.6%	0.0%	0.9%
Carpet	0.4%	0.5%	0.0%	0.3%
Remainder/Composite Organics	2.0%	0.7%	0.0%	1.6%
Construction & Demolition	4.8%		5.4%	5.0%
Concrete	0.0%	0.0%	0.0%	0.0%
Asphalt Paving	0.0%	0.0%	0.0%	0.0%
Asphalt Roofing	0.0%	0.0%	0.0%	0.0%
Lumber & Treated Wood Waste	3.7%		1.8%	3.3%
<i>Lumber</i>	3.0%	2.9%		
<i>Treated Wood Waste</i>	0.7%	1.2%		
Gypsum Board	0.0%	0.0%	0.0%	0.0%
Rock, Soil, & Fines	0.3%	0.4%	0.0%	0.2%
Remainder/Composite C & D	0.8%	0.9%	3.6%	1.5%
Household Hazardous	0.1%		0.0%	0.1%
Paint	0.0%	0.0%	0.0%	0.0%
Vehicle & Equipment Fluids	0.0%	0.0%	0.0%	0.0%
Used Oil	0.0%	0.0%	0.0%	0.0%
Batteries	0.0%	0.0%	0.0%	0.0%
Remainder/Composite HHW	0.0%	0.0%	0.0%	0.0%
Special Waste	0.0%		0.0%	0.0%
Ash	0.0%	0.0%	0.0%	0.0%
Sewage Solids & Industrial Sludge	0.0%		0.0%	0.0%
<i>Sewage Solids</i>	0.0%	0.0%		
<i>Industrial Sludge</i>	0.0%	0.0%		
Treated Medical Waste	0.0%	0.0%	0.0%	0.0%
Bulky Items	0.0%	0.0%	0.0%	0.0%
Tires	0.0%	0.0%	0.0%	0.0%
Remainder/Composite Special Waste	0.0%	0.0%	0.0%	0.0%
Mixed Residue	0.0%		0.0%	0.0%
Mixed Residue	0.0%	0.0%	0.0%	0.0%
Total:	100.0%		100.0%	100.0%
Total Pounds per Employee:	3,903		1,145	5,049
Number of Samples:	33		33	

Confidence intervals calculated at the 90% confidence level. Percentages for materials may not total 100% due to rounding.