

# Recycling: A crucial component of LEED construction practices

(/8568759/index.php/news/construction-demolition/1602-recycling-a-crucial-component-of-leed-construction-practices)

## Details

Hits: 224

[Construction & Demolition \(/8568759/index.php/component/tags/tag/20-construction-demolition\)](#)

[Front Page \(/8568759/index.php/component/tags/tag/28-front-page\)](#)



The Executive Air Terminal in Chattanooga, Tennessee is a LEED building designed by Allen & Hoshell. Photo courtesy of Allen & Hoshell.

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For more than a decade, there has been a significant push toward sustainable construction initiatives.

Green methodologies in the construction and waste reduction process are now taking center stage for construction projects, both large and small. The goal is a simple one: to extend, preserve and recycle resources used in the sustainable construction initiatives. As more and more construction professionals embrace these green building concepts, particularly in respect to LEED certified construction processes and procedures, they are eagerly focusing on construction waste management and recycling programs.

Developed by the U.S. Green Building Council (USGBC), LEED is an internationally recognized green-building certification system. According to the USGBC, LEED "provides third-party verification that a building or community was designed and built using strategies aimed at improving performance across all the metrics that matter most: energy savings, water efficiency, CO<sub>2</sub> emissions reduction, improved indoor environmental quality, and stewardship of resources and sensitivity to their impacts."

The LEED Rating System offers four certification levels for new construction – Certified, Silver, Gold and Platinum – each corresponding to the number of credits accrued in five green-design categories: sustainable sites, water efficiency, energy and atmosphere, materials and resources, and indoor environmental quality.

And while the green-building design, construction, operations, and maintenance is paramount, how the building's construction waste is handled plays an important role in LEED certification and subsequent rating system.

In fact, the Construction Waste Management component of the LEED rating system (referred to as credits MRc2.1 and MRc2.2), focuses on "diverting construction, demolition and land-clearing debris from disposal in landfills and incinerators. Redirect recyclable recovered resources back to the manufacturing process. Redirect reusable materials to appropriate sites."

So if a builder or construction company is striving to achieve this credit in their LEED certification process, at least 50 percent of non-hazardous construction and demolition debris (or 75 percent for credit MRc2.2) must be recycled or salvaged.

Therefore most builders seeking the LEED designation develop a construction waste management plan that, at a minimum, identifies the materials to be diverted from disposal and whether the materials will be sorted on-site or commingled. The newest version of the LEED rating system, referred to as the LEED v4 or 4.0, has divided the construction and demolition waste management into two parts. The first is a prerequisite for creating a construction waste management plan, while the second part provides voluntary points for implementing the plan and diverting construction and demolition debris from the landfill.

With the latest LEED 4.0 rating system, construction and demolition waste management planning will now be a prerequisite and the standard will be raised. In fact, a strong construction waste management plan and tracking waste is required as a new prerequisite – whether a builder is attempting to earn any LEED points or not.

As part of developing a construction waste management plan under the new LEED 4.0 system, construction companies or builders must:

- Establish goals by identifying five materials and approximate percentage of waste they represent.
- Specify whether materials will be separated or commingled and the diversion strategies.
- Provide a final report detailing all waste streams generated and diversion rates.

Here's how it works: At the beginning of any LEED project, a construction waste management plan is prepared which includes the identification of diversion goals, relevant construction debris and materials to be diverted, implementation protocols and parties responsible for implementing the plan.

As identified in the construction waste management plan, specific materials include cardboard, paper, plastic, metal, wood, concrete and brick masonry and gypsum board. Other hazardous materials identified in demolition projects would include mercury-containing light fixtures and products such as lead or copper.

According to A-Industrial's owner, Andrew Hernandez, today's LEED require very specific parameters as it relates to recyclables. A-Industrial is an all-encompassing LEED Certified Design-Build Creative Studio based in downtown Los Angeles.

"Under LEED credits category 'Materials and Resources' recycled content needs to be made of post-consumer content plus half of the pre-consumer content, and needs to be at least 10 percent based on cost of the total value of the projects materials," Hernandez said. "If it yields 20 percent recycled content, you can get up to 2 credits as opposed to just 1 with 10 percent."

Waste management control at the construction site is crucial for obtaining other LEED credits while building. "Diverting demolition material and construction debris directly back to manufacturers, or back into the reusable process, has heavy environmental benefits and greatly impacts a lower carbon footprint on the entire process," Hernandez said.

According to Rick Boeving, AIA, LEED AP BD+C, and senior architect at Allen & Hoshall, there are other LEED credits that contribute to the overall goal of diverting construction materials from the waste stream to landfills. These include specification of products that have recycled content, such as concrete with fly ash or recycled steel materials.

One of the first in the state of Tennessee, Boeving received his LEED Accredited Professional Certification in May 2003. One of the projects Boeving is most proud of, the Executive Air Terminal (FBO) in Chattanooga, Tennessee, was the first LEED Platinum General Aviation Facility in the world, with 100 percent of the construction waste diverted from landfills.

"There is also the practice of building component reuse or reuse of demolition materials for new construction," Boeving said. An example of this may be taking the concrete and bricks from a demolition site and crushing them to be used as a base for road pavement on a new site. Another example is taking carpet from one demolition site and sending it back to the manufacturer, where it is reprocessed to produce new carpet.

### **Challenges aplenty**

A few of the challenges of recycling materials during the LEED construction process include organizing and placing containers on-site and timely removal and replacement of containers when filled to capacity.

"There's also the need for educating sub-contractors to separate, clean and sort each waste material into the proper recycling container or dumpster," Boeving said. Other challenges involve the location and economics of recycling centers, as well as the value of materials. For example, due to the relatively light weight of plastics, transportation costs may offset the recycling benefits.

The implementation process requires total participation of all the general contractors, subcontractors, waste haulers and recycling centers. As Boeving explained, weekly progress meetings need to be held to discuss cross-contamination of materials, enforcement requirements, waste segregation and co-mingling requirements, and responsibility of moving waste to applicable containers. Record keeping is required to convert all waste materials to weight or volume to calculate percentage. Waste haul receipts, waste management reports and spreadsheets are mandatory with each transaction to confirm diverted materials have been recycled or salvaged as intended.

And as Bryan Henson, president of Allen Construction explained, in addition, you have to keep track of each load individually, because the version of LEED you're applying for dictates the diversion rate and they won't accept the facility's average diversion rate.

"For us, we eyeball the percentage of contents on a daily basis and then we have a best guess on the percentages," Henson said. "Protocol is to collect each load ticket and calculate percentage either by volume or weight. It's best to do both ways, so that you can get the most advantageous percentage. If you have the space on site, you can get bins for each type of waste, but many LEED builds don't have this luxury."

David Krueger, director at the Institute for Sustainable Business Practice, School of Business at Baldwin Wallace University said that with respect to the demolition or deconstruction of existing buildings, the primary barrier to building material waste is the significantly higher cost of deconstructing, as opposed to demolishing, existing buildings.

"Rust belt cities like Cleveland and Detroit have thousands of buildings waiting upon the wrecking ball," Krueger said. "Unfortunately, deconstruction still costs upwards of ten times what a more simple demolition would cost. Thus, there are clear and unavoidable trade-offs between efficiency and neighborhood safety on the one hand, and waste reduction on the other hand."

### **On the horizon**

Higher yielded percentages for both post and pre-consumer materials, better integration of recycled content for designers and architects, and low cost sustainable materials will impact the construction industry in client cost savings, reduce material waste and ultimately, recycling construction material waste at the job-site back into a future construction project.

"I see the off-site refabricating of certain materials reducing on-site cutting and waste," Boeing said. "I also predict the diversion of at least three or four separate material waste streams. Other options may be offered including waste incineration in waste-to-energy facilities and the reuse of materials on-site to avoid transportation and hauling costs."

As Krueger explained, waste reduction is obviously a huge and important sustainability goal for the future, as we attempt to move to a "cradle to cradle" future that mimics a "circular economy."

"Globally, our industrial processes are slowly but surely moving in this direction, incrementally making improvements in reducing raw material inputs and waste outputs," Krueger said. "In the future, though, as we move toward a more 'circular' economy that attempts to design out waste from the start, then I think we'll see a steady uptick of recycling/repurposing of building waste upon the death of a building or of recycling of construction waste. Those waste items, eventually, will be better designed for re-use and re-purposing."

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