

Today's Workshop Is Hosted By:

WoodWorks™



**Providing Market Education
and Design Resources
for Wood Construction**



Funding Partners

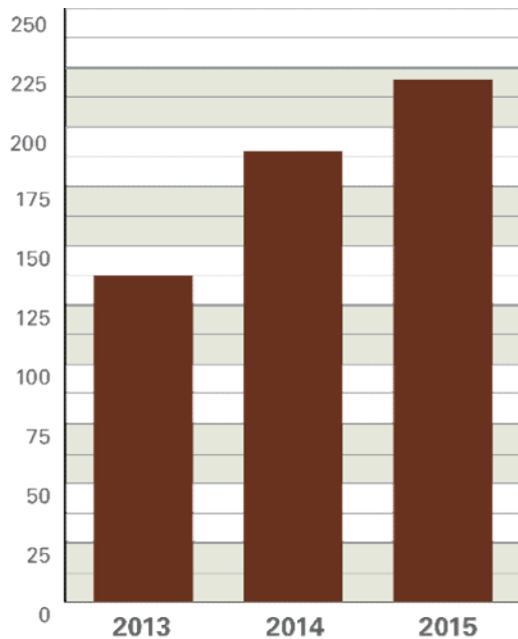


2015 PROGRAM HIGHLIGHTS

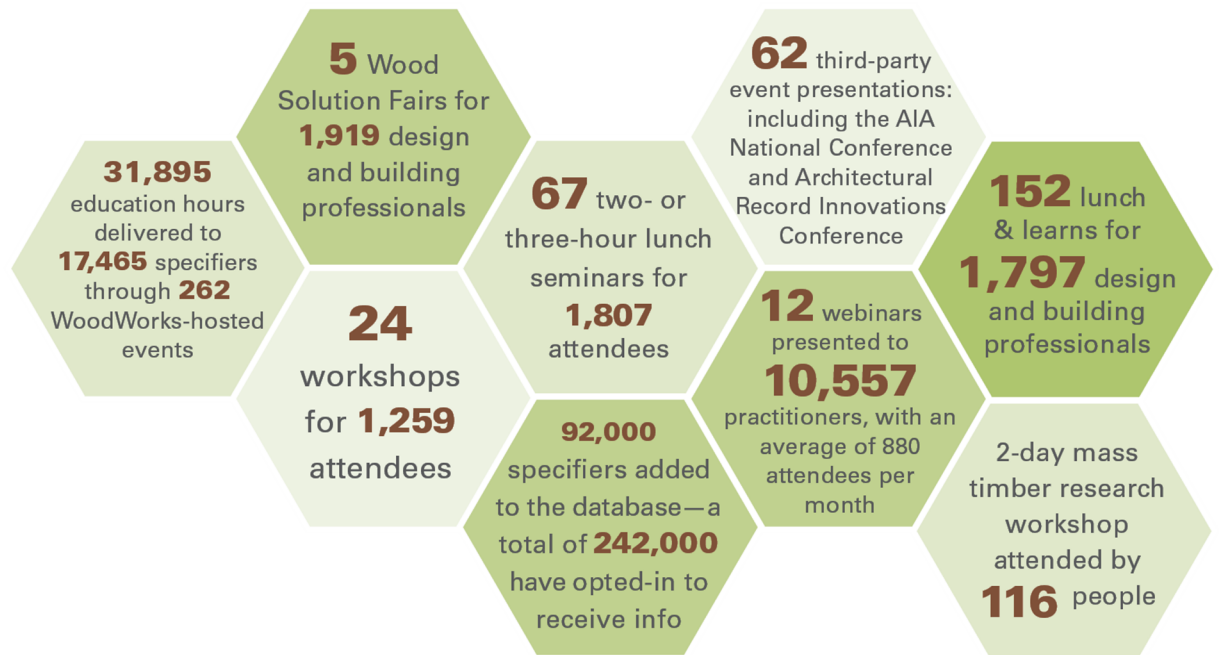
technical support for **220** projects that went to construction this year & technical support on an additional **488** projects that are still in design phase

43,300 practitioner education hours through Wood Solutions Fairs, workshops, webinars and other education events

Growth in Number of Direct Projects Supported



EDUCATIONAL OUTREACH TO SUPPORT PROJECT ASSISTANCE



Resources For You

- Education Events
- Design Tools
- Case Studies
- Help Desk



Woodworks provides education, resources and technical support related to the design of the non-residential and multi-family wood buildings.

Technical Support

Events

Design Tools

Design with Wood

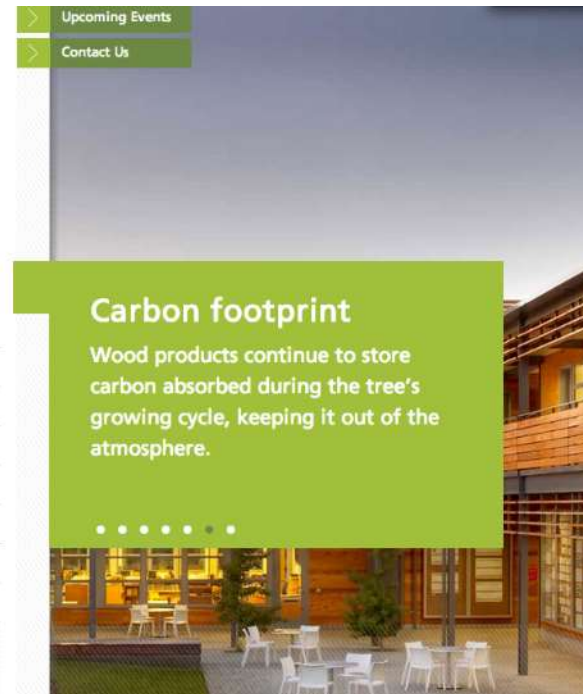
Why Wood?

US Wood Design Awards

Education & Publications

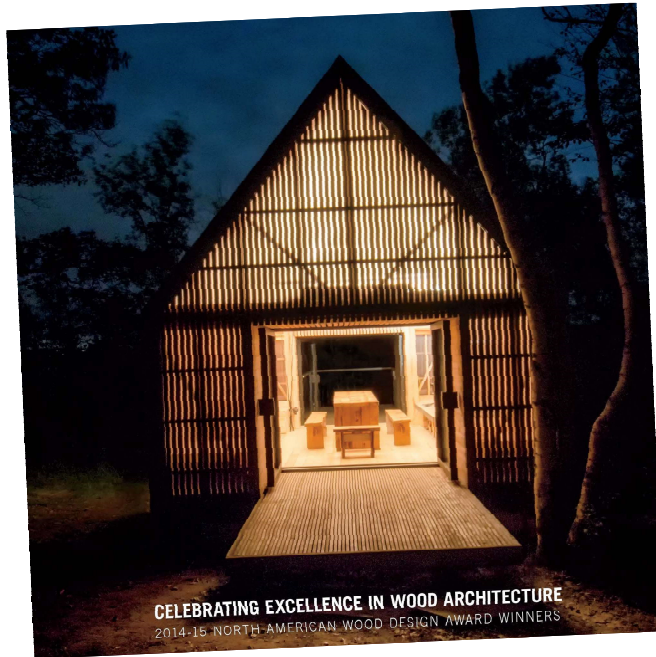
About WoodWorks

Google™ Custom Search



www.woodworks.org

US Wood Design Awards



- Institutional
- Educational
- Commercial
- Multi-Story
- Beauty of Wood
- Green Building
- Government Buildings

Nominations open June 1, 2016!

Upcoming Events

September 27, 2016 *Mid-Rise Design – Portland, ME*

October 13, 2016 *Mid-Atlantic Wood Solutions Fair – Philadelphia, PA*

October 18, 2016 *Mass Timber – Manchester, NH*

October 25, 2016 *Mass Timber – New York, NY*

November 29, 2016 *Mid-Rise Design – Portland, ME*

Webinars

Check woodworks.org for monthly webinars

Visit www.woodworks.org for a complete list of events

Project Support and Technical Assistance

- Schools
- Mid-rise/multi-family
- Commercial
- Corporate
- Franchise
- Retail
- Institutional
- Recreational
- Healthcare





Why Wood?

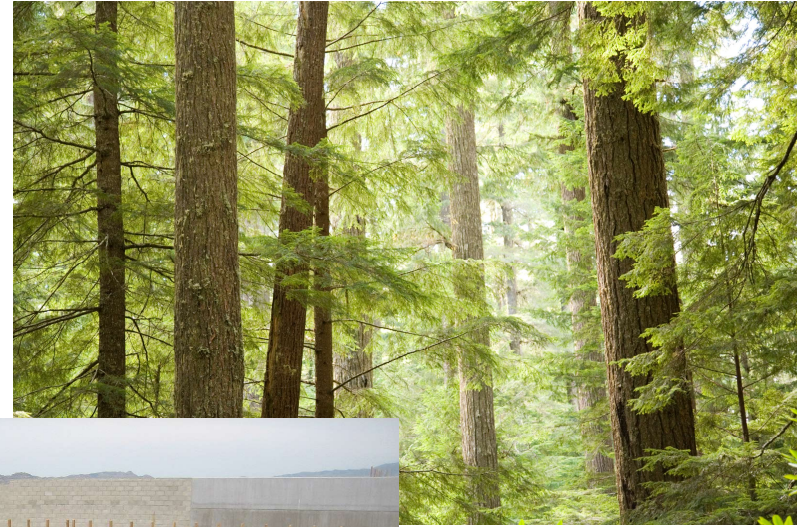
Wood Costs Less

Wood is Versatile

Wood Meets Code

Wood is Durable

Wood is Renewable

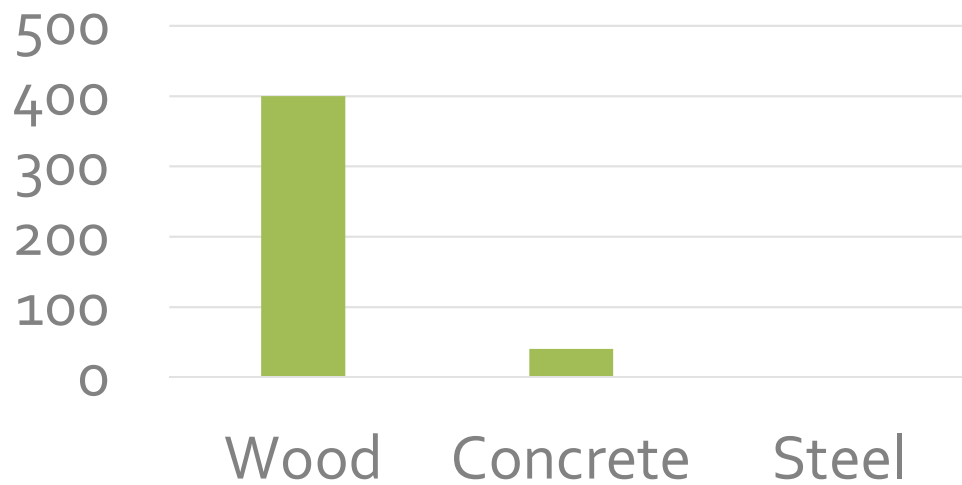


Using Wood Helps Reduce Your Environmental Impact

Wood Products Play a Significant Role in Modern Economy

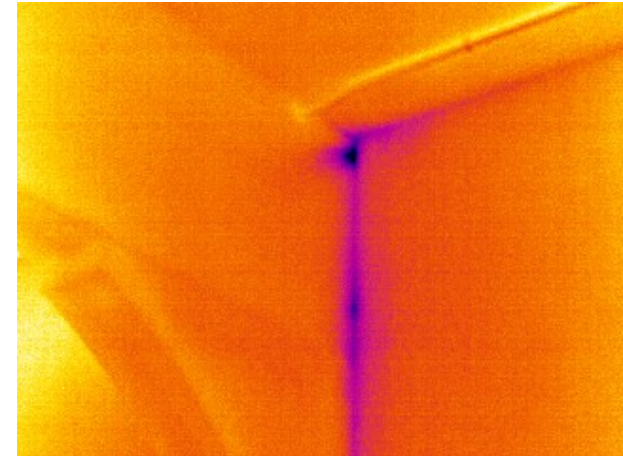
Energy Performance

Thermal Resistance



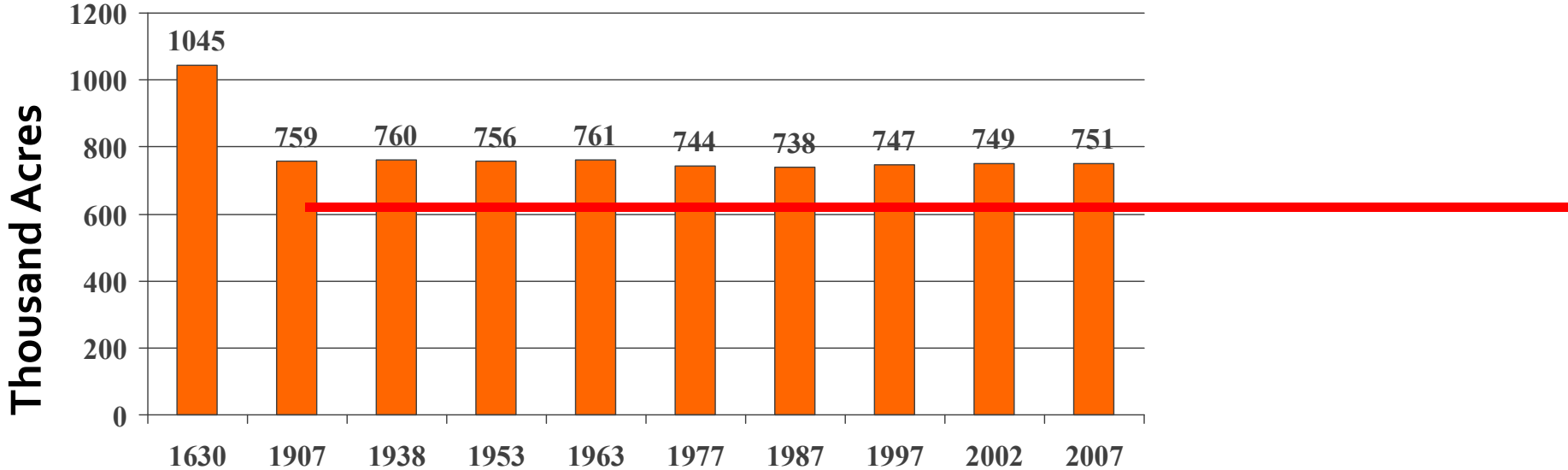
*Normalized Comparison

Source: *Thermal Performance of Light framed Systems, CWC*



US Forest Land

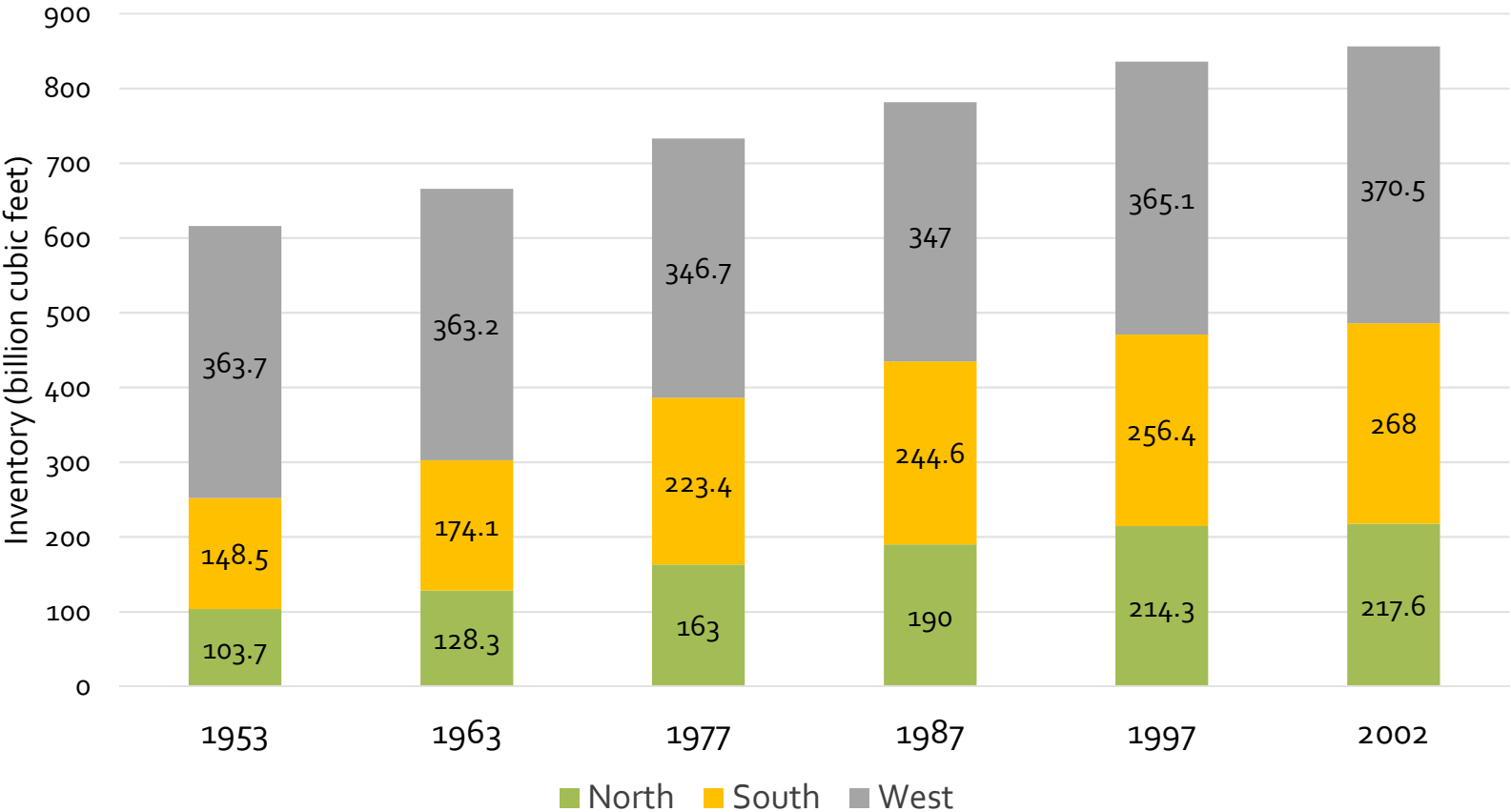
Forest Area in the United States 1630-2007



Source: USDA-Forest Service, General Technical Report WO-78. (2009).

US Forest Land

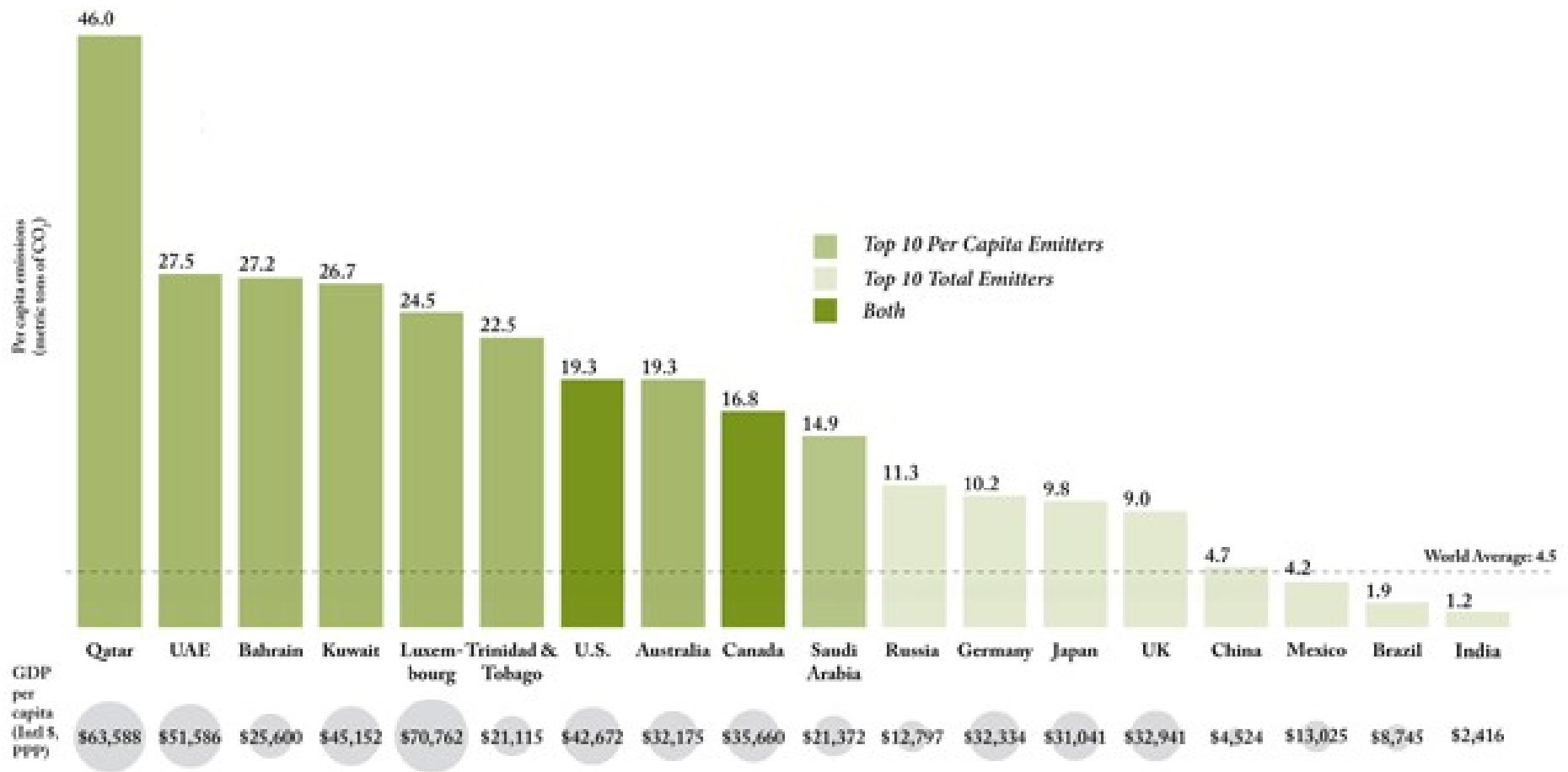
US Timber Volume on Timber Land



Source: USDA-Forest Service, US Forest Resource Facts and Historical Trends FS-801. (2004).

US Contributes Highly to World Emissions

Per Capita CO₂ Emissions and Per Capita GDP for the Top Ten Total Emitters and Top Ten Per Capita Emitters, 2006



Data Source & Notes: WRI, CAIT (2009). Qatar GDP per capita estimate is for 2005; all other data presented are for 2006.

Sustainable Forestry Carbon Cycle



LCA of Materials: Carbon Emissions

	USEPA (2006)	USEPA (2006)
Material	Process Emissions (kg CO ₂ e/ kg of product)	Process Emissions Including Carbon Storage within Material (kg CO ₂ e/ kg of product)
Framing lumber	0.12*	-1.68
Concrete	0.12	0.12
Concrete block	0.14	0.14
Brick	0.32	0.32
Medium density fiberboard (MDF)	0.32	-1.47
Recycled steel (avg recy content)	0.81	0.81
Glass (not including primary mfg.)	0.57	0.57
Cement (Portland, masonry)	0.97	0.97
Recycled aluminum (100% recycled content)	1.13	1.13
Vinyl	--	1.00
Steel (virgin)	2.55	2.55
Aluminum (virgin)	16.60	16.60

Carbon content of 49% assumed for wood. (measured values range from about 47-52%)

Source: 2006 US EPA Database



Wood Mid-Rise Construction – Light Framing

How many stories can be wood framed in the IBC?





Marselle Condos, Seattle, WA



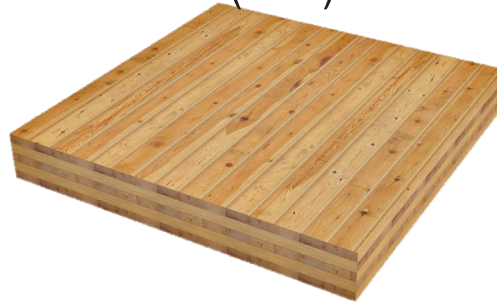
6 stories for Offices, 5 stories for Residential
+ Mezzanine + Multi-Story Podium

Mass timber products

Nail-Laminated Timber (NLT)



Cross-Laminated Timber (CLT)



horizontal framing

Glue-Laminated Timber (GLT)



Tongue & groove decking (T&G)



Timber concrete composite



Structural composite Lumber



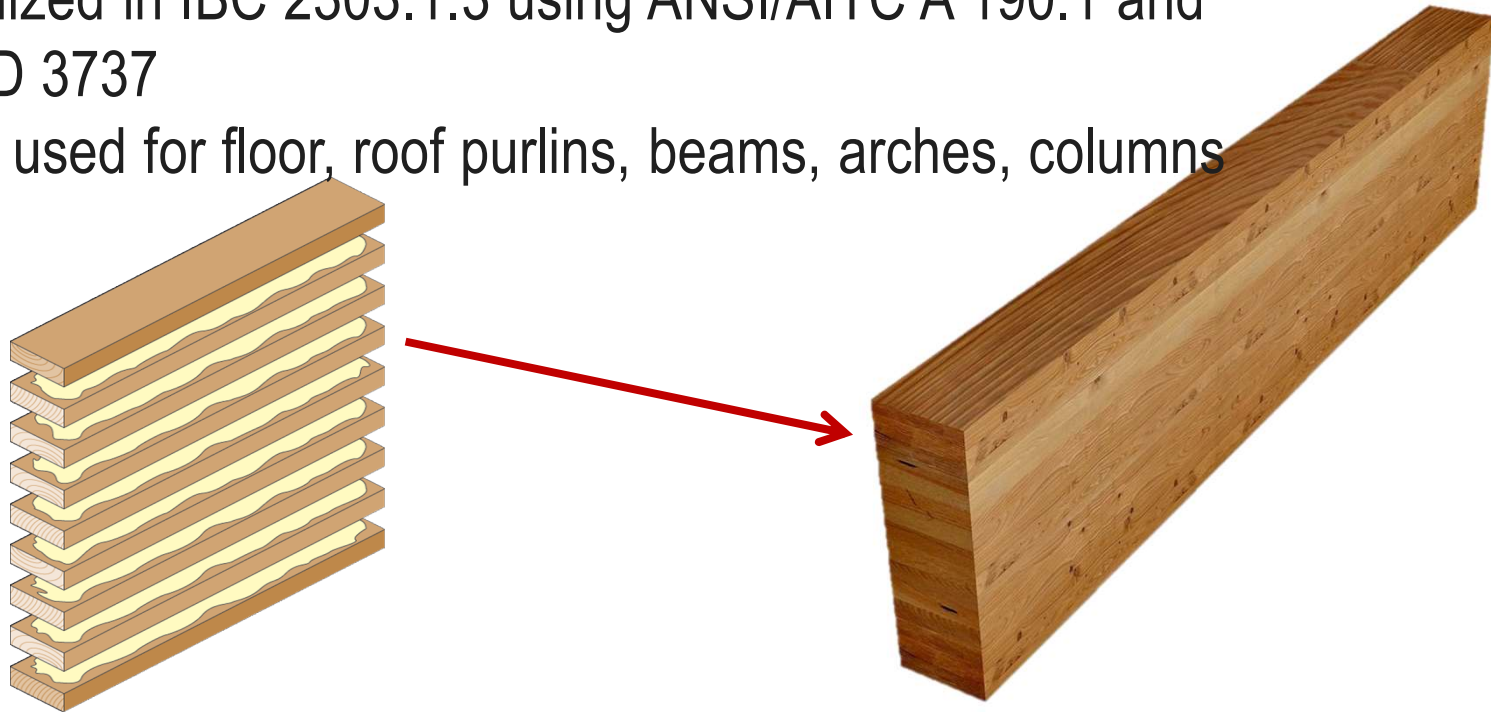
Image source: structurecraft

Mass timber products

glulam

Glulam = a structural composite of lumber and adhesives

- Recognized in IBC 2303.1.3 using ANSI/AITC A 190.1 and ASTM D 3737
- Can be used for floor, roof purlins, beams, arches, columns



Solid Timber Panel Products



Glue Laminated Timber

Considerations:

- Gap panels for dimensional change
- Need Wood Structural Panel for diaphragm capacity
- Inconsistent lamination grades
- Manufacturers everywhere

Flexibility of spans and shapes



Richmond Olympic Oval, Richmond, BC, Canada

Design Team: Cannon Design Architecture, Fast + Epp, Glotman Simpson

Photo Credit: Stephanie Tracey, Craig Carmichael, Jon Pesochin, KK Law

Creative, Ziggy Welsch

Solid Timber Panel Products



Nail Laminated Timber

Considerations:

- Requires accommodation for dimensional change
- Need wood structural panel for diaphragm capacity
- Recognized as a heavy timber floor system
- Long history of use

Bullitt center

Seattle, wa



Photo Credit: bullitt center

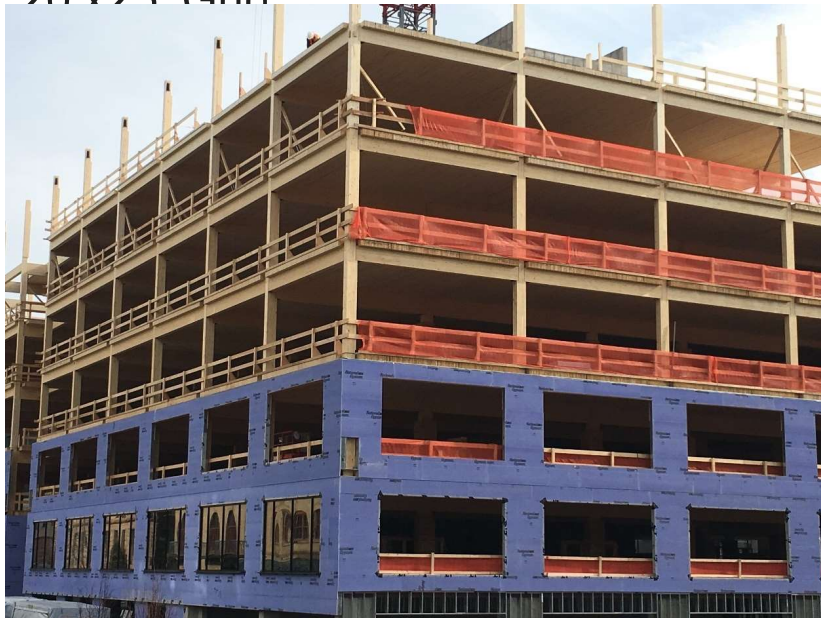
t3 minneapolis

Minneapolis, mn



Image Credit: StructureCraft/Hines/Michael Green Architect

Type IV Construction
7 stories (6 Timber on 1 Concrete)
234,000 sf
2x8 NLT Floor Panels w/3" Concrete
Topping
Glulam Beam and Column Frame
20'x25' Grid



Solid Timber Panel Products



Cross Laminated Timber

Considerations:

- Span usually governed by vibrations
- Dimensionally stable
- Recognized by 2015 codes and standards
- High in plane shear capacity
- Dual Directional span capabilities

Umass design building

Amherst, ma



Image Credit: Leers Weinzapfel Associates

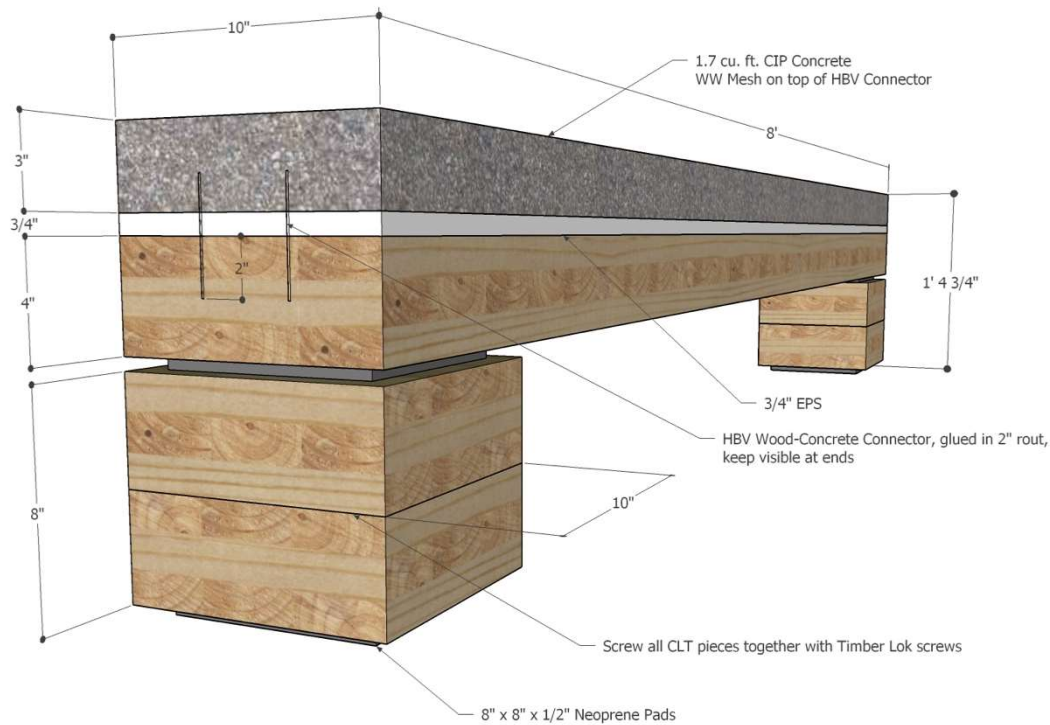
Umass design building

Amherst, ma

Currently under construction, expected
opening date: January 2017.

Photo Credit: alex schreyer





CLT Panels utilized in floor systems with composite concrete topping slab



UMASS Integrated Building Design Image: UMASS Building and Construction Technology





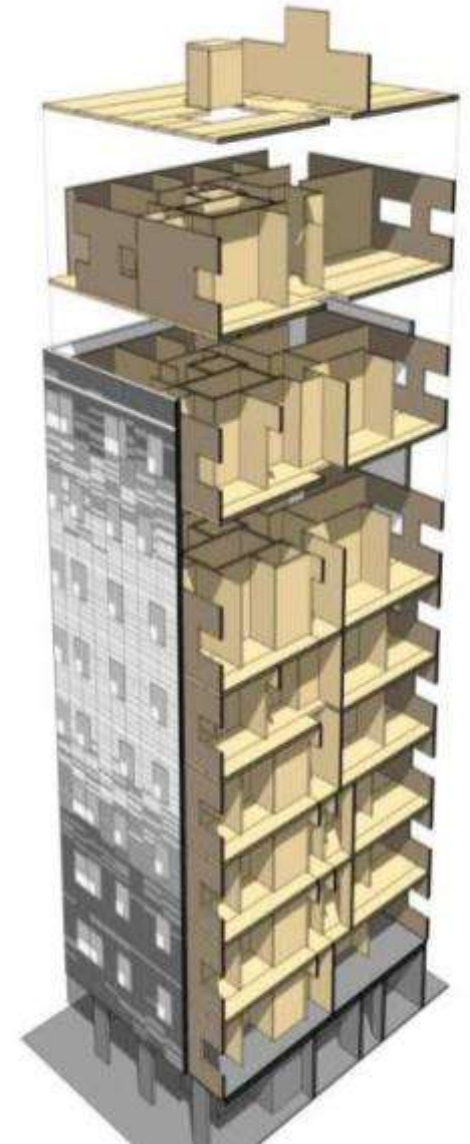
- Completed in 2009
- 8 stories of CLT over 1 concrete



Stadhaus, London, UK
Architect: Waugh Thistleton Architects
Photo credit: Waugh Thistleton Architects

Carbon Reduction

Volume of wood used	950 m ³
Carbon sequestered and stored (CO₂e)	660 metric tons
Avoided greenhouse gases (CO₂e)	225 metric tons
Total potential carbon benefit (CO₂e)	915 metric tons
Carbon savings from the choice of wood in this one building are equivalent to:	
	175 passenger vehicles off the road for a year
	Enough energy to operate a home for 79 years



Stadhaus, London, UK

Architect: Waugh Thistleton Architects

Photo credit: Waugh Thistleton Architects

Government Support

“Building stronger markets for innovative wood products will **support sustainable forestry,** reduce green house gas emissions, and put rural America at the forefront of an emerging industry”

Tom Vilsack – Agriculture Secretary

> Questions?

Please do not hesitate to contact me for free
project assistance

Marc Rivard, P.E. S.E.
New England Regional Director
marc.rivard@woodworks.org

(617) 997-3890

