2015-2017 MANUFACTURE STUDY FOR CROSS LAMINATED TIMBER ACCELERATION IN OREGON & SW WASHINGTON
CLEANTECH MAKES OREGON INDUSTRIES BETTER

OREGON INDUSTRIES

ENERGY
Oregon is #2 in Clean Energy Leadership

AGRICULTURE
Agriculture is 15% of Oregon GDP

URBAN SYSTEMS
Portland in Top 10 Best-Performing Cities

FOREST PRODUCTS
#1 Producer in U.S.

OREGON’S CLEANTECH SECTOR

SMART GRID

PRECISION AGRICULTURE

SMART CITIES

ADVANCED WOOD PRODUCTS

INTERNET OF THINGS • BIG DATA & ANALYTICS • ADDITIVE MANUFACTURING
CLEAN CHEMISTRY & MATERIALS • WASTE TO RESOURCE • BIOPROCESSING • AUTOMATION

ENABLING TECHNOLOGIES

SOURCES: Oregon Forest Resources Institute; Oregon Business Plan; CleanEdge "2015 US Clean Tech Leadership Index"; Milken Institute, “2015 Best-Performing Cities”

$120,885 Federal Share EDA Funds
$82,606 Non-Federal Matching Share
MANUFACTURE STUDY FOR CROSS-LAMINATED TIMBER ACCELERATION IN OREGON & SW WASHINGTON, 2015-2017

FEASIBILITY STUDY OBJECTIVES:

• Accelerate global competitiveness
• Support environmentally sustainable development
• Provide relief and support to economically distressed and underserved communities
Overarching Question...

Will an increased demand challenge the sustainability of the forests?
US New Construction Market Opportunity
~6.1bbf

Annual Demand

Provided by:
FPInnovations
US Market Estimation, 2016
MANUFACTURE STUDY FOR CROSS-LAMINATED TIMBER ACCELERATION IN OREGON & SW WASHINGTON, 2015-2017

Regional Supply

Oregon & SW Washington has tremendous production potential

Approximately 60 million acres in Oregon alone!

- 47% is identified as forestland
- ~80% of that classified as “timberland” or “land capable of productively growing commercial grade timber”
- The timberland designation does not include forestland with lower forest productivity or regions where production is restricted (wilderness areas, national parks, or other reserved areas)
- Significant potential for commercial forest production and activity.
**Import Substitution**
- Raw materials to remain in region as demand increases
- Long Term Potential Impact: pricing changes
- Near Term Potential Impact: production demands likely to have limited impact on broader market pricing

**Supply Chain Gap Statement**
- Abundant dimensional material to support additional production enterprises regionally,
- Kiln dry softwood lumber is standard lumber that has been dried (typically 15% moisture content) in kilns
  - 12% ± 3% moisture content for CLT production
    - Oregon: 21/69 mills in the region produce kiln dry lumber
  - Assumption: 60/40 No. 2 grades and No. 3 grades of KD lumber used for CLT
  - 1.625 bbf of No. 2 and No. 3 grade processed in Oregon
CONVENING PARTNERSHIPS TO IMPROVE PREDICTABILITY & REDUCE RISK

THE PATH FORWARD
David Kenney, Executive Director/CEO
Johanna Brickman, Director of Collaborative Innovation
Tricia Clemans, Special-Projects Manager
Karl Mundorff, (former) Director of Research Programs

Lech Muszynski, Wood Science & Engineering Professor
John Turner, (Former) Advantage Accelerator Co-Director
Chris Knowles, Faculty Advisor
Amanda Terhes, C2C Director
Brent Lawrence, Graduate Research Assistant
Christina Lawrence, Graduate Research Assistant
Trent Thompson, Undergraduate Research Assistant

Donna Greene-Salter, Strategic Initiatives Project Manager
Karen Goddin, Asst. Director Economic Strategies
Chris Claflin, Business Development Manager
Michael Meyers, Economist
Marc Zolton, Research & Policy Analyst
Dana Shannon, Global Trade Specialist

John Tokarcyk, Policy Analyst Forest Resources

David McFeeters-Krone, OMEP Affiliate/Consultant

Michael Ebinger, Director, WSU Center for Innovation
Nick Pangares, Intern

Tom Nelson, Economic Development Manager

Rick Gruen, Forest & Ag Economic Development Manager

Anne Fifield, Economic Development Planner

Ethan Martin, Northwest Regional Director

... Plus several other supportive staff from these organizations
Additional Materials
## SUMMARY STATISTICS FOR KILN DRY LUMBER PRODUCERS IN OREGON AND SW WASHINGTON THAT SHARED PRODUCTION FIGURES

<table>
<thead>
<tr>
<th></th>
<th>total board feet</th>
<th>average board feet</th>
<th>proportion</th>
</tr>
</thead>
<tbody>
<tr>
<td>annual KD lumber production</td>
<td>2,574,671,232</td>
<td>135,509,012</td>
<td></td>
</tr>
<tr>
<td>#2 or equivalent</td>
<td>1,392,950,522</td>
<td>73,313,185</td>
<td>54%</td>
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<tr>
<td>#3 or equivalent</td>
<td>242,008,845</td>
<td>12,737,308</td>
<td>9%</td>
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<tr>
<td>Douglas Fir</td>
<td>1,624,882,996</td>
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<td>63.1%</td>
</tr>
<tr>
<td>Hemlock Fir</td>
<td>615,153,236</td>
<td></td>
<td>23.9%</td>
</tr>
<tr>
<td>White Fir</td>
<td>166,822,500</td>
<td></td>
<td>6.5%</td>
</tr>
<tr>
<td>Western Hemlock</td>
<td>89,537,500</td>
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<td>3.5%</td>
</tr>
<tr>
<td>Ponderosa Pine</td>
<td>64,500,000</td>
<td></td>
<td>2.5%</td>
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<tr>
<td>Sitka Spruce</td>
<td>13,775,000</td>
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<td>0.5%</td>
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</tbody>
</table>
Annual U.S. Demand for Softwood Lumber

- U.S. Lumber Consumption [Billion Board Feet (BBF)]
- 15% Diffusion of CLT into US Market
- New Multi-residential & Non-residential Construction (1 to 10 stories)

FP Innovation 2015 US Market
WHAT BARRIERS EXIST FOR GETTING PRODUCT TO MARKET?

**Product Demand**
More projects, less hurdles to meet code – prescriptive language, tested assemblies & connections

**Manufacturing**
Cost efficiency, capacity, CLT design & utilization

**Distribution**
Transportation logistics, export strategy

**Raw Material**
Combine species, 12% moisture content (versus 15-18% for commodity, certainty of sale), small diameter sources – efficiency, access to federal/state timber

**Education & Workforce Training**
Manufacturers, transportation/distribution, forestry, lending institutions & Insurances, permitting projects, construction: General contractors, sub-contractors, framers, and erectors

**Prescriptive Projects & Language**
Assemblies and connections tested then made publicly available, more projects!

**Testing**
Seismic and fire safety, hybrid systems, exposure, mass timber connections & assemblies

**Infrastructure**
Production facilities
TARGET EDUCATION PLAN: TARGET SECTORS

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<thead>
<tr>
<th>Supply Side</th>
<th>Short Term Needs</th>
<th>Long Term Needs</th>
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<tr>
<td></td>
<td>Manufacturer education</td>
<td>Forestry management</td>
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<tr>
<td></td>
<td>Distribution</td>
<td>Manufacturing efficiencies</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Distribution systems</td>
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<tr>
<td>Demand Side</td>
<td>Short Term Needs</td>
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<td></td>
<td>Permitting projects</td>
<td>Managed, long-term education plan</td>
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<td></td>
<td>Project design assistance</td>
<td>Timber Innovation Act</td>
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<td></td>
<td>Construction/subcontractors</td>
<td>Prescriptive projects &amp; language</td>
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<tr>
<td></td>
<td></td>
<td>Testing of assembly systems</td>
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<tr>
<td></td>
<td></td>
<td>Shared knowledge</td>
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BARRIERS TO MARKET

- Short Term Needs
  - Permitting projects
  - Project design assistance
  - Construction/subcontractors

- Long Term Needs
  - Managed, long-term education plan
  - Timber Innovation Act
  - Prescriptive projects & language
  - Testing of assembly systems
  - Shared knowledge
HIGHLIGHTS...

**Manufacturing**
- Demand exceeds the Oregon capability to supply panels to even local building projects
- If potential producers see the demand, there is interest in entering production market
- Foreign partnership & investing possibilities

**Natural Resources & Lumber Production**
- 92% of raw material supply comes from private ownership
- Concern: Need federal timber to support nearing demand - private forest owners are nearing sustainable harvest levels
- Increased demand for CLT expected to absorb timber export, bring value add to lumber and logs harvested in Oregon

**More Building Projects**
- Construction labor /skill training & demonstrations needed
- Need for regular structural testing updates to design teams & building officials
- Suite of common CLT assemblies/connections tested – make public

**Economic Development**
- Impacts of tax revenue, jobs (PNW & US), employer benefits
- Expected demand for CLT will translate to the rural communities
- Attract federal funding to support investment & strategic efforts

**Continue Momentum**
- Legislator support for follow-on projects & initiatives
- Testing for structural assemblies (fire, seismic, acoustic)
- Local sourcing, local labor policies

THE PATH FORWARD
**Innovation**  
Design/efficiencies (CNC), handling, kit designs, fasteners/connections, weather/shipping protection, on site services, auxiliary products

**Incentives to Build**  
- Provide streamlined permitting for buildings using Oregon CLT  
- Permitting costs waived or reduced for structures using CLT  
- CLT Design Contests or programs to assist with testing, permits, challenges  
- Carbon cap & trade system – purchase offsets from projects  
- Funding support for creating a suite of tested assemblies/connections

**Induce Investment in Manufacturing**  
- Seek foreign or out-of-state partnerships  
- Equipment/facility/capital investment support (grants, loans, manufacturing support)  
- Grants or subsidies for equipment (or assistance into federal programs, including R&D tax credit)  
- Loan guarantees for equipment  
- Creating a protected purchasing program (or guaranteed cost savings subsidy) for government buildings built with Oregon mass timber

**Policies & Initiatives**  
- Jurisdictions adopt: Carbon First Approach, net zero, or push for carbon neutral  
- Carbon credit system (cap & trade)  
- Sector or building type “Wood first” policies (ie. schools, hospitals, public facilities)  
- Local sourcing, local labor policies  
- Create lobbying task force
GOING FORWARD:
• R&D to target under utilized species, lower grade, and/or small diameter timbers in CLT production
• Domestic & export distribution strategy for Oregon produced CLT
• Increase manufacturing capacities, efficiencies, and capabilities
• Continue to measure/track the economic impact
• Accelerate the prescriptive language for building with CLT/mass timber
• Get outside of the 4-8 story target market and push for cost-competitive designs for other building types