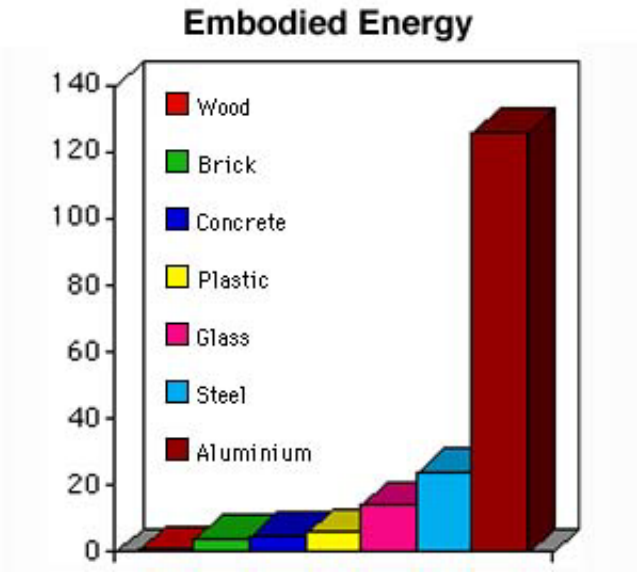
# Materials and Resources
## Overview

**The Materials and Resources (MR) category addresses:**

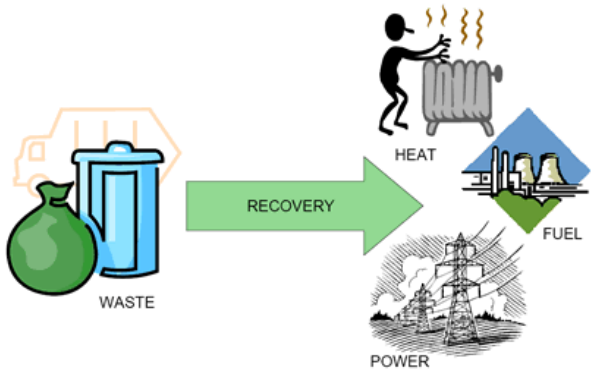
- ❑ Minimizing the embodied energy and other impacts associated with the extraction, processing, transport, maintenance, and disposal of building materials.




## The Waste Hierarchy

Construction and demolition waste constitutes about 40 percent of the total solid waste stream in the United States and about 25% of the total waste stream in the European Union.

In its solid waste management hierarchy, the U.S. Environmental Protection Agency (EPA) ranks source reduction, reuse, recycling, and waste to energy as the four preferred strategies for reducing waste.

## Life-cycle assessment (LCA)

- Life-cycle assessment (LCA) provides a more comprehensive picture of materials and products, enabling project teams to make more informed decisions that will have greater overall benefit for the environmental, human health, and communities, while encouraging manufacturers to improve their products through innovation.

- LCA is a “compilation and evaluation of the inputs and outputs and the potential environmental impacts of a product system throughout its life cycle.”

## Qualifying Products and Exclusions

- The MR section addresses “permanently installed building products,” which as defined by LEED refers to products and materials that create the building or are attached to it.

- Examples include structure and enclosure elements, installed finishes, framing, interior walls, cabinets and casework, doors, and roofs. Most of these materials fall into Construction Specifications Institute (CSI) 2012 MasterFormat Divisions 3-10, 31, and 32. Some products addressed by MR credits fall outside these divisions.

- Furniture is not required to be included in credit calculations. However, if furniture is included in MR credit calculations, all furniture must be included consistently in all cost-based credits.

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- Special equipment, such as elevators, escalators, process equipment, and fire suppression, systems, is excluded from the credit calculations. Also excluded are products purchased for temporary use on the project, like formwork for concrete.







## Determining Product Cost

To calculate the total materials cost of a project, use either the actual materials cost or the default materials cost.

- **Actual materials cost**. This is the cost of all materials being used on the project site, excluding labor but including delivery and taxes.

- **Default materials cost**. The alternative way to determine the total materials cost is to calculate **45% of total construction costs**. This default materials cost can replace the actual cost for most materials and products, as specified above. If the project team is including optional products and materials, such as furniture and MEP items, add the actual value of those items to the default value for all other products and materials.

## Location Valuation

Several credits in the MR section include a location valuation factor, which adds value to locally produced products and materials. The intent is to incentivize the purchase of products that support the local economy.

- Products and materials that are extracted, manufactured, and purchased within 100 miles of the project are valued at 200% of their cost (i.e., the valuation factor is 2).

- The distance must be measured as the crow flies, not by actual travel distance.

## Location Valuation

**Example:**

A project team purchases 50 doors salvaged from a local deconstruction site and sold through a local Habitat for Humanity ReStore for $500. The value of equivalent new doors is documented at $400 each, or $20,000. Their contribution to the credit is as follows:

$20,000 x 1.0 criterion valuation * 2.0 location valuation = $40,000

$40,000 is the total sustainable criteria value for these doors

# Determining Material Contribution of an Assembly

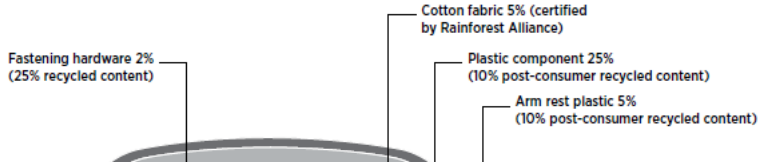


**Table 1. Example calculation for $500 office chair**

| Chair component | Percentage of product, by weight | Value of component | Percentage of component meeting sustainability criteria | Value of sustainability criteria |
|---|---|---|---|---|
| Fastening hardware | 2% | $10 | 25% preconsumer recycled content | $1.25 |
| Cotton fabric | 5% | $25 | 100% certified by Rainforest Alliance | $25.00 |
| Plastic component | 25% | $125 | 10% postconsumer recycled content | $12.50 |
| Armrest | 5% | $25 | 10% postconsumer recycled content | $2.50 |
| Metal base | 20% | $100 | 25% preconsumer recycled content | $12.50 |
| Steel post | 8% | $40 | 40% preconsumer recycled content | $8.00 |
| Wheels | 5% | $25 | 10% postconsumer recycled content | $2.50 |
| Total value contributing to credit | | | | $64.25 |

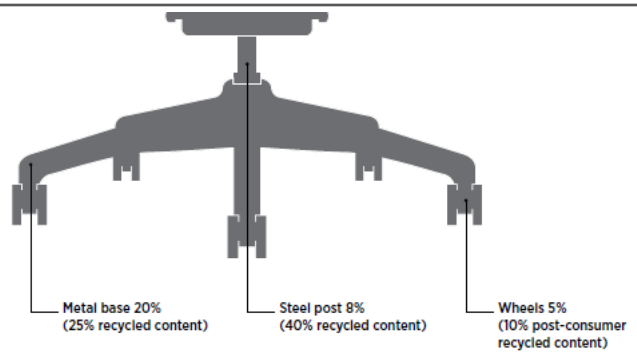


**Figure 2.** Sustainably produced components of $500 office chair

# MATERIALS AND RESOURCES

## LEED ADDRESSES THE FOLLOWING ISSUES RELATED TO MATERIALS AND RESOURCES:

- Conservation of materials
- Environmentally, socially, and locally preferable materials
- Waste management and reduction

### STRATEGIES FOR CONSERVING MATERIALS THROUGHOUT A PROJECT'S LIFE-CYCLE:

- **REUSE EXISTING BUILDINGS AND SALVAGED MATERIALS.** Selecting resources that have already been harvested and manufactured results in tremendous materials savings.
- **PLAN FOR SMALLER, MORE COMPACT COMMUNITIES.** Reduce the need for new roads and other infrastructure by preventing sprawling land-use patterns.
- **DESIGN SMALLER, MORE FLEXIBLE HOMES AND BUILDINGS.** Use space-efficient strategies, reduce unused space such as hallways, and provide flexible spaces that can serve multiple functions.
- **USE EFFICIENT FRAMING TECHNIQUES.** Advanced framing, in which studs are spaced 24 instead of 16 inches on center, and structural insulated panels, which combine framing and insulation into one rigid component, use less material than conventional framing without compromising performance.
- **PROMOTE SOURCE REDUCTION IN OPERATIONS.** Designate office supply reuse centers. Encourage paper conservation through double-sided and electronic printing.

**Environmentally preferable attributes to consider include:**

- Support the local economy
- Sustainably grown and harvested
- Have intended end-of-life scenarios that avoid landfill
- Contain recycled content from industrial or consumer sources
- Made of bio-based material
- Free of toxins
- Long lasting, durable, and reusable
- Made in factories that support human health and workers' rights

Product transparency tools like life-cycle assessment (LCA), Environmental Product Declarations (EPDs), and material ingredient disclosures provide a more comprehensive picture of materials and products, enabling project teams to make informed decisions.

### STRATEGIES TO PROMOTE SUSTAINABLE PURCHASING DURING DESIGN AND OPERATIONS:

- **IDENTIFY LOCAL SOURCES OF ENVIRONMENTALLY PREFERABLE PRODUCTS.** Using local materials not only reduces the environmental harms associated with transportation, it also supports the local economy.
- **DEVELOP A SUSTAINABLE MATERIALS POLICY.** Outline the goals, thresholds, and procedures for procurement of ongoing consumables and durable goods. Incorporate systems thinking. Evaluate materials based on their upstream and downstream consequences. Monitor compliance to ensure that the policy is effective.
- **SPECIFY GREEN MATERIALS AND EQUIPMENT.** Give preference to rapidly renewable materials, regional materials, salvaged materials, and those with recycled content. Choose vendors who promote source reduction through reusable or minimal packaging of products. Look for third-party certifications, such as the Forest Stewardship Council, Green Seal, and ENERGY STAR.
- **SPECIFY GREEN CUSTODIAL PRODUCTS.** Choose sustainable cleaning products and materials that meet Green Seal, Environmental Choice, or EPA standards to protect indoor environmental quality and reduce environmental damage.

### STRATEGIES TO REDUCE WASTE DURING CONSTRUCTION:

- **DESIGN BUILDINGS THAT PRODUCE LESS WASTE.** Use strategies such as designing for dimensional construction materials, prefabrication, or material efficient framing.
- **DEVELOP A CONSTRUCTION WASTE MANAGEMENT POLICY.** Outline procedures and goals for construction waste diversion. This policy should specify a target diversion rate for the general contractor.
- **ESTABLISH A TRACKING SYSTEM.** Ensure that the general contractor provides waste hauler reports and captures the full scope of the waste produced. Designate a construction and demolition waste recycling area. Diligent monitoring will ensure that the policy is effective.

### STRATEGIES TO REDUCE WASTE DURING OPERATIONS AND MAINTENANCE:

- **DEVELOP A SOLID WASTE MANAGEMENT POLICY.** Outline procedures and goals for solid waste diversion. This policy should specify a target diversion rate for the facility.
- **CONDUCT A WASTE STREAM AUDIT.** Establish baseline performance for the facility and identify opportunities for increased recycling, education, and waste diversion.
- **MAINTAIN A RECYCLING PROGRAM.** Provide occupants with easily accessible collectors for recyclables. Label all collectors and list allowable materials. Through signage or meetings, educate occupants about the importance of recycling and reducing waste.
- **MONITOR, TRACK, AND REPORT.** Use hauler reports or other reliable data to monitor and track the effectiveness of the policy. Track performance goals and provide feedback to the occupants.
- **COMPOST.** Institute an on-site composting program to turn landscaping debris into mulch. Work with the waste hauler to allow for collection and composting of food and other organic materials.
- **PROVIDE RECYCLING FOR DURABLE GOODS.** Institute an annual durable goods drive where e-waste and furniture are collected on site and disposed of properly through donation, reuse, or recycling. Allow occupants to bring e-waste and furniture from home.

# Materials and Resources

## Waste Management and Reduction

# MATERIALS AND RESOURCES

**Materials and Resources (MR)**

| Adaptation | NC | CS | S | R | DC | WDC | HOS | HC |
|---|---|---|---|---|---|---|---|---|
| Total | 13 | 14 | 13 | 13 | 13 | 13 | 13 | 19 |
| Storage and Collection of Recyclables | req | req | req | req | req | req | req | req |
| Construction and Demolition Waste Mgmt Planning | req | req | req | req | req | req | req | req |
| PBT Source Reduction - Mercury | -- | -- | -- | -- | -- | -- | -- | req |
| Building Life-Cycle Impact Reduction* | 5 | 6 | 5 | 5 | 5 | 5 | 5 | 5 |
| BPD&O - Environmental Product Declarations* | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| BPD&O - Sourcing of Raw Materials* | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| BPD&O - Material Ingredients* | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| PBT Source Reduction - Mercury | -- | -- | -- | -- | -- | -- | -- | 1 |
| PBT Source Reduction - Lead, Cadmium & Copper | -- | -- | -- | -- | -- | -- | -- | 2 |
| Furniture and Medical Furnishings* | -- | -- | -- | -- | -- | -- | -- | 2 |
| Design and Flexibility | -- | -- | -- | -- | -- | -- | -- | 1 |
| Construction and Demolition Waste Management* | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |