

Construction Waste Recycling Programs Gain Traction

After a slow start, recycling construction and demolition (C&D) waste is becoming a well-established practice in the green building industry. The trend received a substantial boost from two developments this past September.

The first was an announcement by Turner Construction Co., the country's largest commercial builder, to implement C&D recycling on all future projects. Turner Chairman Thomas Leppert says the company will implement C&D recycling on its projects initially to at least a 50% level, with the ultimate goal to recycle 100% of C&D waste on all new projects. Previously, Turner did C&D recycling only on projects registered with the USGBC's LEED program.

As part of the stepped-up program, Turner plans to

negotiate national or regional agreements with major waste haulers, according to SVP Roderick Wille, Turner's manager of sustainable construction. Since 1995, Turner has completed, or currently has under contract, more than 85 green projects with a construction value of \$7.6 billion. (Turner is a sponsor of this Progress Report.)

Shortly after the Turner announcement, the Associated General Contractors of America, the Washington, D.C.-based trade association representing the nation's largest contractors, released its Environmental Management System program.

Developed in partnership with the U.S. Environmental Protection Agency, the documents outline how contractors can establish an Environmental Management System that takes in

Manufacturers push C&D recycling efforts

Carpeting and ceiling tiles are the focal points of two major recycling programs in the building products field.

Two years ago, the carpet industry (through its trade association, the Carpet & Rug Institute, a sponsor of this Progress Report) launched an initiative to keep carpet waste out of landfills. Under a January 2002 voluntary agreement with the U.S. Environmental Protection Agency and 13 states, CRI agreed to set national goals for increasing the amount of reused and recycled post-consumer carpet, ultimately resulting in a landfill diversion rate of 40% by 2012.

The carpet industry created the Carpet America Recovery Effort to meet these goals, according to CARE executive director Robert Peoples, PhD. Last year, the program diverted 93.7 million pounds of post-consumer carpet from landfill, and recycled 86.6 million pounds. This was an 87% increase in diversion and a 64% increase in recycling compared to 2002.

Post-consumer carpet material is reused in the manufacture of non-carpet products as diverse as composite lumber, railroad ties, garage wall liner, roofing shingles, and nylon auto parts. The carpet industry continues to seek reuse opportunities for recycled material, which Georgia Tech researcher Matthew Realf says could someday amount to hundreds of millions of pounds in volume.

The other program involves mineral fiber ceiling tiles removed during renovation projects. Participants in the Armstrong Ceiling Recycling Program must first obtain verification that the tiles can be recycled. They are then removed, shrink-wrapped, and stacked on pallets to await shipment. When 30,000 sf of tile has been accumulated, Armstrong will pick it up, at no cost to the owner, in the continental U.S. and at some Canadian locations.

The program is particularly suited to large, single-story buildings. Logistical considerations make it less appropriate for high-rise buildings.

Armstrong says that preparation of the old tiles for shipping takes only slightly longer (about six minutes for one laborer for 1,000 sf) than dumping the old tiles into a pushcart and taking them to a dumpster. The company, which says it has recycled 20 million sf of tile since the program began in 1999, provides a checklist that enables a comparison of the costs of throwing the tile away and of recycling it.

As this Progress Report was going to press, a move was under way to develop a single national sustainability standard for carpet and textiles. This would unify the Sustainable Textile Standard developed by the Institute for Market Transformation to Sustainability, Washington, D.C., and the carpet and carpet fiber standard developed by Scientific Certification Systems, San Francisco. A single standard would reduce confusion in the market and help to eliminate "greenwashing," says CARE's Robert Peoples.

C&D recycling. An accompanying 148-page manual provides guidelines and templates for its implementation.¹

According to the National Demolition Association, Doylestown, Pa., about 70% of the C&D waste stream consists of demolition debris; the remainder is construction waste. Certain materials, such as tars, glues, mastics, and adhesives, are covered by Material Safety Data Sheets required by the Occupational Safety and Health Administration's Hazardous Communication Rule, and can be considered hazardous. But NDA executive director Michael Taylor says most demolition waste is relatively inert, benign material that poses no risk to public health or the environment.

NDA identifies 14 recyclable building components, only three of which have any current economic value in the U.S. and Canada — metals (from I-beams to venetian blinds), aggregates (in certain areas of the country), and wood. In the Los Angeles area, where there is strong demand for subbase material for parking lots and roads, recyclers will pay top dollar to get aggregates. But in the Bay Area of San Francisco, demand is weaker because there are no longer quarries nearby with integral recycling operations.

A similar logistics problem confronted the project team for the 1.1 million-sf EPA Research & Administration facility in Research Triangle Park, N.C. General contractor Clark Construction's original waste

management plan did not include recycling gypsum, because the firm couldn't find a gypsum recycler in the area. When EPA insisted that gypsum waste be recycled, the contractor was able to locate a vendor, and more than 80% of the project's construction debris was diverted from landfill.

A 1994-95 NDA waste characterization study found 1,800 landfills in the U.S. that accept C&D waste, but NDA believes this number has declined in the last decade. Although the EPA has urged all 50 states to address C&D waste disposal, only 38 have done so to date, Taylor says.

C&D recycling is "a bottom-line thing," according to the NDA's Taylor. "We believe in recycling, think it's the wave of the future, and promote it aggressively. It's just a matter of making it economically attractive."

Profit margins on many materials at the end of the recycling process are so low that it's cheaper to dispose of them in landfill, Taylor says. NDA members have invested in land and equipment for C&D landfills, only to mothball them when it became apparent that their investment would not generate the necessary return.

On the regulatory front, the Massachusetts Department of Environmental Protection is reviewing public comments on proposed regulations that would ban landfill disposal of five C&D materials — asphalt paving, brick, concrete, metal, and wood. Final regulations may be released by the end of this year, with implementation expected to occur nine months

¹ The two-volume package is available from AGC for \$129 (AGC members) or \$193.50 (nonmembers). More information: www.agc.org.

Recyclers' database online from the GSA

Two years ago, when the U.S. General Services Administration attempted to compile a database of C&D waste recycling firms in the U.S., the effort floundered. "A lot of companies did not respond to postcard notices, were difficult to locate, or had gone out of business," says Ellen Larson, an associate in Steven Winter Associates' office in Washington, D.C.

GSA has now hired the Norwalk, Conn.-based building systems consultant to update the information and create a searchable database. (GSA is a sponsor of this Progress Report.)

The new database currently contains listings for about 50 firms. It permits searches by state and ZIP code, and by more than 15 commonly recycled construction waste materials.

Companies not currently listed are encouraged to register by logging on to the Website at: <http://cwm.wbdg.org>

Why contractors support C&D waste reduction

	Agree or strongly agree
C&D recycling improves my company's public image	72%
Employees are willing to recycle C&D wastes once they are trained (e.g., source segregation)	55%
C&D recycling saves money	53%
Subcontractors are willing to recycle C&D wastes once they are trained	41%
Established waste disposal practices can be changed without major difficulty to include C&D recycling	39%
There are readily available markets for C&D recyclables	34%
C&D recyclables can be economically transported to recycling facilities	31%
Source: "C&D Debris Survey," Associated General Contractors of America, June 2004.	Base: 328

Most respondents to the AGC survey see the image benefit of debris recycling (72%), believe their own employees can be trained to do it (55%), and agree that it saves money (53%). But apparently they are less sanguine about getting subcontractors involved, changing current procedures, finding markets for recycled materials, and their ability to ship C&D waste to recycling facilities economically.



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A handwritten signature in cursive script that reads "Susan Regan".

Susan M. Regan
The Hardwood Council
American Hardwood Information Center

How C&D recycling cuts costs

Material	Tons	Recycling cost	Avoided disposal cost*	Savings
Ceiling tiles	6	\$625	\$708	\$83
Asphalt	970	\$2,367	\$114,460	\$112,093
Concrete	1,267	\$4,092	\$149,506	\$145,414
Metal	19	\$785	\$2,242	\$1,457
Cardboard	0.86	\$105	\$101	(-\$4)
TOTAL	2,263	\$7,974	\$267,017	\$259,043

*Cost that would have been paid if material were disposed; asphalt and concrete are typically recycled. Source: Consigli Construction Co.; Massachusetts Department of Environmental Protection (2003).

A C&D recycling effort for a \$6.9 million, 100,000-sf office/warehouse project in Milford, Mass., achieved an overall diversion rate of 97%. Cost savings from source separation and recycling amounted to nearly \$260,000.

afterward. Massachusetts would become the first state to ban such materials on a statewide basis, says James McQuade, a regional planner with the department.

Massachusetts has 21 active landfills, nine of which accept C&D waste. Tipping (dumping) fees for C&D waste disposal generally run \$80 a ton or more in Massachusetts, but vary widely across the country, ranging from \$125-150 a ton in New York City to as little as \$8 a ton in Midland, Mich. (see table).

Working with the Massachusetts Department of Environmental Protection, Consigli Construction Co., Milford, Mass., launched a recycling program in late 2001. A company-wide jobsite source separation program was initiated the following year.

Vance Freymann, Consigli's director of project development, says new construction typically generates four pounds of C&D waste per square foot of building area; renovation projects can generate anywhere from 50 to 150 pounds per square foot. "The primary obstacle is just the mindset that recycling is not going to be cost effective or feasible," he says. "Once you get over that hurdle and implement a good system, it becomes an ingrained practice."

As for C&D recycling within the USGBC's LEED program, LEED for New Construction awards one point if more than 50% of total C&D materials are diverted from landfills, two points for diverting more than 75% (MR Credits 2.1 and 2.1). While Consigli has easily met these requirements, Freymann says it is much more difficult to earn points by documenting that reused materials account for 5% or 10% of total project value (MR Credits 4.1 and 4.2).

The biggest single limitation for a recycling program is the nature of the local recycling infrastructure, says Kimberly Ann Pexton, sustainability director for James G. Davis Construction Corp., Rockville, Md. She cites the need in the Washington area for

more outlets that would recycle drywall and for recyclers who would accept plywood, wood composite, plastics, and fiberglass. "We're able to recycle big items that generate a lot of waste, but a lot of the remaining materials don't have ready outlets," she says.

Pexton says architects can help to foster recycling programs by writing specifications which avoid materials that can't be downcycled or recycled.

Freyman adds: "Construction debris accounts for 30% of all landfill material. Make a dent in that, and you can make a serious impact on the environment."

Average landfill tipping fees (per ton)

Alabama	\$26	Montana	\$32
Arkansas	\$28	Nebraska	\$25
California		Nevada	\$30
San Francisco	\$75	New Hampshire	\$76
Los Angeles	\$18-24	New Jersey	\$50
San Diego	\$24	New York	\$48
Connecticut	\$48	North Carolina	\$30
Delaware	\$55	North Dakota	\$27
Florida	\$42	Ohio	\$32
Georgia	\$33	Oklahoma	\$20
Illinois	\$33	Oregon	\$35
Indiana	\$34	Pennsylvania	\$55
Iowa	\$33	Rhode Island	\$58
Kansas	\$28	South Dakota	\$30
Kentucky	\$31	Tennessee	\$28
Louisiana	\$25	Texas	\$27
Maine	\$52	Vermont	\$64
Maryland	\$49	Virginia	\$35
Massachusetts	\$72	Washington	\$47
Mississippi	\$26	West Virginia	\$35
Minnesota	\$50	Wisconsin	\$36
Missouri	\$33		

Sources: CARE; Waste News 2003; The Market Handbook and Biocycle Magazine (January 2004)

The charge for dumping a ton of debris in a landfill varies considerably, from as much as \$150 a ton in New York City to as little as \$8 a ton in Midland, Mich. But even rural states like Vermont (\$64 a ton) can have high C&D tipping fees.