PART 9 – Materials and Resources (MR)



Introduction

Construction and demolition waste constitutes about 40% of the total solid waste stream.



Masonry waste



Ceramic waste



Construction and Demolition Wastes (CDW)



Concrete waste



Mortar waste



Drywall



Excavation material



Others:

- Asphalt · Polymers
- Wood · Glass
- Metals · Cardboard/Paper



Introduction

However, there are much better alternatives than <u>classifying items as waste</u>, and there are many ways to reduce the environmental harm associated with materials.

Using fewer materials, choosing environmentally preferable materials, using locally harvested materials and eliminating waste all provide great benefits.

<u>Life-cycle assessment</u> will also serve as a great tool to evaluate materials and resources according to their environmental performances.

The MR credit category will be discussed under four major sections:

- Conservation of materials
- Environmentally preferable materials
- Waste management and reduction
- Sustainable purchasing



Conservation of materials

The conservation of materials starts by eliminating the need for materials during the planning and design phase. Rightsizing the project is the first step toward conservation of materials. Reusing existing materials, salvaged materials, and especially existing buildings results in material savings.

If the project is a major renovation of an existing building, the project team should look for ways to reuse the following existing materials:

- Framing
- Envelopes
- Walls
- Flooring
- Ceilings
- Roofing



Conservation of materials

Using salvaged materials will contribute to reduction in the demand for virgin materials. Following are some types of salvaged materials that can be used in new buildings:

- Bricks
- Doors
- Windows
- Flooring
- Cabinets
- Tiles

Adaptive reuse strategies, which can also be called "designing for flexibility", should be well considered in the buildings that may need frequent changes in layouts or floor plans.



Conservation of materials





Conservation of materials

The best way to eliminate waste is through **source reduction**. Source reduction refers to the exact sizing of the materials to be produced through <u>prefabrication</u>, <u>modular construction</u>, or similar methods, so that no waste is generated on-site. Since it's about decreasing the unnecessary material brought into a building, it also covers the use of products with less packaging.





The conservation of materials does not end with the completion of the construction phase. In a green building, the same principles should be applied throughout the <u>building operations</u> phase to the last phase of the building, a demolition or reuse phase.



Environmentally preferable materials

When selecting materials to be used in the project, the project team should consider a material's life cycle. The first goal is to implement all the strategies to <u>stop</u> the material from going to landfills as waste.

The second goal should be to evaluate the effects of a particular product on the environment. The building materials are harvested/extracted, manufactured in the factories, and then installed in the buildings to be used. After that, they either get demolished, disposed, or recycled.



Environmentally preferable materials

Materials that get extracted or harvested in a sourceful manner, get manufactured in environmentally friendly facilities, and can be recycled to be a part of another product should be less harmful to the environment than regular products. On the contrary, a product that requires lots of energy consumption for extraction and is also not very durable cannot be considered as environmentally friendly.

If the purchased products or materials are extracted, manufactured, and purchased within 160 km of the project, LEED will award the project in the credit calculations by valuing those products at **200%** of their cost.



Environmentally preferable materials

Below are some features of environmentally preferable materials:

- Locally harvested/extracted and manufactured
- Made from rapidly renewable materials
- Do not contain any toxins
- Manufactured in factories that support human health and worker's rights
- Long-lasting and reusable
- Contain recycled content
- Have intended end-of-life scenarios that avoid a landfill
- Low in embodied energy



Environmentally preferable materials

Life cycle assessment

Life-cycle assessment (LCA) examines all the environmental effects of a product quantitively during an entire life cycle.



LEED

Environmentally preferable materials

Life cycle assessment

A **cradle-to-cradle** approach is used in LCA, allowing both the total energy use and other environmental consequences resulting from the creation of that material to be calculated.

A cradle-to-cradle approach analyzes a product's life cycle from the first resource extraction/harvesting of the product to its new life as another product or as a part of another product. Thus, cradle-to-cradle products are waste free products that can be recycled.





Environmentally preferable materials

Life cycle assessment

On the other hand, a **cradle-to-grave** approach analyzes a product's life cycle from the first resource extraction/harvesting of the product to the end of its life, resulting in a form of waste.



Environmentally preferable materials

Life cycle assessment

Cradle-to-gate approach evaluates a product's partial life cycle, from its resource extraction/harvesting to becoming a manufactured product ready for sale at the factory gate.





Environmentally preferable materials

Life cycle assessment

Cradle-to-Cradle certified products are proven to be environmentally friendly.





Environmentally preferable materials

Product transparency

Project teams should be careful about **greenwashing** when selecting products, which refers to the presentation of a product or a material as being more environmentally friendly than it actually is.



BIM Building Information Modeling

Environmentally preferable materials

Product transparency

Environmental Product Declaration (EPD) looks at the entire life cycle of a product and assess the cost of the product on the environment. Products that contain an EPD will give information about product's impact on global warming, ozone depletion, water pollution, greenhouse gas emissions, human toxicity, and more.



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Environmentally preferable materials

Product transparency

A product with a Health Product Declaration (HPD) provide disclosure about its material ingredients, a list of potential chemicals, related concerns, and additional health information.



Corporate Sustainability Reports (CSR) provide information about the manufacturer or raw material supplier of a product that has been verified to employ sustainable principles during the creation of their products.



Waste management and reduction

Green building projects should work on reducing the amount of waste that goes to landfills. With the development and implementation of a **waste management plan** for both the construction and operation phases of a building, project teams can identify potential waste streams and look for ways to reuse or recycle them.

At a minimum, all the LEED projects must recycle paper, corrugated cardboard, glass, plastics, and metals.

According to the local recycling programs, projects may determine which materials will be stored separately and which may be commingled into a single stream, which is called **commingled recycling.**

LEED



Waste management and reduction

The EPA developed a hierarchy, ranking the most environmentally sound strategies for reducing municipal solid waste:

- Source reduction (the most important strategy)
- Reuse
- Recycle
- Waste-to-energy conversion



Sustainable purchasing

Green building need to address sustainable purchasing during the building operations phase.

Developing a **sustainable material purchasing program** can foster choosing environmentally friendly products when buying office papers, computers, furniture, light bulbs, and more.

PRODUCT PURCHASING TIPS





Sustainable purchasing

When purchasing sustainable <u>cleaning products</u>, the facility manager can look for green custodial products that meet the **Green Seal**, **Environmental Choice**, or **EPA standards** in order to protect the indoor air quality and to reduce environmental damage.

Third-party certifications can help identify sustainable products related to food.



Strategies to address Materials and Resources

- Reuse existing buildings and salvaged materials
- Plan for smaller, more compact communities
- Design smaller, more flexible homes and buildings
- Use efficient framing techniques
- Implement source reduction
- Conduct life-cycle assessment (LCA)
- Look for cradle-to cradle certified products
- Look for products that are sustainably grown and harvested, are made from rapidly renewable materials, are toxin free, are manufactured in factories that support human health and workers rights, are long-lasting and reusable, contain recycled content, have intended end-of-life scenarios that avoid landfills, and are low in embodied energy
- Identify local sources of environmentally preferred products
- Develop a sustainable materials policy
- Specify green materials and equipment and look for third-party certifications like Green Seal, ENERGY STAR, or something similar
- Specify green custodial products that meet Green Seal, Environmental Choice, or EPA standards

BIM

LEED

- Avoid greenwashing and look for transparent products that contain an EPD and an HPD
- When choosing manufacturers or raw material suppliers, look for a CSR
- Develop a construction waste policy

Strategies to address Materials and Resources

- Develop a solid waste management policy
- Establish a waste tracking system
- Conduct a waste stream audit
- Maintain a recycling program
- Compost
- Provide recycling for durable goods such as e-waste and furniture
- Develop a sustainable purchasing program during the building operations phase

