

WELCOME TO

Sector Spotlights

From Trees to Global Tech
Hub: Forest Products in the
Age of Biotechnology

Forest Products Lunch & Learn



SPONSORED BY



Scott Dionne

President & CEO at Aroostook Partnership
previously, Chief Marketing Officer for TimberHP

Forest Products Lunch & Learn



SPONSORED BY

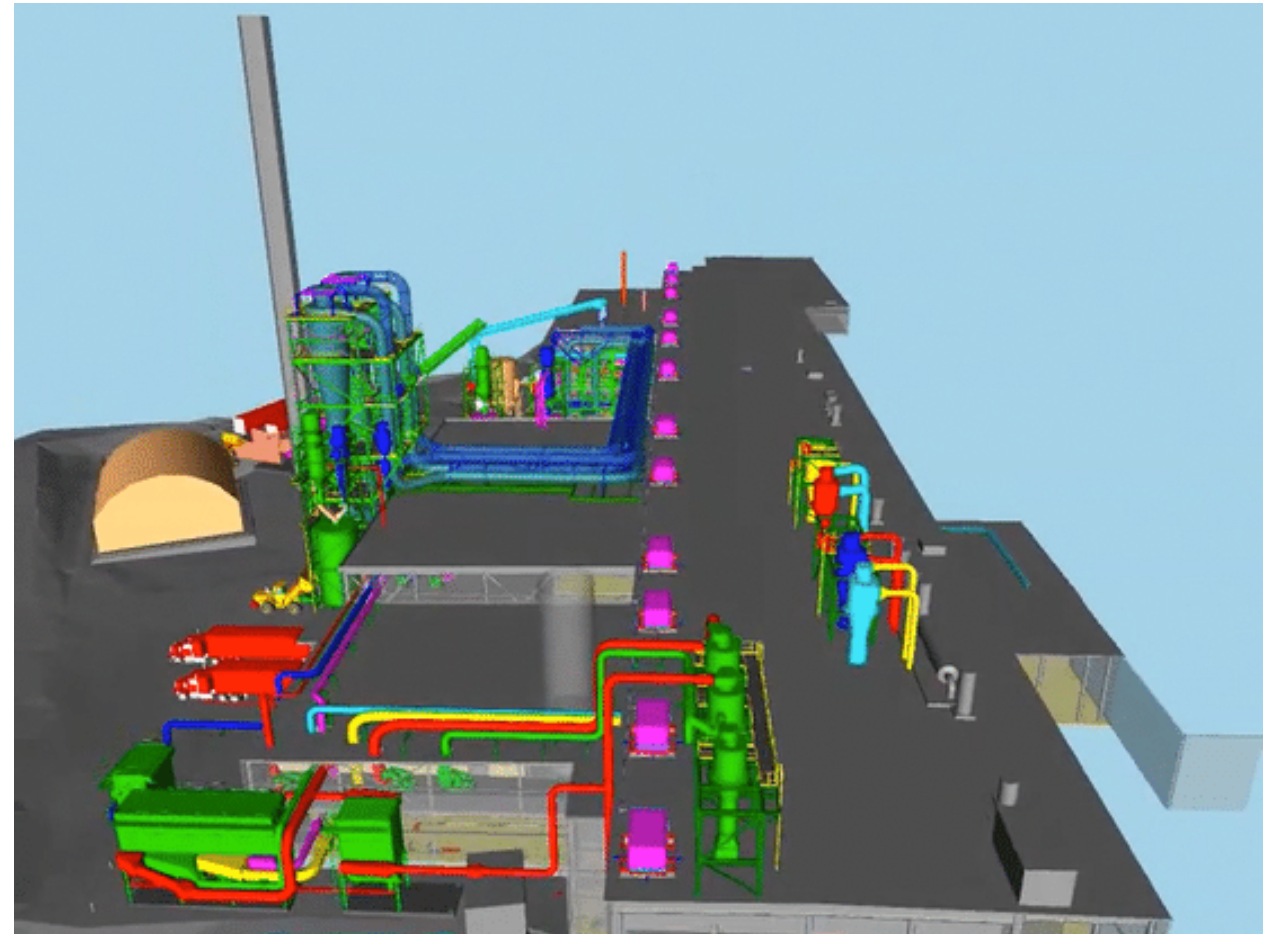


Largescale Manufacturing Start-Up in Maine



TIMBERHP

INSULATE BETTER. LIVE BETTER.™







G·OLAB

Wood Fiber Insulation



What do you really want to do?



Joshua Henry
CEO & Co-Founder

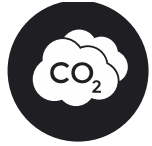
PhD in Physical Chemistry (Cornell University), NSF International Fellow (2005-2007), faculty member (Bates College and University of Maine), research focus: sustainable materials, renewable energy, thermodynamics



Matthew O'Malia
Vice-President & Co-Founder

An award-winning architect with a nationwide reputation for innovation and expertise in design. A leader in the Passive House movement in North America and named to Architect Magazine's Architect 50 List in 2018

Problem : The insulation market is dominated by fossil-fuel dependent products with devastating environmental impacts



High Embodied Carbon

Irredeemable Global Warming Potential



Vapor closed, traps moisture

Leading to mold and mildew, health risks, and rot



Non-recyclable, made with toxins

Loaded with dangerous toxic ingredients



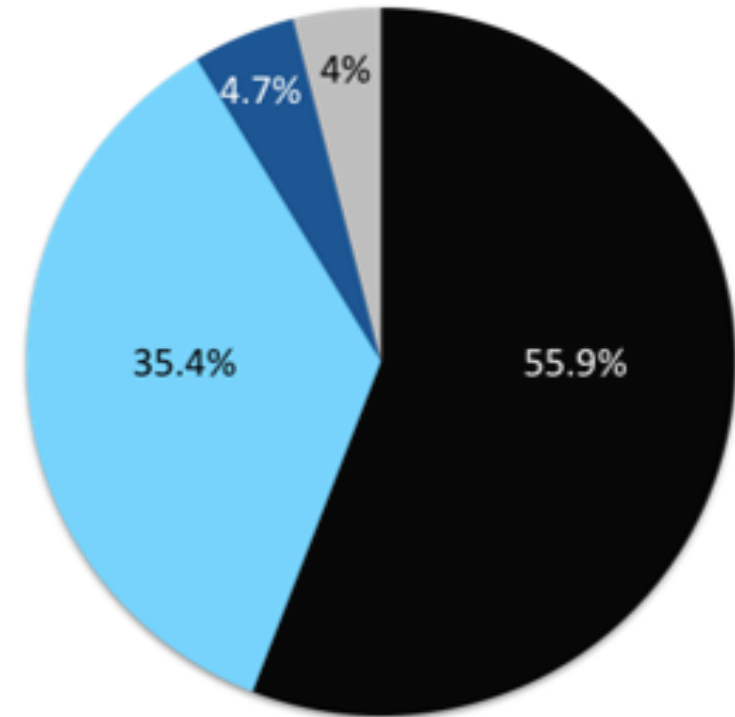
Harmful off-gassing

Leading to unhealthy indoor air quality



Highly flammable

Fiberglass and foam insulation are fire accelerants

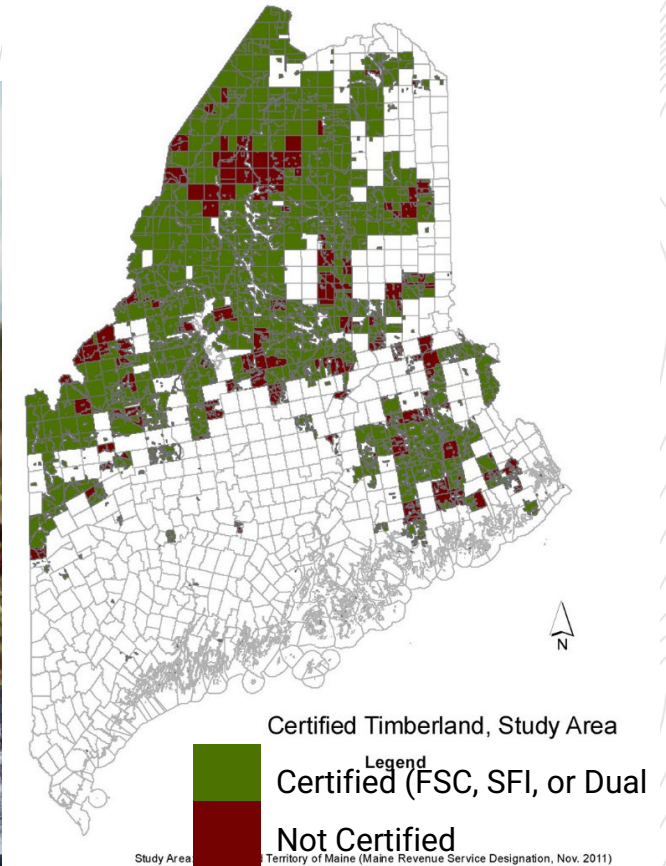


Help solve problems for a Legacy Industry



Since 2014, Maine alone has lost markets for over 4 million tons of low-grade wood that would have otherwise supplied paper and biomass mills

- Mill towns are suffering
- Loggers need that revenue
- We don't want to leave waste in the forests
- Lumber mills need to move chips



TIMBER + HP = High Performance Healthy Planet Healthy People




 High Performance

Building envelope, thermal, and acoustic solutions

A comprehensive, above-grade product line to create wind-tight, vapor-open assemblies offering stable, long-term R-values, improved temperature stability, and premium sound protection



 Healthy Planet

Recyclable, renewable, non-toxic, and carbon negative

Made from residual wood chips to maximize the use of our renewable forest resource. As a high-value insulator with a negative carbon footprint, reduces a building's global warming potential on day one and everyday it operates



 Healthy People

Moisture managing, safe, and sound absorbing

Installers benefit from the absence of dangerous fibers that harm skin and negatively impact air quality. Leads to the creation of safe, quiet indoor habitats, free of airborne toxins and trapped humidity

European wood fiber insulation market

- 15 manufacturing facilities in Europe with 5 more under construction
- Estimated \$800 m (~5% of total insulation market) for all three products (board, batt and loose fill)
- Freedonia forecast the European market will reach \$1 b in demand by the end of 2023
- Product is sold at a 20% premium in a market that is only 25% wood frame construction

EUROPEAN SUPPLIERS OF WOOD FIBER INSULATION:



STEICO
natürlich besser dämmen



GUTEX[®]
DÄMMPLATTEN AUS SCHWARZWALDHOLZ



pavatex
by SOPREMA



best wood[®]
SCHNEIDER



UNGER
DIFFUTHERM[®]
Umweltfreundliche innovative Dämmsysteme



INTHERMO
Meine natürliche Dämmung!



AGEPAN[®]SYSTEM

Freight costs combined with high production costs limit the sale of European wood fiber insulation in North America to select projects only where price is not a factor.



Carbon Footprint

36 kg CO₂

Per 100SF @ R=1



15 kg CO₂

Per 100SF @ R=1



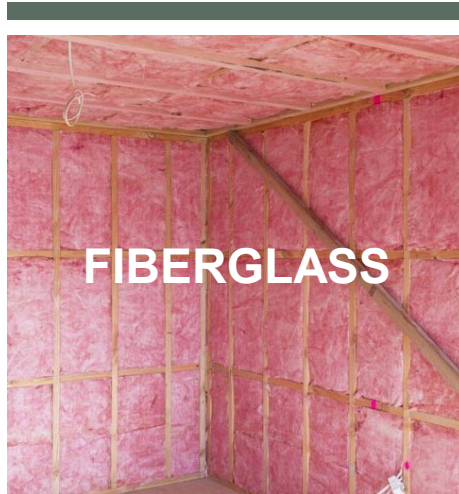
14 kg CO₂

Per 100SF @ R=1



2 kg CO₂

Per 100SF @ R=1



FIBERGLASS



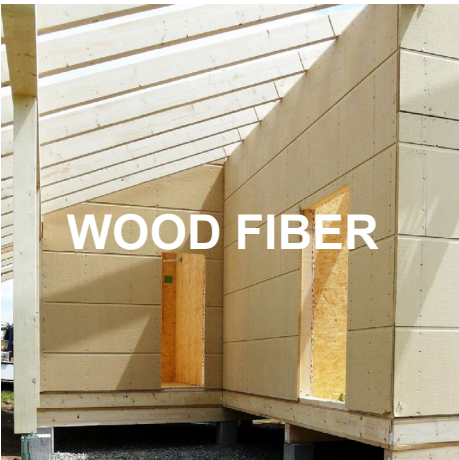
MINERAL WOOL



SPRAY FOAM



XPS



WOOD FIBER

-9 kg CO₂

Per 100SF @ R=1



Waste into Composites

Made from clean, species-agnostic, softwood residuals; insulating wood fiber composites are a perfect fit for the US wood products manufacturing sector.

PROCESS:



LUMBER IS MILLED FROM LOGS



THE WASTE CHIPS ARE RECOVERED



FINELY GROUND



AND FORMED INTO INSULATION



Can we produce it in Maine?



- Advanced Structures & Composites Center
- School of Forest Resources
- Prototypes
- Connections with other testing agencies
- Connections with strategic partners
- Characteristic testing during start up
- Innovation—Test line



US and Canada Code Compliance



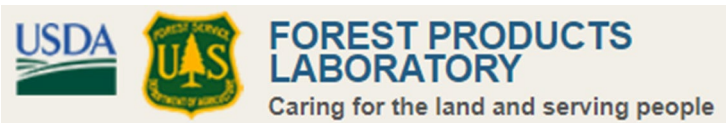
ASTM C739 CAN/ULC-S703-
Standard Specification for
Cellulosic Fiber
ASTM 119/E84 CAN/ULC S102



ASTM C739 CAN/ULC-S703-
(Abridged) Standard Specification
for Cellulosic Fiber
ASTM 119/E84 CAN/ULC S102



ASTM (abridged) C208/209
Standard for Cellulosic Fiber
Insulating Board
ASTM 119/E84 CAN/ULC S102



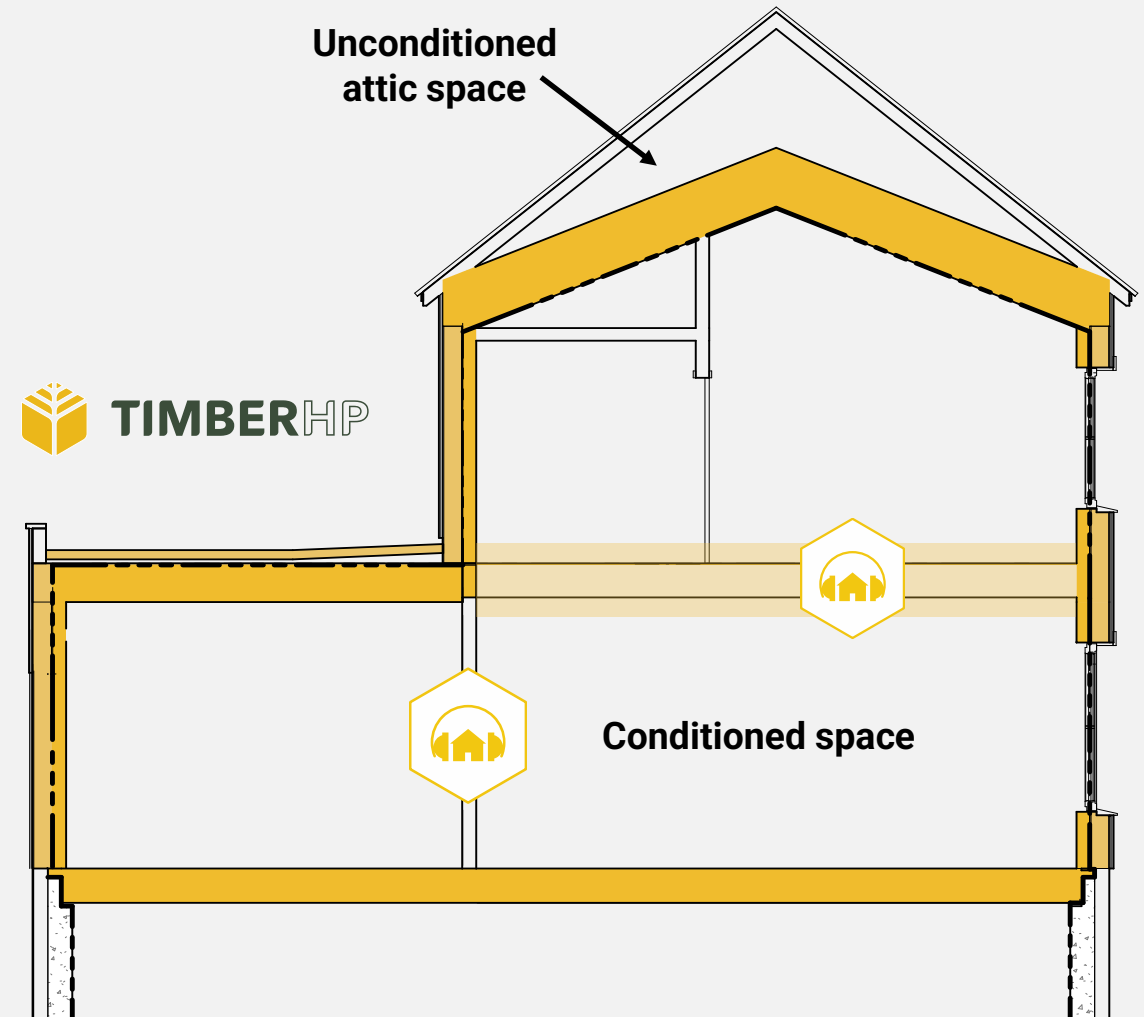
Translating a European Technology for the US Market

Drop-In Replacement

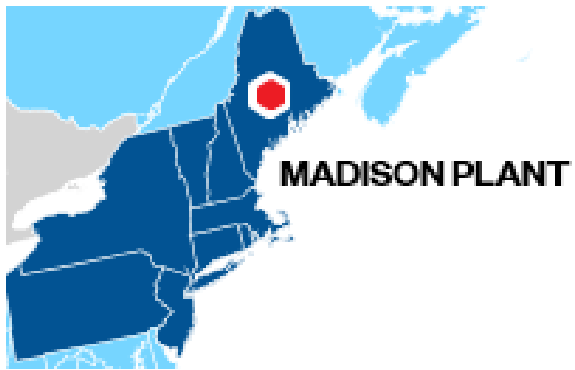
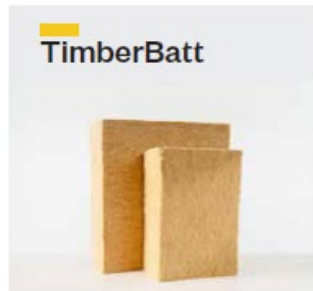
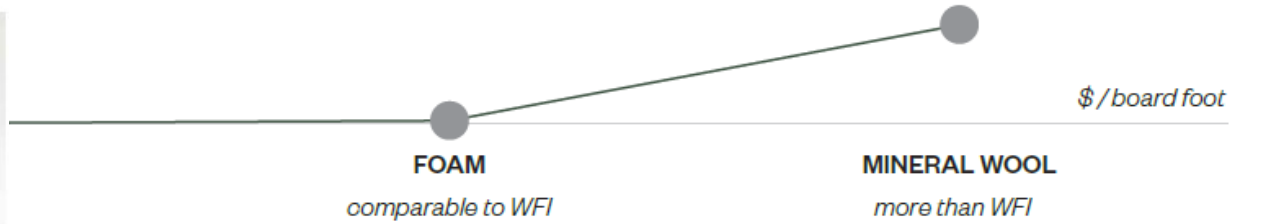
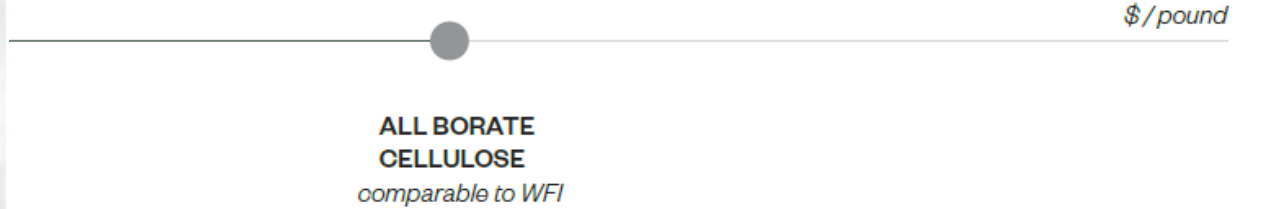
- Affordable, low-risk replacement for foam, mineral wool, cellulose, fiberglass, and other traditional insulating products for above-grade assemblies
- Meet thermal and acoustic demands with the same product offering

Comprehensive Above-Grade System

- Full-line of insulating products made from one material to address cavity, continuous, and attic blanket applications
- Prescriptive building envelope approach to create wind-tight, vapor-open assemblies



*Wood Fiber Insulation: Price Comparison



*Within Madison Target Market

Competitive Advantage

TimberFill and TimberBatt Insulation

Fire Resistant

Achieves ASTM E84 Class A flame and smoke spread performance through the introduction of borate as a flame retardant



Best in Class Acoustics

Best-in-class acoustics and pure fiber are the building blocks for the new indoor habitat



Insulation for All Seasons

Low Thermal Conductivity & High Heat Capacity balance temperature swings in conditioned spaces, reducing heating and cooling loads



Competitive Advantage TimberBoard Insulation

Wood fiber insulation offers high vapor permeability (40 to 70 perms/inch) allowing for drying to both the inside and outside of buildings

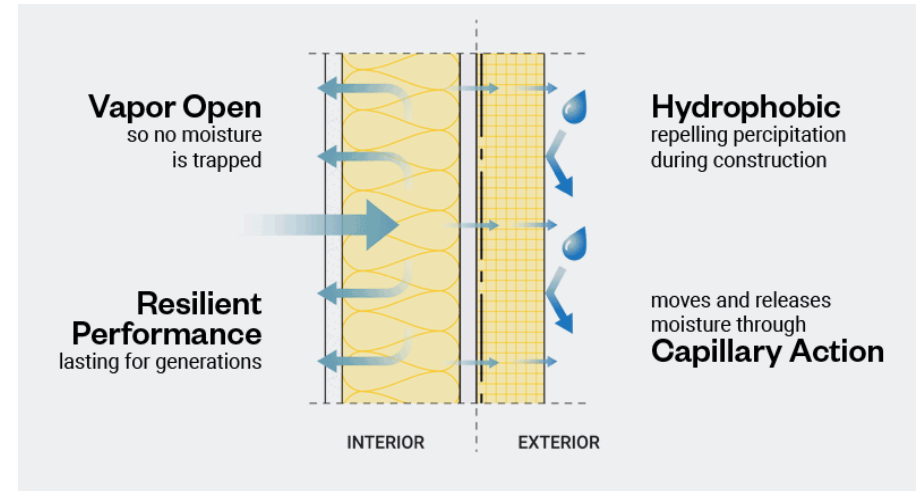


Introduction of PMDI and Paraffin throughout the entire fiber stream results in a hydrophobic board that can be exposed in sidewall applications for six months and roof months for three months

Wood fiber can hold 15% of its weight in moisture without losing insulating properties



Breathable insulation results
in healthy indoor air quality



Build a **GORE-TEX®** home with TimberHP's comprehensive envelope solution

INTRODUCING

A NEW GENERATION

OF WOOD FIBER

INSULATION



Impact is Expensive: \$100 MM or More

- **Equity investment** from forest products manufacturers, loggers, LBM retailers, contractors, architects, and impact investors
- **Pine Tree Zone, Opportunity Zone, Maine Seed Tax Credit, Qualified Small Business Stock Section 1202, New Market Tax Credit, Federal Tax-Exempt Bond**
- **Construction underway** with Cianbro as GC
- **\$150 MM investment** in Maine
- **130 direct jobs**, 16x indirect jobs
- **\$150 MM Annual Sales**



Uses	(x thousands)
Administrative, Marketing, and Legal	4,750
Working Capital	8,500
Costs of Bond Issuance (Underwriter discount and Issuance)	2,600
Debt Reserves - Capitalized Interest Fund	11,222
Debt Service Reserve	7,190
Production Facility- Madison Maine	
Mill Purchase	1,900
Facility Including Production lines and renovation (see below)	89,967
Facility, Renovations and Green End	-
5 tph Loose Fill Packaging Line	-
7 tph Batt Line	-
7 tph Board Line	-
Indirect costs including Engineering, CM	-
Contingency	4,416
Sub Total Facility	96,283
TOTAL Uses	130,545

Table 2 GO Lab's Capital Budget

Sources	(x thousands)
Seed Round Investors	12,000
Grants	3,351
Series A Equity	17,500
Subordinated loans	4,225
Mezzanine Debt	3,000
NMTC-cash at close	5,469
Sub Total	45,545
Tax Exempt Bond	85,000
TOTAL Sources	130,545

Table 3 Sources of Capital

December 23, 2022

TimberHP Start Up Advantages

- Multidisciplinary team, including Madison senior engineers
- Madison mill <\$2mm
- Infrastructure was intact
- Leverage some used equipment
- Insurance
- Local, state and federal support
- Product line with multiple areas of impact
- Maine's forest products industry support
- **Energy**



Martin Troy
Director of Electrical
Engineering



Joseph Clark
Director of Maintenance



Rick Veinotte
Project Manager

TimberHP Start Up Advantages

- **Electricity**
- Eagle Creek Hydro-\$0.05/KWH
- Madison Electric-COU \$0.135/KWH
- Maine's All-In Rate Today?
- *Montreal, QC \$0.081/KWH*
- **Natural Gas**
- Biogas (Wood and Ag)
- **Combined Heat and Power**
- Ashland, Maine (European Model)



European Lessons

- **Circular Economy**
- Reduce waste by converting waste
- Resource efficiency
- **Value Add**
- Competitive advantage (value add) vs. commodity thinking
- **Products to Consider**
- Pressed wood pallets
- Industrial pellets
- Long-length and wide finger-jointed lumber
- Hardwood value add



binderholz ■

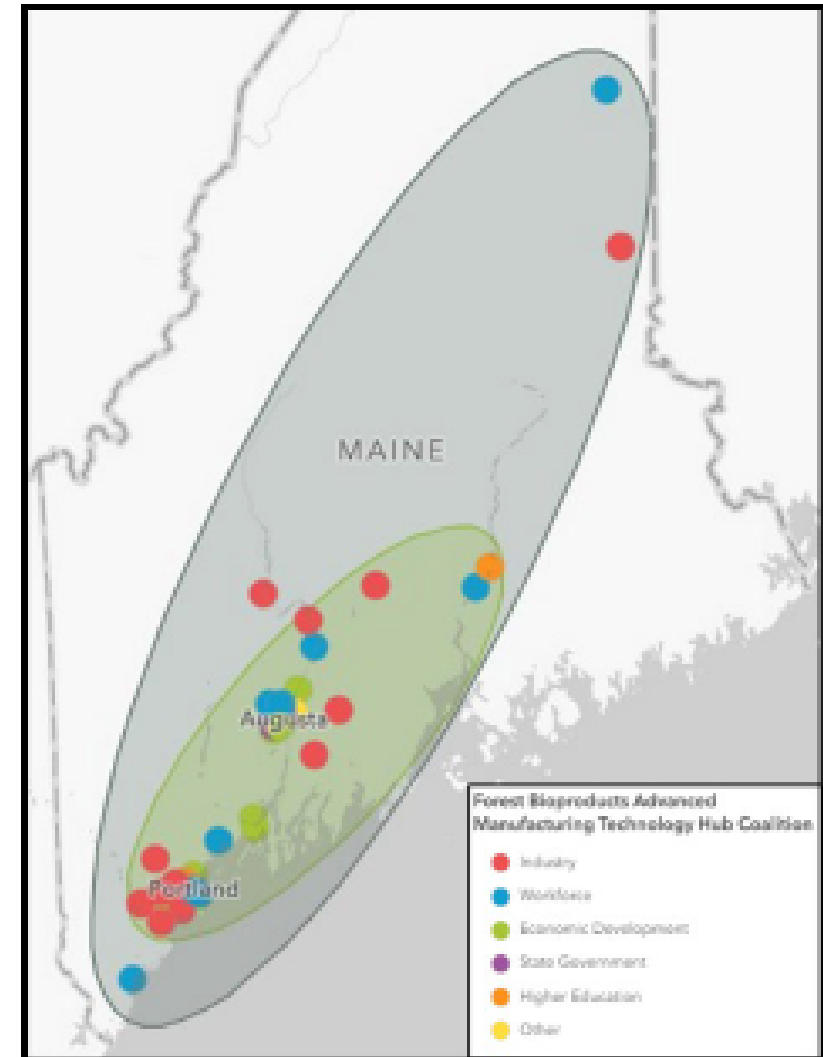


Thank you!!!

Scott Dionne

President & CEO

sdionne@aroostookpartnership.org



James J. Beaupré, Ph.D.

Director of Industrial Cooperation
for the University of Maine

Forest Products Lunch & Learn



SPONSORED BY





Maine's Future Forest Economy



**What's being done
to change things?**

Innovating Within

- Modern forest management tools and practices
- Nanocellulose materials
- Biobased fuels and chemicals
- Additive manufacturing
- Sustainable packaging
- Advanced building materials...



Precision Forestry

- Remote sensing
- UAVs increasing
- LiDAR
- Data analytics
- Predictive mapping
- Forest health monitoring

Township Layer

Budworm Monitoring

- <2 Moths
- 2-10
- 10-50
- 50-100
- 100-150
- >150

Manual class breaks

Forest Vulnerability

Adjust Opacity

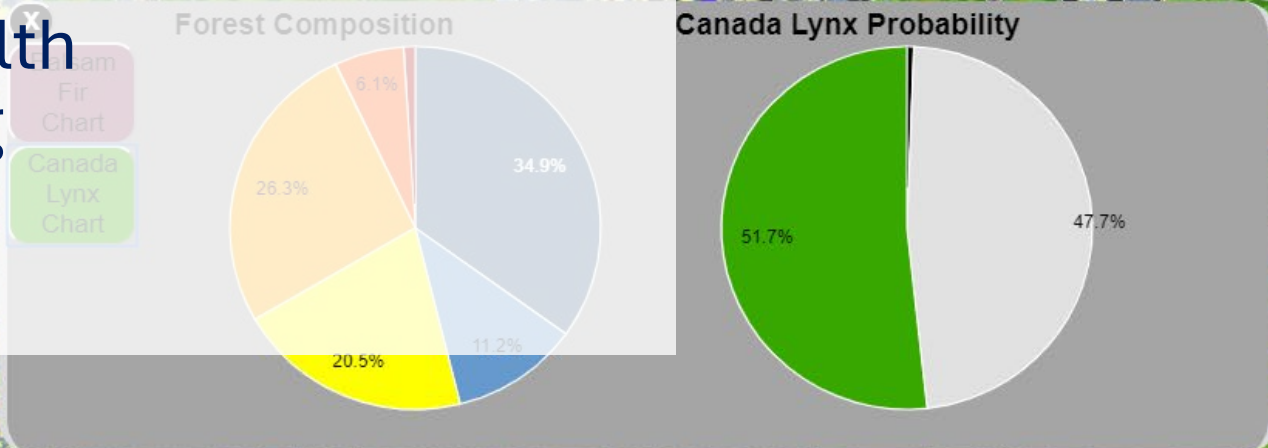
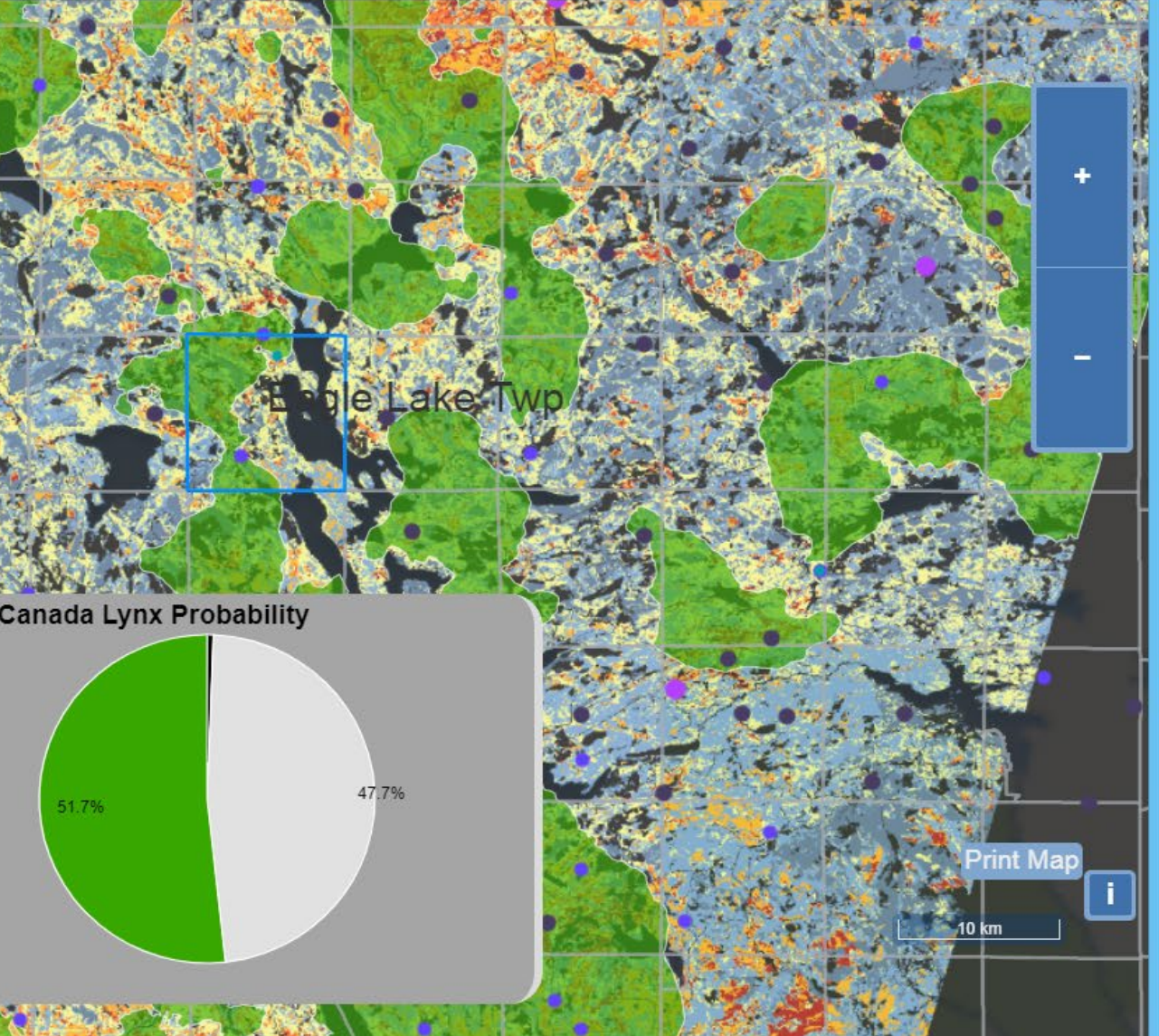
- Water/No Data
- Non-host Forest
- Mixed Forest, Abundant Fir
- Mixed Forest, Abundant Spruce
- Spruce-Dominant Host Forest, Immature
- Fir-Dominant Host Forest, Immature
- Fir-Dominant Host Forest, Mature

Canada Lynx Probability

Adjust Opacity

- < 50% Probability of Lynx Occurrence
- ≥ 50% Probability of Lynx Occurrence

Balsam Fir Abundance



Workforce Development

- Mechanized Logging Operations program
- Maine's 10-year strategic economic development plan
- “Green Collar Careers”



Nanocellulose





Petrochemical Replacements





Large Scale Additive Manufacturing



Sustainable Packaging

“Green and PFAS Free”



Advanced Building Materials



2x4's

MASS TIMBER

Advanced Building Materials

(and how you can work with UMaine)

- Some guys have an idea
- Call UMaine to see what we can do
- We come up with a scope of work to help
 - Product Development and Evaluation
- Prototype boards manufactured at the Composites Center → comparable to European commercial products
- Some guys buy an old mill in Madison





THANK YOU

James J. Beaupré, Ph.D.
Director of Industrial Cooperation
james.beaupre@maine.edu

Scott Kleiman

Policy Director, Economy and Workforce
for the Governor's Office of Policy Innovation
and the Future

Forest Products Lunch & Learn



SPONSORED BY



Maine's Forest Bioproducts Advanced Manufacturing Tech Hub

POWERING THE UNITED STATES AS A GLOBAL BIOECONOMY SUPERPOWER



For more, visit
<http://MaineTechHub.us>

MAINE'S CAPABILITIES MEET A GLOBAL OPPORTUNITY

**Largest
contiguous
privately-owned
working forest
in the U.S.**

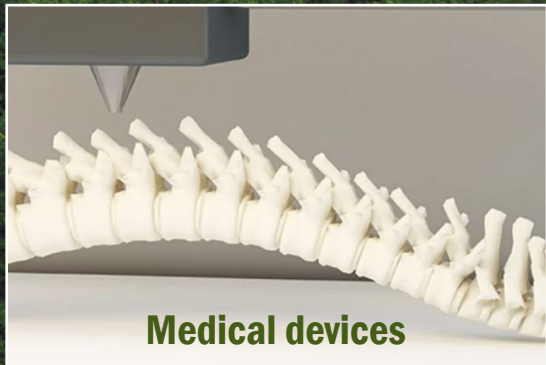
**Distinctive
innovation
assets**

World's largest 3D
printer & world's
largest public supplier
of nanocellulose

**\$5 trillion
opportunity
from switching
to biobased
products**

THE FUTURE IS WOOD

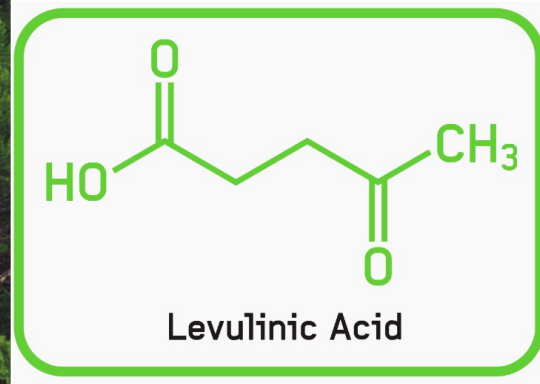
Displacing plastics



Sequestering carbon



Eliminating toxics



Bolstering critical technologies



70+ PARTNERS, COLLABORATORS AND SUPPORTERS

**Led by Maine
Technology Institute,
with GOPIF & DECD**

**Investor network
with \$4.25 billion in
assets**

**Leveraging \$630m
in local
commitments**

State of Maine: Governor's Office of Policy Innovation and the Future, Maine Department of Economic and Community Development, Maine Department of Education, Maine Department of Labor

Industry: Arcadia Alliance, Blue Highway Growth, BlueTriton/Poland Spring, CapaTec, Energy Impact Partners, Flexible Capital Fund, Folia Materials, Hancock Lumber, Highland Solutions, IDEXX, LaCasse & Weston, Louisiana Pacific, Maine Angels, Maine Forest Products Council, Maine Venture Fund, Manufacturers Association of Maine, Material Impact, Northeast Bio-based Materials Collective, OMX Ventures, P3 Nano Program, Professional Logging Contractors of Maine, Progress Engineering, Safer Made, Sappi, SHoP Architects, Tanbark, Thornton Thomasetti, TimberHP, Two Lanterns Venture Fund, Valmet, Valo Ventures, Xylogen

Higher education: Maine Community College System, Northeastern University's Roux Institute, University of Maine

Economic development: Ashland Area Economic Development Council, Coastal Enterprises, Entrepreneurship 4 All, Finance Authority of Maine, FocusMaine, FOR/Maine, Greater Portland Immigrant Welcome Center, Maine Development Foundation, Maine International Trade Center, Maine Technology Institute, New England Forestry Foundation, Our Katahdin, StartUp Maine, Sunrise County Economic Council, Tech Place

Labor and workforce organizations: AFL-CIO Maine, Boots to Roots, Harold Alfond Foundation Center for the Advancement of Maine's Workforce, Maine State Building and Construction Trades, Maine TREE Foundation, New Ventures Maine, Portland Adult Ed's New Mainers Resource Center, Rural Aspirations

Additional partners: Maine Manufacturing Extension Partnership, Northern Forest Center representing CONFIR Regional Innovation Engine, NSF International, Oak Ridge National Laboratory, RAPID Manufacturing Institute, the Towns of Jay, Lincoln, and Old Town.

MAKING MAINE THE U.S. REGION OF CHOICE FOR FOREST BIOPRODUCT COMMERCIALIZATION

Over the next decade, Maine's Tech Hub aims to help the U.S. displace at least half of conventional product lines in plastic packaging, building materials, and petrochemicals. It will be the nationwide region of choice for firms developing, manufacturing, and selling innovative, climate-forward products derived from forests and other natural sources.

About EDA's Tech Hubs:

Funded by the CHIPS & Science Act out of US Commerce's EDA

Aim to create globally leading technology clusters

Maine's "Tech Hub" designation announced fall 2023

Implementation awards of \$50-75m expected to be announced summer 2024

20+
technology
lines reach
commercial
production

4,000 high-
wage jobs
added

\$10B in net
new firm
revenues
(sales)

100 startups
accelerated

\$10B in
capital
investment

**Technology
commercialization**

**Business
development**

Talent pipelines

VISION

GOALS

STRATEGY

THANK YOU FOR JOINING US!

Sector Spotlights

Forest Products Lunch & Learn



SPONSORED BY

