

Zero Net Carbon Building Zoning

*Embodied Carbon TAG #3
Presentation*



boston planning &
development agency

July 14, 2021

Zoom Meeting Guidance

The BPDA will record this meeting and post it on BPDA's Zero Net Carbon Building Zoning webpage. The recording will include the presentations, discussions and a transcript of Q&A / Chat comments.

It is possible that participants may be recording this meeting as well.
If you prefer not to be recorded during the meeting, please turn off your microphone and camera.

Zoom Meeting Guidance

- Help us ensure that this conversation is a pleasant experience for all.
 - Please mute your mics during the presentation to avoid background noise.
 - It's great to see you! Participant video can be on during the meeting.
 - **Use the Chat** feature for questions and comments during the presentation.
 - Use the Raise Hand feature during the discussion segment.
 - Please be respectful of each other's time.
- As always please feel free to reach out to me directly!
John Dalzell, AIA, LEED Fellow at John.Dalzell@Boston.gov

COVID-19 Resources

Stay up-to-date with COVID-19 related announcements, City of Boston reopening plans, and resources for you and your community at:

boston.gov/coronavirus



The screenshot shows the City of Boston website page for COVID-19 resources. The header includes the City of Boston logo, Mayor Martin J. Walsh's name, and the date July 12, 2020. The main heading is "CORONAVIRUS DISEASE (COVID-19) IN BOSTON". Below the heading, there is a paragraph of text: "The state has updated guidance on the Reopening Massachusetts website. We also continue to update City-specific guidance for Boston on our reopening website." To the right of this text is a "PUBLISHED BY PUBLIC HEALTH" logo. Below the text, there is a section for "MULTILINGUAL CONTENT" with links for Arabic, Kriolu (Cabo Verdean), Chinese, French, Haitian Creole, Portuguese, and Russian. At the bottom, there is a section for "BOSTON (AS OF FRIDAY, JULY 10)" with the statistics "13,673 CASES | 9,683 RECOVERED".

AGENDA

DIVERSITY EQUITY & INCLUSION AND MASS TIMBER UPDATE

1. Welcome and Introductions – John Dalzell (5 min)
2. TAG Meeting #2 Summary - Michelle Lambert (10 min)
3. Equity in Embodied Carbon - Barry Reaves, BPDA (35 min)
 - Discussion & Recommendations
4. Mass Timber - Nicole St Clair Knobloch (25 min)
 - Discussion & Recommendations
5. Updates and Next Steps - John Dalzell (5 min)

WELCOME & BRIEF INTRODUCTIONS

WORKING GROUP

Michelle Lambert, CPHC®, LEED BD+C
Lambert Sustainability / Carbon Leadership Forum

Rachelle Ain, AIA CPHC®, WELL AP, Utile Design
Carbon Leadership Forum

Julie Janiski, Buro Happold
Carbon Leadership Forum

Andrea Love, Payette

Olivia Humphrey, Jacobs

Lori Ferriss, Goody Clancy

Jennifer Effron, BSA

Meredith Elbaum, BE+

CITY STAFF

John Dalzell, AIA, LEED Fellow
Sr. Architect Sustainable Development, BPDA

Richard McGuinness
Deputy Director, BPDA

Chris Busch, AICP
Assist Deputy Director, BPDA

Kathleen Pedersen
Sr. Land Use Planner / Sustainability Specialist, BPDA

Alison Brizius
Director of Climate & Environmental Planning, Boston

Kat Eshel
Carbon Neutrality Program Manager, Boston

WELCOME & BRIEF INTRODUCTIONS

TAG MEMBERS

Alison Nash, DiMella Shaffer

Andrea Love, Payette

Anthony Pak, Priopta

Aurora Jensen, Buro Happold

Brad Mahoney, MP Boston

Brenda Pike,

Caroline Shannon, Howeler + Yoon Architecture

Chen Qin, HED (Harley Ellis Devereaux)

Christopher Stanley, Trinity Financial

Ciarán Smyth, BALA Engineers

Courtney Koslow, Beacon Communities

Dan Whittet, AHA consulting Engineers

Daniel Bailey, Takeda Pharmaceuticals

Dennis Carlberg, Boston University

Erin McDade, Architecture 2030

Gunnar Hubbard, Thornton Tomasetti

Ivan Lee, Morrison Hershfield

James Rogers, Turner Construction

Jim Newman, Linnean Solutions, LLC

Kayla Natividad, NSG Pilkington North America

Kevin Maguire, Oxbow Urban LLC

Lori Ferriss, Goody Clancy

Maura Zlody,

Meghan Lewis, Carbon Leadership Forum, University of Washington

Michael Orbank, Commodore Builders

Michael Gryniuk, LeMessurier

Michelle Apigian, ICON Architecture

Nicole Knobloch, Olifant, LLC

Patrick Kenny, Thornton Tomasetti

Paul Richardson, Buro Happold

Peter Sun, BPDA

Steven Burke, Consigli Construction Company, Inc.

Tamar Warburg, Sasaki Associates, Inc.

Tom Chase, New Ecology, Inc.

Turan Karakus, BR+A Consulting Engineers

TAG Meeting #2 on June 2 - Summary

36 attendees! Thank you!

Dual Focus on-

- 1. Policy- Precedents and Boston-specific ideas**
- 2. Awareness, Education & Stakeholder Outreach**
3. Practice, Structure, Materials, Tools

TAG Meeting #2 Presentations

Policy- Types and goals

- Policy should be accompanied by incentives to be most effective
- Policies can be either **Prescriptive:**
 - Use existing rating systems that address embodied carbon
- Or **Performance-based:**
 - Set targets or budgets with flexibility on how to get there
- Policies can be whole building level or more granular at the material-specific level (ie: concrete Buy Clean)

TAG Meeting #2 Presentations

Policy- Zoning Precedents

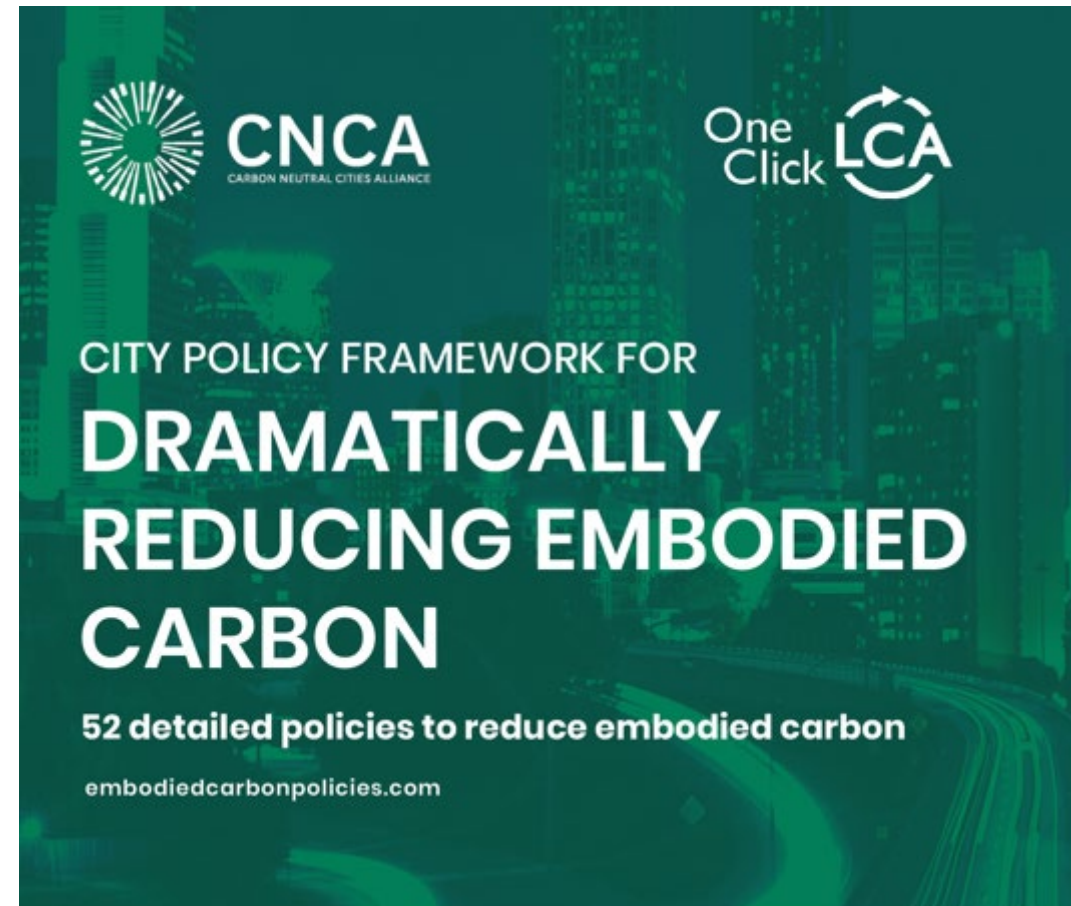
- Vancouver-
 - Phase 1 (2017)- Disclosure
 - Phase 2 (2021/22)- Establish baseline and enact Carbon Targets/Budget
 - Phase 3 (2033+)- Revisions based on experience/project feedback loops and net zero goals

Newton, MA- special permit is both performance and prescriptive

TAG Meeting #2 Presentations

Policy- National Precedents






<https://carbonneutralcities.org>



TAG Meeting #2 Presentations

Policy- Climate Action Plans (CAPs)

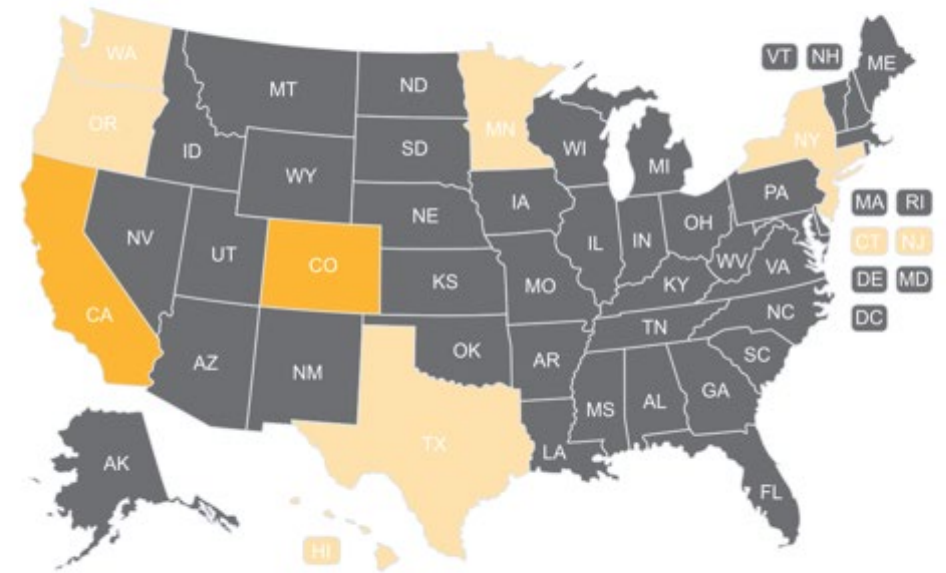
FIGURE 19: COORDINATING CLIMATE PREPAREDNESS EFFORTS

	 BUILDINGS	 TRANSPORTATION	 LAND USE & NATURAL SYSTEMS	 ENERGY	 WATER INFRASTRUCTURE	 EMERGENCY MANAGEMENT
CITY	<ul style="list-style-type: none"> Building permits and inspections Zoning Energy reporting requirements 	<ul style="list-style-type: none"> Local roads and sidewalks Complete Streets design guidelines Parking 	<ul style="list-style-type: none"> City parks and urban wilds Street trees Open space planning Wetlands protection Floodplain regulation 	<ul style="list-style-type: none"> Permits infrastructure developments Develops district energy, energy efficiency programs 	<ul style="list-style-type: none"> Retail water distribution, waste water and storm water collection (BWSC) Groundwater overlay district (zoning) 	<ul style="list-style-type: none"> Local emergency response Public safety Emergency shelters and cooling centers
STATE	<ul style="list-style-type: none"> Building code Insurance regulation 	<ul style="list-style-type: none"> MBTA system State highways and parkways Airport and seaport 	<ul style="list-style-type: none"> DCR Parkland (Muddy River; Charles River) Dams; Access to waterfront 	<ul style="list-style-type: none"> Energy utility regulation Energy efficiency and renewable energy incentives 	<ul style="list-style-type: none"> Wholesale water supply and waste water treatment (MWRA, Deer Island) 	<ul style="list-style-type: none"> Regional emergency response (backup for cities)
FEDERAL	<ul style="list-style-type: none"> Flood insurance 	<ul style="list-style-type: none"> Airport and railroad Federal highway standards Coast Guard regulations 	<ul style="list-style-type: none"> Boston Harbor Islands National Recreation Area Designation of floodplain 	<ul style="list-style-type: none"> Regional electricity grid (transmission) Power plant regulation Energy efficiency and renewable energy incentives 	<ul style="list-style-type: none"> Clean Water Act 	<ul style="list-style-type: none"> Federal emergency response (backup for states)

TAG Meeting #2 Presentations

Policy- CLF Policy Toolkit

<https://carbonleadershipforum.org/clf-policy-toolkit/>



State Buy Clean legislation passed State embodied carbon policy introduced but not passed and/or city policy passed

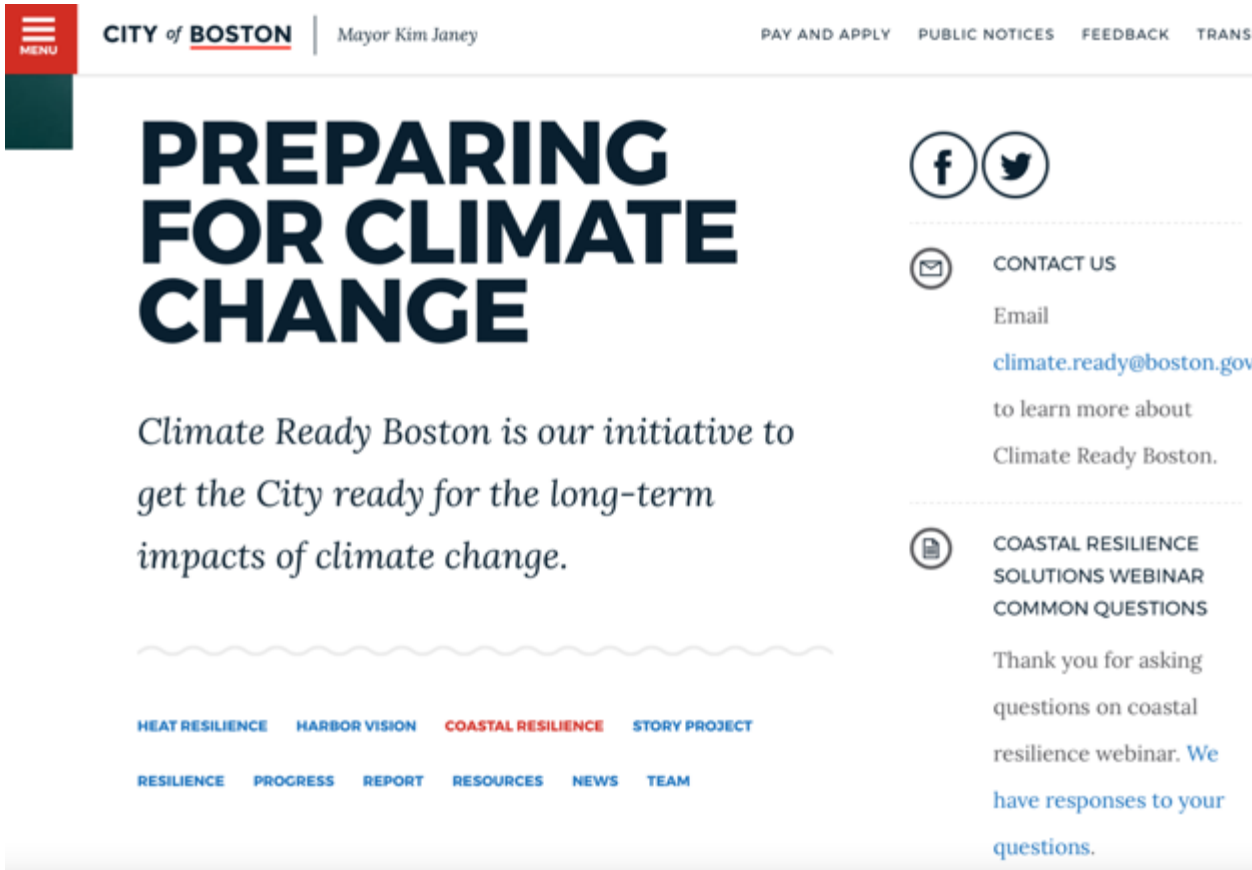
TAG Meeting #2 Presentations

Policy- Local Examples

- **Cambridge - phased-in approach over next 5 years**
- **Newton**
- **Many others in MA in development**

TAG Meeting #2 Presentations

Awareness, Education and Outreach



CITY of BOSTON | Mayor Kim Janey

PAY AND APPLY PUBLIC NOTICES FEEDBACK TRANSLATE

PREPARING FOR CLIMATE CHANGE

Climate Ready Boston is our initiative to get the City ready for the long-term impacts of climate change.

HEAT RESILIENCE HARBOR VISION COASTAL RESILIENCE STORY PROJECT

RESILIENCE PROGRESS REPORT RESOURCES NEWS TEAM

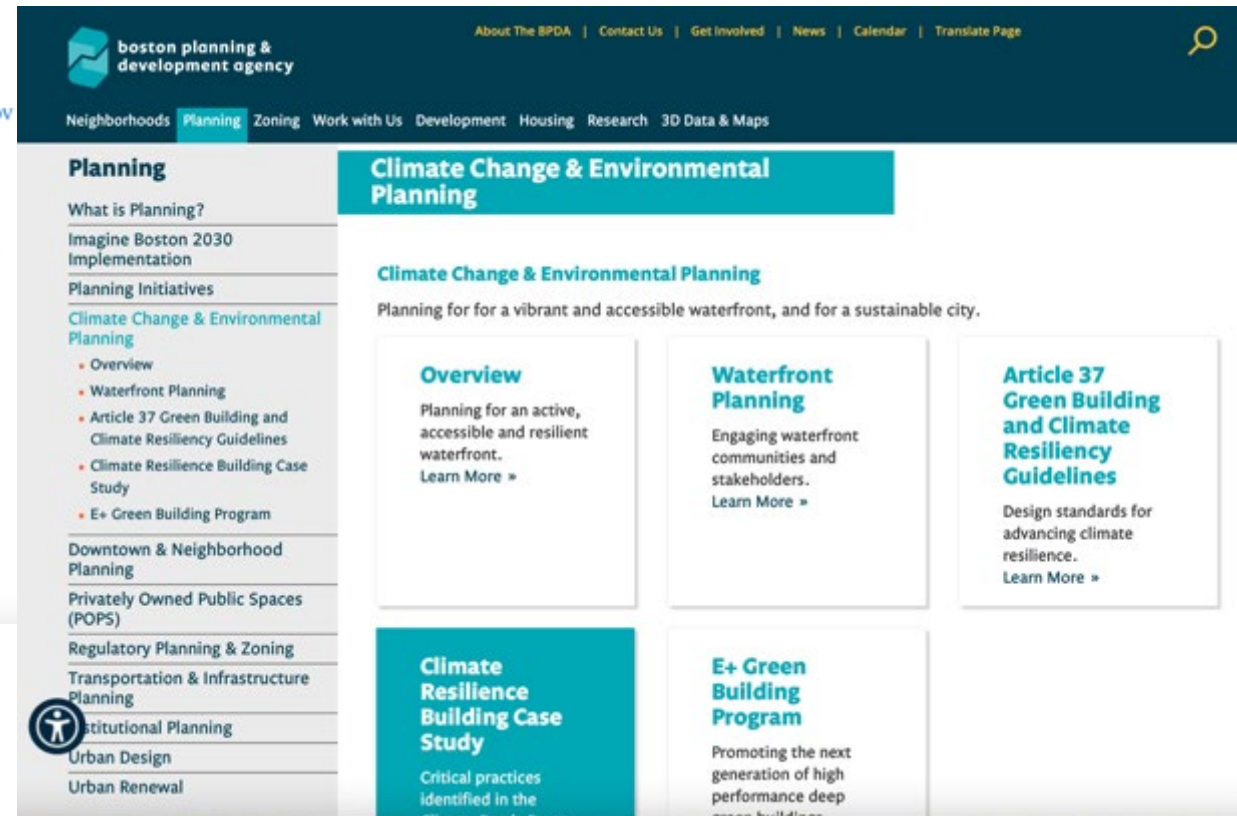
CONTACT US

Email climate.ready@boston.gov

to learn more about Climate Ready Boston.

COASTAL RESILIENCE SOLUTIONS WEBINAR COMMON QUESTIONS

Thank you for asking questions on coastal resilience webinar. We have responses to your questions.



boston planning & development agency

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Neighborhoods **Planning** Zoning Work with Us Development Housing Research 3D Data & Maps

Climate Change & Environmental Planning

Planning for for a vibrant and accessible waterfront, and for a sustainable city.

- Overview**
Planning for an active, accessible and resilient waterfront.
[Learn More >](#)
- Waterfront Planning**
Engaging waterfront communities and stakeholders.
[Learn More >](#)
- Article 37 Green Building and Climate Resiliency Guidelines**
Design standards for advancing climate resilience.
[Learn More >](#)
- Climate Resilience Building Case Study**
Critical practices identified in the...
- E+ Green Building Program**
Promoting the next generation of high performance deep green buildings.

What is Planning?
Imagine Boston 2030 Implementation
Planning Initiatives
Climate Change & Environmental Planning

- Overview
- Waterfront Planning
- Article 37 Green Building and Climate Resiliency Guidelines
- Climate Resilience Building Case Study
- E+ Green Building Program

Downtown & Neighborhood Planning
Privately Owned Public Spaces (POPS)
Regulatory Planning & Zoning
Transportation & Infrastructure Planning
Institutional Planning
Urban Design
Urban Renewal



TAG Meeting #2 – Breakout Discussions

- **Synthesizing into categories and recommendations to be discussed at the next TAG meeting**

Diversity, Equity & Inclusion

Barry Reaves

Director of Diversity, Equity & Inclusion, BPDA

Barry.Reaves@boston.gov



**boston planning &
development agency**

Equity Framework

The Zero Net Carbon Building framework is the equity framework to improve planning, decision-making, and resource allocation to create more equitable policies and program.

Many current inequities are sustained by historical legacies and systems that repeat patterns of exclusion. Institutions and structures have continued to create and perpetuate these inequities, despite the lack of explicit intentions.

Integrating equity into the consideration will help those strategies be more effective.

The Equity Framework applies principles, goals, and processes to address inequity at all levels of the agency. Institutionalizing use of an equity tool provides the opportunity to develop thoughtful, realistic strategies and timelines to advance equity.

Equity Framework

Communities of color, immigrants, refugees, people with low incomes, youth and limited English-proficiency individuals tend to live, work, play, and learn in specific areas of our City. Targeted investments will likely be necessary to advance the goals and strategies of the Agenda in these geographic areas to address disparities, mitigate impacts, and share benefits while minimizing displacement.

However, geographic considerations should not substitute for race, as many of the concerns of communities would persist even if they moved to a new location.

Specific cultural and population approaches that are not geographically based must remain a priority, especially as communities move to new areas and new people arrive. Additionally, actions must focus on multi-generational approaches, especially the engagement of and support of youth.

Equity Framework

The goals of the Equity Framework

- Institutionalize structures for community decision-making, transparency, leadership, and influence on design of environmental programs and policies.
- Refine environmental policies/programs so that the distribution of individuals and grassroots organizations that participate in and benefit from these programs is equitable and reflective of communities of color, immigrants, refugees, people with low-incomes and limited-English proficiency individuals.

Equity Framework

The Equity Framework strives to understand and assess the impact of the agency's policies, programs, and operations by applying essential inquiries:

- **Stakeholder engagement:** Who is affected by the policy, program, practice, or decision and how can they be involved?
- **Systems and data analysis:** What has caused or contributed to the inequity and what does the data say?
- **Developing equitable solutions:** What are the desired results and outcomes? What are the best strategies for advancing racial equity or mitigating unintended consequences?
- **Accountability and communication:** How will we ensure accountability, communicate, and evaluate results?

Discussion Notes - DEI

Who are the stakeholders?

- Checklist for how we are working with the community, established vernacular, and how are NOT displacing people and how are we engaging them
- People who live in proximity of waste and material facilities and people who work in those industries and businesses
- New opportunities that affordable housing communities.

Communities impacted by proximity to facilities / communities with language barriers?

- Newmarket Industrial area at the edge of Roxbury neighborhood.
- Displacement by new buildings and building improvements. Cultural and aesthetic alignment.
- Ensure information, policy, are opportunities are accessible to non-expert entities
- Ensure everyone has access to economic opportunities and new businesses.
- Concern for additional burdens / hurdles / costs, both perceived and real, to building affordable housing.
- Impact on historical buildings and related community impacts.
- How to ensure impacted communities see the potential new job and business opportunities?

How to ensure equitable outcomes?

- Include more people who might / will be impacted by these changes. Engage local organizations.

What is it that we want people to know? What do people need to know to make better decisions?

- To understand the whole picture of carbon, both operational and embodied, including reusing existing new buildings. Caution not for this to become for not building new, low carbon buildings.
- That there is a linkage between big picture (global carbon emissions) to everyday impacts (health, economic wellbeing).
- Everyone can play an impactful role in promoting and managing change.

Discussion Notes - DEI - continued

How to ensure equitable outcomes?

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- Everyone can play an impactful role in promoting and managing change.
- More resilient neighborhoods (resiliency = sustainability).
- Long term climate change impact (e.g. heat, SLR) AND short term impacts from facility locations that disproportionately impact frontline communities.
- Correlation of carbon emissions and extreme heat.
- THESE THOUGHTS ARE NOT LIMITED TO EMBODIED CARBON... ALL OF THE ZNC AGENDA.

What are the potential impacts such as health?

- Reducing smog and emissions will have related beneficial health impacts.
- Reduce the cost of housing and affordable housing
- What transformation are we after... opportunity to change who builds, what gets built, and what community are getting built.
- Helping communities find their voice and improve the quality of life.

Discussion Notes - DEI - continued

How do we measure success and how do we measure / track success, how do we know we have succeeded?

- Government measure on who makes decisions, and where does the money flow.
- People of color represent a large portion of the builder industry; how to ensure education of these stakeholders. Grow entrepreneurs and grow wealth.
- Learning how to listen... all of us!
- Add chat notes.

Resilient Neighborhoods; what defines this term and success?

- We need to be clearly define this!
- Enduring climate change... already experiencing more flooding, more heat.

CHAT NOTES

- Meredith Elbaum | Built Environment Plus: Here's the link to the Muni Summit recording. We are actively working on a summary document. <https://builtenvironmentplus.org/road-to-net-zero/>
- Nicole Knobloch: One type of equity might be access to better-constructed, more efficient, sustainable buildings. Making sure sustainability is not only the province of the affluent. To Mike's point, engaging communities in sustainability planning makes sense.
- Jim Newman (he/him/his): A key outcome is for white people to do the learning. Especially learning how to listen.
- Michael Orbank: Tree cover is also important in helping bolster community resiliency. A lot of studies coming out showing that communities of color and immigrant communities lack robust tree cover which help exasperate climate change impacts and heat island effects. Greater tree cover in communities help promote community wellness, lower heat intensity, and can help bolster community resiliency. I know it's not exactly embodied carbon but it's very related. Cambridge has done a lot in investigating the differences in it's communities and demographics regarding tree presence and cover.

Dan Bailey: Because certain types of development are concentrated in certain neighborhoods, embodied carbon policies should target a range of different types of development. For example, if policies only apply to the largest buildings, the benefits of these policies may not accrue equally to residents of many majority minority neighborhoods like Eastie, Dorchester, and Roxbury where development tends to be small infill projects often involving full or partial demolition of existing buildings.



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- Nicole Knobloch: Totally agree about tree cover. I think it's a huge issue and it is definitely an equity issue. It doesn't make sense to tell those communities we're working on these technical, long-term solutions to climate change when we're not increasing neighborhood resiliency in this most basic way. I would love to work on this issue.
- Jenny Efron | BSA (she, her, hers): resiliency can mean so many things!
- Christopher Stanley: Net zero carbon and net zero energy strategies will rely on relatively newer skills. Design and installation of electric heat pumps is one evolving industry, for example, that should be exploited for bringing equity in employment and ownership of the companies that do this type of work.
- Meghan Lewis: Thanks for leading this discussion and the constructive feedback on giving specific/actionable comments, Barry!
- Jim Newman (he/him/his): Community resilience: Resilience to climate change by reducing carbon emissions and increasing community strength across the community in ways that meets the needs of its most vulnerable residents so that everyone in the community can thrive in the face of a changing world.

Mass Timber

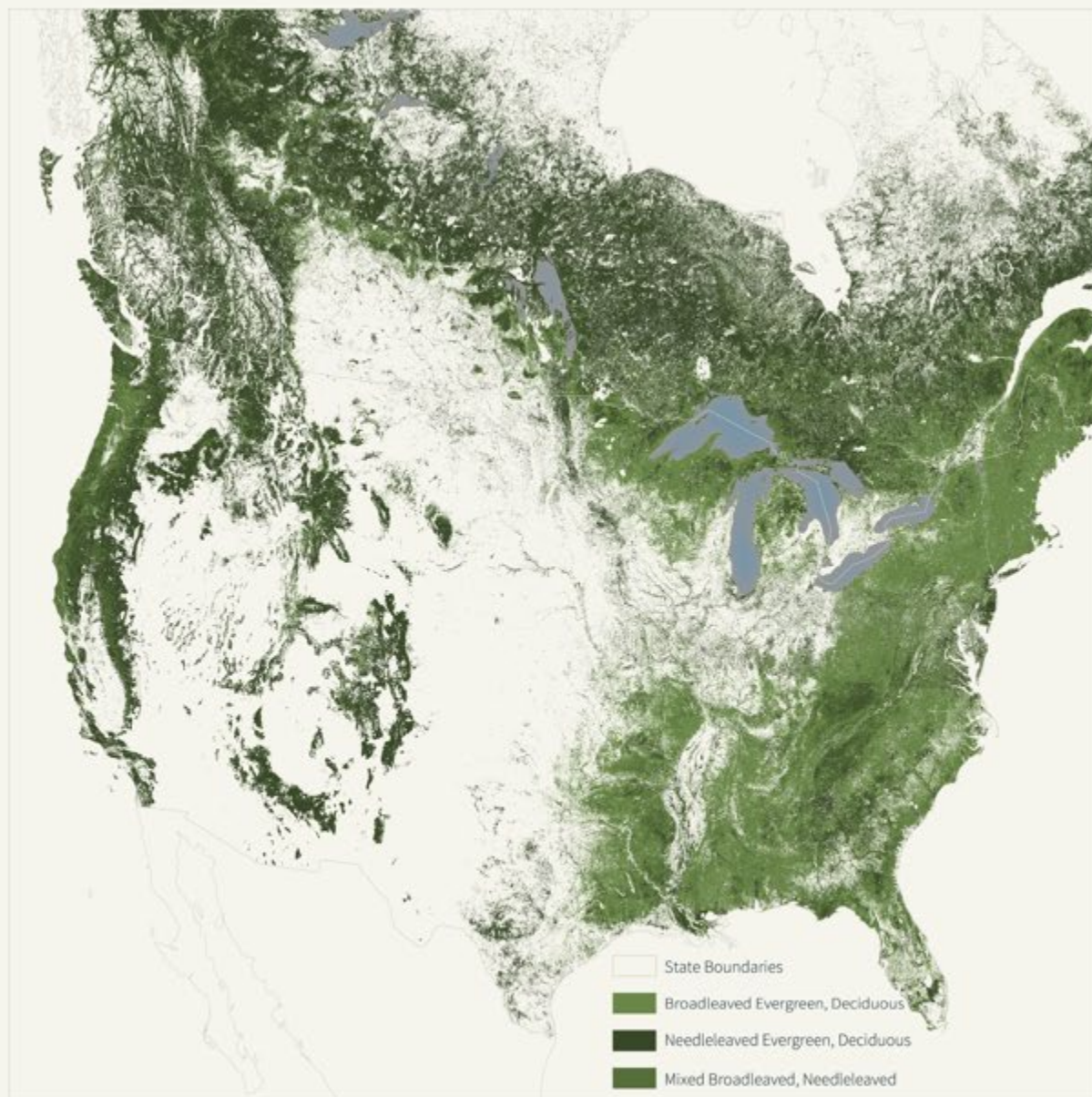
Nicole St Clair Knobloch

Principal, Olifant

nknobloch@olifant.org



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US Forestland

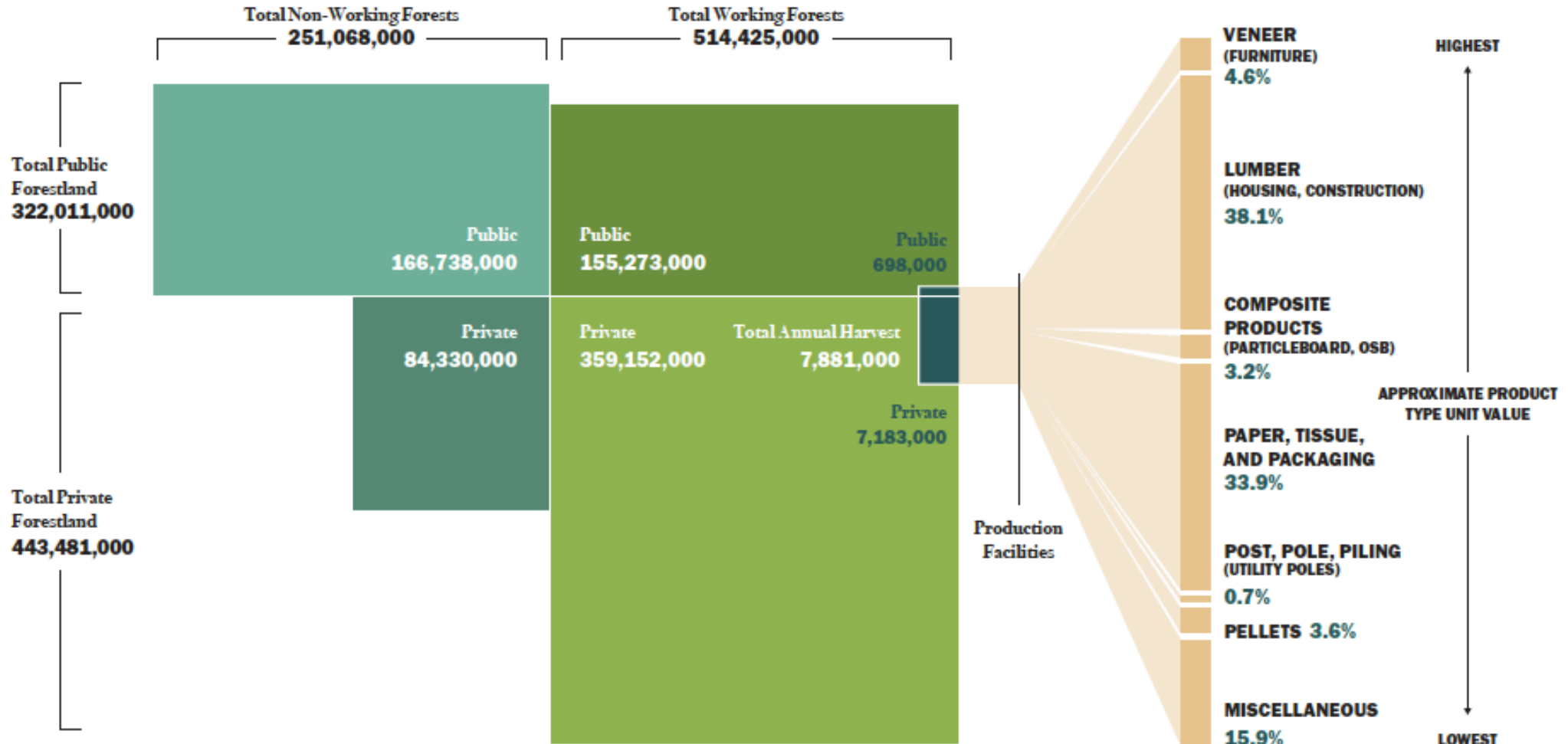
North American forests are concentrated on both coasts, with the major wood-producing baskets located in the US south and Pacific Northwest. The Northeast has significant and increasing forest cover, but has not been a significant lumber producer for some time.

Source: *Global Forest Resource Assessment* FAO, 2010.

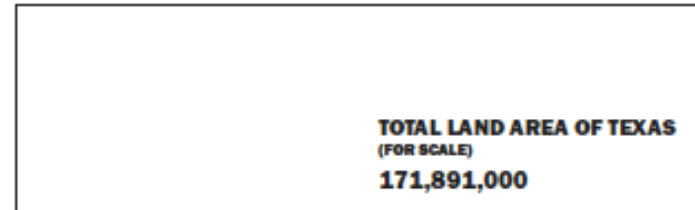
U.S. Forest Sector Markets

TOTAL U.S. FORESTLAND **765,493,000 ACRES**

TOTAL HARVEST MARKET SHARE %



DATA IS REPRESENTED PROPORTIONALLY.



90 % OF HARVESTS FOR WOOD AND FIBER OCCUR ON PRIVATE WORKING FORESTS

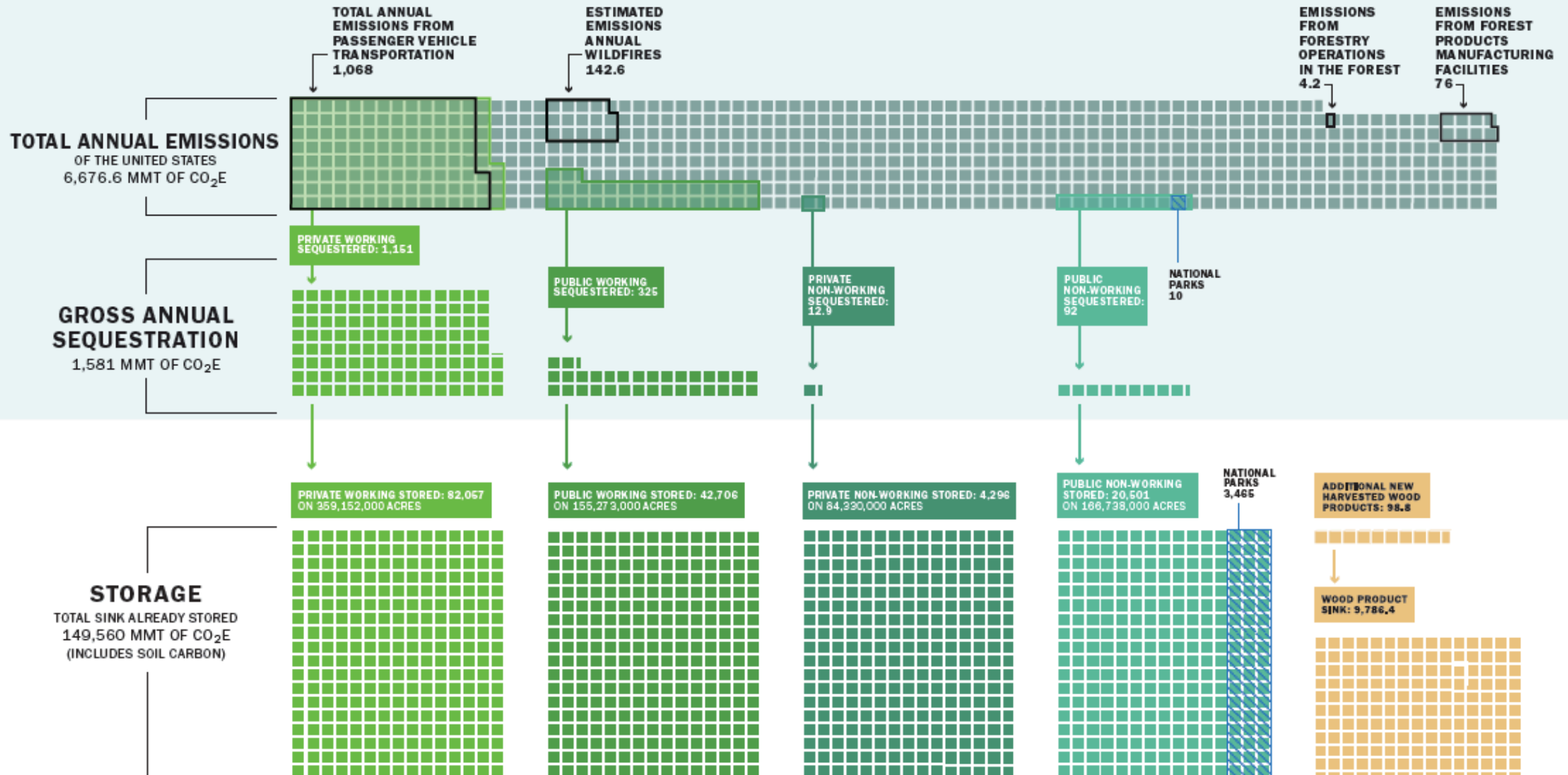
Forest & Forest Products Carbon

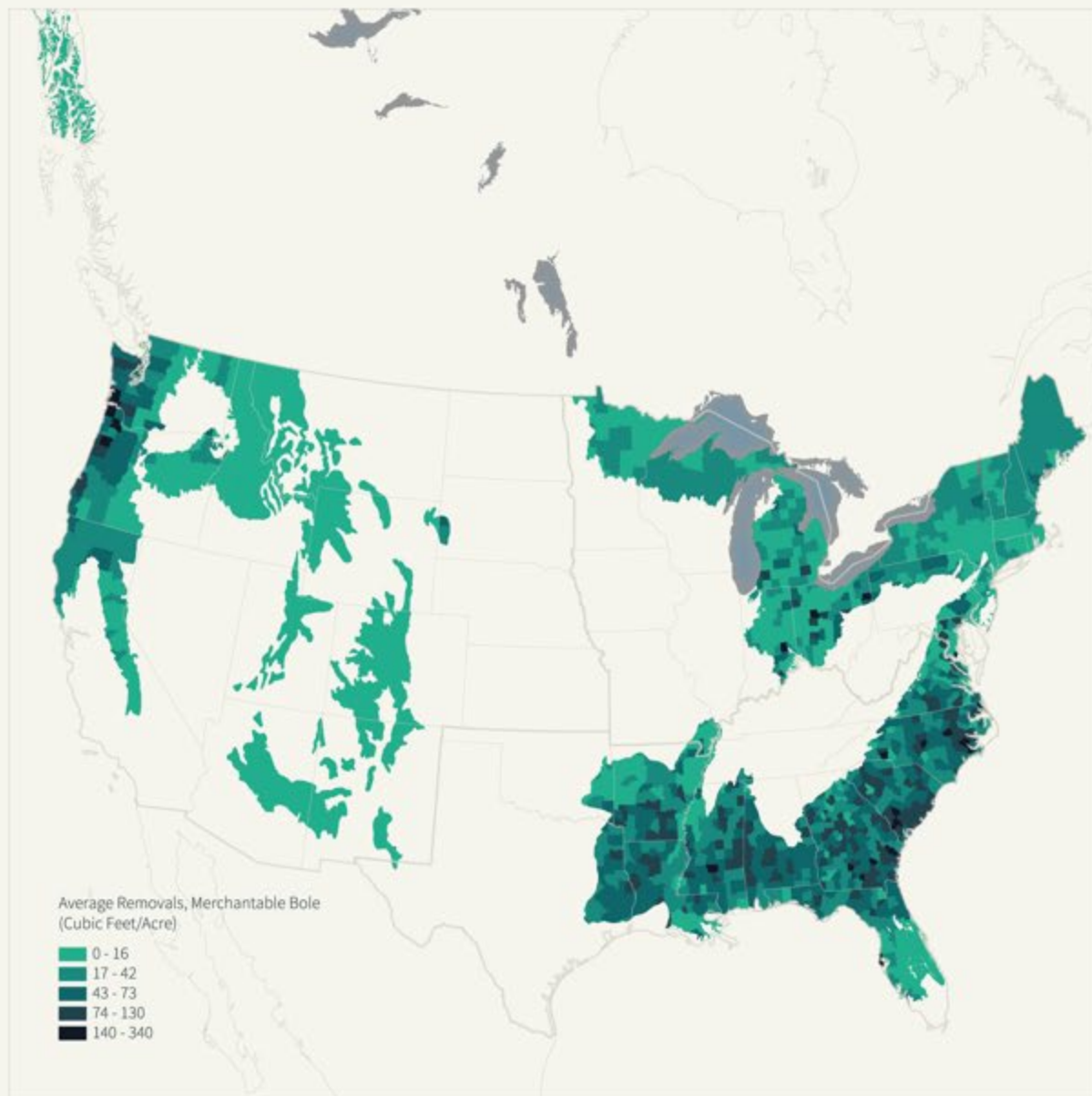
■ ← 10 MMT CO₂E = THE CO₂E EMITTED BY 2,160,436 PASSENGER VEHICLES IN ONE YEAR.

ALL FIGURES REPRESENTED ARE IN MMT OF CO₂E

SHADED SQUARES ■ = SEQUESTERED CO₂E
 OUTLINED SQUARES □ = EMISSIONS
 TEXTURED SQUARES ▨ = NATIONAL PARKS

ANNUAL SNAPSHOT





Average Removals

Rank	State	Cubic Feet (Millions)
1	Georgia	1,375
2	Alabama	1,272
3	Mississippi	970
4	Oregon	920
5	North Carolina	899
6	South Carolina	868
7	Louisiana	726
8	Arkansas	694
9	Washington	674
10	Texas	655
11	Maine	533

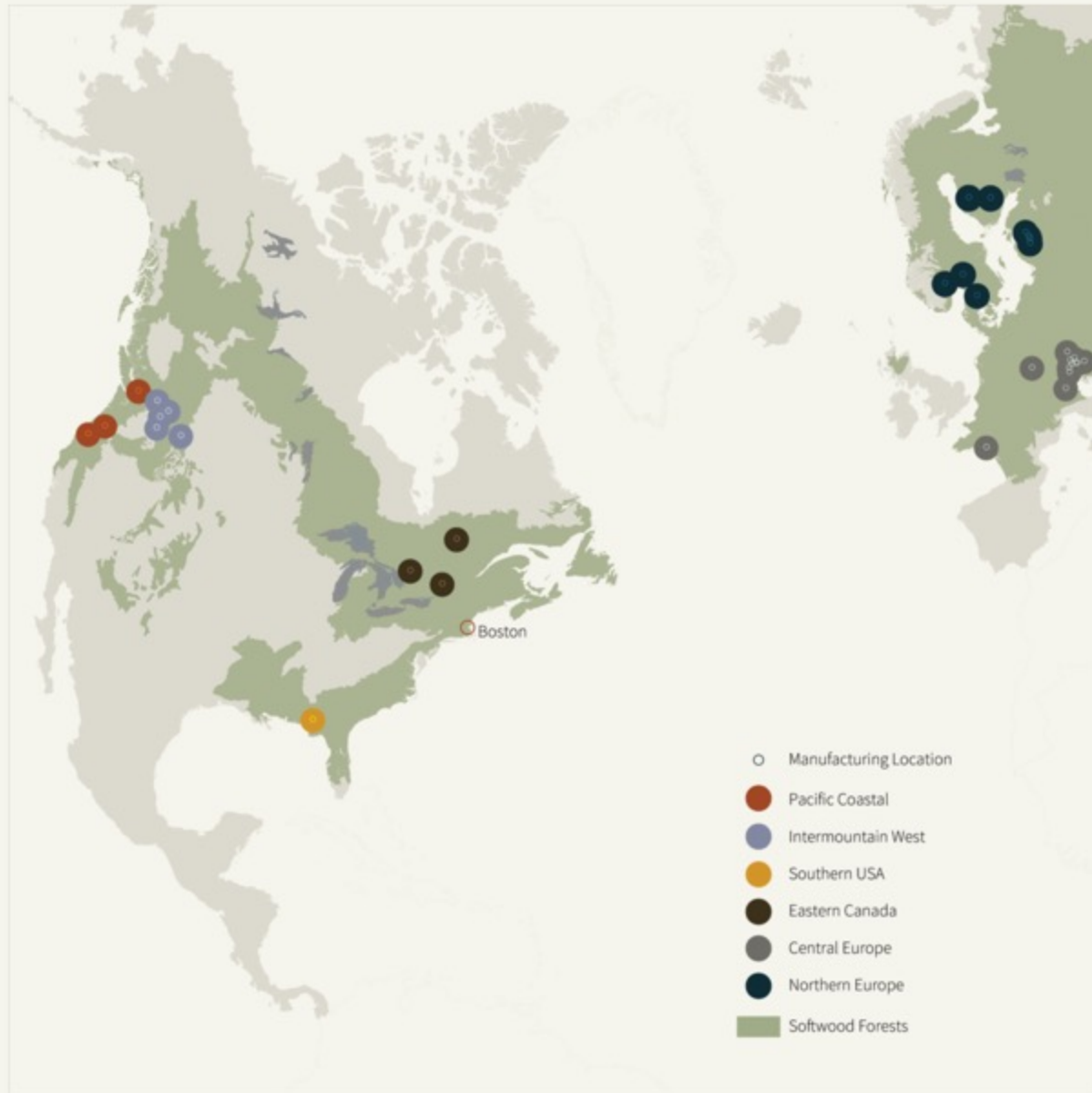
Source: FIA Counties Data, 2015



MASS TIMBER SOURCING

Softwood Forests

Each region has a specific forest type or types. These range from the pine plantations of the American South to boreal conifer forests in northern Canada. Forest type influences the quality and quantity of wood supply for mass timber, and also the habitat, carbon sequestration, and other ecosystem services provided by forests in a region.



MASS TIMBER SOURCING

Woodsheds

Six major woodsheds currently exist for delivery of wood products to New England, all of which have existing and growing mass timber manufacturing facilities. These regions produce cross laminated timber (CLT), dowel laminated timber (DLT), mass plywood panels (MPP), as well as other innovative wood products. All of these products rely on dimensional lumber combined into a laminate, and primarily source dimensional lumber (lamstock) from existing sawmills.



Mass Timber Facilities (Northern Hemisphere)

	Region	Structural Mass Timber Facilities (#)	Forest Ecoregion	Species	Forest Practices
	Pacific Coastal	3	Puget lowland forests, Central and Southern Cascades forests, Klamath-Siskiyou forests	Douglas Fir	Even-age native forest
	Intermountain West	5	Okanagan dry forests, North Central Rockies forests	Mixed Conifer	Uneven-age native forest
	Southern USA	1	Southeastern conifer forests	Southern Pine	Even-age monoculture plantation
	Eastern Canada	3	Eastern forest-boreal transition, Central Canadian Shield forests	Mixed Conifer	Combination of even and uneven-age
	Central Europe	12	Alps conifer and mixed forests, Pannonian mixed forests, Western European broadleaf forests, Atlantic mixed forests	Mixed Conifer	Combination of even and uneven-age
	Northern Europe	9	Sarmatic mixed forests, Scandinavian and Russian taiga	Mixed Conifer	Even-age monoculture plantation



Eastern Forests

Shades of green indicates areas of forest and forest type within the Northeastern US and eastern Canada. While the New England region enjoys significant forest cover, relatively little lumber is produced in the region. The expanse from Hudson Bay through Florida and Texas is one of the world's largest forested areas.

Source: *Global Land Cover L4 (ESA 2010 UCLouvain)*



New England Region

The Atlantic Ocean, Hudson River, and Canadian border bound the greater New England region. These boundaries mirror regional transitions in forest type and forest products infrastructure.

Further west lie hardwood sawmills and a different forest type. A vast forest products supply chain infrastructure exists to the north of the US - Canada border. While significant for regional wood markets, the forest and infrastructure type differs notably from what exists in New England.



Forest Biomass

Forest biomass is higher in southern and central New England and lower in the furthest northern reaches of Maine. This results from the growing season, underlying ecological productivity of different landscapes, and legacies of land use over preceding centuries.



Source: USDA Forest Service, Northern Research Station, 2013

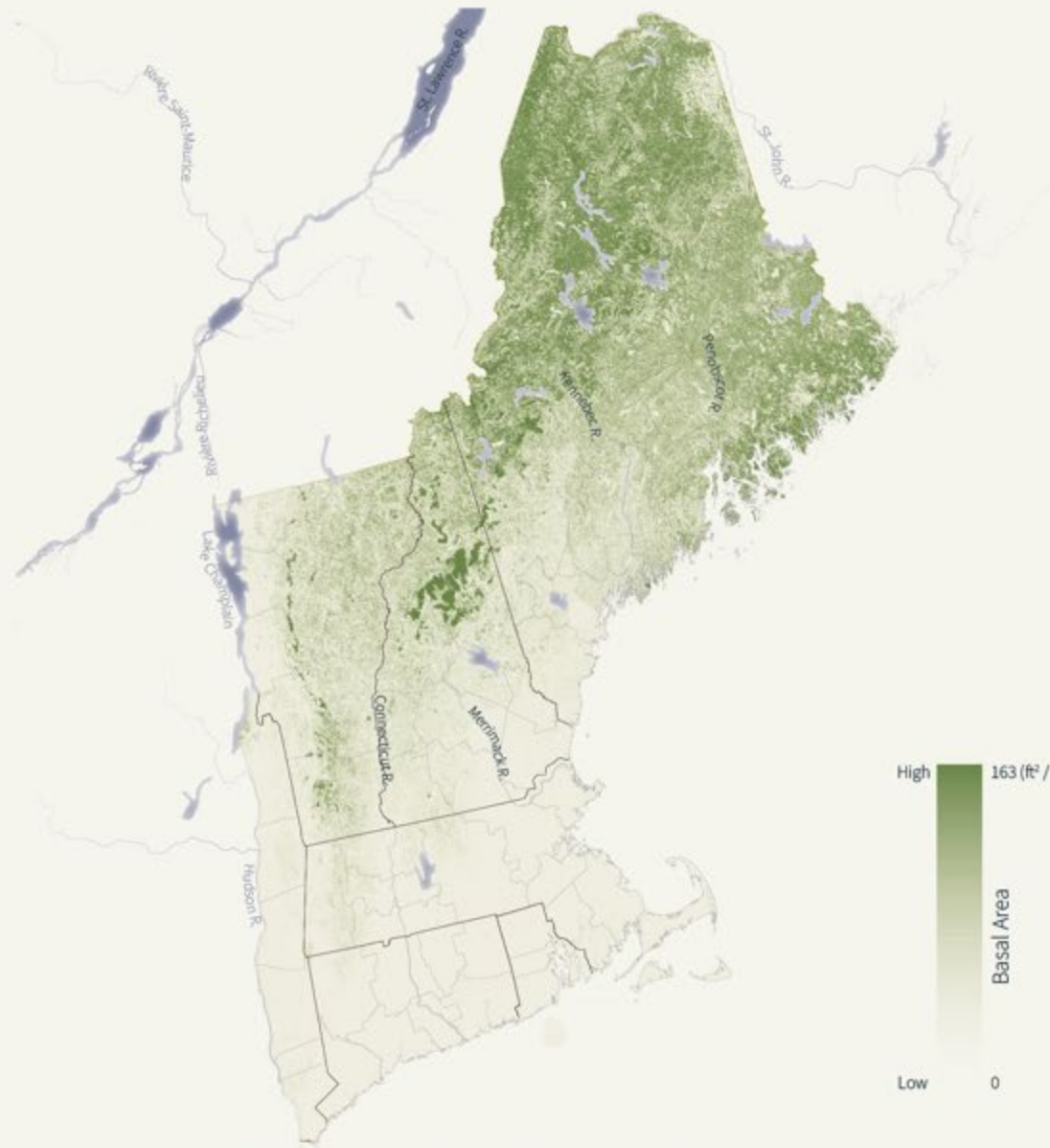
NEW ENGLAND FOREST RESOURCES | WE HAVE THE SPECIES SUITABLE FOR MASS TIMBER



Spruce-Fir forest, Maine
Credit: Maine.gov



Hemlock forest, Massachusetts
Credit: Harvard Forest

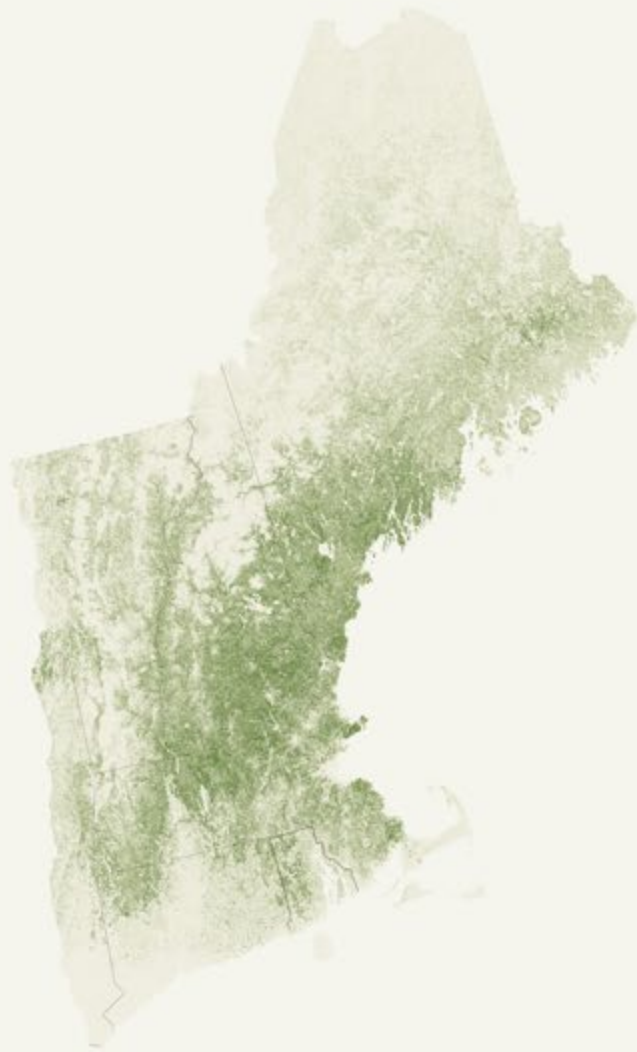


Structural Species: Spruce, Pine, Fir

Spruce, Pine and Fir (SPF) are the primary structural building materials grown in New England. These species, all of which are approved for structural use, grow primarily in Northern Maine.

Structural Species Locations

Source: USDA Forest Service, Northern Research Station, 2013



Eastern white pine



Eastern hemlock

While the current supply of SPF is concentrated to the north, Eastern white pine and Hemlock are both under consideration for structural use in Cross Laminated Timber and other products, and grow in high densities in central and eastern New England. This species location presents significant opportunities for increased wood utilization and infrastructure development to support a new wood supply chain.



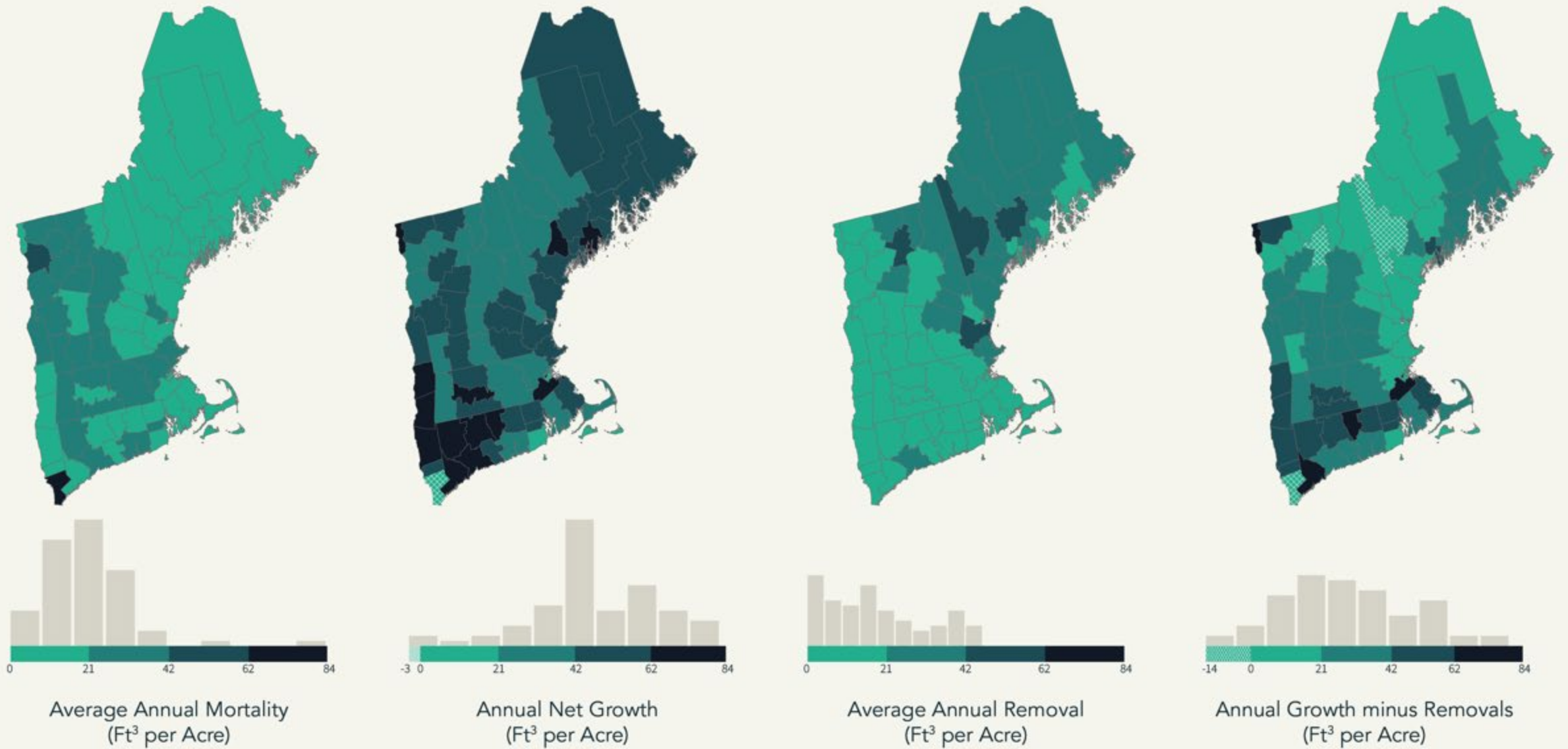
0 (ft² / acre)

Basal Area

177 (ft² / acre)

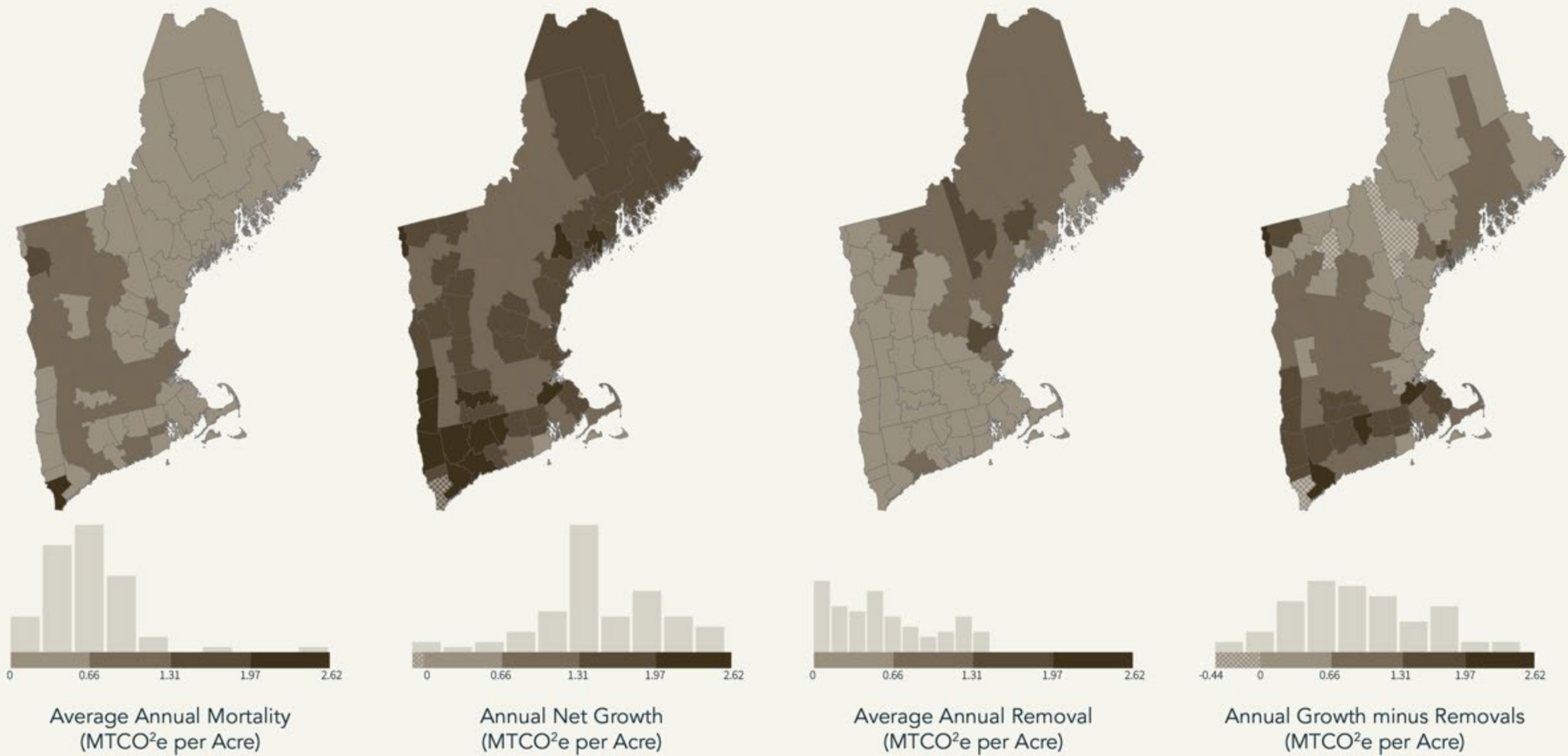
Pine / Hemlock Species Locations

Source: USDA Forest Service, Northern Research Station, 2013



County-Level Growth and Removals

Source: USDA Forest Service, Northern Research Station, 2013



Forest Carbon Growth and Removals

FORESTS UNDER THREAT | LOSS OF FOREST PRODUCTS, DEVELOPMENT



Pulp and paper mills close in Millinocket, Maine -- 2014



Sprawl threatens forests in Massachusetts

FIVE PATHWAYS REPORT
TO PRESERVE THE
NEW ENGLAND
FOREST CARBON SINK

NO NET LOSS

WILDLANDS

IMPROVED FOREST MANAGEMENT

MASS TIMBER CONSTRUCTION

URBAN CANOPY ENHANCEMENT

DEVELOPING REGIONAL MASS TIMBER SUPPLY

ATTRACTING MASS TIMBER FOR RURAL ECONOMIC DEVELOPMENT

Maine Mass Timber
Commercialization Center
University of Maine

- State incentives
- Federal government support
- Forestry-based organization partnerships
- Harvest data and modeling
- Workforce training and development
- Economic development
- Investment package for manufacturers



Photo by Joe Anastasi

The Case for CLT Manufacturing In Maine

Research

UNIVERSITIES CERTIFYING SPECIES

U. Maine- Orono

- Multiple forest products.
- CLT – spruce-pine-fir
- Wood insulation
- New uses for hemlock

U. Mass-Amherst

- Eastern hemlock, white pine CLT research
- Olver design demonstration building



FORESTS AND THE ECONOMY | JOBS THROUGHOUT NEW ENGLAND



Lumber in Maine



Consulting foresters in Massachusetts

A NEW FOREST PRODUCT | NEW BUILDING MATERIAL, NEW ECONOMIC ACTIVITY



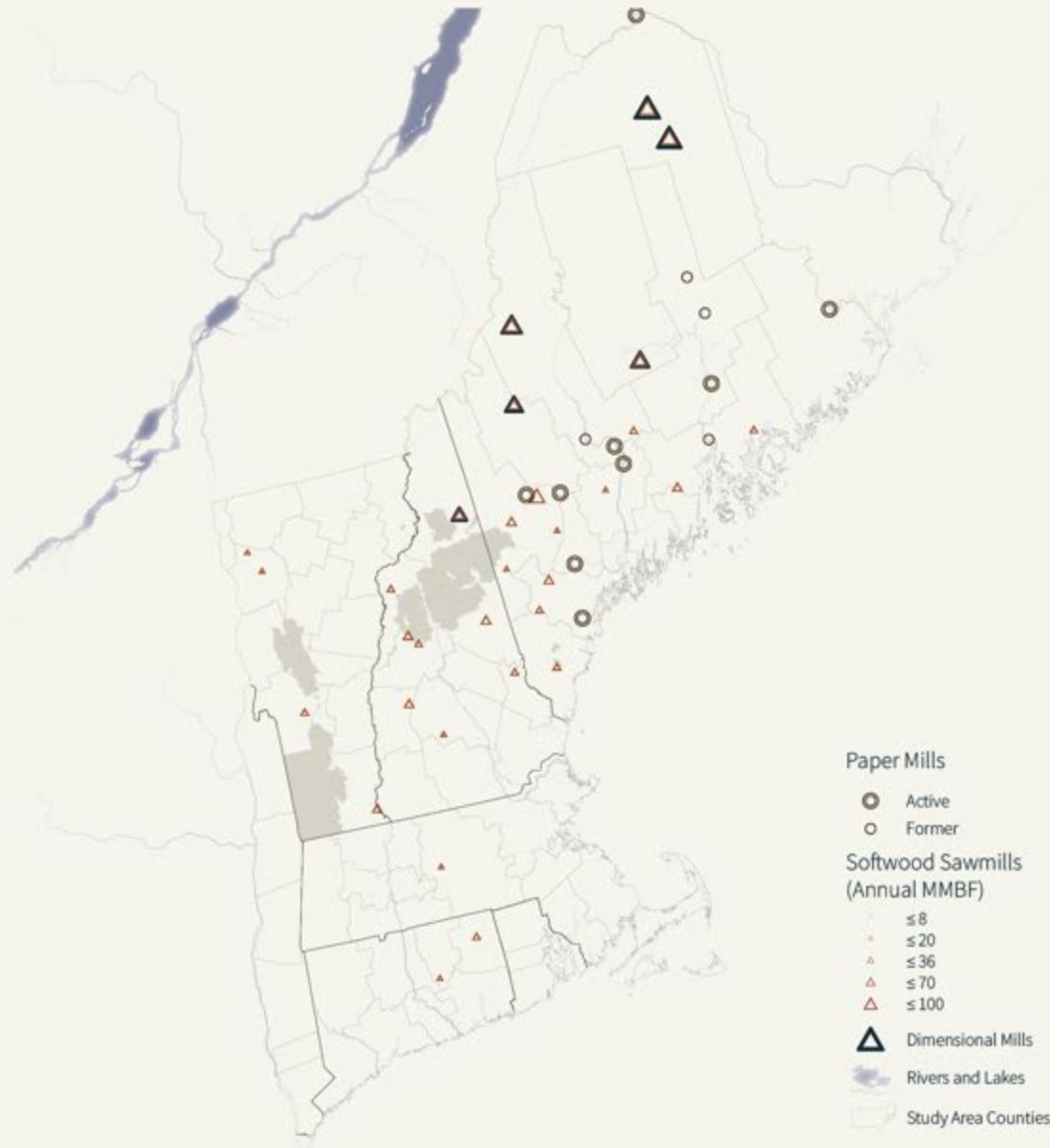
Bensonwood – New Hampshire



SmartLam (MT) - Maine



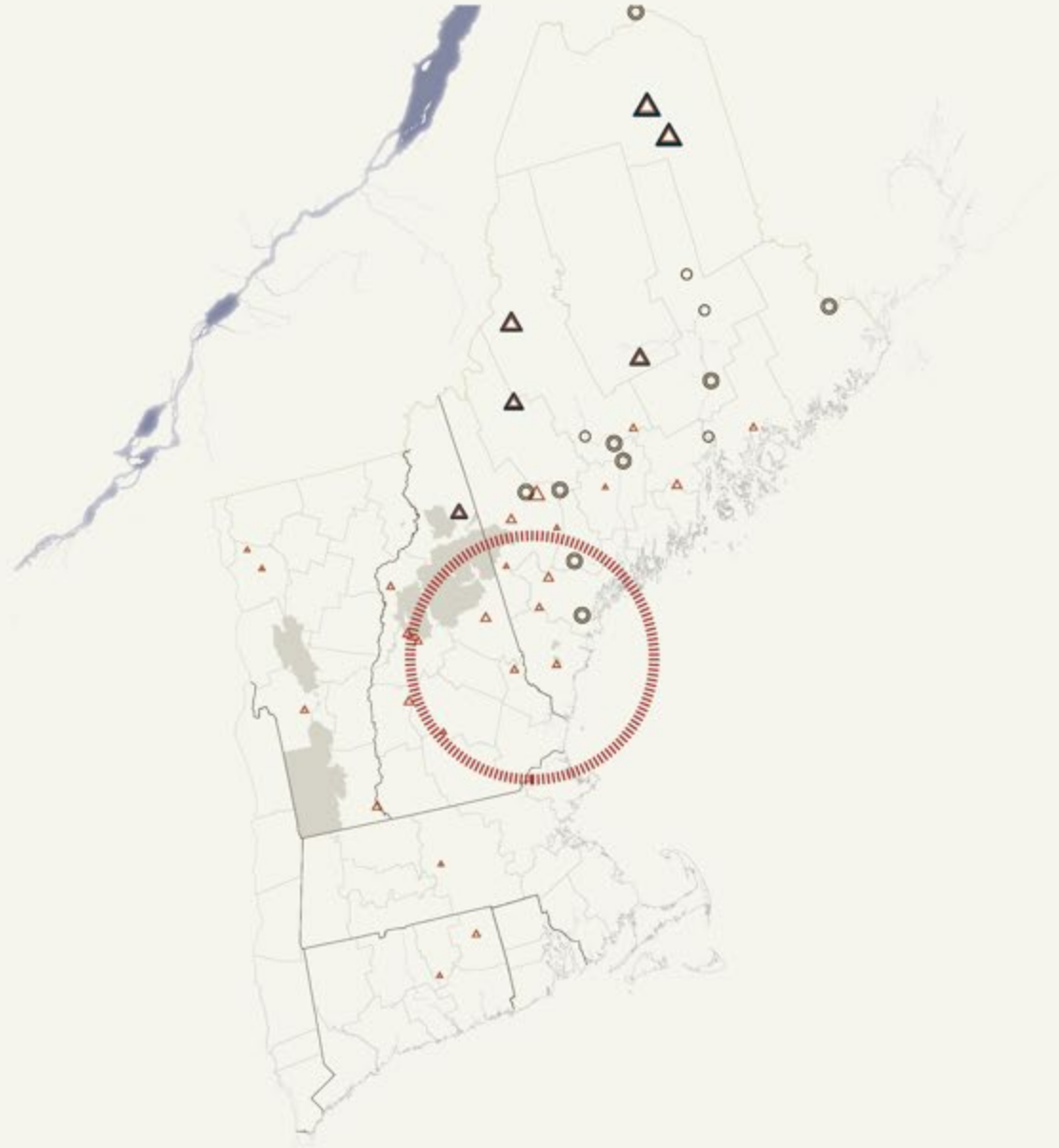
Travirke - Massachusetts



Mill Sites

This map depicts all sawmills, including SPF mills as well as smaller facilities that focus on boards, hardwood, and other solid wood products.

Many of these locations represent potential sites for future wood products infrastructure investments. These sites have existing space, power, and access. In addition, many of these facilities exist in economically depressed areas with significant raw log supply.

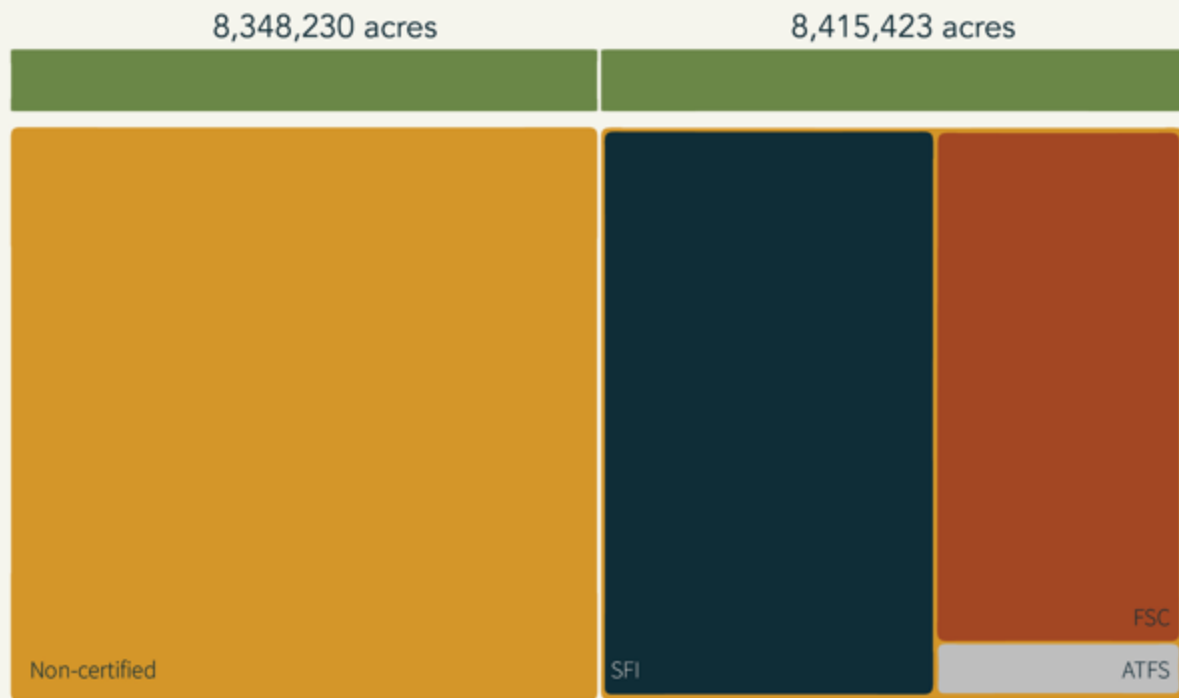


Remanufacturing and Fabrication

Opportunities for infrastructure investment exist along the travel route from existing SPF sawmills to major building centers, including Boston.

New lumber remanufacturing and fabrication facilities could co-locate on one of the many small or closed mill sites in this area. By locating between supply and demand, transportation, market, and carbon efficiencies are realized in the material supply chain.

Proximity of fabrication to final project location also improves ease of project delivery and assembly.



Timberland Acreage in Maine by Certification Type

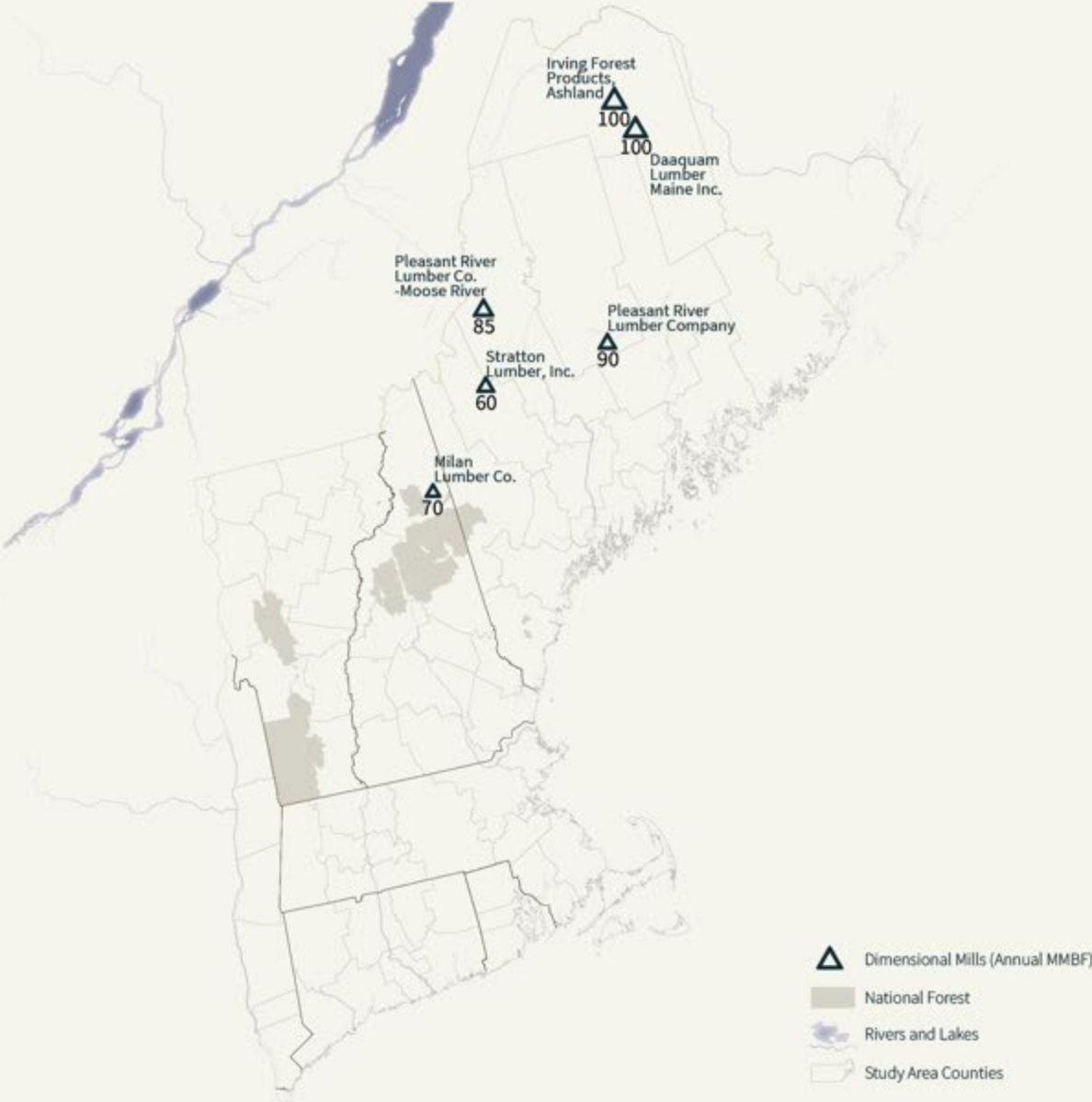
Five of the six SPF sawmills that could provide lamstock to CLT manufacturers are located in Maine. Maine is also the only state with reported forest certification data in New England.

Certifications include (by acreage) the Sustainable Forestry Initiative (SFI), Forest Stewardship Council (FSC), and American Tree Farm System (ATFS).

Source: Maine Forest Products Council, 2020.

Certification / Chain-of-Custody

Sawmills have chain of custody (COC) certification in order to track certified logs into certified lumber. COC certification is not required, but does allow mills to access some lumber markets. COC certification also exists for lumber remanufacturers and mass timber manufacturers.



Name	Forest Stewardship Council (FSC)	Sustainable Forestry Initiative (SFI)
Daaquam Lumber Maine Inc.	x	
Irving Forest Products, Ashland	x	x
Pleasant River Lumber Co. -Dover-Foxcroft	x	
Pleasant River Lumber Co. -Moose River		
Milan Lumber Co.		
Stratton Lumber, Inc.	x	

Source: Northeastern Lumber Manufacturers Assoc. (NELMA), April 2020



SUPPLY NEEDS DEMAND

The Boston Area

The City of Boston and surrounding region provide an ideal location for substitution of mass timber for steel and concrete in commercial and residential construction. While no local supply currently exists, projects can easily be built using existing suppliers.



MASS TIMBER SOURCING

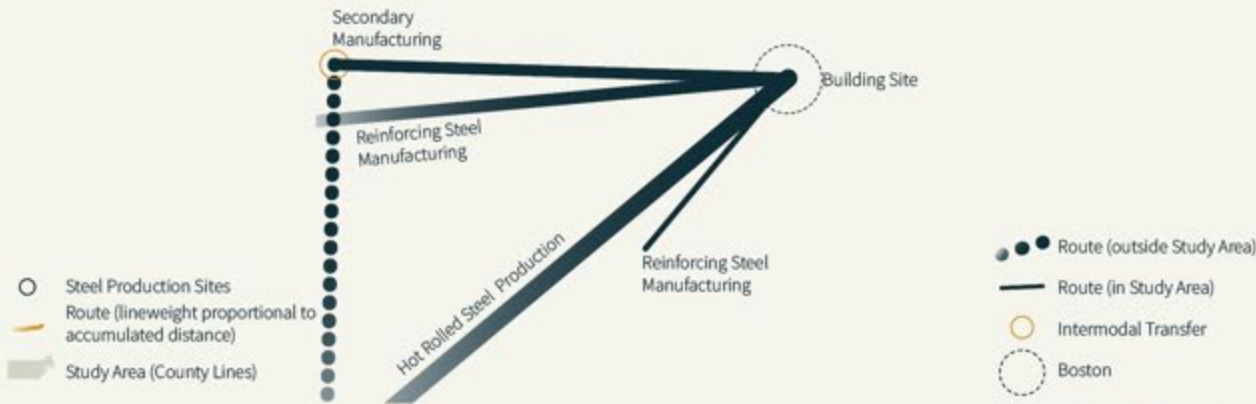
Current Suppliers

Six mass timber projects have been built in the greater Boston area over the past four years. The majority of these projects have been supplied by Nordic. With an increase in the number of mass timber building projects and possible suppliers, diversification is likely to occur.

Source: Woodworks, Wood Products Council

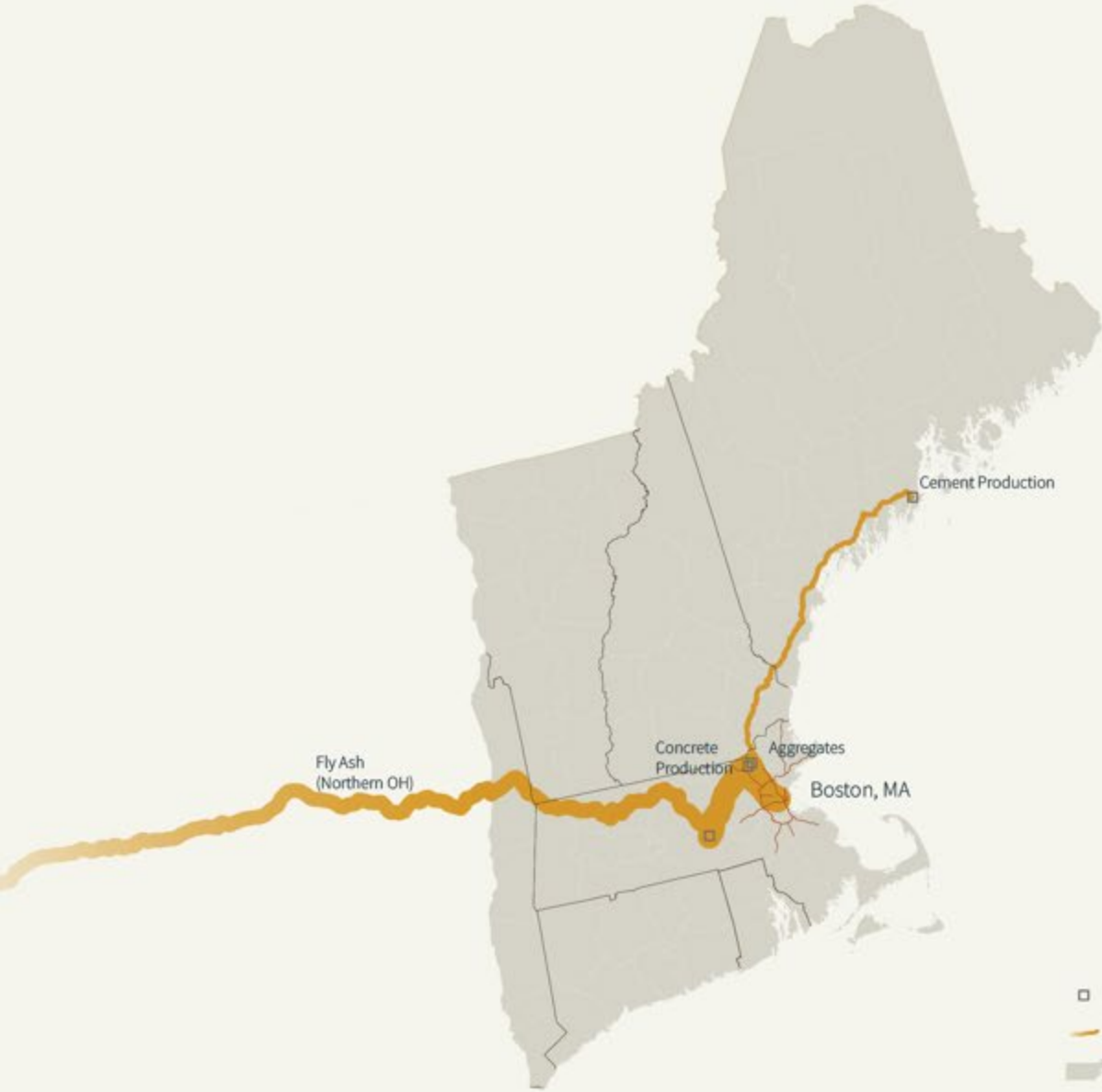
Steel Supply Chain

The steel supply chain illustrates the sourcing and transportation of a primary building material for which CLT or other mass timber products could serve as a direct substitute.



Concrete Supply Chain

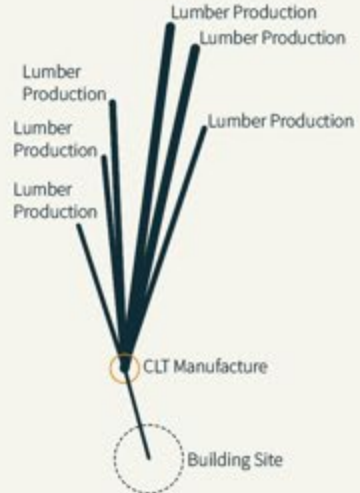
While produced locally, concrete, like steel, requires significant material sourced from outside of the local area. Concrete is the primary building product for which mass timber may be substituted with positive carbon implications.



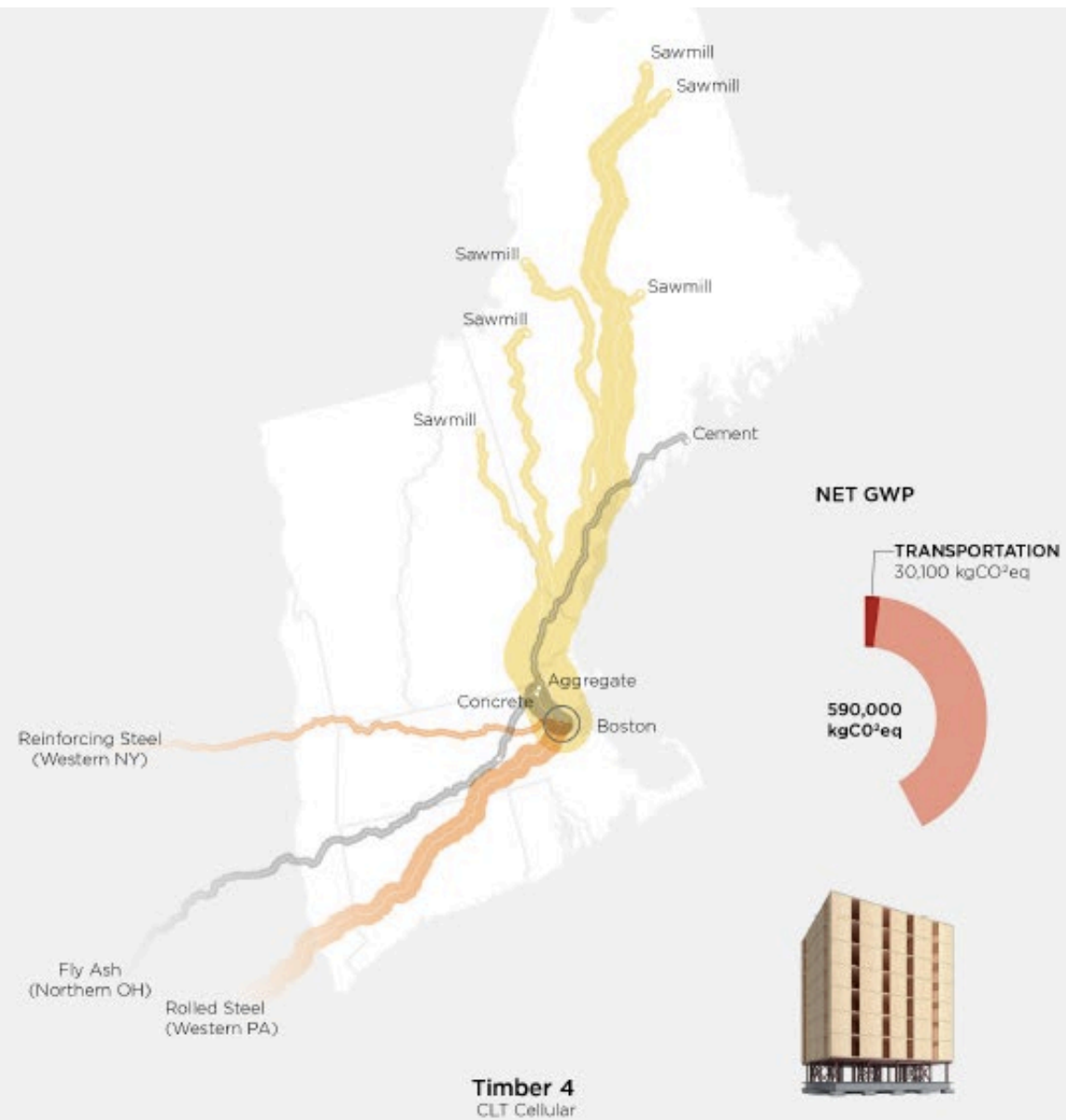
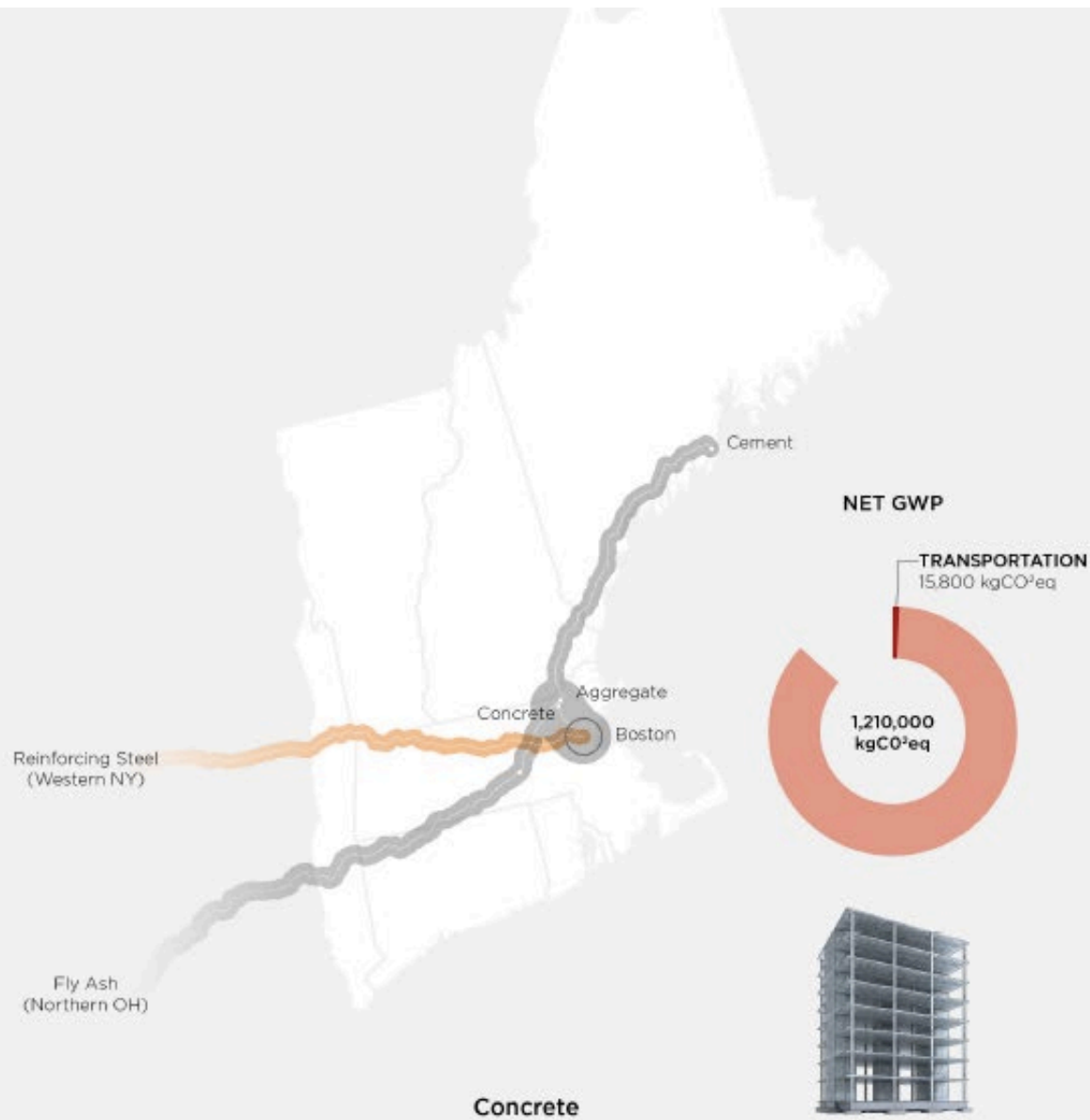
Wood Construction Supply Chain



- △ Dimensional Mills
- Route (line weight proportional to accumulated distance)
- Study Area (County Lines)



- Route (in Study Area)
- Intermodal Transfer
- Boston





Concrete With Steel Frame



Concrete



Timber 1
Hybrid Steel



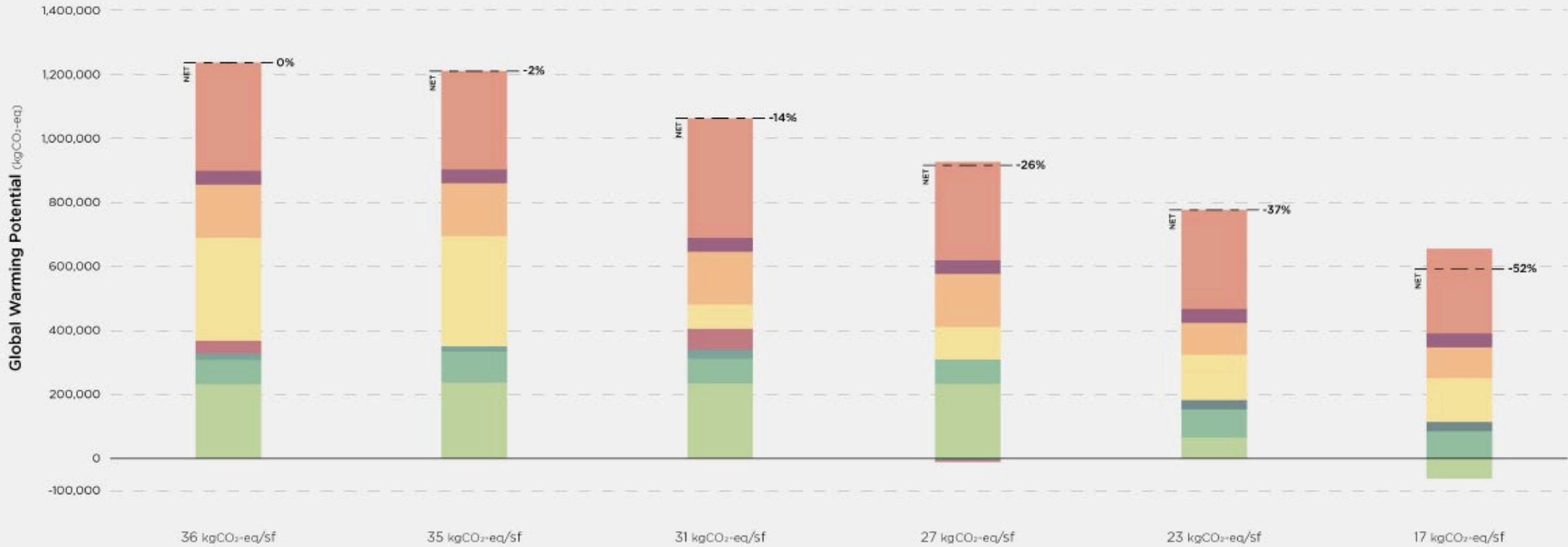
Timber 2
Post, Beam, & Plate



Timber 3
Hybrid CLT-LGM



Timber 4
CLT Cellular



GLOBAL WARMING POTENTIAL (PER BUILDING ASSEMBLY)

The total global warming potential (GWP) of each option is shown with a breakdown by building assembly. The Concrete With Steel Frame and Concrete options have the highest GWP, with the bulk of the impact embedded in the floor slabs. The Hybrid Steel (Timber 1) option offers a slight reduction in GWP,



Concrete With Steel Frame



Concrete



Timber 1
Hybrid Steel



Timber 2
Post, Beam, & Plate

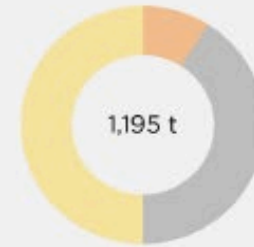


Timber 3
Hybrid CLT-LGM

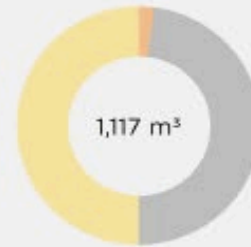


Timber 4
CLT Cellular

MASS



VOLUME



SYSTEM MATERIAL COMPOSITION

For each structural system studied, this graphic breaks out the relative contribution of concrete, steel and timber by mass and volume. The Timber options vary in their reliance on steel and concrete, as well as the quantity of heavy timber utilized. The lowest-carbon mass timber design - CLT Cellular (Timber 4) -

LOWER EMBODIED CARBON

- Important and yet can still be extractive, non-renewable, fossil fuel-based. No forest benefit.

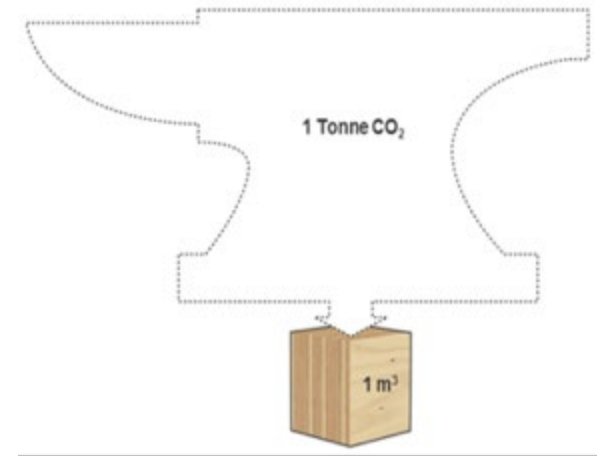


Please join us for a discussion
Net Zero Energy Buildings:
Understanding Costs, Accessing Resources
Speakers:



NET ZERO + ... ?

- Biogenic carbon, stored carbon, renewable materials, forest benefit.



POLICY PRINCIPLES TO CONSIDER

What gets measured gets managed. Embodied emissions, carbon storage accounting will bring materials consideration into practice.

Embodied emissions requirements alone will not lead to mass timber or other renewable wood products at a scale that will help forests or increase supply.

Embodied emissions incentives alone can lead to almost sole low carbon concrete policy (including procurement) in C40 markets noted by CLF.

Being specific in policy about mass timber can help move toward a more renewable, more circular construction industry.

Mass timber can help with better density projects including more (7+ story) tall wood and overstory.

The City does not need to prescribe forestry. Continued growth in LCAs, EPDs, and other drivers (family forest carbon programs and carbon markets) will drive continuous improvement. Setting policy allows setting higher expectations along the way.

Consider Timber and Timber Hybrid First

Introduce the practice benefits at BPDA Pre-file and Initial Filing meetings and share resources.

Create a Mass Timber Design / Technical Assistance Program

- Promote public awareness and professional knowledge
- Accelerate adoption of practices and build tall wood buildings
- Signal market demand to manufacturers

Incentive Early Adoption (Y1-5)

- Consider priority or expedited review for Mass Timber / low embodied carbon projects

Require Embodied Carbon Emissions Accounting (Y5+)

- LCA, structural or whole building?
- Add incentive/ recognition for reduced GWP through carbon storage/ renewable material

CONSIDER

DESIGN PROCESS

PERMITTING

Establish Embodied Carbon Emissions Maximums

- Per SF targets and limits by building and use typologies

Density Bonus for Mass Timber / Hybrid Projects

- Achieve tall wood development (7+) with reduced embodied carbon emissions
- Bring tall wood buildings (7+) near transit

Maintain Design Resources List

- List Mass Timber suppliers and fabricators.

Create and Publicize Embodied Carbon Registry

- Carbon reduction benefits
- Carbon storage
- Projects using biogenic materials

CONSIDER:

ZONING

SUPPORT

CITY OF BOSTON LEAD BY EXAMPLE

- Commitment to mass timber where appropriate in public projects including K-12 school buildings

CONSIDER:

PROCUREMENT

OTHER TOOLS?

STATEMENT OF INTENT

For example:

As Boston works to achieve carbon neutrality, we must consider emissions from every source, including the production and transport of, and construction with materials. The City's intention is to reduce those emissions, through reporting, incentives, and requirements.

Zero Net Carbon +. The City of Boston will lead in moving toward the use of biogenic, renewable materials, such as engineered wood and wood fiber insulation, where appropriate, to encourage a lower carbon footprint, reduced extraction, and the reduced use of fossil fuels.

CONSIDER:

LEADERSHIP

Discussion Notes – Mass Timber

How do we advance the use of low carbon wood products?

- How are calculations being done relative to harvesting, regrowth, sequestration.
- Mass timber is more suited to slower growth northern forests.
- There is economic pressure on forest lands; ongoing use of forest lands can ensure the long term economic viability of these lands for foresting .

Chat Notes – Mass Timber

- Mike Gryniuk (LeMessurier): Just an FYI on steel supply chain - a lot of Boston projects use structural steel rolled in the southern US, railed up to the northern US and then trucked down to Boston.
- Jim Newman (he/him/his): The Mass healthy Soils Action Plan supports this view of Mass Timber, especially with improved forestry practices.
- Nicole Knobloch: nknobloch@olifant.org

Next Steps

Today's Presentation and Discussion notes will be posted by Friday

We will follow up with a calendar invite for our next TAG Meeting - TBD

DRAFT TAG Recommendations will be sent to TAG Members for comments

ZNC Building Zoning Initiative

- Public engagement opportunities (ongoing)
- Public Meeting #2 - Fall (Date TBD)
- Recommendations Report will follow
- Regulatory zoning process will follow