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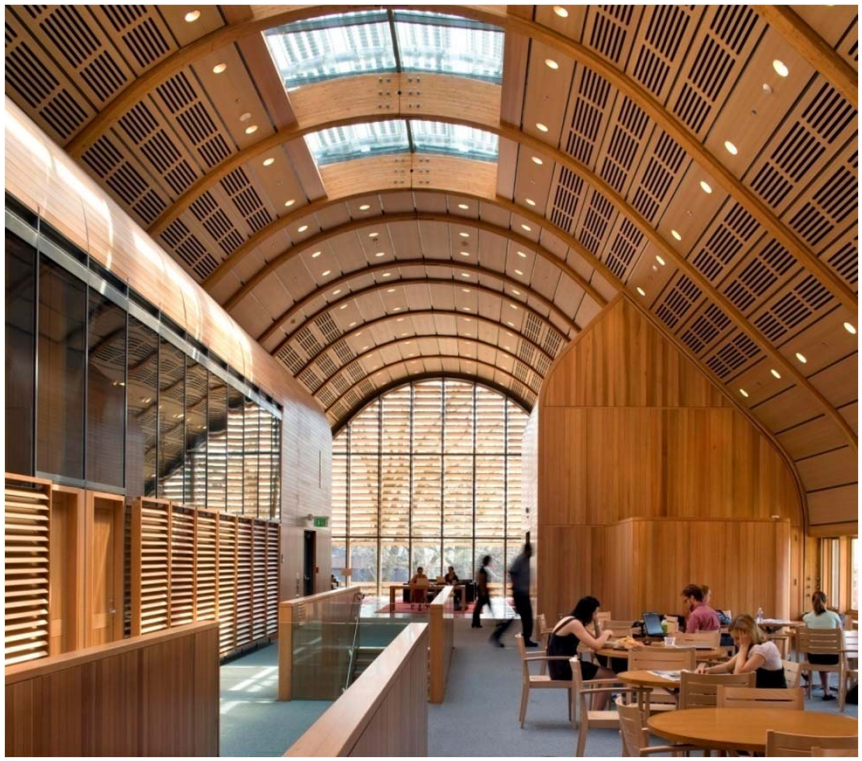
North American Hardwoods and their Role in Carbon Neutral Design



Locally-sourced red oak is featured throughout Yale's LEED-Platinum Kroon Hall.
Photo courtesy of the American Hardwood Export Council; © Morley von Sternberg

What are North American Hardwoods?

Hardwoods are deciduous trees.

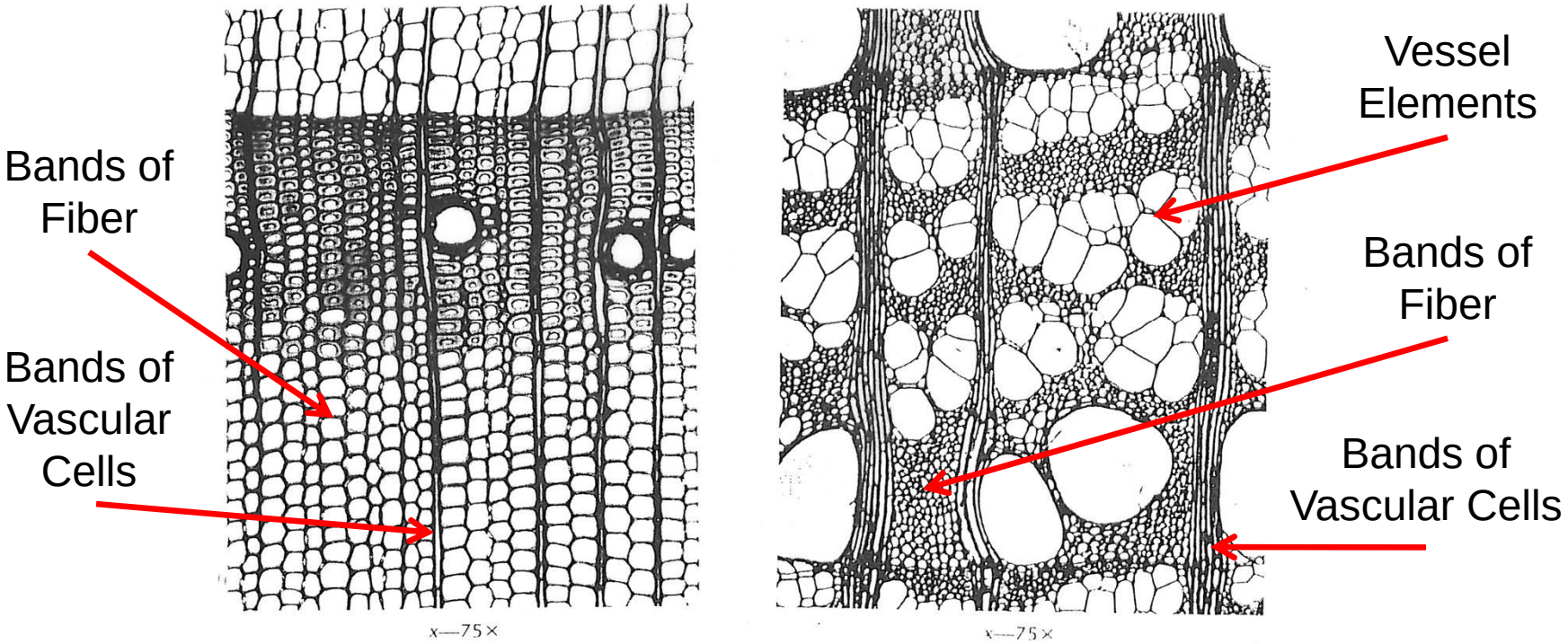
- Have broad leaves
- Produce a fruit or nut

America's forests grow hundreds of varieties of hardwood trees.

Photos courtesy of the American Hardwood Export Council.

What are North American Hardwoods?

Each species has a unique cellular structure, which creates differences in physical properties.



What are North American Hardwoods?

The Janka Rating System measures the relative hardness of woods.

Janka Scale	
Typical North American Hardwoods	**Hardness**
Hickory/Pecan	1820
Hard Maple/Sugar Maple	1450
White Oak	1360
Red Oak (Northern)	1290
Walnut	1010
Cherry	950
Elm	830
Chestnut	540

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Where Do They Grow and How Abundant are They?

There are 514 million acres of timberland in the United States.

Of all temperate forests in the world, North American forests have the most diverse hardwood species.

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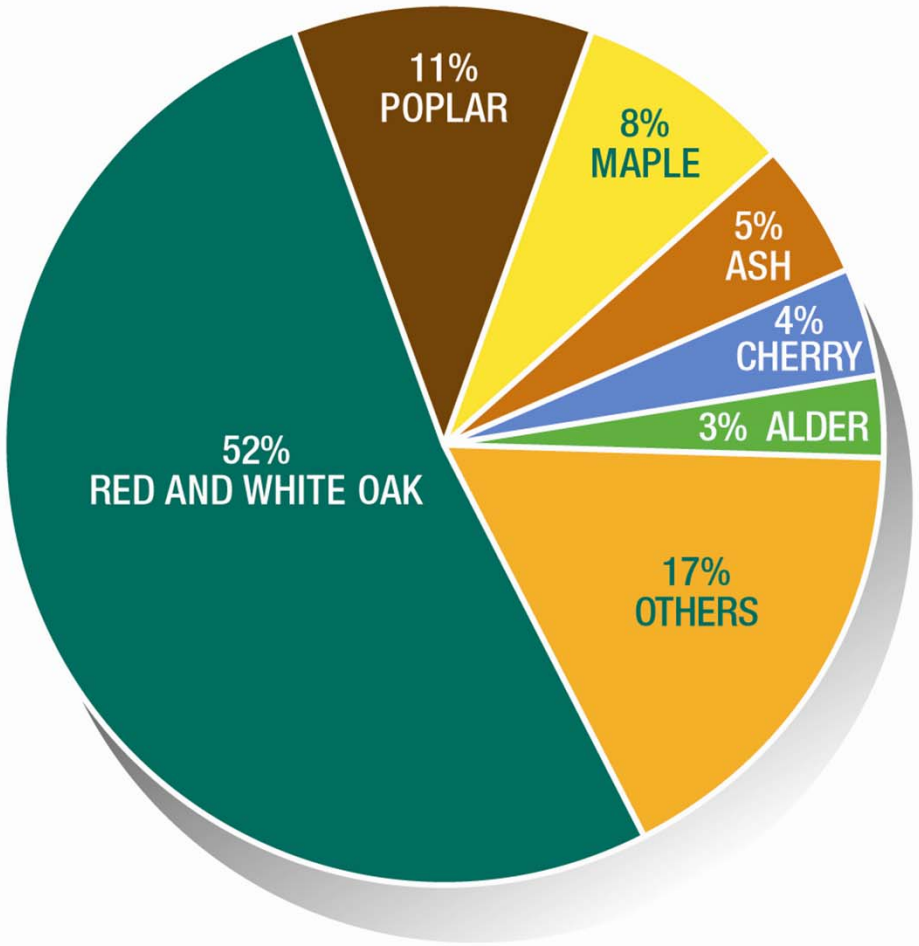
Which Hardwoods are Most Abundant?



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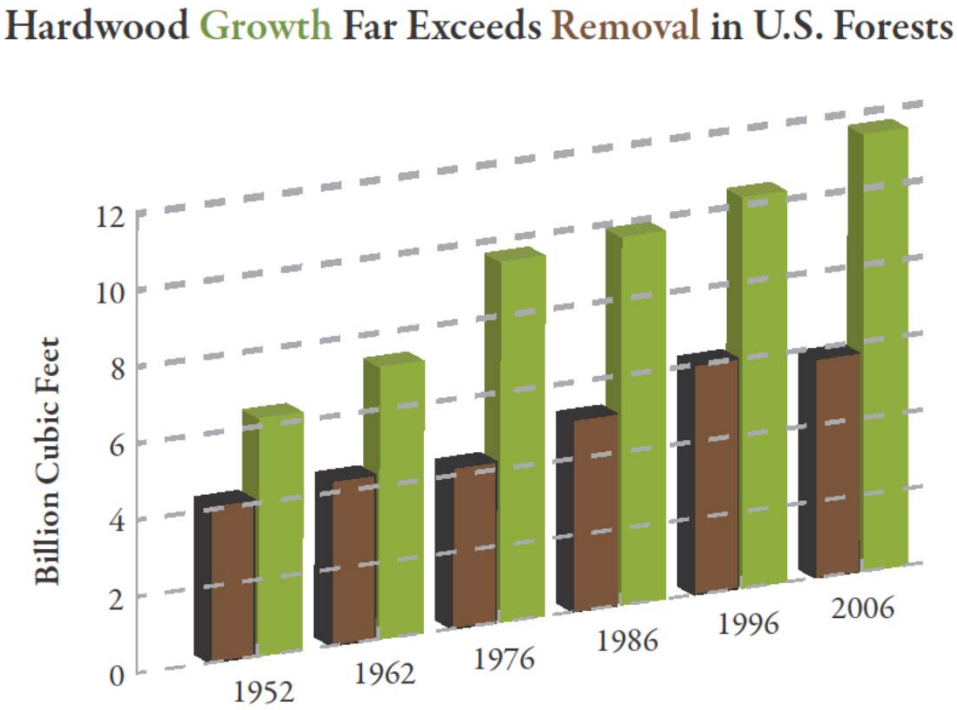
Where Do They Grow and How Abundant are They?

The average annual net growth of hardwoods exceeds removals, by a ratio of **2.00**.



USDA NRCS
United States Department of Agriculture
Natural Resources Conservation Service

Forest Resources of the United States, by the U.S. Department of Agriculture, 2007

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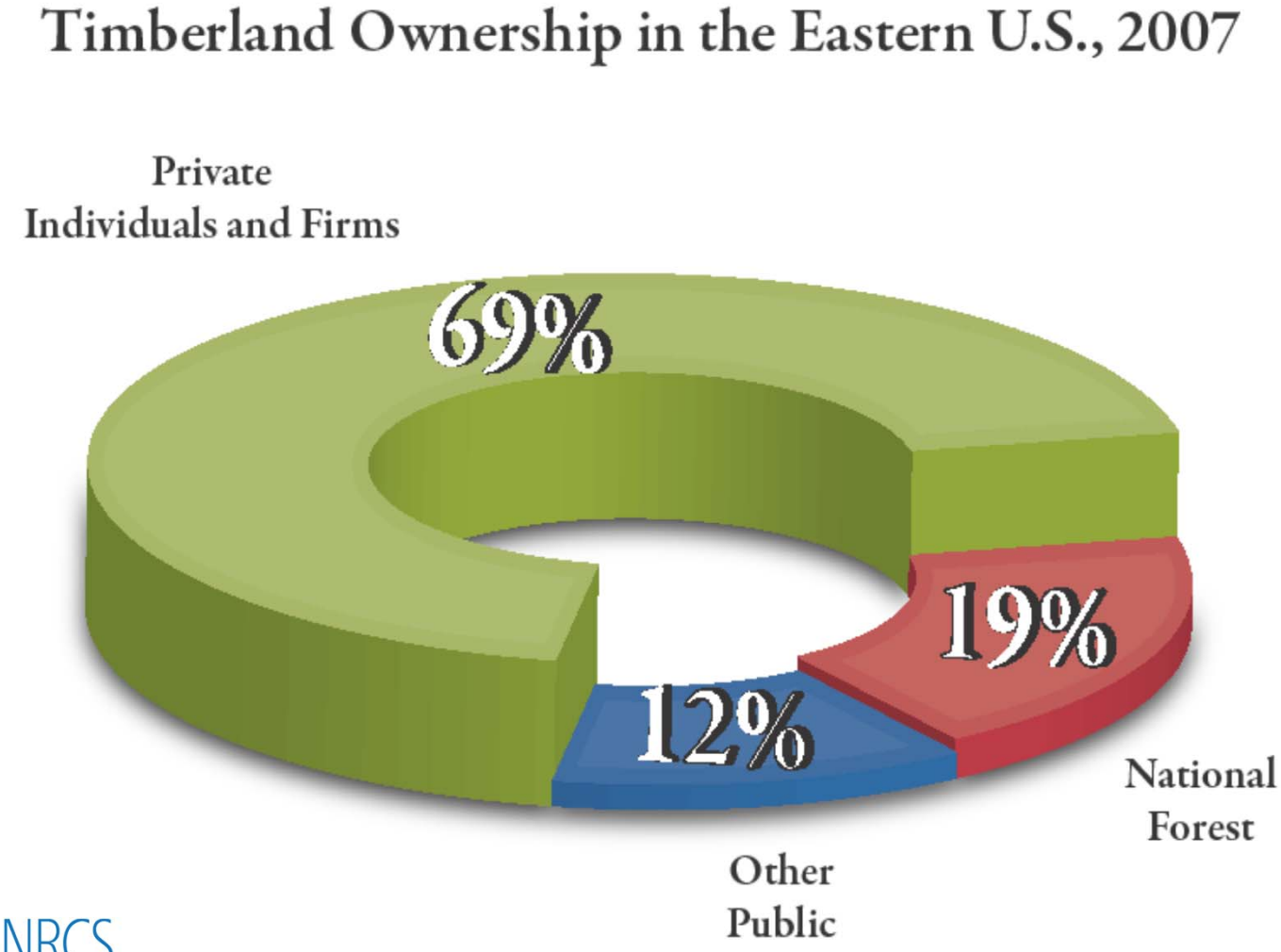
Who Owns Them?



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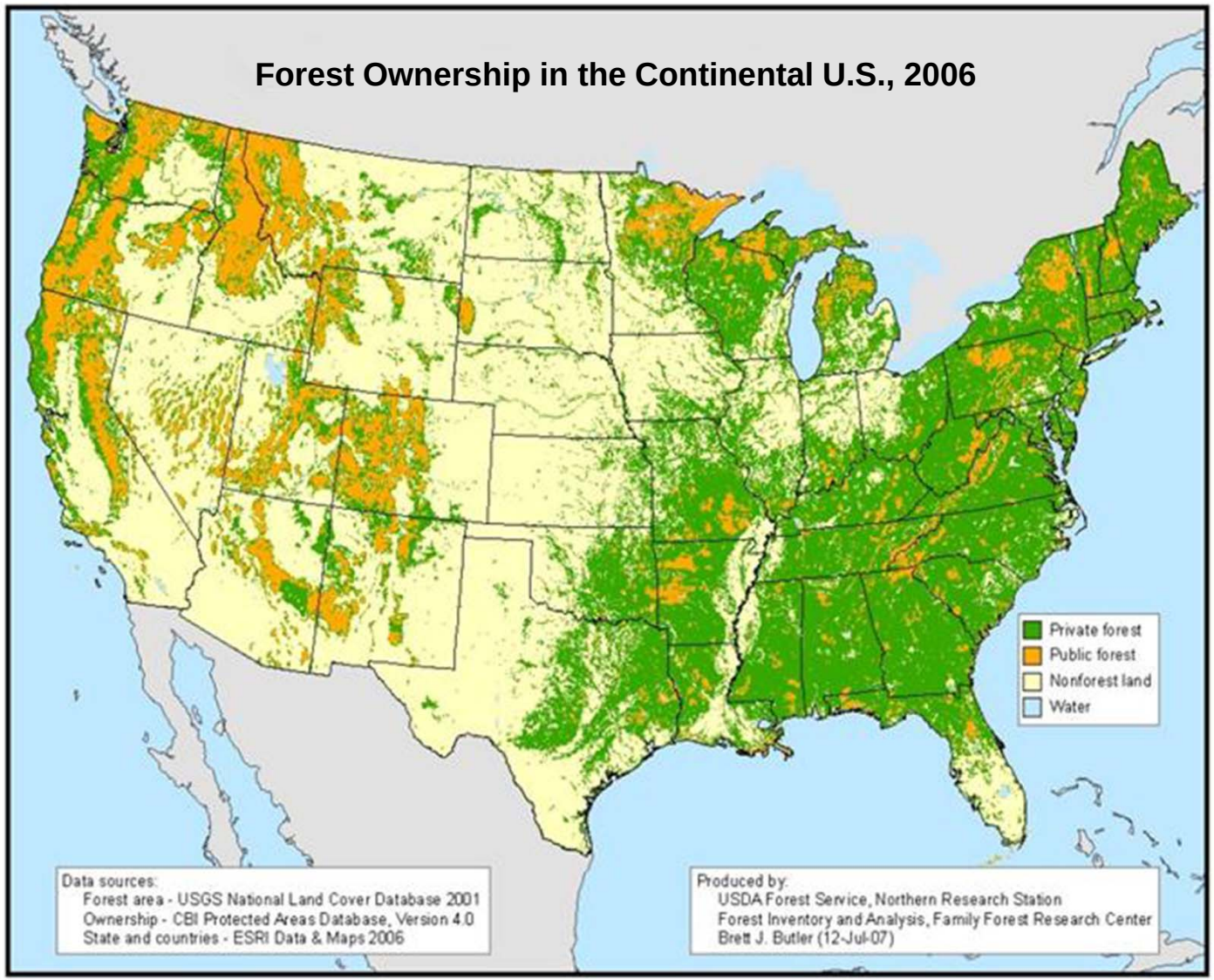


Hardwoods—How Do We Get Them?

Silviculture: the art and science of controlling the establishment, growth, composition, health and quality of forests to meet diverse needs and values.

Photo courtesy of the American Hardwood Export Council.

Hardwoods—How Do We Get Them?

Responsible

Forest Management Practices

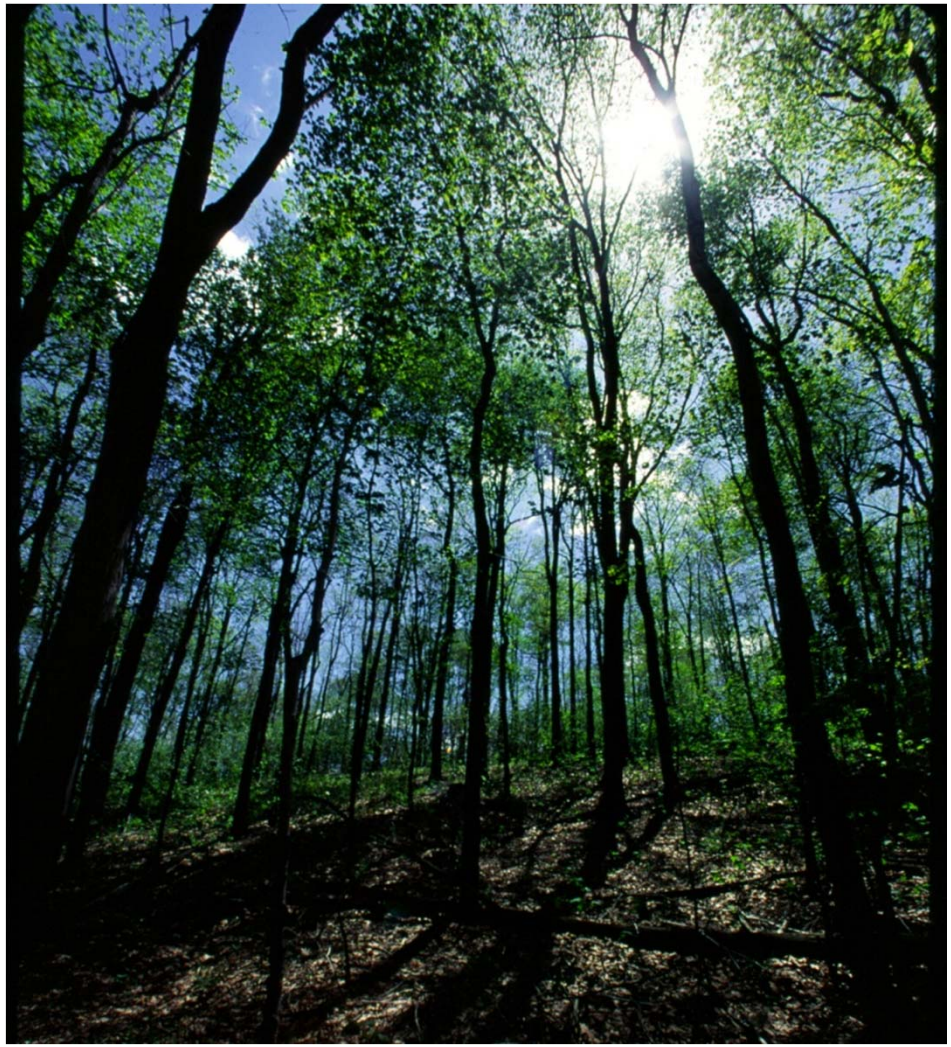


Photo courtesy of Mark Bolster.

Hardwoods—How Do We Get Them?

Single-tree selection is the predominate harvesting method in hardwood forestry, not clear-cutting.

Photo courtesy of the American Hardwood Export Council.

Hardwoods—How Do We Get Them?

In a hardwood forest, trees compete for water and sunlight.

Photos courtesy of the American Hardwood Export Council.

Hardwoods—How Do We Get Them?

Manufacturing technology assures the least wood waste and greatest yield of lumber.

Photos courtesy of the American Hardwood Export Council.

Hardwoods—How Do We Get Them?

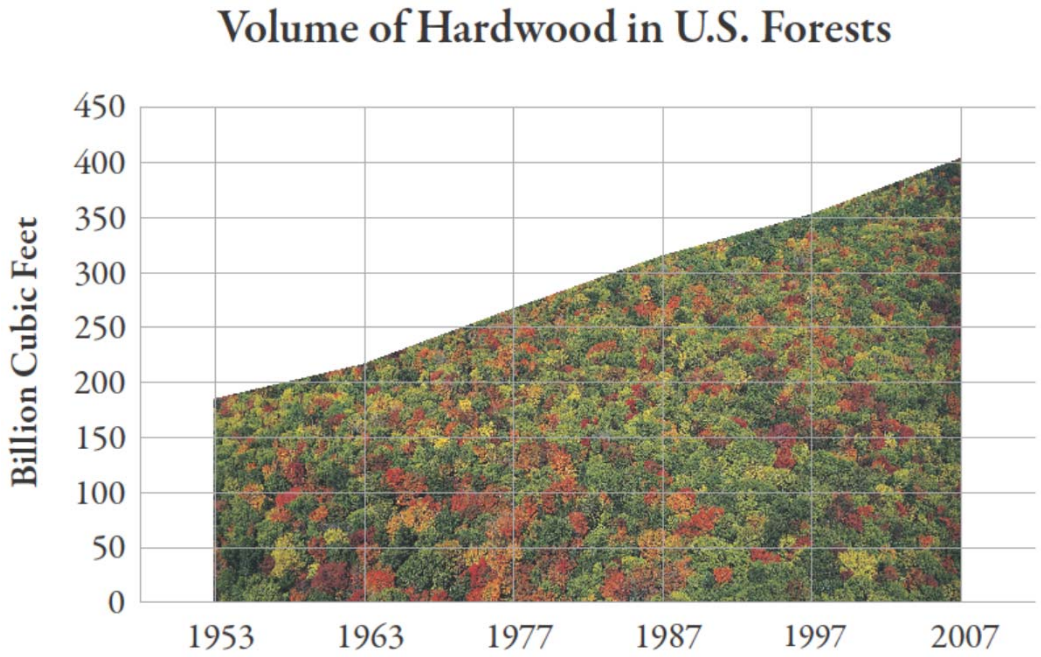
All wood processing by-products have a use.

- Mulch
- Soil Conditioners
- Combustible Fuel
- Animal Bedding
- Paper
- Wood Components

Photo courtesy of the American Hardwood Export Council.

Hardwoods—How Do We Get Them?

The Volume in hardwood forests has increased **119%** from 1953 – 2007.



United States Department of Agriculture
Natural Resources Conservation Service

Forest Resources of the United States, by the U.S. Department of Agriculture, 2007

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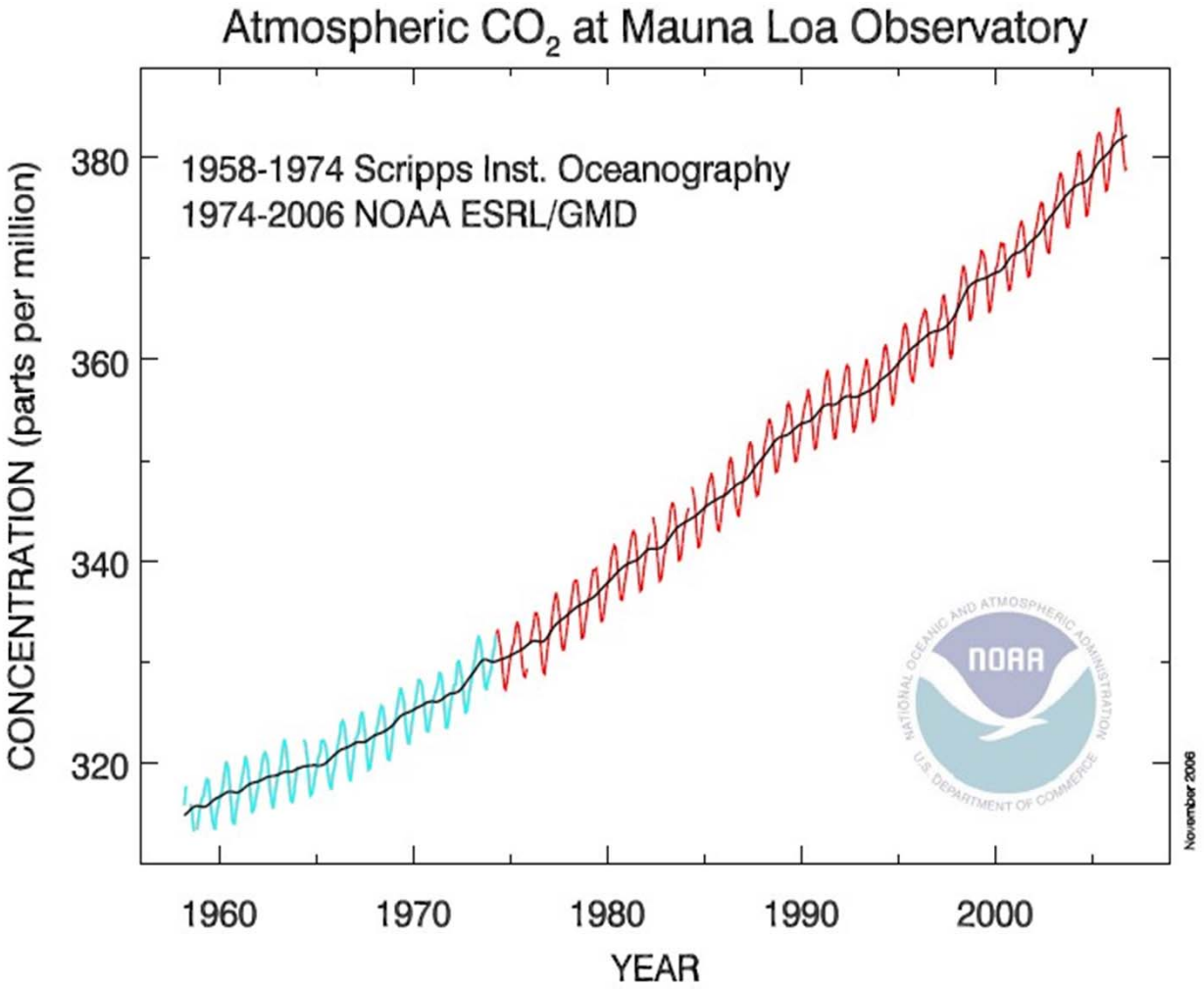
The Incredible Facts about Wood and Carbon



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Greenhouse Gas Producers

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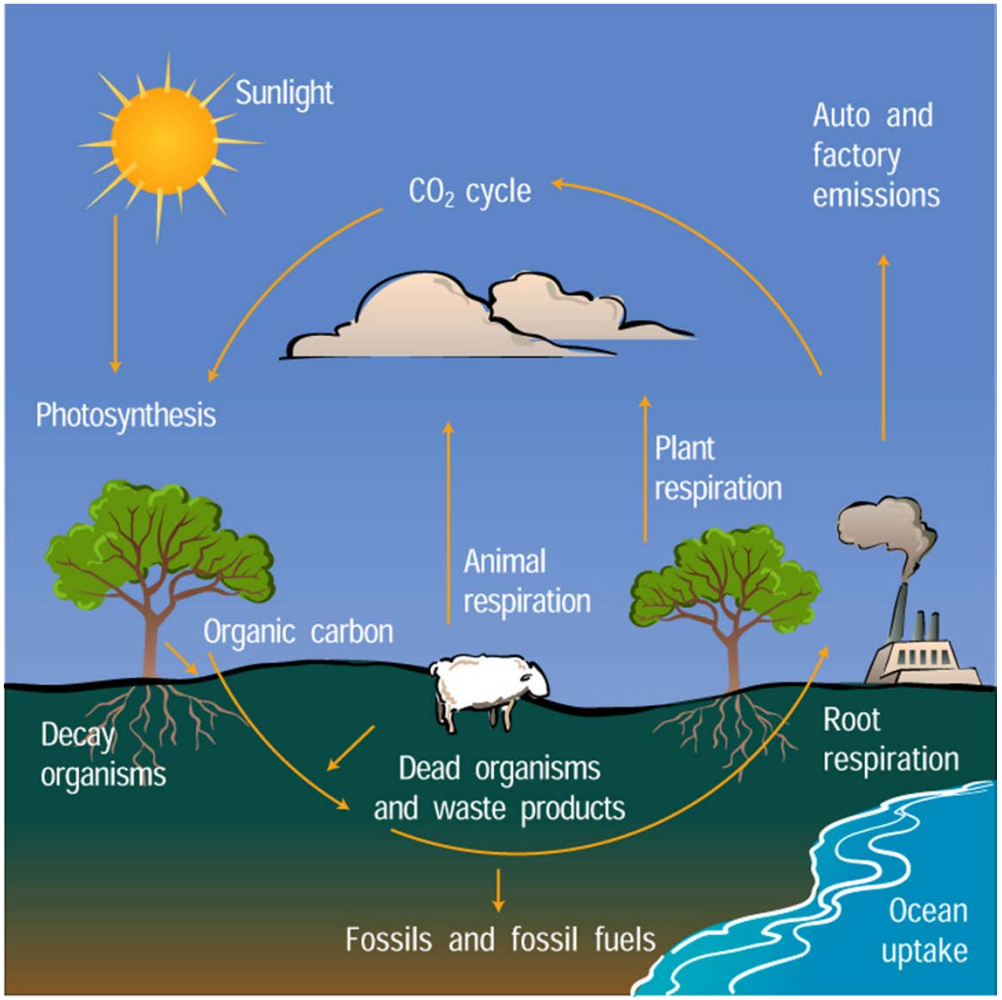
The Incredible Facts about Wood and Carbon

Growing trees:

- **Remove CO_2**
- **Return oxygen**
- **Use carbon**
- **Store carbon**



Graphic created by the University Corporation for Atmospheric Research

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The Incredible Facts about Wood and Carbon

Wood products require less energy to manufacture.

Compare the amount of energy required to produce one ton of cement, glass, steel, or aluminum to the production of 1 ton of wood:	
Cement	5x more energy
Glass	14x more energy
Steel	24x more energy
Aluminum	126x more energy

Wood products make up 47% of all industrial raw materials manufactured in the U.S., but consume only 4% of the energy required to manufacture those materials.

Engineered Wood Association, www.apawood.org

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Table 1: Net Carbon (C) Emissions in Producing a Ton of Various Materials

Material	Net Carbon Emissions (kg C/metric ton)[a/] [b/]	Net Carbon Emissions Including Carbon Storage Within Material (kg C/metric ton)[c/]
Framing lumber	33	-457
Medium density fiberboard (virgin fiber)	60	-382
Brick	88	88
Glass	154	154
Recycled steel (100% from scrap)	220	220
Concrete	265	265
Concrete block[d/]	291	291
Recycled aluminum (100% recycled content)	309	309
Steel (virgin)	694	694
Plastic	2,502	2,502
Aluminum (virgin)	4,532	4,532

a/ Values are based on life cycle assessment and include gathering and processing of raw materials, primary and secondary processing, and transportation.
b/ Source: USEPA (2006).
c/ A carbon content of 49% is assumed for wood.
d/ Derived based on EPA value for concrete and consideration of additional steps involved in making blocks.

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The Incredible Facts about Wood and Carbon

The Incredible Facts about Wood and Carbon

Some fire is a natural part of a forest's ecosystem.

The National Interagency Fire Center provides nationwide wildfire statistics. Visit http://lwf.ncdc.noaa.gov/sotc/?report=fire.

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Life Cycle Assessment and North American Hardwoods

Life Cycle Assessment is the evaluation of a product's impact on the environment through its total existence.

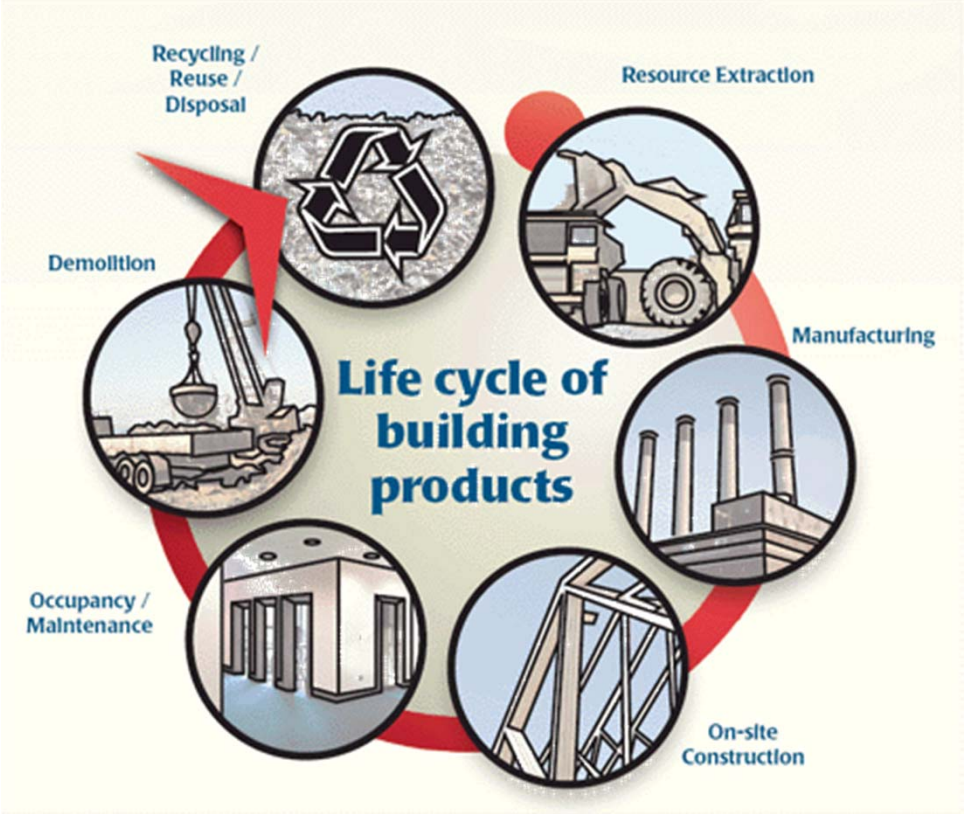

Image Source: Athena Institute

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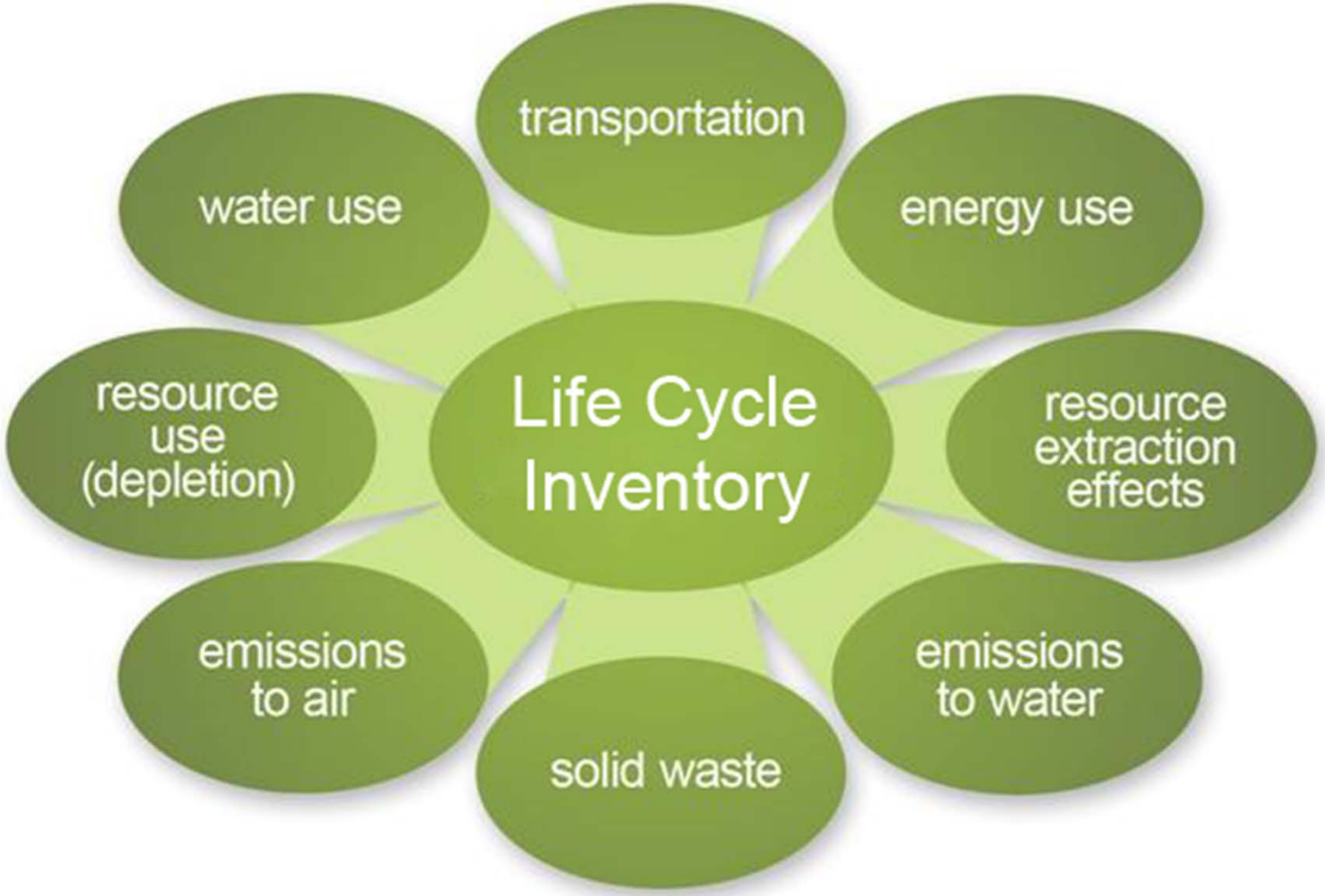
Life Cycle Assessment and North American Hardwoods



Life Cycle Assessment and North American Hardwoods

Consortium for Research on Renewable Industrial Materials

www.CORRIM.org

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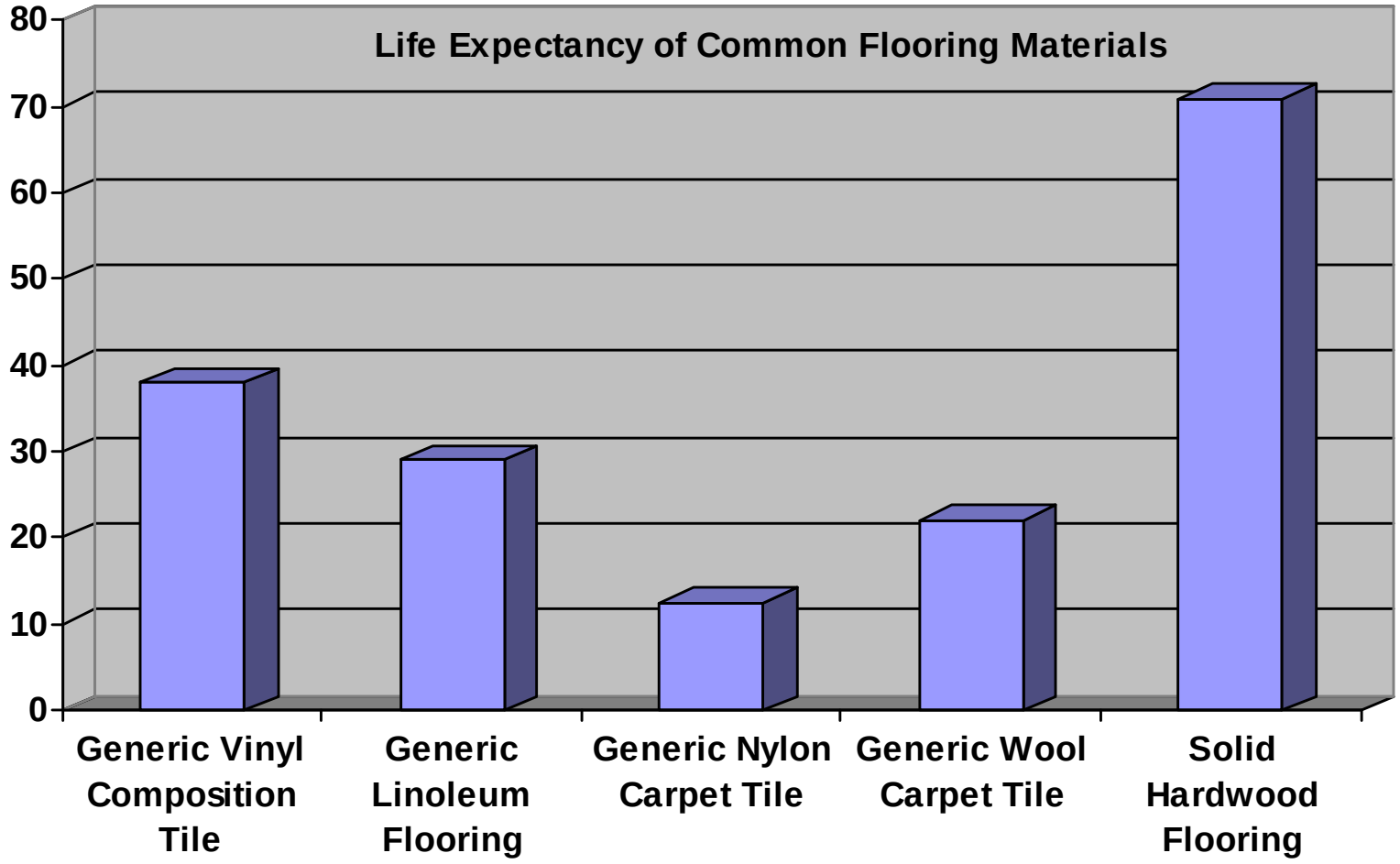
Life Cycle Assessment and North American Hardwoods



Source: National Wood Flooring Association and the Consortium for Research on Renewable Industrial Materials, 2007 – 2008

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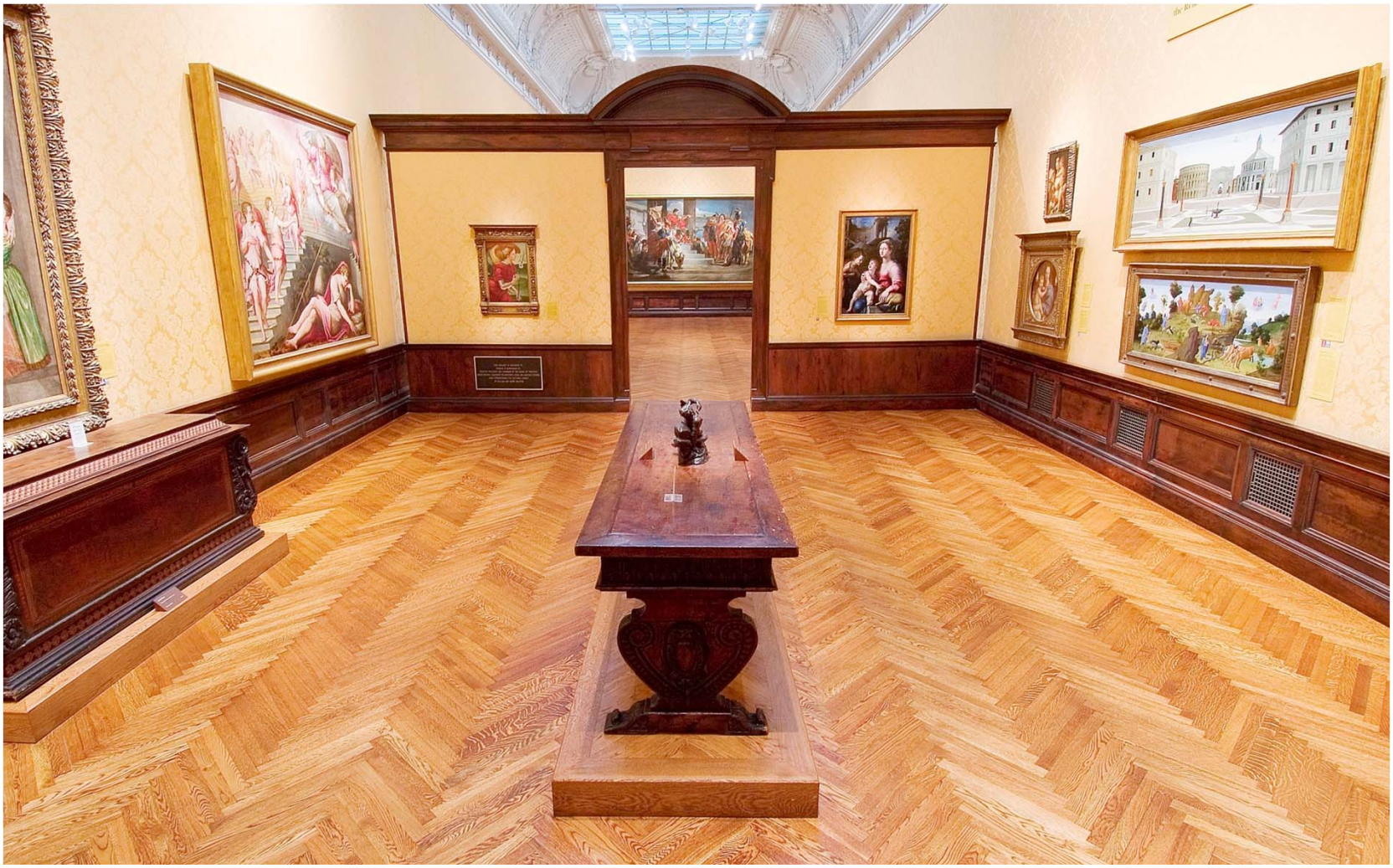
Life Cycle Assessment and North American Hardwoods



100-year-old white oak floors meet the demands of this high-traffic area. Photo © National Wood Flooring Association.

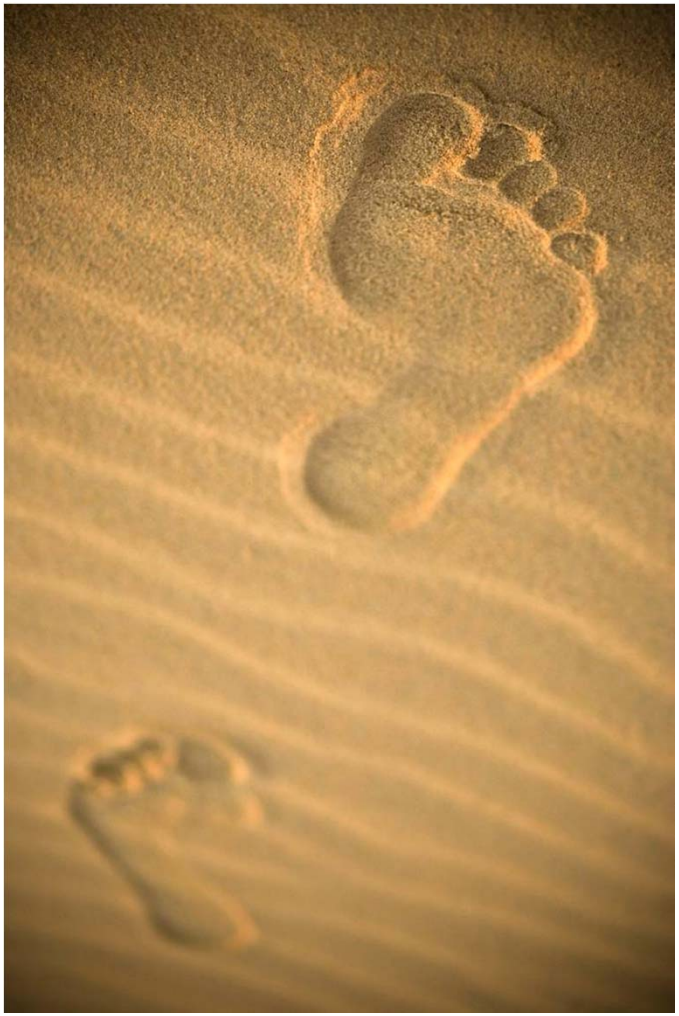
Life Cycle Assessment and North American Hardwoods

Other assessment tools have emerged and are under continuous development.

- SimaPro Model
- Athena™ Environmental Impact Estimator
  - Shows wood has the lowest environmental impact when compared to steel and concrete
- BEES® (Building for Environmental and Economic Stability)

Environmental Attributes of North American Hardwoods

- Sequester carbon
- Sustainable resource
- Minimal energy consumption
- Eco-Friendly disposal or repurposing
- Low carbon footprint



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“Green” Building and the AIA 2030 Challenge

Image courtesy Wikipedia Creative Commons

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“Green” Building and the AIA 2030 Challenge

Maple flooring and alder casework , doors and paneling were sourced within 500 miles of Seminar II, in Olympia, Wash. Photo courtesy of the Evergreen State College.

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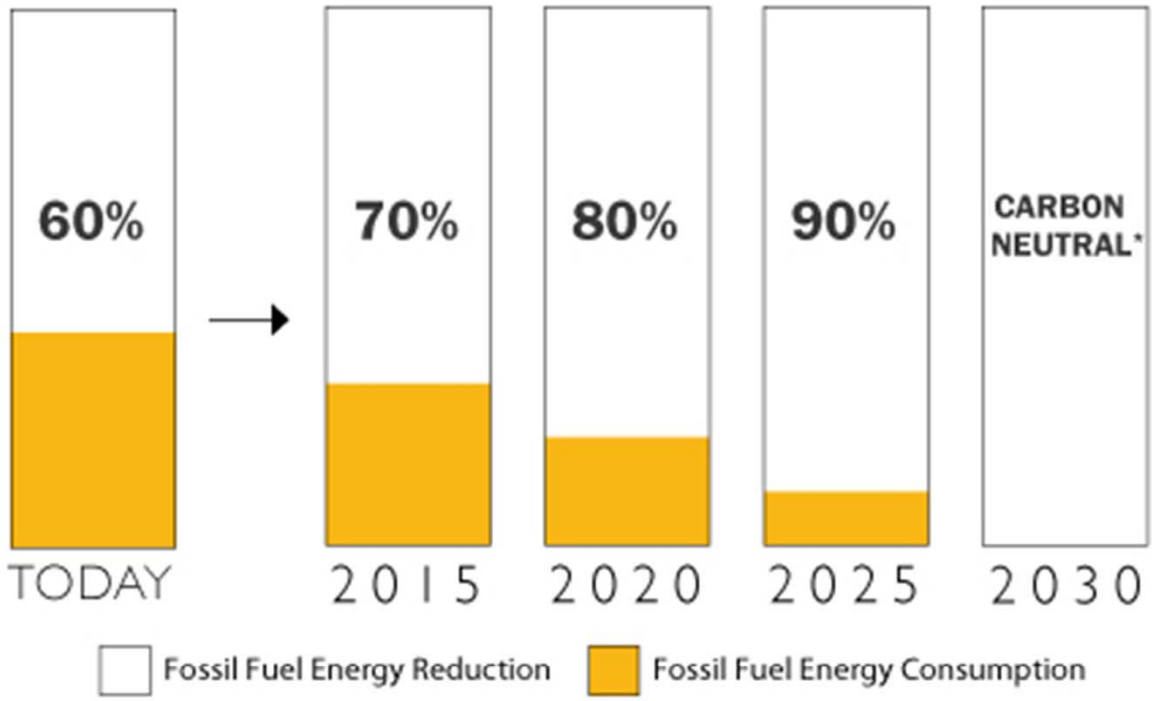
The 2030 Challenge



The 2030 Challenge

**Using no fossil fuel GHG-emitting energy to operate.*

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“Green” Building and the AIA 2030 Challenge

North American hard maple is featured in Spain’s Castellón Auditorium and Conference Hall. Photo courtesy the American Hardwood Export Council.

The Voice of Congress

- **House Resolution 81**
- **Senate Resolution 411**

www.govtrack.us

Carbon-Neutral Design — Using North American Hardwoods

How North American Hardwoods Compare
North American hardwoods are an all-natural material.
With hardwood floors for example, there is no place to harbor pollen or animal dander, or for mold to grow.
Cutting and drying of lumber is all that is required.
Virtually every part of a log is used as lumber or by-products, including bark, sawdust, and scrap.
Regionally sourced North American hardwoods don't incur burning fossil fuels to transport them across the ocean.
Some foreign countries have no governing agencies to assure quality standards or environmentally safe manufacturing practices. In the U.S., quality standards and safe manufacturing practices are regulated by U.S. agencies and associations.
With the proper finish, hardwood products require minimal maintenance, like dusting or occasional buffing.
Minimal maintenance is required. Typical repair is refinishing.
A solid hardwood floor can last up to 125 years or longer with several refinishings. Museum quality furniture can last centuries.
Hardwood products can be repurposed or used as a combustible fuel.
If in a landfill, hardwoods naturally decay and return to nature, unlike many synthetics and plastics which will remain almost indefinitely.

Carbon-Neutral Design — Using North American Hardwoods

The Aldo Leopold Legacy Center, Baraboo, Wisc.

- First-ever LEED Platinum building
- Net-Zero Energy Building
- Uses 70% less energy than a code-compliant building
- Solar array produces 110% of energy needs

Photo courtesy the Aldo Leopold Legacy Center.

Carbon-Neutral Design — Using North American Hardwoods

The use of locally-harvested wood products was key.

- Ash
- Cherry
- Maple
- Oak

Visit www.aldoleopold.org/legacycenter for more information.

Photo courtesy the Aldo Leopold Legacy Center.

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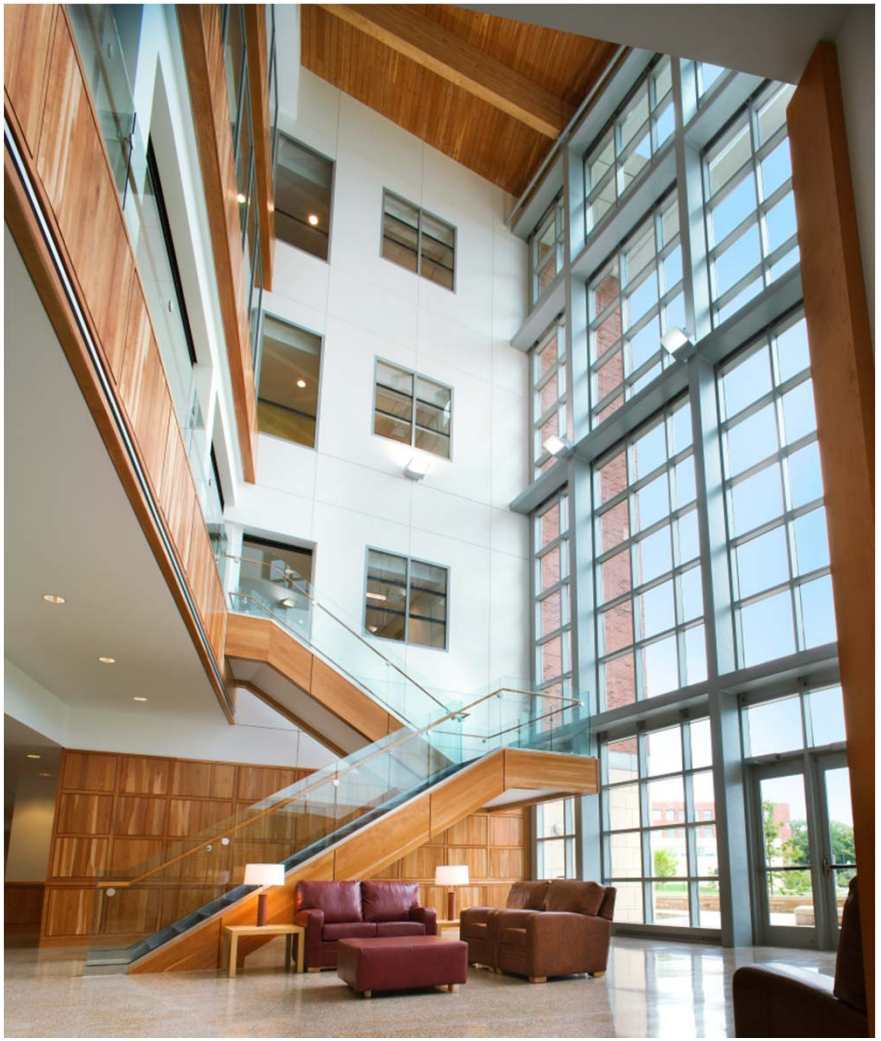
Choose North American Hardwoods

North American red oak is featured in the Amsterdam Conservatory. Photo courtesy the American Hardwood Export Council.

Choose North American Hardwoods

Material Selection will play an important role in carbon-neutral buildings



Maple glulams and cherry paneling are featured in Penn State's Forest Resources Building. Photo © Warren Jagger Photography.

Choose North American Hardwoods

North American hardwoods:

Naturally Renewing

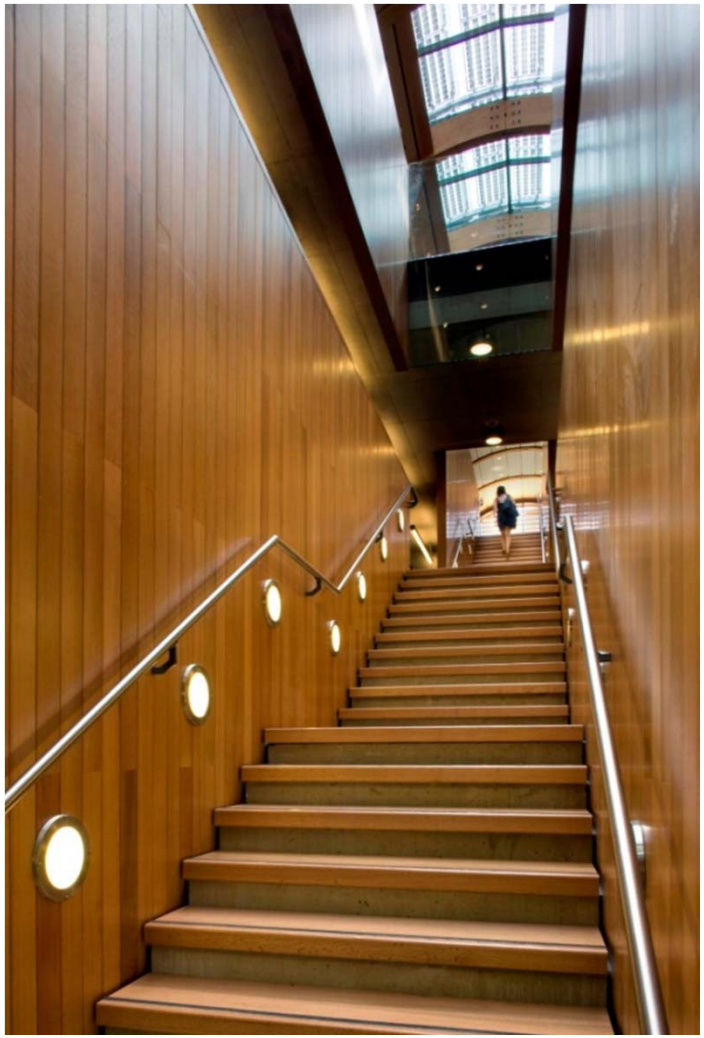
Abundant

Sustainable

Photo courtesy of the American Hardwood Export Council.

Choose North American Hardwoods

North American hardwoods can make a difference in attaining carbon neutrality.



Locally-sourced red oak is featured throughout Yale's LEED-Platinum Kroon Hall. Photo courtesy of the American Hardwood Export Council.

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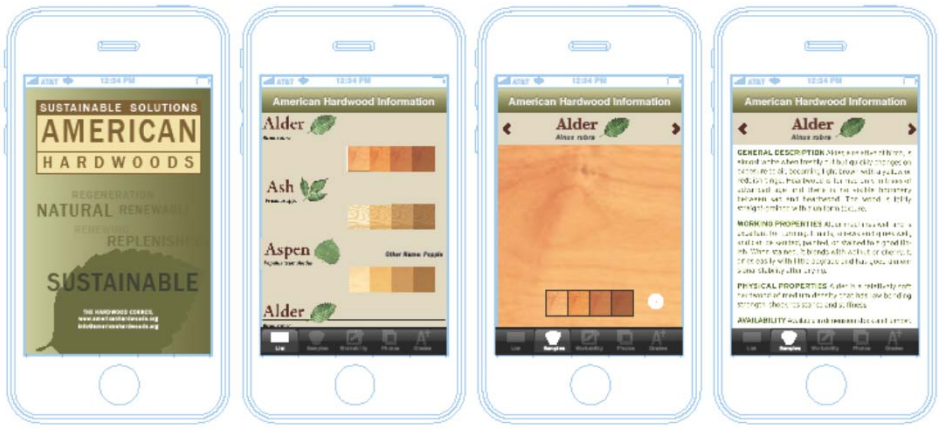
Your ideas for Marketing!

Don’t “preach to the choir”, get the word out!

Start the conversation with the new

American Hardwood Selector App!



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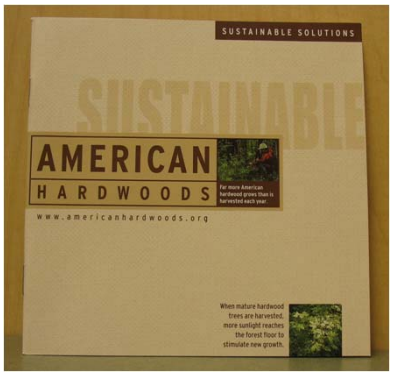
Your ideas for Marketing!

-Let your contacts & followers know about sustainable woods in your project with your social media and mass emails.

-Use the Hardwood Councils resources



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Your ideas for Marketing!

-Sponsor and man a trade show exhibit

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Your ideas for Marketing!

-Sponsor a webinar

-Host a forest tour

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Thank You For Attending!

Questions?

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info@HardwoodCouncil.com

412.244.0440