Industry Trends and Marketing Strategies for the Hardwood Lumber Industry

Great Lakes Forest, Industry Products, and Resources Summit
Scott Bowe
June 6, 2012
Outline

• Status of the hardwood industry
• What are the current marketing strategies employed by the hardwood industry?
• Development of Life Cycle Analysis (LCA) and Environmental Products Declarations (EPDs)
Status of the Hardwood Industry
Hardwood Lumber Markets

2010 market share:

- Furniture: 5%
- Flooring: 9%
- Millwork: 6%
- Cabinets: 6%
- Exports: 15%
- Pallets: 47%
- Railway ties: 12%

## Hardwood Lumber Market Share

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Industrial</td>
<td>32%</td>
<td>40%</td>
<td>34%</td>
<td>37%</td>
</tr>
<tr>
<td>Appearance-based</td>
<td>68%</td>
<td>60%</td>
<td>66%</td>
<td>63%</td>
</tr>
</tbody>
</table>

Source: W. Luppold, U.S. Forest Service
## Recent Market Shifts

<table>
<thead>
<tr>
<th>User Group</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industrial</td>
<td>41%</td>
<td>42%</td>
<td>44%</td>
<td>52%</td>
<td>60%</td>
<td>59%</td>
</tr>
<tr>
<td>Appearance-based</td>
<td>59%</td>
<td>58%</td>
<td>56%</td>
<td>48%</td>
<td>40%</td>
<td>41%</td>
</tr>
</tbody>
</table>
Hardwood Lumber Markets

2010 market share:
- Furniture: 5%
- Flooring: 9%
- Millwork: 6%
- Cabinets: 6%
- Exports: 15%
- Pallets: 47%
- Railway ties: 12%

What about softwood lumber?

Most softwood lumber goes to residential construction (70%).

- 39% New residential
- 31% Repair/Remodeling
- 25% Nonresidential
- 5% Industrial

A. Schuler, USDA Forest Service
Eastern Hardwood Lumber Production

Four years of decline from 1999-2003 (this last happened in the 1930’s)

Source: W. Luppold, U.S. Forest Service
Nonupholstered Household Wood Furniture: Major U.S. Import Sources

Data source: International Trade Administration
Market share of imports in the U.S.*

These market shares are conservative because some imported components and finished furniture is included in the domestic shipments.

Consumption = value of shipments + imports – exports
Import share = imports/consumption

Data source: U.S. Census Bureau, Intl. Trade Admin.
# Changing markets for Hardwood Components

<table>
<thead>
<tr>
<th>Product</th>
<th>1984</th>
<th>2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>Furniture</td>
<td>65%</td>
<td>22%</td>
</tr>
<tr>
<td>Cabinetry</td>
<td>16%</td>
<td>27%</td>
</tr>
<tr>
<td>Building Products *</td>
<td>10%</td>
<td>42%</td>
</tr>
<tr>
<td>Decorative/Specialty</td>
<td>4%</td>
<td>7%</td>
</tr>
<tr>
<td>Industrial Products</td>
<td>5%</td>
<td>3%</td>
</tr>
</tbody>
</table>

* residential and commercial, both new construction and remodeling

Source: 2008 WCMA Market Study
The problem with that . . .

Value of private U.S. construction, 2002-2012

Data source: U.S. Census Bureau, *Annual Value of Private Construction Put in Place*
Employment Trends

Trends in home (single family) prices and household income

Home prices were increasing at an unsustainable rate

(1990=100)

Sources: Median income & median new home prices - U.S. Census Bureau; Natl. Assoc. of Realtors
This metric does not count the “shadow” inventory of seriously delinquent, foreclosed, and bank-owned properties, which adds to supply.

Sources: New homes - U.S. Census Bureau; Existing homes – Natl. Assoc. or Realtors
Single family housing starts
Down 75% from 2005 (peak) to 2011

Data source: U.S. Census Bureau
Top U.S. hardwood species exported to Asia
(volume basis)

![Graph showing the proportion of total imports from U.S. for different hardwood species from 1994 to 2011.]

Data: USDA Foreign Agricultural Service
U.S. hardwood lumber exports (top 5 destinations)

Data: USDA Foreign Agricultural Service

~70% of total

110 other trading partners account for the remaining 30%
U.S. hardwood lumber exports

Data: USDA Foreign Agricultural Service
Volume of U.S. exports of hardwood lumber to Taiwan, China, and Vietnam

Data: USDA Foreign Agricultural Service
Current Marketing Strategies
Label Fatigue
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The thermal mass myth

Research shows that the optimum floor thickness required to achieve an effective thermal mass is readily delivered by steel framed buildings. There is a common misconception that buildings must be heavyweight to achieve an optimum thermal mass. This myth has probably arisen because buildings such as churches are cool in the summer. However, the idea that churches stay cool is because they have very few windows, which reduces heat gain.

In modern buildings, the greatest available mass is found in the concrete floor slab. Independent research has shown that the optimum thickness of concrete floor slab for providing thermal mass is 75 to 100 mm. This thickness of concrete floor slab is readily available in almost all steel-framed buildings, which are precisely the lighter weight form of construction.

The extra weight associated with hollow steel building sections is not required to improve thermal mass and is surplus to requirements. In fact, the extra mass of heavy weight concrete components may actually increase the energy required to heat and cool the building.

For more information visit www.corusconstruction.co.uk
Strip mining for iron ore...
Low environmental impact?
Marketing Strategies

• What marketing strategy will...
  – Leveling the playing field for all materials?
  – Appeal to a common environmental concern?
  – Scientifically demonstrate wood’s small environmental footprint?
Wrong Habits & Decisions
are always embarrassing & painful!
Be it fingerling your nose in public or selecting a wrong ply...

जिससे आपको मिलती है सिर्फ टर्माइट की टर्न-टर्न...
और फर्नीचर की चूं चूं...

उघर नहीं,
↔ हघर देखिए!

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Distt. Yamuna Nagar (Haryana) Factory: 01735-329240,
M: 09812042449, 09355642449 E-mail: ply.assamwood@gmail.com
What is Life Cycle Science?

• Careful accounting of all inputs and outputs during a product’s manufacture and use

• Other terms: Life Cycle Analysis, Life Cycle Assessment, Life Cycle Inventory, Life Cycle Science, etc.

• Life Cycle Science standards set by International Organization for Standardization (ISO) – ISO 14040 Standard
What is Life Cycle Science?

• Environmental Factors:
  – Raw Material Resources
    • Wood
  – Energy
    • Fossil based
    • Biomass
  – Emissions
    • Air
    • Water
    • Landfilled

• Trace the product and co-products from the Cradle to Grave
Complete Life Cycle from Forest to Final Wood Disposal

Important LCA Wood Research

• Forests
  – Life-Cycle Impacts of Inland Northwest and Northeast/North Central Forest Resources
  – Forest Resources Pacific Northwest and Southeast

• Structural Building Products
  – Life-Cycle Inventory of Hardwood Lumber Manufacturing in the Northeast and North Central United States
  – Life-Cycle Inventory of Softwood Lumber Manufacturing in the Northeastern and North Central United States
  – Resins: A Life-Cycle Inventory of Manufacturing Resins Used in the Wood Composites Industry
  – Southeastern Oriented Strand Board Production
  – Composite I-Joists – Pacific Northwest and Southeast
  – Glue Laminated Beams – Pacific Northwest and Southeast

(Source: http://www.corrim.org/)
Important LCA Wood Research

• Interior Finish Products
  – Life-Cycle Inventory of Solid Strip Hardwood Flooring in the Eastern United States
  – Life-Cycle Inventory of Hardwood Lumber Manufacturing in the United States
  – Life-Cycle Inventory of Manufacturing Prefinished Engineered Wood Flooring in the Eastern United States

• Building Assemblies
  – Design of Residential Building Shells – Minneapolis and Atlanta
  – Environmental Impacts of a Single Family Building Shell – From Harvest to Construction
  – Life-Cycle Assessments of Subassemblies Evaluated at the Component Level

(Source: http://www.corrim.org/)
Science and Replication

• Consortium for Research on Renewable Industrial Materials (CORRIM)

• Life Cycle Assessment of Rough Kiln-dried Hardwood Lumber for Export
  – American Hardwood Export Council (AHEC)
  – Hardwood Federation
  – Hardwood Manufacturers Association
  – Hardwood Flooring Association
Hardwood Lumber Production

“TOTAL MATERIAL AND ENERGY INPUTS”

- Logs
  - Saw logs, pulpwood, and veneer

- Energy Generation
  - Sawing
  - Drying
  - Planing

- Mill hog fuel

- System boundary for on-site emissions

- Dry Planed Lumber
  - “TOTAL MATERIAL AND ENERGY OUTPUTS”

- Industrial waste
  - Air emissions
  - Water effluents
  - Co-products: rough green and dry lumber, bark, sawdust, shavings, and chips

- System boundary for cumulative (total) emissions

(Source: http://www.corrim.org/pubs/reports/2010/phase2/Module_C.pdf)
Complete Life Cycle from Forest to Final Wood Disposal

What can we do with all of this Life Cycle data?
Environmental Product Declarations

• EPDs
  – Leveling the playing field for all materials
  – Appeal to a common environmental concern
  – Scientifically demonstrate wood’s small environmental footprint
Environmental Product Declarations

• EPDs provide science based, verified and comparable environmental information along product's entire supply chain
• Standardized (ISO 14025)
• Two types:
  – Generic EPDs prepared by trade associations
  – Product Specific EPDs prepared by manufacturers
## Table 1. Environmental performance, base case

<table>
<thead>
<tr>
<th>Impact category</th>
<th>Unit</th>
<th>Per 1 m² of decking</th>
<th>Per 100 ft² of decking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total primary energy</td>
<td>Mj</td>
<td>275.86</td>
<td>2562.71</td>
</tr>
<tr>
<td>Non-renewable, fossil</td>
<td>Mj</td>
<td>74.13</td>
<td>688.64</td>
</tr>
<tr>
<td>Non-renewable, nuclear</td>
<td>Mj</td>
<td>0.60</td>
<td>5.62</td>
</tr>
<tr>
<td>Renewable (SWHG)</td>
<td>Mj</td>
<td>14.08</td>
<td>130.79</td>
</tr>
<tr>
<td>Renewable, biomass</td>
<td>Mj</td>
<td>3.46</td>
<td>32.62</td>
</tr>
<tr>
<td>Feedstock, non-renewable fossil</td>
<td>Mj</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Feedstock, renewable biomass</td>
<td>Mj</td>
<td>183.59</td>
<td>1705.54</td>
</tr>
<tr>
<td>Renewable material consumption (wood)</td>
<td>kg</td>
<td>8.14</td>
<td>75.60</td>
</tr>
<tr>
<td>Non-renewable material consumption (nails)</td>
<td>kg</td>
<td>0.10</td>
<td>0.91</td>
</tr>
<tr>
<td>Fresh water use</td>
<td>L</td>
<td>0.03</td>
<td>0.30</td>
</tr>
<tr>
<td>Total waste</td>
<td>kg</td>
<td>8.24</td>
<td>76.51</td>
</tr>
<tr>
<td>Hazardous</td>
<td>kg</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Non-hazardous</td>
<td>kg</td>
<td>8.24</td>
<td>76.51</td>
</tr>
<tr>
<td>Global warming potential (GWP)</td>
<td>kg CO₂ eq</td>
<td>-1.45</td>
<td>-13.39</td>
</tr>
<tr>
<td>Acidification potential</td>
<td>H+ moles eq</td>
<td>2.72</td>
<td>25.31</td>
</tr>
<tr>
<td>Eutrophication potential</td>
<td>kg N eq</td>
<td>2.62E-03</td>
<td>2.43E-02</td>
</tr>
<tr>
<td>Smog potential</td>
<td>kg NO₂ eq</td>
<td>5.91E-02</td>
<td>5.49E-01</td>
</tr>
<tr>
<td>Ozone depletion potential</td>
<td>kg CFC-11 eq</td>
<td>2.55E-09</td>
<td>2.37E-08</td>
</tr>
</tbody>
</table>

SWHG: Solar, wind, hydroelectric and geothermal
Note: GWP includes all biogenic carbon sinks and sources throughout the product system boundary.

Source: FPInnovations, Western Red Cedar Decking EPD, 2011.
Why does wood perform so well?

“Growing trees takes carbon out of the atmosphere storing it first in the forest, which when harvested moves this carbon to storage in products while at the same time displacing fossil intensive products like steel and concrete.”

Life Cycle Information

• Consortium for Research on Renewable Industrial Materials (CORRIM)

• International Organization for Standardization
  – [http://www.iso.org/iso/home.html](http://www.iso.org/iso/home.html)

• U.S. Life Cycle Inventory Database

• Athena Institute
Questions?
Contact Information

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Madison, WI 53706-1598
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Email: sbowe@wisc.edu
Why are U.S. Hardwoods the Right Choice?

• When compared to other non-wood substitute materials:
  – U.S. Hardwoods are abundant
  – U.S. Hardwoods are renewable
  – U.S. Hardwoods are natural
  – U.S. Hardwoods are use less energy to manufacture
  – U.S. Hardwoods are create less pollution during manufacturing
  – U.S. Hardwoods are carbon neutral
  – U.S. Hardwoods are beautiful!
Why are U.S. Hardwoods the Right Choice?

• When compared to wood substitutes from other countries:
  – U.S. Hardwoods are abundant
  – U.S. Hardwoods are sustainable
  – U.S. Hardwoods are legally harvested
  – U.S. Hardwoods are consistently well manufactured
Forests, Wood, and the Carbon Relationship
Important Concepts

• As trees grow, they remove carbon from the atmosphere. As trees reach maturity, growth slows and ultimately stops as mortality catches up to growth.

• Alternatively the rate of removal of atmospheric carbon can be sustained by harvesting trees before growth slows moving the carbon into products.

• Continuously moving the growing forest carbon into other wood uses provides the greatest mitigation of carbon emissions.
Important Concepts

• The carbon footprint is quantified by the Global Warming Potential (GWP)
• GWP is categorized using greenhouse gas (GHG) emitted
• GHGs important to forest products industry: Carbon dioxide (#1), methane, and nitrous oxide
Important Concepts

• Forests are carbon neutral sources of energy
• Substitution – wood can be substituted for other materials that do not store carbon and consume far more fossil fuel energy in production such as concrete or steel.
• Displacement – wood biomass can displace fossil fuel energy during a products’ manufacture.
All Carbon Pools: Forest, Products, Emissions, Displacement, & Substitution

(Source: http://www.corrim.org/pubs/factsheets/fs_05.pdf)
Substitution and Displacement

Carbon Emission Reduction by Displacing Non-wood Products
(kgCO2/kg dry wood used)

ENERGY:
- Wood Residuals vs Coal
- Wood Residuals vs Natural Gas

WALL STUDS:
- BioDryStud vs Steel Stud

FLOOR JOIST:
- EWP I-joist vs Steel I-joist

COVERED FLOOR:
- EWP Joist+Ply vs Steel+Ply
- EWP Joist+Ply vs Concrete Slab

CLADDED WALL:
- Biodry stud+Ply vs Concrete +Stucco

KgCO2 reduced per kg wood fiber used

(Source: http://www.corrim.org/pubs/factsheets/fs_07.pdf)
NE/NC Hardwood vs. Plastic Moulding

• A = 0.89 (total CO₂ emissions)
• B = 0.59 (biofuel CO₂ emissions)
• C = 1.84 (carbon storage)
• D = 2.63 (substitution effect)
• E = 0.89 − 0.59 − 1.84 − 2.63 = - 4.16 kg CO₂-eq per bf

E is the net CO₂ balance

NE/NC Hardwood vs. Plastic Moulding

## Other Wood Examples

<table>
<thead>
<tr>
<th>Product</th>
<th>Unit</th>
<th>Category</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>Alternative</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hardwood</td>
<td>One board foot</td>
<td>NE/NC</td>
<td>0.89</td>
<td>0.59</td>
<td>1.84</td>
<td>2.63</td>
<td>PVC</td>
<td>-4.16</td>
</tr>
<tr>
<td>Lumber</td>
<td>One board foot</td>
<td>SE</td>
<td>1.08</td>
<td>0.79</td>
<td>1.77</td>
<td>2.64</td>
<td>PVC</td>
<td>-4.12</td>
</tr>
<tr>
<td>Softwood</td>
<td>One 2x4 ‘stud’</td>
<td>NE/NC</td>
<td>1.85</td>
<td>1.23</td>
<td>6.63</td>
<td>6.97</td>
<td>Steel stud</td>
<td>-13.0</td>
</tr>
<tr>
<td>Lumber</td>
<td>One 2x4 ‘stud’</td>
<td>SE</td>
<td>3.90</td>
<td>3.32</td>
<td>8.42</td>
<td>7.01</td>
<td>Steel stud</td>
<td>-14.9</td>
</tr>
<tr>
<td>Wood</td>
<td>1 square foot</td>
<td>Solid wood</td>
<td>1.06</td>
<td>0.69</td>
<td>2.12</td>
<td>-0.13</td>
<td>Linoleum</td>
<td>-1.61</td>
</tr>
<tr>
<td>Flooring</td>
<td>1 square foot</td>
<td>Engineered</td>
<td>0.98</td>
<td>0.52</td>
<td>1.10</td>
<td>-0.22</td>
<td>Linoleum</td>
<td>-0.42</td>
</tr>
<tr>
<td>Doors</td>
<td>One door</td>
<td>Solid wood</td>
<td>46.5</td>
<td>29.4</td>
<td>100</td>
<td>228</td>
<td>Steel door</td>
<td>-311</td>
</tr>
<tr>
<td>Decking</td>
<td>One deck board</td>
<td>Treated pine</td>
<td>5.18</td>
<td>1.70</td>
<td>16.1</td>
<td>11.9</td>
<td>WPC</td>
<td>-24.5</td>
</tr>
<tr>
<td>Siding</td>
<td>100 square feet</td>
<td>WRC</td>
<td>37.7</td>
<td>5.96</td>
<td>77.7</td>
<td>20.4</td>
<td>Vinyl</td>
<td>-66.3</td>
</tr>
<tr>
<td>Poles</td>
<td>One 45' pole</td>
<td>Treated wood</td>
<td>454</td>
<td>431</td>
<td>1160</td>
<td>1380</td>
<td>Concrete</td>
<td>-2520</td>
</tr>
<tr>
<td>OSB</td>
<td>One 4’x 8' sheet</td>
<td>SE</td>
<td>19.0</td>
<td>10.7</td>
<td>34.7</td>
<td>-</td>
<td>n/a</td>
<td>-26.3</td>
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<tr>
<td>Plywood</td>
<td>One 4’x 8' sheet</td>
<td>PNW</td>
<td>5.72</td>
<td>4.13</td>
<td>25.5</td>
<td>-</td>
<td>n/a</td>
<td>-23.9</td>
</tr>
<tr>
<td></td>
<td>One 4’x 8' sheet</td>
<td>SE</td>
<td>10.1</td>
<td>6.48</td>
<td>30.9</td>
<td>-</td>
<td>n/a</td>
<td>-27.3</td>
</tr>
</tbody>
</table>