Deconstruction / reuse
an alternative for environmental, social and economic benefits

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Impacts of building materials US

- Construction ~5-9% GDP
- Construction materials 11% global CO2
- 60% of materials flow (ex. food / fuel)
- 3.4 billion tons of materials in 2000 – 5% from renewable sources
- ~40% of waste from C&D

USGS, US EPA, US Census
USA annual C&D debris

170-200 million ton/yr = height 3-4 story building; width 2-lane road; length continental USA coastline
## C&D materials

<table>
<thead>
<tr>
<th>Material</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concrete, masonry, brick</td>
<td>45%</td>
</tr>
<tr>
<td>Wood</td>
<td>25%</td>
</tr>
<tr>
<td>Gypsum drywall</td>
<td>10%</td>
</tr>
<tr>
<td>Asphalt shingles</td>
<td>8%</td>
</tr>
<tr>
<td>Metals</td>
<td>4%</td>
</tr>
<tr>
<td>Plastics</td>
<td>4%</td>
</tr>
</tbody>
</table>
C&D recycling rates (International)

<table>
<thead>
<tr>
<th>Country</th>
<th>% of total waste</th>
<th>% recycled</th>
</tr>
</thead>
<tbody>
<tr>
<td>Netherlands</td>
<td>26</td>
<td>75</td>
</tr>
<tr>
<td>Japan</td>
<td>36</td>
<td>65</td>
</tr>
<tr>
<td>Germany</td>
<td>19</td>
<td>40-60</td>
</tr>
<tr>
<td>UK</td>
<td>50&gt;</td>
<td>40</td>
</tr>
<tr>
<td><strong>United States</strong></td>
<td><strong>40-45</strong></td>
<td><strong>30</strong></td>
</tr>
<tr>
<td>France</td>
<td>25</td>
<td>20-30</td>
</tr>
<tr>
<td>Spain</td>
<td>70</td>
<td>17</td>
</tr>
<tr>
<td>Italy</td>
<td>30</td>
<td>10</td>
</tr>
</tbody>
</table>

Tam, 2007; Cochran, 2010; US EPA, 2006
Building-related debris by phase

- Construction: 9%
- Renovation: 38%
- Demolition: 53%
C&D / MSW reuse and recycle goals

Massachusetts – landfill ban 2006
• asphalt brick concrete (ABC) wood metal
• 80% diversion rate

Seattle – landfill ban phased 2012-2015
• goal 70% diversion by 2020

California
• goal 75% diversion by 2020

District of Columbia
• goal 20% reuse and 80% diversion by 2032
Residential deconstruction / reuse

• Seattle
  – 20% (excluding ABC) reuse
  – 50% (excluding ABC) reuse or recycle
  – 100% of ABC reuse or recycle

• Chicago
  – 5% reuse
  – 70% reused or recycle
Deconstruction

The removal of buildings:
1) Safely
2) Maximize reuse & recycle
3) Environmentally responsibly
4) Effectively
through careful and selective dismantling
Benefits of deconstruction

• Conserve natural resources
• Extend embodied energy
• Reduce landfills requirement
• Management of hazardous materials
• Enhance profit & cost-savings
• New businesses, jobs, value-adding
• Reduced site environmental impacts
• Reduced environmental health impacts
Potential for deconstruction / reuse

- Demolition ~270,000 residential units / year
- 30% current recycling rate
- 50-75% potential recycling rate
- Recycling potential x2 to 2.5 current

- 0.2% current reuse rate
- 5% - 25% potential reuse rate
- Reuse potential x25 to x125 current
Reuse

• The continuing use of a previously used or unwanted material or component in the same form, allowing for the removal of damaged parts, connectors, adhesives, mortars, and including the addition of minor components necessary for reinstallation.
Rucksack factors

- Wood 1.2
- Glass 2
- Plastics 2 - 7
- Cement 3
- Steel 7
- Paper 15
- Aluminum 85
Reuse / recycle jobs

- Source separated recycling (& deconstruction)
  - 8 jobs / 1,000 tons
- Processing recyclables
  - 5 jobs / 1,000 tons
- Reuse / manufacture use recycle
  - 3-10 jobs / 1,000 tons (3 wood, 4 metals, 10 plastics)
- Waste disposal
  - 1.3 jobs / 1,000 tons

(CalRecycle, Tellus Institute, NRC)
Greenhouse gas benefits

• Increase national C&D recycling rate to 50%
  75 MMT CO2-e/yr
  = offset 15 million cars / yr

• Increase national C&D recycling rate to 75%
  113 MMT CO2-e/yr
  = offset 24 million cars / yr

Estimated 250 millions passenger vehicles in US (US EPA)
“Waste is a resource... in the wrong place”

Thank you!
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