



Green Building Materials

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Outline

- Overview of green buildings
- Principles of green building materials
- Examples: roofing and floor coverings
- Conclusion

Green Buildings

- Holistic approach
- Sources and impacts of materials
- Mechanical system efficiency
- Site / building relationship
- Innovation





Principles of Green Building

- Save energy
- Recycle buildings
- Create community
- Reduce material use
- Protect and enhance the site
- Select low-impact materials
- Maximize longevity
- Save water
- Make the building healthy
- Minimize C&D waste
- Green up your business



Building Materials

- Materials form a large part of the overall environmental burden of buildings
 - Raw material extraction
 - Waste and pollution associated with manufacturing
 - Material installation
 - Public health risks
 - Disposal



Material Life Cycle

Assessment

- Resource extraction
- Manufacturing and transportation
- Installation
- Operation and maintenance
- Salvage, recycling and disposal



Principles of Green Materials

- Choose products:
 - made from environmentally attractive materials
 - that are green because of what isn't there
 - that reduce environmental impacts during construction, renovation or demolition
 - that reduce environmental impacts of building operation
 - that contribute to a safe, healthy indoor environment

Products made from environmentally attractive materials

■ Use:

- salvaged products
- products with post-consumer/industrial recycled content
- certified wood products
- rapidly renewable products
- products made from agricultural waste material





Products that are green because of what isn't there

- Use:
 - products that reduce material use
 - alternatives to ozone-depleting substances, PVC and polycarbonate
 - alternatives to conventional preservative-treated wood
 - alternatives to other components considered hazardous

Products that reduce environmental impacts associated with construction

■ Use:

- products that reduce the impacts of new construction
- products that reduce the impacts of renovation
- products that reduce the impact of demolition



Products that reduce environmental impacts of building operation

- Use:
 - building components that reduce heating and cooling loads
 - energy & water conserving components
 - renewable energy and fuel cell equipment
 - products that prevent pollution or reduce waste



Products that contribute to a safe, healthy indoor environment



■ Use:

- products that don't release significant pollutants into the building
- products that block the introduction, development or spread of indoor contaminants
- products that remove indoor pollutants
- products that warn occupants of health hazards in the building

Focus Building Materials

■ Roofing

- Asphalt / fiberglass composition
- Aluminum / steel
- Metal



■ Floor Coverings

- Wood
- Natural linoleum
- Carpeting / carpet pads



Principles Discussed

- Durability
- Recyclability
- Recycled-content
- Pollution (embodied energy)





Roofing Criteria

- Durability
 - 25-year minimum warranty
- Color
 - Use light colored roofs
 - Increases durability
 - Decreases reliance upon mechanical cooling

Roofing: Options for Shingles

- Asphalt / Fiberglass Composition
 - Very durable
 - 40-year warranty
 - Some recycled content
- Aluminum / Steel
 - Durable
 - 90% recycled content
 - Recyclable at end of life



Roofing: Options for Shingles

■ Metal

- Durable
- 100% recycled content
- Recyclable
- High embodied energy costs



Comparison of Materials

✓ Low ✓ ✓ Moderate ✓ ✓ ✓ High -
 - N/A

Material	Durability	Emb. Energy	Cost	Env. Impact	Recycled Content	Recyclability
Cedar	✓		✓ ✓ ✓	✓ ✓ ✓	--	--
Tile/ Slate	✓ ✓ ✓	✓ ✓	✓ ✓	✓ ✓ - ✓ ✓ ✓		
Asphalt/ Fiberglass	✓ ✓ ✓		✓		✓ - ✓ ✓	
Alum. / Steel	✓ ✓ ✓	✓ ✓ ✓		✓	✓ ✓	✓ ✓ - ✓ ✓ ✓
Metal	✓ ✓ ✓	✓ ✓ -		✓	✓ ✓ ✓	✓ ✓ - ✓ ✓ ✓

Floor Coverings Criteria

- Durability
- Resource efficiency
- Indoor air quality
 - Offgassing concerns



Floor Coverings

■ Wood

- Reclaimed wood flooring
- Sustainably harvested wood flooring
- Bamboo flooring

■ Natural Linoleum

- Durable
- Abrasion resistant



Floor Coverings



- Carpeting
 - Must be replaced frequently
 - Large contributor to landfill waste
 - Traps dust, mold, bacteria

- Carpet pads
 - Durable with recycled content
 - Use of recycled materials
 - Offgassing concerns



Floor Coverings

- Options
 - Recycled-content carpeting
 - Carpet tiles
 - Carpet leasing
 - Rapidly renewable fibers
 - Use mats or small carpets



Comparison of Materials

✓ Low ✓ ✓ Moderate ✓ ✓ ✓ High --
 N/A

Material	Durability	Emb. Energy	Cost	Env. Impact	Recycled Content	Recyclability
Renew. Fibers	✓ ✓- ✓ ✓ ✓	✓ ✓ ✓	✓ ✓	✓		
Nat. Linol.	✓ ✓ ✓	✓ ✓		✓ ✓ - ✓ ✓ ✓		
Vinyl / Rubber	✓ ✓ - ✓ ✓ ✓	✓ ✓ - ✓ ✓ ✓		✓ ✓ ✓	✓ - ✓ ✓ ✓	
Carpet	✓ - ✓ ✓	✓ ✓ ✓	✓ - ✓ ✓ ✓	✓ - ✓ ✓ ✓	✓ - ✓ ✓ ✓	✓ ✓ - ✓ ✓ ✓



General Recommendations

- Specify at least four major construction materials with post-consumer recycled content
 - Less energy expenditure and pollution
- Use natural materials to the extent possible as they have low levels of toxicity compared to synthetic materials



For More Information

- Santa Monica Green Building Guidelines
 - <http://greenbuildings.santa-monica.org>
- Environmental Building News
- GreenSpec Binder
- Santa Barbara County Green Building Guidelines (To be published)