2025

PNW Regional Mass Timber Market Study

PACIFIC NORTHWEST
MASS TIMBER TECH HUB

AUTHORS

Roy Anderson, Vice President, The Beck Group

Erica Spiritos, Owner, Erica Spiritos LLC

Nicholas Sills, Principal, Whirlwind Consultants

Kristin Slavin, Founder, Conifer Advising LLC

STEERING COMMITTEE

Iain Macdonald, Director, TallWood Design Institute (Oregon State University)

Larry Holzgang, Regional Development Officer, Business Oregon

Lech Muszynski, Professor, Department of Wood Science and Engineering, Oregon State University

Marcus Kauffman, Biomass Resource Specialist, Oregon Department of Forestry

William Silva, Regional Director of Preconstruction, Swinerton Builders

Woodam Chung, Stewart Professor of Forest Operations, Forest Engineering, Resources & Management, Oregon State University

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1. Executive Summary

The Pacific Northwest (PNW) for the purpose of this report is defined as a region including the States of Oregon and Washington. It has been an early adopter of mass timber manufacturing and construction in the United States. This largely resulted from the region's abundant forest resources, robust engineered wood products manufacturing, and a culture of building with wood. Inspired by the leadership of British Columbia, Quebec, and Central Europe, the PNW has grown into the clear mass timber leader in the United States.

To continue its leadership trajectory and become globally competitive, the PNW must stay focused on key points of improvement to maintain and grow its manufacturing advantage and continue to set an example of high-performing mass timber buildings.

Mass timber represents a paradigm shift in construction, in which natural materials are paired with cutting-edge technology to produce best-in-class construction solutions that make our forests healthier and our communities stronger. We will assess and present the state of the industry, then offer the consulting team's leading recommendations for supporting the PNW in becoming a globally competitive mass timber economy.

1.1 Benefits of Mass Timber for the PNW

The PNW Mass Timber Tech Hub believes that mass timber manufacturing and construction have the potential to be economic drivers for the region. A robust mass timber ecosystem supports high quality jobs in advanced manufacturing, revitalizes rural communities, reduces the carbon footprint of our built environment, and establishes the region as a leader in sustainable construction—while improving the health and performance for building occupants. For these reasons, the PNW Tech Hub is working to propel the mass timber ecosystem into its next stage of growth and development. To learn more about these benefits, please read **Section 8**.

1.2 State of the Industry

This report analyzes the supply chain for mass timber in the region and across North America, including quantifying the current state of forestry, the lumber industry, project demand, and mass timber product supply. While these statistics show how the industry and associated supply chain relate, the detailed analysis dives into the complexities behind the numbers that describe what could improve the industry..

Table 1-1 provides an overview of the magnitude of the mass timber industry in the PNW and in North America, with respect to timber resources utilized, lumber consumed, volume of mass timber produced, and number/size of construction projects built.

Based on **Table 1-1**, in the PNW Region at the current harvest rate of about 0.9% of the standing inventory on timberland (forested public and private land not administratively restricted from harvest), regional mass timber production uses only about 0.5% of the lumber produced from that harvest. Learn more in **Section 4**. This means that mass timber does not significantly impact how much logging or lumber production occurs. However, mass timber manufacturers are affected by broader supply and demand dynamics in the logging and lumber industries. These dynamics, shaped by global economic factors not necessarily directly linked to mass timber markets, directly influence mass timber manufacturers' fiber cost and fiber availability. These findings highlight the fact that mass timber's market presence is small relative to other consumers of lumber, its key raw material. Thus, the industry is currently exposed to shifts in global and regional lumber markets. Learn more in **Section 7.1**. It also indicates that the mass timber industry currently has limited ability to influence how mills operate (and to affect their willingness to manufacture specialty products). Learn more in **Section 4.10**.

Demand for mass timber in construction projects totaled an estimated 60,500 cubic meters in 2024, and during 2020-2024 market

Table 1-1 - State of the Industry Summary

	Unit	PNW	North America	Alt Unit	PNW	North America
Forests						
Timberland Area (2015–2024 avg.)	Million Acres	41.5	746			
Standing Inventory (Sawtimber) (2015–2024 avg.)	Billion bf Scribner	696	10,225	Thousand m3	5,600,000	81,800,000
Annual Harvest (2015–2024 avg.)	Billion bf Scribner	6.3	68.5	Thousand m3	50,000	550,000
Lumber						
Lumber Production (2024)	Billion bf	8.7	57	Thousand m3	14,300	94,100
Well-Suited Lumber for CLT (2024)	Billion bf	2.8	19	Thousand m3	4,600	64,400
Lumber used in Mass Timber (2024)	Billion bf	0.045	0.353	Thousand m3	70	580
Projects						
General Construction Area (2024)	FT2	69,800,000	4,827,430,000			
Mass Timber Project Area (2024)	FT2	3,030,000	25,850,000			
Mass Timber Project Volume (2024)	m3	60,500	517,000	Thousand m3	60.5	517
Project Mass Timber Value (2024)	Million $	$118	$1,006			
5 year CAGR (2020-2024)	%	5.67%	37.08%			
Last 5 year Market Penetration (2020-2024)	%	3.06%	0.44%			
2030 Mass Timber Volume Demand @ 20% CAGR	m3	182,000	1,543,754	Thousand m3	182	1,544
2030 Mass Timber Project Value @ 20% CAGR	Million $	$391	$2,943			
2035 Mass Timber Volume Demand @ 20% CAGR	m3	452,000	3,841,353	Thousand m3	452	3,841
2035 Mass Timber Project Value @ 20% CAGR	Million $	$1,072	$7,322			
Mass Timber Product Supply						
Project-Based Mass Timber Product - Volume Manufactured (2024)	m3	62,000	477,000	Thousand m3	62	477
Project-Based Mass Timber Product - Value Manufactured (2024)	Million $	$121	$928			
Project-Based Mass Timber Product - Project Area (2024)	FT2	3,090,000	23,850,000			
Project-Based Mass Timber Product - Effective Capacity (2024)	m3	225,000	718,000	Thousand m3	225	718
PNW Mass Timber Products Used in Projects (2024)	%	42.35%	11.99%			
Commodity Mass Timber Product - Volume Manufactured (2024)	m3	227,000		Thousand m3	227	
Commodity Mass Timber Product - Value Manufactured (2024)	Million $	$321				
2030 Project-Based Mass Timber Production Volume @ 30% CAGR	m3	300,000		Thousand m3	300	
2030 Project-Based Mass Timber Production Value @ 30% CAGR	Million $	$644				
2035 Project-Based Mass Timber Production Volume @ 30% CAGR	m3	1,114,000		Thousand m3	1,114	
2035 Project-Based Mass Timber Production Value @ 30% CAGR	Million $	$2,641				

penetration of mass timber was higher in the PNW than in the rest of the continent by a factor of 6. However, the general construction market in the PNW has shown negative growth over the last five years, significantly impacting mass timber project growth over the same period.

While we can expect growth in mass timber projects in the PNW to be higher than that of the last five years, there is significant growth potential in the rest of the country based on current trends in both general construction and mass timber projects. Accordingly, the PNW manufacturers, who collectively supplied about half of mass timber projects in the PNW in 2024, could anticipate exporting products outside the region as critical to their business development strategy going forward. Learn more in **Section 5**.

Also noted in **Section 1.1**, current mass timber production in the PNW is estimated at only about a third of the effective capacity of manufacturers in the region, showing significant room for growth and the ability to meet demand. Mass timber manufacturing in the PNW is currently valued at $120M (projects) and $320M (commodity). With the right conditions in place, mass timber manufacturing in the PNW could be valued at $1 billion by 2030 and over $2 billion by 2035 based on a CAGR of 30%. Learn more in **Section 6**.

1.3 Section Summaries

PNW Mass Timber Ecosystem

Section 3 describes the Pacific Northwest's mass timber ecosystem as a complex network of businesses, institutions, and agencies spanning the entire supply chain from forest management and specialty lumber mills to manufacturers, fabricators, integrators, and prefab housing companies, alongside regulatory bodies, research institutions, and workforce programs. While Oregon and Washington are home to more than 20 mass timber related companies with diverse business models, the region lacks full-service producers able to deliver complete project packages, creating competitiveness challenges. Workforce shortages, professional services bottlenecks, and regulatory complexity remain pressing barriers, but strong research institutions (e.g., TallWood Design Institute) and emerging training initiatives provide a foundation for growth. Overall, Section 3 highlights both the strengths of the PNW ecosystem and the critical gaps, particularly in integration, workforce, and technology, that must be addressed for the region to achieve global leadership.

PNW Fiber Supply: Forests, Logs, and Lumber

Section 4 examines the Pacific Northwest's abundant timber resources and their role in supplying mass timber manufacturing. The region's 41.5 million acres of timberland and nearly 700 billion board feet of standing sawtimber (logs large enough to be sawn into lumber products), dominated by Douglas-fir and larch, provide a biologically sustainable foundation. Mass timber currently consumes only about 0.5% of annual lumber production and 0.01% of standing inventory, meaning overall supply is not a near-term constraint. However, bottlenecks emerge in kiln drying, lamstock availability, and lumber sorting for structural applications, which drive up mass timber manufacturers' costs and can limit mass timber's competitiveness.

Logging, trucking, and sawmill infrastructure are adequate but aging, and while restoration activities offer additional fiber sources and wildfire risk reduction, they are underutilized. Compared to other North American regions, the PNW maintains a strong fiber advantage, but future mass timber industry growth will depend on upgrading processing capacity, securing long-term sawmill partnerships, and diversifying fiber inputs to ensure consistent, cost-effective supply for a growing mass timber market.

Mass Timber Project Demand

Section 5 analyzes current and projected demand for mass timber in the Pacific Northwest and across North America. In 2024, roughly 60,500 m3 of mass timber was used in PNW buildings, equivalent to $115 million in value and 3 million FT2 of project space, primarily in office, education, and multifamily sectors. Despite an overall decline in general construction over the past five years in the PNW, mass timber demand grew at a compound annual rate of 5.7%, showing strong resilience and interest.

Market penetration in the PNW averages 3%, six times the continental average, though per capita usage remains below British Columbia's more mature market. Growth potential is significant both regionally and nationally, with North American demand projected to be between 2.5 and 9.0 million m3 annually by 2035. Policy levers such as embodied carbon regulations, zoning bonuses, and public procurement could accelerate adoption, while contractor familiarity and cost-competitiveness will be decisive in mainstreaming mass timber in diverse building types and geographies.

Mass Timber Product Supply

Section 6 reviews the history, status, and future trajectory of mass timber manufacturing in the PNW. Since the first CLT production lines in the 2010s, regional capacity has grown steadily, with effective capacity estimated at 225,000 m3 for project-based products in 2024. Actual production reached only 28% of that figure. Commodity glulam and other mass timber products add further capacity, valued at over $320M annually, but the region still relies heavily on Canadian mass timber product imports to meet demand.

A major gap is the absence of full-service providers capable of offering CLT, glulam, fabrication, logistics, and erection under one roof, limiting competitiveness in comparison to integrated suppliers elsewhere. Prefabrication and modular housing companies are emerging, but scaling remains limited by equipment and design bottlenecks, much of which depend on European technology and software. Looking ahead, North American demand will require multi-billion-dollar investment in new facilities, and the PNW is well-positioned to capture a large share if it can modernize equipment, strengthen integration, and expand value-added services.

Influences on the PNW Mass Timber Ecosystem

Section 7 explores the key forces shaping supply and demand in the PNW mass timber industry, highlighting both constraints and opportunities. On the supply side, bottlenecks include kiln drying, lamstock availability, CNC throughput, and limited access to capital and skilled labor, particularly in fabrication, engineering, and erection. On the demand side, challenges stem from higher material costs, inconsistent contractor familiarity, insurance and permitting hurdles, and developer hesitancy. At the same time, opportunities exist to expand exports, scale prefabrication and modular systems, standardize digital workflows, and invest in domestic equipment and software.

Policy interventions, such as building code adoption, zoning bonuses, and embodied carbon requirements have proven highly effective in other regions like British Columbia, suggesting their importance in accelerating adoption. Finally, per capita usage analysis shows the PNW trailing behind more mature markets, underscoring the need to grow demand through policy levers, workforce development, and integrated delivery models if the region is to achieve global leadership.

Economic Impact of the Mass Timber Industry

Section 8 details the broad economic, social, and environmental benefits of mass timber in the PNW. The industry contributes an estimated $756M in annual gross output, with manufacturing as the largest share, and supports thousands of jobs across forestry, manufacturing, construction, and design, providing critical opportunities for rural communities. Mass timber shortens project schedules by 15–25%, reducing financing and labor costs while lowering risk. Environmentally, it offers significant carbon reductions by replacing carbon-intensive materials and storing carbon in long-lived buildings, while also improving occupant health through biophilic design.

Coalitions, public funding, and research initiatives have already spurred regional adoption, but future growth will require substantial investment, between $3-15 billion nationally by 2035, to expand manufacturing capacity and finance projects. Together, these impacts position mass timber as a transformative industry for the PNW, capable of advancing economic development, rural revitalization, climate goals, and housing needs simultaneously.

1.4 Key Takeaways

Section 3 - PNW Mass Timber Ecosystem Boundary

- There are over 20 mass timber companies in the PNW, with manufacturers generating annual revenues on the order of $50 to $100 million and value-add companies on the order of $1 to $10 million. Read more in Section 3.1.
- Full-service manufacturing can help with cost competitiveness and reduce customer risk. Read more in Section 3.1.
- Manufacturer's professional services (architectural, engineering, and construction) must scale with mass timber skill sets to better enable the industry. Read more in Section 3.1.2 and Section 7.1.5.

Section 4 - PNW Fiber Supply: Forests, Logs, and Lumber

- Timber and lumber supplies are not a near-term constraint. Read more in Section 4.

Section 5 - Mass Timber Project Demand

- In 2024, ~60,500 m3 of mass timber went into buildings in the PNW. Read more in Section 5.3.
- Growing demand in the PNW could have the greatest direct impact on the pipeline for PNW manufacturers, who supply roughly half of the mass timber consumed in the region. Read more in Section 5.3.2 and Section 6.3.3.
- Mass timber growth exceeds that of general construction in the PNW. Read more in Section 5.3.2.
- Penetration rates vary across the continent but are highest in the PNW. Read more in Section 5.3.2.
- Growth across the continent is significant relative to the PNW, with the greatest increase in mass timber projects in Eastern U.S. Read more in Section 5.3.2 and Section 5.4.6.

Section 6 - Mass Timber Product Supply

- Less than half of the PNW mass timber building project square footage is built with mass timber from the PNW. Read more in Section 6.3.3.
- The PNW is exporting to other North American Regions—and this will increase over time. Read more in Section 6.3.3.
- In 2024, PNW manufacturers had a collective estimated effective capacity for project-based mass timber amounting to 225,000 m3, and 62,000 m3 were produced (28% of that capacity). Commodity mass timber contributes another 384,000 m3 of estimated effective capacity, and 227,000

m3 of commodity mass timber products were produced. Read more in **Section 6.4**.

Section 7 - Influences on the PNW Mass Timber Ecosystem

- Limited lamstock availability impacts cost-competitiveness. Read more in **Section 7.1.4**.
- PNW demand is currently less than half of BC's, on a volume per capita basis. Read more in **Section 7.5** and **Section 5.4**.
- Policy levers are critical to accelerating market demand. Read more in **Section 7.4**
- Contractor familiarity with mass timber is critical for market growth. Read more in **Section 7.2.7**.
- Process standardization could address professional service bottlenecks and reduce cost. Read more in **Section 7.3.3** and **Section 7.3.7**.
- Increasing manufacturing efficiency will reduce product cost. Read more in **Section 7.3.6**.

Section 8 - Economic Impact of the Mass Timber Industry

- Mass timber projects contribute $756M to the PNW economy, or 0.08% of total GDP. Read more in **Section 8.6**.
- Multi-billion-dollar investments needed in regional manufacturing. To read more please reference **Section 8.8**.

1 m3 of CLT material

Photo Credit: Nicholas Sills, Whirlwind Consultants

2. Introduction

This PNW Mass Timber Market Study was commissioned in Summer 2025 by the PNW Mass Timber Tech Hub ("MTTH")—a Federally designated Tech Hub funded by the United States Economic Development Administration, Department of Commerce and led by Oregon State University's TallWood Design Institute. The MTTH is a collaborative forum for coordinated activities that support sustainable economic development in mass timber across Oregon and Washington, representing companies, public agencies, universities, and nonprofits that either work directly with mass timber, or have a stake in its utilization in construction.

Why mass timber? The MTTH believes that mass timber can be an engine for creating resilient, well-paying jobs for rural and urban residents, increasing housing production and affordability, lowering wildfire risk and improving forest health, and reducing the construction industry's carbon footprint.

Toward this vision, the MTTH is driven to build upon Oregon and Washington's traditional timber industry strengths as the nation's #1 and #2 producers of lumber; leverage the early mass timber leadership in its local businesses and the excellent university-based R&D capacity; and deploy a multifaceted set of programs that will move the PNW's mass timber sector from its current position of U.S. leader to one of sustained global competitiveness.

2.1 Study Overview

This section outlines the foundation of the Market Study, including its purpose, scope, intended audience, and methodology. Together these elements provide the context and framework for understanding how the study was designed, who it serves, and the approach taken to generate findings that can guide the growth of the PNW mass timber ecosystem.

2.1.1 Purpose of the Study

The Market Study was designed to provide context for the development of regional programs that would propel the PNW toward becoming a globally competitive cluster of mass timber manufacturing and design within ten years. Two key goals for the study are:

1. Deepen the MTTH's understanding of the potential for mass timber to be an economic engine for the region, to help prepare the mass timber ecosystem for the future and to attract public and private investment in the industry toward attaining global competitiveness.
2. Benchmark current regional mass timber demand, production, and capacity, and set quantitative targets for five- and ten-year horizons.

2.1.2 Scope of the Study

Through an ecosystem lens that addresses all key elements involved in supporting mass timber manufacturing and its use in construction, the study serves to establish a baseline of the current landscape for both supply and demand, while also forecasting how that landscape may evolve over the next decade.

The Market Study addresses the following questions:

1. What is the current makeup and extent of the region's mass timber industry?
2. What is the current and projected future fiber supply in the PNW?
3. What is the current and future demand for mass timber?
4. What volume of mass timber is currently being produced in the PNW, and what might production be in ten years?
5. What is the current manufacturing capacity for mass timber production in the PNW, and how is that capacity projected to change?

6. What are the top influences on the PNW mass timber ecosystem, impacting demand and supply—constraints, opportunities, and policies?

7. What is the economic impact of the PNW mass timber industry?

2.1.3 Audience

While the report was written to inform strategy for the MTTH, the consulting team believes its contents will be illuminating and valuable to the following audiences:

- **Businesses** supplying goods and services (manufacturing, fabricating, integrating, etc.) to the market will gain a deeper understanding of the market they are serving, the potential market, and their competitors.
- **Policymakers** will gain an understanding of the mass timber ecosystem in the region, and its economic and environmental impact.
- **The Architecture Engineering and Construction (AEC) sector** will gain an understanding of the major factors impacting the availability and cost of mass timber materials.
- **Investors** will gain an understanding of the mass timber ecosystem and its benefits, the size (current and future) of the market, the potential return on any investment in mass timber, and the business ecosystem's capital needs.

2.1.4 Methodology

In conducting this Market Study, the consulting team committed to developing a thorough dataset and overarching narrative rooted in robust and replicable methodology to serve as a trusted roadmap for the MTTH and its members in promoting the sustainable growth of the regional mass timber ecosystem.

To complete the scope of work, the consulting team relied on a combination of internal information and knowledge from extensive, varied past project experience; publicly available information (reports, journals, datasets) and in-kind resources; a survey of mass timber manufacturing companies across the continent; and a separate survey of mass timber fabrication, integration, and prefabrication companies in the region. A list of survey recipients, and summary data, can be found in the **Appendix**.

In the anonymous surveys, respondents were asked to share information about the products and services offered in-house, their approach to purchasing feedstock material, their production capabilities and constraints, employment and personnel constraints, the markets they serve, and their capital needs.

A complete summary of the results from both surveys can be found in the **Appendix**, and all references are listed at the end of the report.

2.2 Units of Measure

Mass timber products such as CLT and glulam are commonly measured in cubic volume using either cubic meters or cubic feet. Therefore, the units of measure in this report are primarily based on meters cubed (m3) of physical output in the form of completed mass timber product. While many organizations within the United States use a variety of measurement units, there is no consistent standard. Additionally, board footage—a common unit of measurement in the forest products industry—refers to multiple types of materials. Also, the actual cubic volume of wood fiber per board foot differs by material type. Given these complexities, a short discussion of units of measurement is included below.

2.2.1 Mass Timber Finished Products

Cubic feet: For selling or counting physical volume of product sold to market, this is a relatively straightforward and accurate unit of measure that facilitates cost estimation by contractors accustomed to tracking material volume. However, this Imperial unit requires conversion to reconcile with European, Asian, or Canadian market standards and to understand both production volume and material cost ($/cubic feet) on a global scale. Additionally, conversions between metric and Imperial open a small possibility of error due to the need to ensure correct conversion rates and account for proper rounding.

Cubic Meters: This international unit of measure allows quick comparison across markets and clear understanding of physical properties being discussed. The use of this measurement helps enable an understanding of market comparable and overall competitiveness. 1 m3 = 35.3147 cubic feet.

2.2.2 Mass Timber Raw Materials

Board Feet Lumber Scale: A board foot is a volume measure of lumber defined as 1" thick x 12" wide x 12" long, which equal 144 cubic inches or 0.00236 cubic meters. Care must be taken when calculating lumber board foot volumes because of the way softwood lumber is tallied. In other words, softwood lumber is labeled as 2" thick x 4" wide, or 2" thick x 6" wide, etc. However, the true dimensions are 1.5" thick by 3.5 inches wide (in the case of 2 x 4). This means there is an actual lumber size and a nominal lumber size. Across all the common widths for dimension lumber (4", 6", 8", 10", and 12"), the average difference between nominal and actual sizes is about 32%. In other words, a piece of dimension lumber's average actual size is only about 68% of its nominal size. Table 2-1 provides a comparison of the difference between nominal and actual cubic volume for the common dimension lumber products.

Board Feet Log Scale: Adding further complexity, board feet are also used to measure log volume throughout the Western U.S. The term 'Log Scale' is commonly used when referring to board feet of logs. This signifies that the board feet measurement of a log is an estimate of how many board feet of lumber it will produce. In this context, board foot volume is based on log scale, which differs from lumber scale. The most common log scale used in the PNW is the Scribner Log Scale. There are different variations of it based on region, but it typically underestimates lumber volume by about half. The discrepancy between log scale and lumber volume varies significantly depending on factors such as log size, taper, the lumber product mix produced, and the level of technology employed in the mill. One commonality is that all logs are scaled from the small end only.

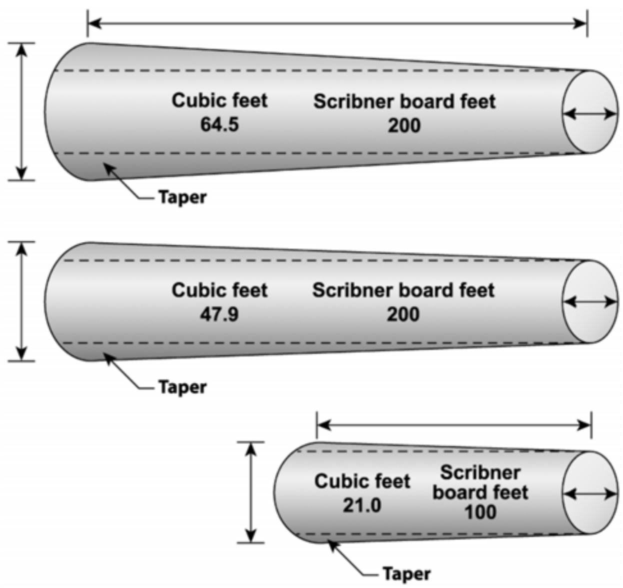
As illustrated in Figure 2-1, two logs with the same small end diameter can have significantly different cubic volumes but still be counted as the same board foot volume in the Scribner log scale system. As a result, one board foot (log scale) typically yields somewhere between 1.50 to 2.75 board feet of sawn lumber. This distinction is important when evaluating raw fiber input from the forest versus processed lumber entering a production line.

Lumber Board feet Input: This term is used by many mass timber producers (generally those who have grown from a sawmill-focused industry) to report production rates and capacities. This unit of measure is rooted in

Table 2-1 - Nominal vs. Actual Lumber Volumes

Nominal Sizes					Actual Sizes				
Size	Length	Width	Thickness	Cubic Inches	Size	Length	Width	Thickness	Cubic Inches
2x4	18	4	2	144	2x4	18	3.5	1.5	95
2x6	12	6	2	144	2x6	12	5.5	1.5	99
2x8	9	8	2	144	2x8	9	7.3	1.5	98
2x10	7.2	10	2	144	2x10	7.2	9.3	1.5	100
2x12	6	12	2	144	2x12	6	11.3	1.5	101

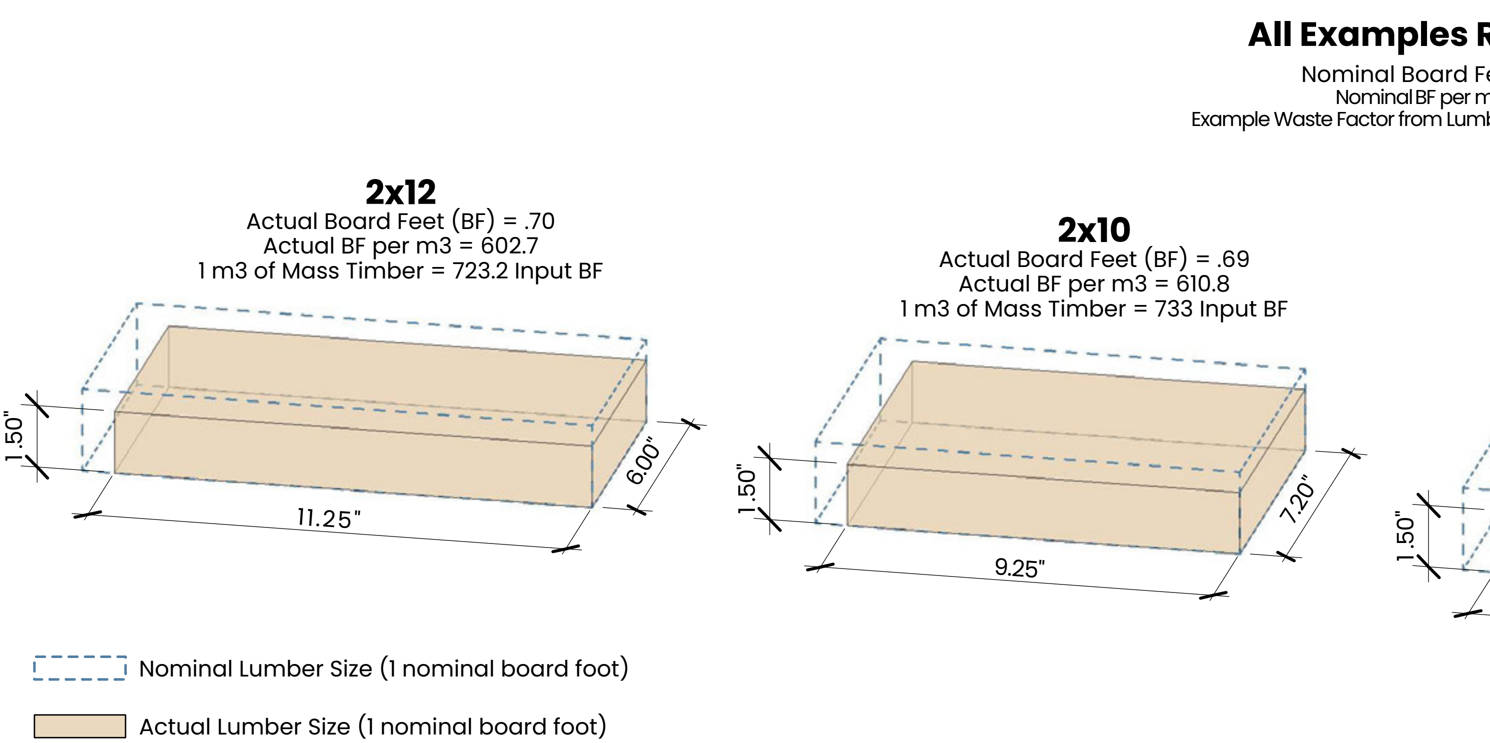
Figure 2-1 - Scribner Board Feet Measurements (USDA Spelter 2003)



gross volume of lumber purchased (nominal basis) to produce mass timber products. This can be a good metric for how much input material it takes to produce an output volume and how much capacity a specific machine such as a fingerjoint line or sorting line might handle, although these are often tied to linear feet or linear meters.

Board feet used in this context contains several variables in lumber sizing and total physical output volume, with the core two variables being baseline dimensions input for volume with up to a 13% difference between a 5/4" x 12 and 2x4 nominal board foot count and a 7% difference between a 2x4 and 2x12 board foot count. When variable waste factors per factory and product line are added, there is approximately a 15% difference in solid net volumes sold to market compared to board foot input volume count.

Figure 2-2 - Lumber Board Foot Examples

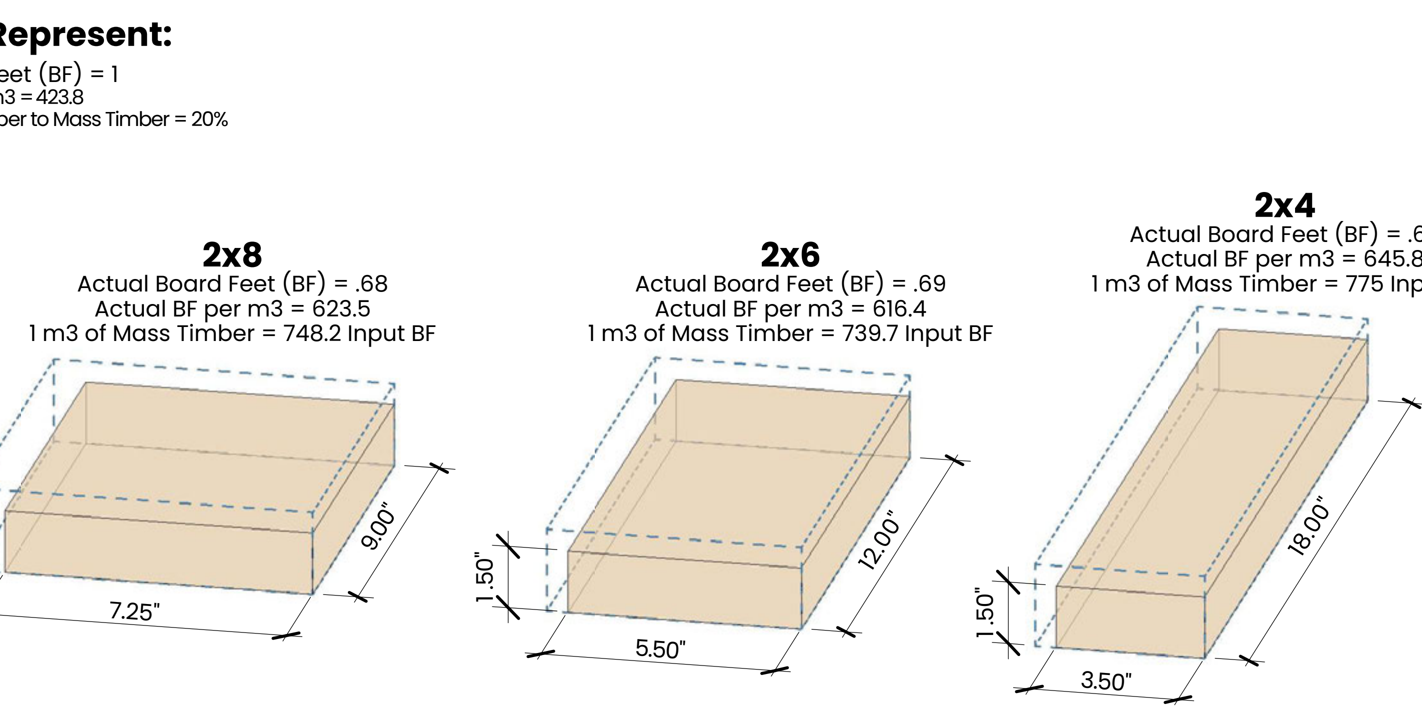


Paired with this, waste factors are variable depending on how different board sizes are tallied and the waste factors are specific to each manufacturer. Thus, there are variable units obscured by variable processing data as well. These waste factors vary typically from 15% up to 25% subject to product, species mix, and processing specifics. When all this variance is combined, the nominal board feet input per cubic volume of finished material is 19.63 BF/FT3 (2x12 count with 15% waste), or 693 board feet per cubic meter. In contrast, for 2x4 material with 25% waste, 22.86 nominal board feet are needed by cubic foot of finished material, or 807 board feet per cubic meter. Thus, the difference between 2x4 and 2x12 is a staggering 16% in the volume of input materials (as measured in nominal board feet) to output net physical volumes. See **Figure 2-2** as an example.

When used as a sales unit to the market, contractors, engineers, architects and developers would have significant difficulty in measuring or understanding what they were being sold and would have no method to accurately estimate the volume of product they require.

Lumber Board Feet Output: This unit of measure is often used in the commodity glulam world. It represents the volume in board feet of glulam beams as measured on an actual 1" x 12" x 12" basis, or 144 cubic inches per board foot. This unit measures the volume of material delivered to a customer on an actual size board foot tally. However, it is often confused with input board feet, and therefore clients are often confused about what they might be purchasing. This unit is technically functional but is based on obscure reference points with poor language communication.

Because of the potential for confusion between board feet of logs and board feet of lumber, in this report we have adopted the convention of using MBF (board feet in thousands – log scale) to refer to board feet of logs and MBM (board feet in thousands – board measure) to refer to board feet of lumber.



2.3 Key Conversions

Accurate conversion between metric and imperial units is essential for analyzing and comparing mass timber markets where both systems are commonly used. This section provides guidance on converting between cubic meters (m3) and cubic feet (FT3), as well as between cost metrics such as $/m3 and $/FT3, ensuring consistency and clarity in economic and production analyses.

2.3.1 Prices / Cost Conversion

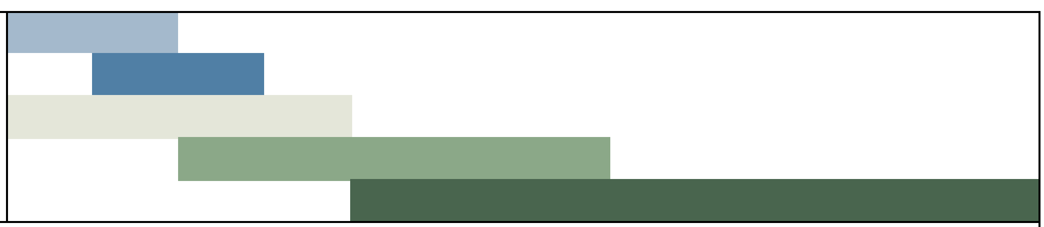
To aid in defining total production value, average mass timber pricing was developed based on the 2025 International Mass Timber report, and recent quotes from manufacturers. The consulting team found mass timber pricing to average $3050 /m3 glulam ($86.37/FT3) and $1350 /m3 CLT ($38.23/FT3), including all "baseline-typical" services required to deliver a fully coordinated mass timber kit of parts including nominal project management, 3D fabrication design modeling, CNC fabrication, steel connections and hardware, and excluding installation.

While these costs are the consulting team's best estimate of current average pricing, under normal market conditions, actual prices vary wildly with project complexity and lumber market fluctuations. Within this context, baseline billet costs typically appear relatively stable amongst suppliers, and it is the project complexities that create the wide range of material supply costs across projects. These complexities include items like finish level, steel connections, detailing complexity, and fasteners. The consulting team's best estimate of current average prices has been used as a benchmark system throughout the report.

Table 2-2 is a table of generic pricing conversions has been developed to allow readers using different pricing units to correlate to those discussed in the report.

$/MBM In equates to dollars per thousand board feet of lumber input net of a 15% or 25% lumber waste factor. This creates a different scale where input board foot lumber measurement can vary versus output measured solid volumes of product in cubic feet, or m3. It should be noted that this is based on a 2x6 BF count, which can also vary up to 13% subject to the width used for manufacturing.

Table 2-2 - Mass Timber Pricing Conversion Scale



CLT Fabricated Billet												
CLT Project Pkg												
Glulam Commodity												
Glulam Project CNC'd												
Glulam Project Pkg												
Net pricing basis:												
$/m3	$1,000	$1,500	$2,000	$2,500	$3,000	$3,500	$4,000	$4,500	$5,000	$5,500	$6,000	$6,500
$/FT3	$28	$42	$57	$71	$85	$99	$113	$127	$142	$156	$170	$184
$/MBM(Out.)	$2,360	$3,539	$4,719	$5,899	$7,079	$8,259	$9,439	$10,618	$11,798	$12,978	$14,158	$15,338
Gross Pricing basis: prices are based on the total volume of wood purchased to produce the product												
$/MBM (In.) @15% W, 2x6	$1,410	$2,116	$2,821	$3,526	$4,231	$4,937	$5,642	$6,347	$7,052	$7,757	$8,463	$9,168
$/MBM (In.) @25%, 2x6	$1,299	$1,948	$2,597	$3,247	$3,896	$4,545	$5,195	$5,844	$6,494	$7,143	$7,792	$8,442
Note: 15% Waste converted at 709 BF/m3, 25% waste converted at 770 BF/m3												

2.3.2 Project Floor Area (FT2) to Unit Volume (m3) Conversions

Table 2-3 outlines typical conversion ratios for entire building assemblies from FT2 of floor area built with mass timber to m3 or FT3 of mass timber material volume required. A weighting factor has been applied to building typologies to come up with a general average material intensity. This range might be from 0.017-0.022 m3/FT2. In many locations of the report, a flatline average conversion of 0.02 m3/FT2 has been used. Conversions are often noted in applicable locations.

2.3.3 Unit Volume Conversions m3 to FT3

The factor for converting between cubic meters and cubic feet is 35.315. In other words, there are 35.315 cubic feet per cubic meter. It is important to note that one must be careful about converting lumber volumes from board feet to cubic feet or to cubic meters. This is because of the difference between actual and nominal board foot count between lumber sizes, along with several interpretations of units of measure on a board foot scale. For instance, if one attempts a simple conversion from m3 to BF it will give a conversion value based on nominal board feet (i.e., 144 cubic inches per board foot).

Table 2-3 - Conversion Ratios for Building Assemblies: Cubic Volume of Mass Timber per Square Footage of Floor Space (m3/FT; m3/m2; and FT3/FT2)

Mass Timber Construction Types Material Intensity			m3/m2	FT3 / FT2	Weighting
LWF + platform Residential	0.018	m3 / FT2	0.1938	0.636	35%
Point Support	0.016	m3 / FT2	0.1750	0.574	20%
Typical Office	0.025	m3 / FT2	0.2691	0.883	15%
Industrial	0.012	m3 / FT2	0.1292	0.424	5%
Full MT Projects (Other)	0.023	m3 / FT2	0.2476	0.812	25%
Average Intensity	**0.020**	**m3 / FT2**	**0.2115**	**0.694**	**100%**

2.4 Geographic Boundary

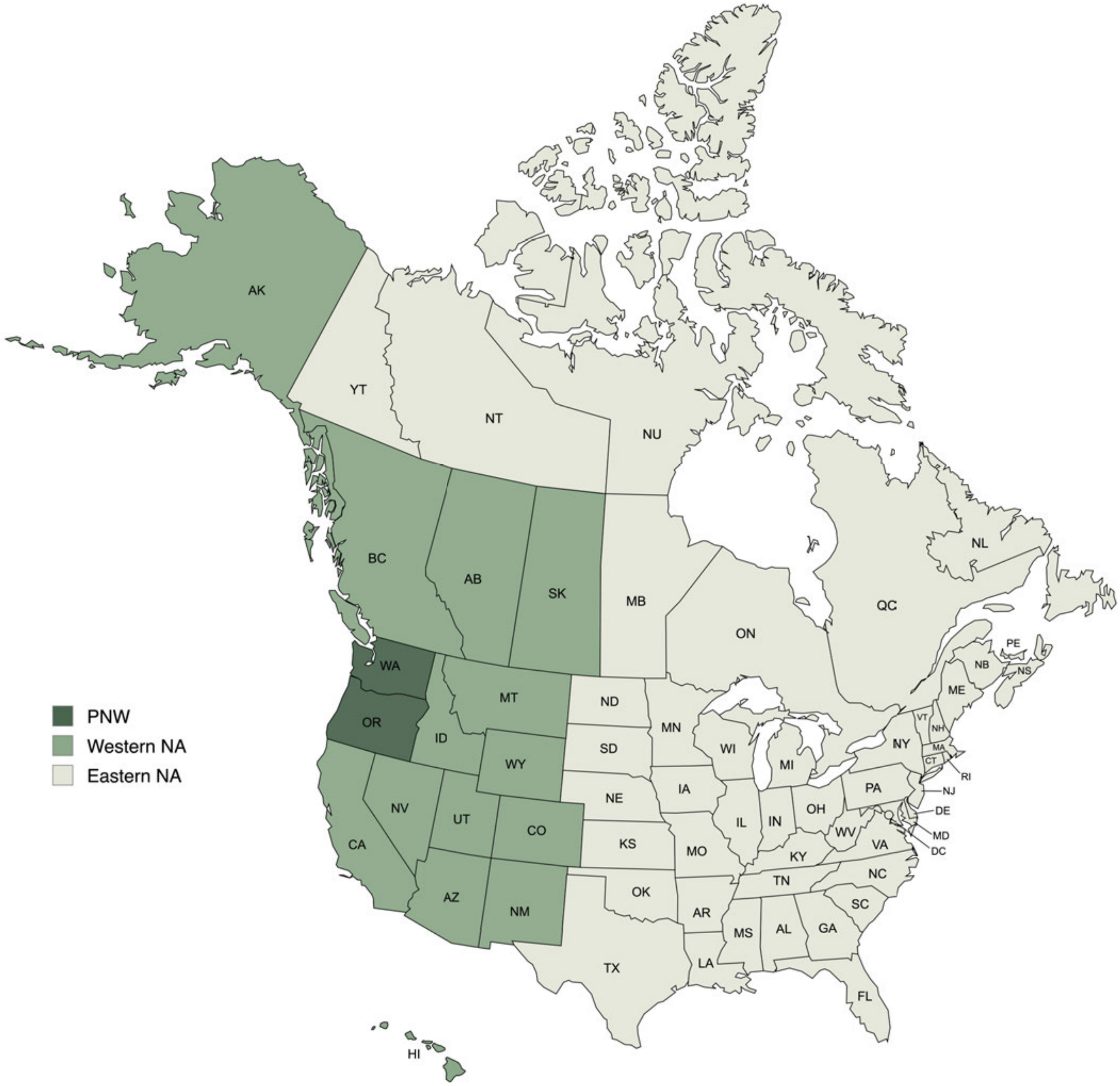
This report organizes North America into three geographic regions as illustrated in Figure 2-3 and as described below:

PNW: The primary geographic boundary is taken to be Oregon and Washington, as this is the region that the PNW Mass Timber Tech Hub most directly serves.

Western North America (Western NA): The secondary geographic boundary is taken to be western Canada and the western United States. This region is of higher relevance to the PNW MTTH, and to this study, because of the proximity to the primary boundary. Manufacturers in Oregon and Washington are in some cases purchasing input feedstock from within the secondary boundary region, and including projects within the secondary boundary region as a target market.

Eastern North America (Eastern NA): The tertiary geographic boundary includes the rest of Canada and the United States not included in the PNW or western NA. This study considers this tertiary geographic boundary to compare how the Oregon and Washington supply chains and markets compare to the rest of Canada and the United States, as well as to understand current penetration rates for PNW manufacturers at this greater distance. Manufacturers in Oregon and Washington are currently supplying products across the United States, and into Canada to a more limited extent.

Figure 2-3 - The Three Geographic Regions of North America Considered in this Study



This geographic boundary system defines the framework for how analysis was performed in this study based on available project data for both supply and demand.

Sauter Timber's Manufacturing Facility

Photo Credit: Erica Spiritos, Erica Spiritos LLC

3. PNW Mass Timber Ecosystem Boundary

The mass timber ecosystem includes all businesses, organizations, agencies, and associations that directly and/or indirectly enable mass timber manufacturing and the use of mass timber in construction. In addition to the supply chain, the ecosystem includes marketers promoting the use of mass timber, the consumers (real estate developers—public and private), regulatory bodies (for land management, manufactured products, and buildings), research institutions, and workforce development bodies (higher education, community colleges, apprenticeship programs, and labor unions). A map of the ecosystem is presented in **Figure 3-1**.

Figure 3-1 - Mass Timber Ecosystem

This holistic view is important as it helps us to understand all potential influencers and change agents that may contribute to increased mass timber manufacturing and construction. Following, we provide an overview of each aspect of the PNW mass timber ecosystem. We also highlight that while the core elements of the supply chain exist within the geographic boundary of the PNW, they rely on others that exist across the continent and even span the globe.

3.1 Supply Chain Overview

The mass timber supply chain is a subset of the ecosystem. It includes the businesses required to deliver mass timber products to market for use in a construction project. Upstream of the mass timber manufacturer, we include specialized manufacturing activity required to produce the raw materials used in mass timber production: lumber and veneer production, and kiln-drying to meet the special requirements for CLT and glulam production. Downstream of manufacturing, we include specialty fabrication (CNC and hand processing) and production of building modules (volumetric and panelized mass timber housing, CLT cores, facade panels, etc.).

Figure 3-2 is meant to illustrate the individual elements of the mass timber supply chain and their relationship to one another.

The mass timber supply chain in Oregon and Washington comprises businesses dedicated in full or in part to advancing the use of mass timber in construction. Given the region's rich timber history, the mass timber businesses in the Pacific Northwest have in some cases been operating since the early 1900s (Freres since 1923), and in other cases were established within the last decade. These businesses offer a range of products and services, and there exists a spectrum of business models under which they operate and serve their customers. To distinguish between business models and the mass timber products and services currently being offered to the market, we categorize the mass timber businesses in the PNW as follows:

Timberland: Significant portions of PNW forests are classified as timberland, with management intensity and harvest rotations varying across the region. Much of the privately owned timberland base is managed for rapid growth and short rotations. This approach produces large volumes of medium-size sawlogs. A smaller number of industrial timberland owners and many non-industrial private timberland owners manage their lands less intensively and on longer rotations, resulting in slower-grown, larger logs that yield lumber well suited to mass timber production.

On publicly owned timberlands, management efforts increasingly target wildfire hazard and forest health improvement management treatments. This is accomplished by thinning smaller, slower growing but tight-grained trees that if large enough when harvested can also be a good match for the mass timber supply chain. Across the landscape, timberland management relies on foresters, logging and road engineers, logging and trucking contractors, and equipment vendors who plan, administer, and implement forest management activities for timberland owners.

Specialty Forest Products: While mass timber manufacturing relies on commodity softwood lumber, input feedstock is also specialized in the sense that it must be dried to a below-normal moisture content of 12+/-3%. There are businesses operating in Oregon and Washington who serve the mass timber industry by bridging the gap between commodity and specialized products. Some provide services such as extra drying and remanufacturing of commodity lumber, so that it better meets the needs of mass timber.

Other companies produce specialty lumber: laminating stock ("lamstock") for glulam production. These are often smaller-scale mills that focus on niche markets rather than high-volume commodity markets. They produce high-quality, higher-value material milled to non-standard specifications, with lower tolerance for wane, skips, marks, and shape issues relative to commodity dimension lumber. In addition to milling and drying, these companies often own and manage timberland, and some also have trucking in-house to cover material transport. Regardless of whether the producer is a remanufacturer or a specialty mill, it is in this part of the supply chain where costs begin to accrue for mass timber products. For example, during recent market conditions, lamstock was selling for $700 to $1400/MBM, while standard KD19 dimension lumber sells for $400/MBM. Some manufacturers are dealing with this challenge by drying lumber in-house or purchasing sawmills to become more vertically integrated.

Commodity Mass Timber: Commodity mass timber companies have been operating in the region as far back as the 1920s (in the case of Rosboro), serving the single-family residential market and commercial construction markets with Douglas-fir beams. Some of these companies (such as Boise Cascade) have started to venture into project mass timber, producing panels for the commercial construction market. While these companies may continue to evolve their project-based businesses, they do not currently offer the wrap-around services (fabrication, design assist) offered by 'project mass timber' companies.

Most commodity mass timber manufacturers also produce lumber and often own timberland. For these companies, selling into the mass timber market requires partnering with project-based companies (fabricators, integrators).

Project Mass Timber: Companies that deliver mass timber projects are oriented toward the construction industry, rather than toward a commoditized forest products industry. All projects are custom, and they have employees who are trained to translate between the design team's intent and the manufacturing drawings and models. Most often, these companies have CLT production at their core, and they may also produce glulam. Indeed, manufacturing is the core business of these companies. However, the services they provide (timber engineering, 3D modeling, CNC fabrication) allow them to interface directly with the architecture, engineering, and construction (AEC) sector.

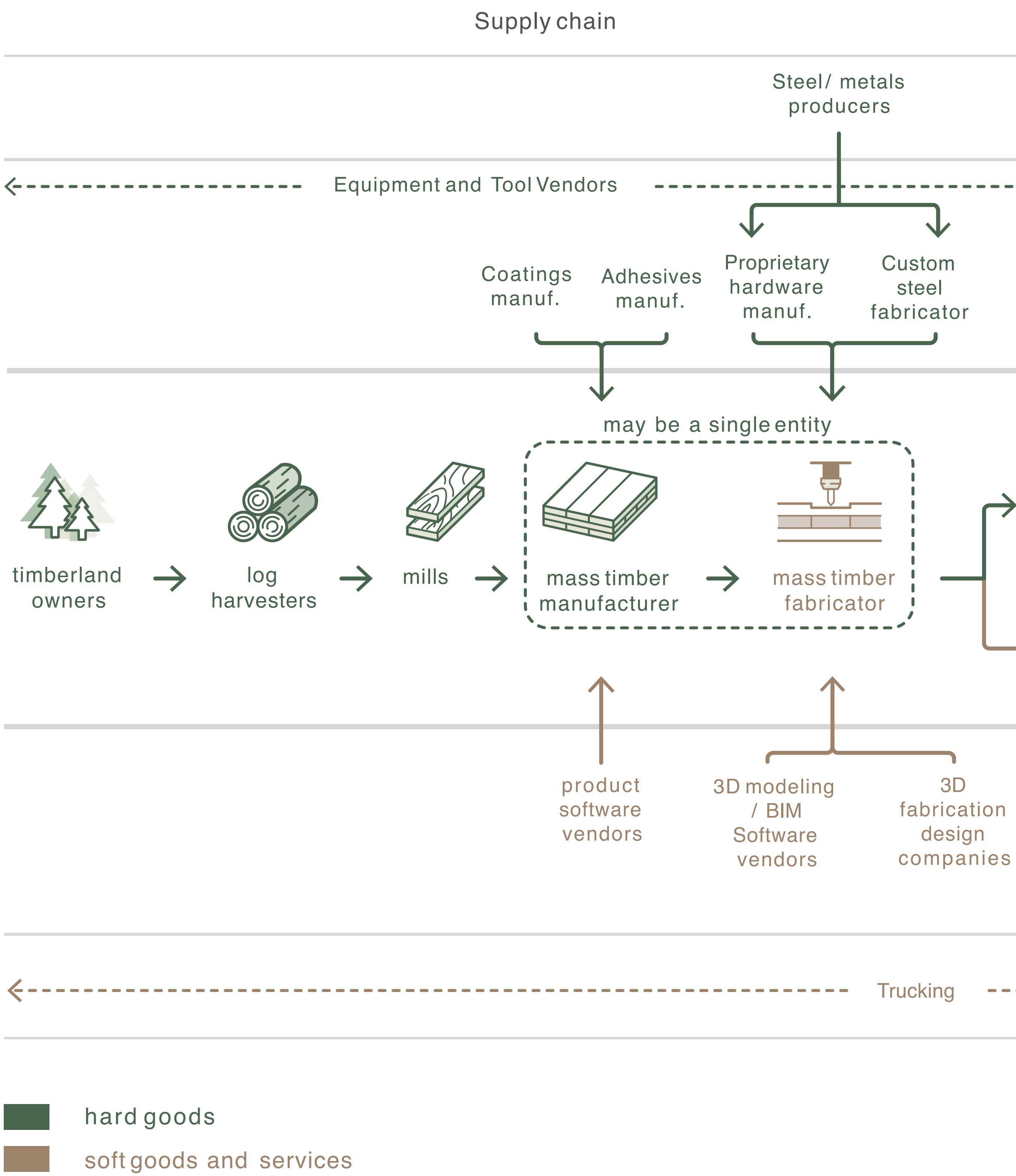
Most of the project-based mass timber companies prefer to deliver projects under the Design for Manufacture and Assembly (DfMA) model, which means they are providing projects with early design assistance as well as a material supply package for projects.

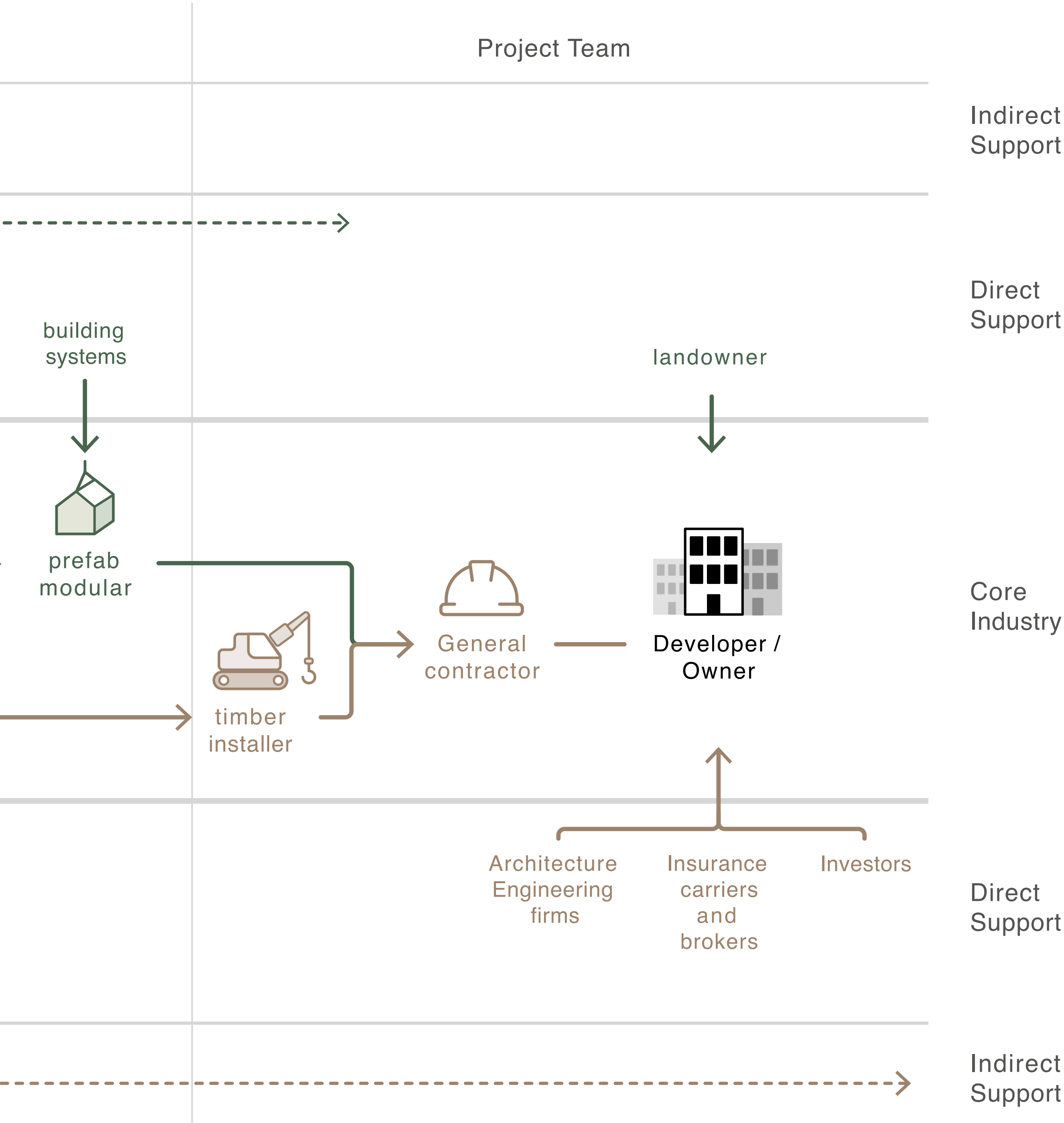
Fabricators: Fabricators, like project mass timber companies, are oriented toward the construction industry—ideally selling to general contractors or developers who require the modeling and fabrication services to deliver a custom kit of parts. Most fabricators are sourcing mass timber products (primarily glulam, though occasionally panel products as well) on the open market, primarily from manufacturers in Oregon and Washington, to a lesser extent from Western Canada, and in limited cases from Europe (for reasons of cost and quality).

These businesses are often challenged to deliver the highly specialized services they offer at a price the market can afford while still earning a profit—often a result of the high cost of labor and the added cost of logistics to move material from a manufacturing facility to a fabrication facility. These companies note receiving little to no support from the government, as the manufacturers receive all the attention. However, their existence is critical for addressing CNC bottlenecks within manufacturing facilities (primarily for glulam) and allowing commodity glulam manufacturers to sell into the mass timber market.

Integrators: Integrators, like fabricators, are oriented toward the construction industry while also selling to general contractors and developers. The primary difference between integrators and fabricators is that they are doing no material processing (CNC or hand fabrication). Often, they are providing installation services and serve the general

Figure 3-2 - Visual Representation of the Mass Timber Supply Chain





Project Team
Indirect Support
Direct Support
building systems
landowner
prefab modular
General contractor
Developer / Owner
Core Industry
timber installer
Architecture Engineering firms
Insurance carriers and brokers
Investors
Direct Support
Indirect Support

contractor through a consolidated scope of services that puts the risk on one entity, while allowing that entity to make the most economically advantageous procurement decisions (which might resemble bundling multiple manufacturers into one coordinated package).

Prefab/Modular Mass Timber: Within the last 10 years, there has been a growing interest in utilizing mass timber (primarily CLT) in prefabricated/modular housing and further streamlining the construction process by adding additional value to mass timber in the factory. These companies are producing volumetric modular housing units, CLT floor cassettes (prefabricated floor assembly with various components), envelope panels, or other panelized components. Companies in this space typically purchase fabricated CLT panels from other regional manufacturers to build their own proprietary systems. Anecdotally, the challenge these companies have faced is in the bulkiness and over-design

Table 3-1 - PNW Mass Timber Company Profiles

	Company	Forest Landowner	Sawmilling & Veneer Prod.	Kiln-Drying	Beam Manuf.	Panel Manuf.	Design Assist
Commodity Mass Timber	Rosboro	Y	Y	Y	Y		
	Shelton Lam & Deck				Y		
	Western Forest Products		Y	Y	Y		
	Zip-O Laminators	Y	Y	Y	Y		
	DR Johnson	Y	Y	Y	Y		
	Boise Cascade		Y	Y	In ID	Y	
Project Mass Timber	Freres	Y	Y	Y	Y	Y	Y
	CRTC			Y		Y (pending certification)	
	Timberlab		Y (soon)	Y	Y	Y (2027)	Y
	Mercer			Y	In BC	Y	Y
	Vaagen Timbers			Y	Y	Y (narrow width)	Y
Full-Service Manuf.	-						
Fabricators (Could also be Integrators)	Cascade Joinery						Y
	CutMyTimber						Y
	Sauter Timber						Y
	Cascadia Structural						Y
Integrators	Western Wood Structures						Y
	Carpentry Plus Inc.						Y
Prefab / Modular	Zaugg Mass Timber (April 2026)						Y (2026)
	New Energy Works						Y
	Cedar Stone						
	Tieton Cabin Company						
	Green Canopy NODE						

of the thinnest products available on the market, 4-1/8", when a thinner product would structurally suffice and cost less.

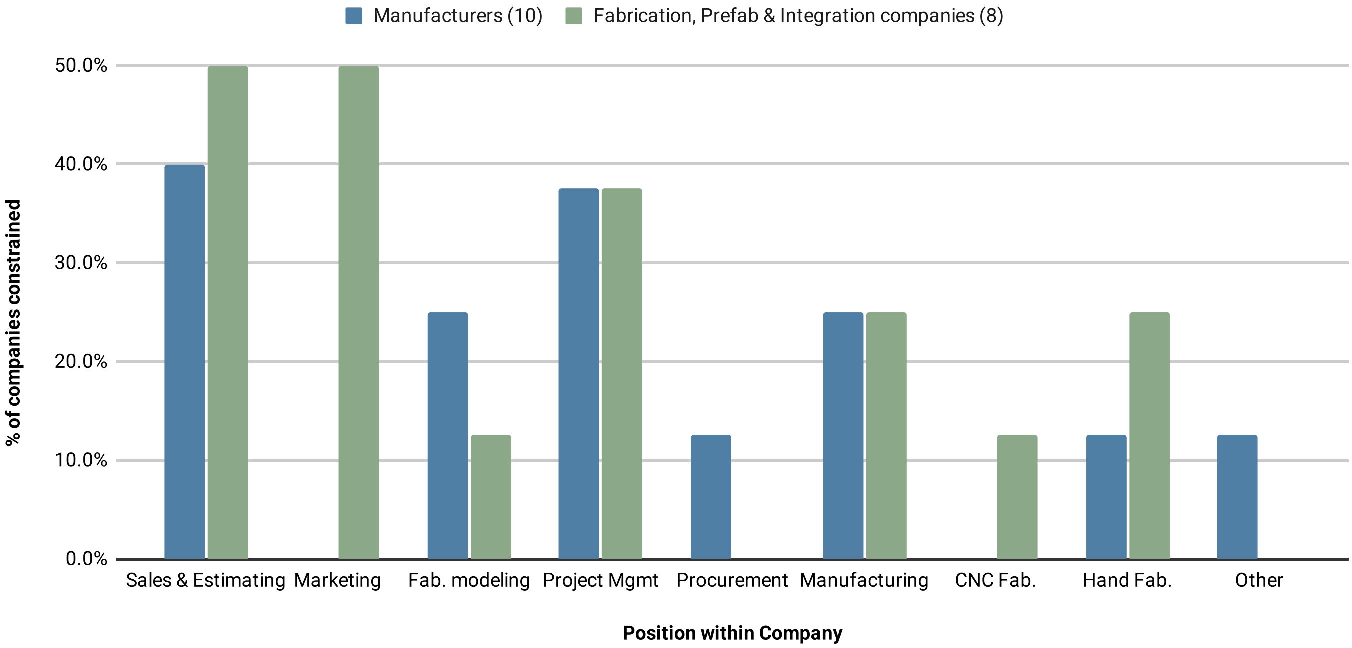
3.1.1 PNW Mass Timber Company Profiles

Table 3-1 captures the mass timber businesses in Oregon and Washington that perform some form of manufacturing—either sawmilling of mass timber grade material, production of mass timber products, or secondary manufacturing (fabrication) of those products to create custom kits. The table shows the range of products and services offered to the market by each business.

While the PNW is home to many mass timber companies, as of 2025, full-service companies are in short supply, impacting the region's manufacturing competitiveness relative to other regions, nationally and globally.

Timber Engineering	3D Modeling	Fabrication	Complete Structures	Procurement	Install	Volumetric Mass Timber	Architecture	Development
	Y (limited)							
	Y	Y	Y					
	Y	Y (hand)			Y	Y		
Y	Y	Y	Y	Y (until 2027)	Y			
Y	Y	Y	Y		Y			
Y	Y	Y	Y	Y (large panels)				
	Y	Y (hand)	Y	Y	Y			
Y	Y	Y	Y	Y				
Y	Y	Y	Y (small / complex projects)	Y (small / complex projects)				
	Y	Y	Y					
Y	Y		Y	Y	Y			
	Y			Y	Y			
Y (2026)	Y (2026)	Y (2026)	Y (2026)	Y (2026)	Y (2026)	Y (2026)		
Y	Y	Y	Y	Y	Y			
		Y (hand)	Y	Y	Y	Y	Y	
			Y	Y	Y	Y	Y	
			Y	Y	Y	Y	Y	Y

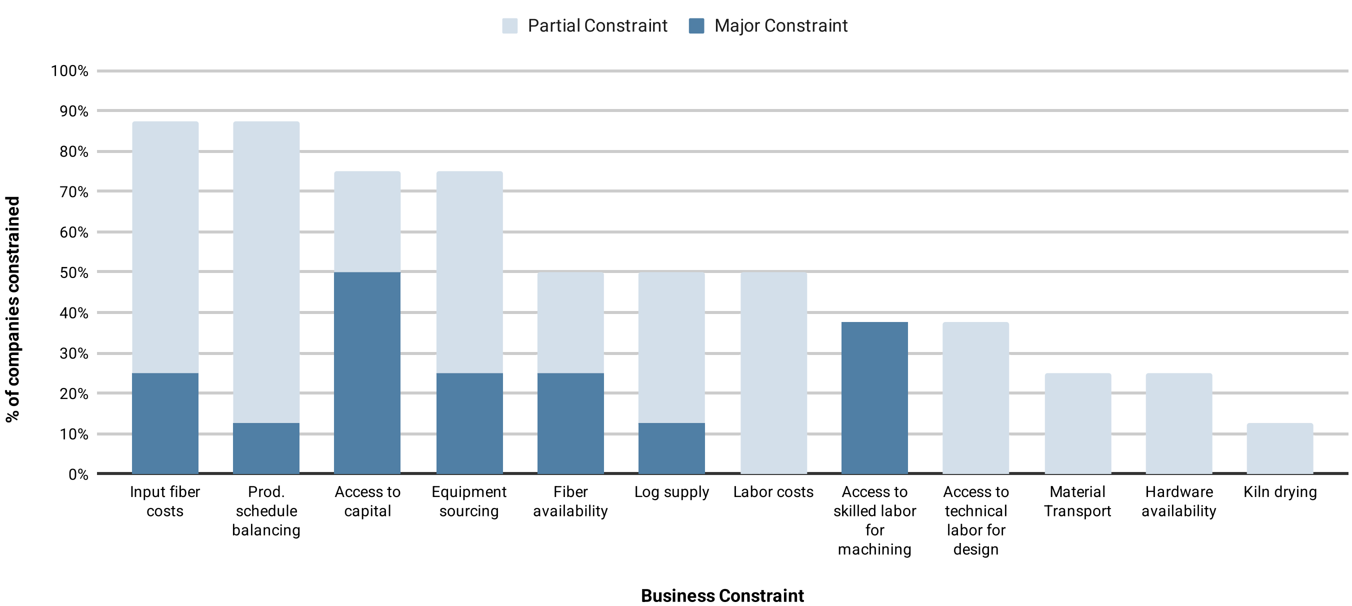
Figure 3-3 - Personnel Constraints for PNW Mass Timber Companies



3.1.2 Business Challenges for PNW Mass Timber Companies

Mass timber manufacturing and value-add (fabrication, prefabrication, integration) companies in the Pacific Northwest face an array of challenges in delivering their products to the market. Companies were asked to disclose some of the hurdles they experience, with regard to personnel and general business constraints. The results of these survey

Figure 3-4 - Production Constraints for PNW Mass Timber Manufacturers

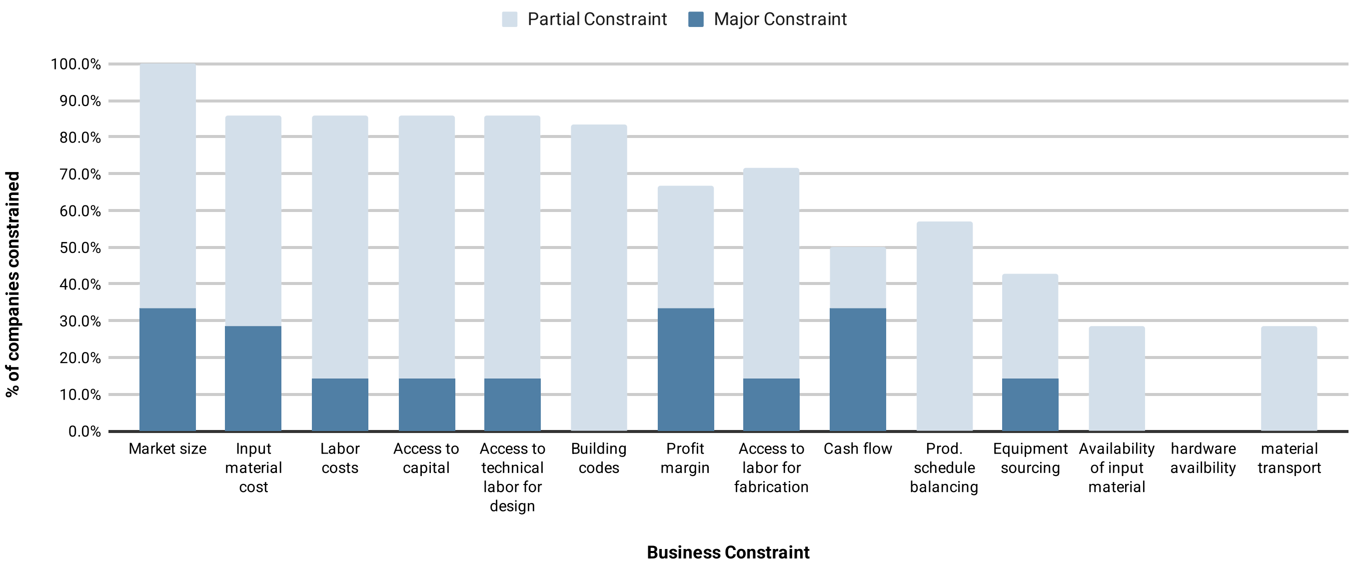


questions are presented in **Figure 3-3**, **Figure 3-4**, and **Figure 3-5**.

The responses received to the question of personnel constraints generate an interesting and unexpected hypothesis: mass timber production is constrained not by manufacturing capacity, but by professional services capacity (sales, estimating, marketing, project management). This idea is explored further in **Section 7.1.5 Personnel Constraints**.

Over 50% of PNW mass timber manufacturers experience the shared challenges of input fiber costs, access to capital, production schedule balancing, and equipment sourcing. Input fiber costs are a function of log supply and cost, but potentially more so of the region's lamstock availability and drying capacity. Access to capital is challenging for a fledgling industry that offers lower return on the investment than in other tech-based industries. Production schedule balancing is difficult when selling custom products to an immature market, as manufacturers must be able to weather the lulls in production while still paying their workforces. Equipment, primarily sourced from Europe, can take significant time to design and procure; costs are high, and options are challenging to navigate. These challenges are explored further in **Section 7.1 Current Constraints to Supply Chain**.

Figure 3-5 - Business Constraints of PNW Mass Timber Value-Add Companies



Nearly all PNW mass timber value-add companies who responded to the survey (six companies out of ten solicited) are challenged regarding the overall size of the market, the cost of labor, the cost of input material (mass timber products), access to capital, and access to technical labor for design. Of note, nearly all respondents commented that building codes were a constraint to their business (though not named as one in the original question). Respondents shared the following sentiments about building codes, as well as other challenges:

- "Building codes, life cycle analysis understanding, and a need for more commitment to higher cost up front to mitigate carbon emissions over the life of the building."

- Building codes, extremely long permitting times, extremely expensive land and housing costs in the PNW plus minimal governmental support for the regional mass timber industry.
- "Energy code complexity."
- "Reflecting on the issues we faced with our own mass timber building, the code-related constraints remain a significant challenge and certainly don't help."
- "Mixed use of ORSC and OSSC. ORSC permits engineered wood but defers mass timber to OSSC."
- "Our work is Just, but to win federal support today, we must speak bureaucracy in translation. It is a bleak landscape for mission driven work."
- "The constraint on timber harvesting seem to be keeping lumber prices high."

3.1.3 Need for Full-Service Producers

When mass timber was introduced to the market in North America, the leading suppliers (Nordic and Structurlam) offered a full-service approach to project delivery. They manufactured the entire timber structure in-house (glulam and CLT), provided strong technical design and preconstruction support, and delivered a fully coordinated kit of parts to the job site. That the manufacturers were able to serve as a single point of responsibility provided significant reassurance to the market as it moved forward with a new system and process.

As the market for mass timber in the Pacific Northwest has grown in the last decade, the industry has responded with big leaps (Katerra) and more incremental steps (Timberlab, Freres, etc.) toward being able to offer a fully coordinated kit of parts in the way that Structurlam did at the onset. These ventures have had varying degrees of success based on a range of key decisions made, but the fact remains that the industry registers this need in the market.

While it may seem that there is an abundance of mass timber suppliers in the Northwest, and some that can offer a fully coordinated kit of parts, the leading providers (Freres, Timberlab, Mercer, Vaagen) are all constrained in some way. Freres only recently began offering structural frames (beams and columns) in addition to their mass plywood panels. Timberlab does not yet produce CLT. Mercer does not produce glulam in the PNW. Vaagen produces narrow panels only. In a sense, the market has been asked to pay more for an "integrator" approach in which certain products/services get marked up twice. In another sense, the market has been given a choice between buying a car without a steering wheel, or a car without a windshield.

In 2027, when Timberlab comes online with the ability to deliver a full kit-of-parts produced in-house, the game will certainly change. For the PNW to become a globally competitive mass timber industry, able to keep pace with growing demand while providing competitive options for customers, the region will ultimately need multiple full-service, large-scale producers.The question of when new companies might successfully enter the market is a tough one to answer, as it gets at the heart of a chicken/egg conundrum around supply and demand. Most manufacturers are looking to see consistent or accelerated demand growth as a key indicator. The industry will want to see the overall pie grow for mass timber use in construction, as well as award rates (an indicator of competitiveness) for PNW companies.

For the PNW to become a globally competitive mass timber industry, able to keep pace with growing demand while providing competitive options for customers, the region will ultimately need multiple full-service, large-scale producers.

3.1.4 Supporting Players in the PNW Supply Chain

While the PNW is home to a robust mass timber supply chain, manufacturers and suppliers rely heavily on "supporting players" in other parts of the world for key inputs and equipment. Below, we highlight some of these key inputs, what roles they play in mass timber manufacturing, and where they are sourced. In the following section, we assess the availability of each manufacturing input in the PNW, and the strategic importance and feasibility of developing that capacity/ capability within the region.

Adhesives

Adhesives used in mass timber manufacturing are produced by large corporations that make a multitude of products for a wide range of markets. While mass timber is a growing market for these corporations, adhesive manufacturers are not "mass timber companies."

The PRG-320 standard for Performance Rated Cross Laminated Timber and the ANSI A190.1 Standard for Structural Glue-Laminated Timber permit multiple types of adhesives. The most common adhesives used are polyurethane (PUR), melamine formaldehyde (MF), and melamine urea formaldehyde (MUF). PUR adhesives are the most used adhesive formulations for CLT production in North America, and globally. Most CLT manufacturers are using PUR manufactured by Henkel in Elgin, Illinois. Adhesives are often multi-part systems, delivered in large totes to manufacturers across the globe.

Custom Steel Hardware

Custom steel hardware (welded assemblies used for timber connections) is available within the PNW and most often sourced from vendors located near the facility that is providing the connections (either the manufacturer or the fabricator/integrator). In response to our survey, mass timber companies reported a range of experiences in providing custom steel hardware for their projects. While most have no challenge procuring steel hardware, some smaller companies did report some difficulty. Notably, mass timber companies were split on the matter of whether steel tariffs affected their procurement decisions and constrained their business.

From the consulting team's experience, the biggest challenge with procuring custom steel hardware is in the lead time associated with this material, and in the reliability of high-quality components. Manufacturers often must reject components that are not fabricated within tolerance requirements, slowing down the overall production process. In rare cases, mass timber manufacturers such as Nordic in Quebec have built steel hardware shops to address this issue. It is unclear whether this provides a strategic advantage, or if the issue will resolve itself as mass timber companies identify the reliable steel fabricators in their markets and build strong relationships.

Proprietary Hardware & Fasteners

Proprietary, pre-engineered hardware and fasteners are manufactured across North America and in many cases in Europe. These products are specified by the structural engineer of record (SEOR), timber engineer, or mass timber manufacturer based on the structural requirements of the connection.

Several companies, including MTC Solutions based in Vancouver, BC, import product manufactured from Europe. These companies conduct testing to North American standards, maintain product design guides, and provide design assistance to structural engineering firms across the country. Meanwhile, European companies such as Rothoblaas (Italy) and Eurotec (Germany) export product to the U.S. market through U.S.-based sales representatives.

Simpson Strong-Tie is currently the leading North American provider of proprietary hardware and fasteners used in mass timber construction. Simpson manufactures their proprietary connection hardware at their facilities in Stockton, CA and Riverside, CA. Fasteners used in mass timber construction are produced in Taiwan and imported to Gallatin, TN for quality assurance, packaging and distribution. Other mass timber screws are made in Gallatin, TN. Simpson also maintains a 90,000 square foot warehouse and training room facility in Kent, WA. A team of seven mass timber specialists, supported by engineering and local sales staff, serves the industry across the U.S.

In response to our survey, mass timber companies reported slightly greater challenges procuring proprietary hardware than when obtaining custom steel hardware. The issue is again one of timing and product availability. Manufacturers have often paid rush fees to expedite shipping of specialty products from Europe, to meet project schedules.

Coatings

Coatings are commonly applied to mass timber components for weather protection during construction, long-term durability, and visual appearance. Whether applied in the shop by the manufacturer or fabricator, or in the field by a subcontractor, coatings have become an essential part of the mass timber supply package.

Sansin is the household name for wood protection. They sell product directly to manufacturers to use as their standard sealer, as well as to general contractors and subcontractors. There are, however, smaller-scale local businesses that provide similar offerings to the market. TimberPro Coatings in Portland, OR is the local option for the Pacific Northwest, known for their work on the PDX Next Terminal Expansion. Notably, TimberPro has started producing a Class-A rated fire retardant for timber structures, which may have a large market with mass timber.

Preservative Treatment

In exterior applications, and in regions such as Hawaii where termites are of concern, integral preservative treatment is preferable (if not required) to topically applied coatings. Unlike coatings, which can be manufactured and shipped for application anywhere, mass timber products must be shipped to a treatment facility. This makes it essential for the PNW to have this capacity within the region. Fortunately, such a company exists in Hillsboro, OR. PermaPost is a full-service supplier of custom pressure-treated and fabricated forest products. They have provided treatment for mass timber products used in exterior environments, and for products being sent to Hawaii. If the Pacific Northwest is going to become a major exporter of mass timber to other regions, local treatment options might need to expand.

Equipment

Equipment touches all parts of the mass timber supply chain from log harvesting to sawmilling, mass timber manufacturing and fabrication, and prefabrication of building modules. Equipment is expensive, and many facilities operating in the PNW are running on older, fully depreciated equipment. This is true of both sawmills and glulam manufacturers. The equipment investments that will be most impactful in reducing the cost of mass timber include:

1. Log scanning that produces a 3D model of each log, including internal defects, prior to sawing;
2. Machine Stress Rating (MSR) systems that enable more precise identification of lumber best-suited for use in CLT and glulam;
3. Dry kilns to add capacity and more precise control during drying, and
4. Automated glulam presses.

Mass timber manufacturing is a heavy industrial process involving planers, finger-jointers, hydraulic/pneumatic/RF presses, scanners, and CNC machines working in

Equipment is critical to product cost-competitiveness. The most impactful investments will be in log scanning, electronic grading of lumber, kiln-drying, and glulam pressing.

sequence. A large share of this equipment used in North America is still sourced from European suppliers such as Minda, Ledinek, and Weinig. These companies provide not only the machinery, but production line integration, equipment warranty, maintenance support, customer service, and options for harmonious upgrading of production lines. They also provide a link to European manufacturers developing new products and production lines, sharing innovations across the globe. These firms maintain U.S. sales/support footprints and tooling inventories, but most product design and fabrication occur in Europe. Typical lead times run about 12–24 months, which lengthens start-up and expansion schedules. That said, the reliance on Europe is not absolute: there are viable U.S.-based options or firms with strong domestic manufacturing roots for key steps in the line, such as USNR, Ziegelmeyer, Congruent, and Microtec (which acquired Corvallis-based Lucidyne), so PNW and broader North-American plants can increasingly review blended options for European presses and lines with domestically built grading, scanning, and integration equipment.

Software

Mass timber companies rely heavily on specialized software to deliver prefabricated building kits—a blend of AEC design tools and CAD/CAM + ERP/Productions software tailored for timber. The design tools are used to interact with architects and engineers, and to support shop drawing development and coordination. Tools include Cadwork as an industry leader, Autodesk Revit, Rhino, Grasshopper, and Tekla among others. Computer Automated Design (CAD) and Computer Aided Machining (CAM) software platforms are used for precise modeling, and to generate code (instructions) for CNC machining. Lastly, manufacturers rely on software for production control, panel nesting, and Enterprise Resource Planning (ERP).

Of note, PNW companies show a significant lack of integration with the leading fabrication design and production coordination software, Cadwork. While there any many competitive software stacks, it is estimated that Cadwork carries over 80% of project market share. PNW manufacturers are not leading users of the software, as Cadwork's process-based methodology can be more challenging to learn. Unlike other software systems, Cadwork modeling is oriented around the methods (tools) for shaping each component, rather than on the shape itself—encouraging modelers to think more like timber framers, generally simplifying the fabrication process. The consulting team has noted that operations that utilize Cadwork often have quicker fabrication design processes, fewer mistakes in course of construction, and critical production handling and data management labeling techniques.

Most of the specialty timber software companies are European, where engineered timber fabrication has deep roots. Cadwork has an office in Montreal; HsbCAD has an office in Toronto, serving CLT and modular facilities. Autodesk, while not a timber-specific company, is based in San Rafael, California. Dassault Systèmes, which produces the SOLIDWORKS and Catia software, has an HQ in Boston for U.S. operations. Simpson Strong-Tie, based in California, has their own software tools (like Strong-Wall, Anchor Designer) used in timber connection detailing. North American mass timber manufacturers have begun to develop timber-specific software to support concept design and streamline the Design for Manufacturing and Assembly (DfMA) process; StructureCraft's Branch tool is one example. This offers the benefit of having a single platform for design and fabrication, rather than having to stitch multiple platforms together or toggle back and forth between them.

While the economic value of software may be small relative to manufacturing, its impact on overall manufacturing efficiency and on mass timber's viability is not to be underestimated. Software innovation and refinement will be an important engine for fueling the growth of the industry in the long term.

3.2 Regulatory Agencies

The mass timber ecosystem is supported by regulation, which sets the limits of what is allowed, and at its best, aligns with our societal values. Across this spectrum, regulation exists to support human and environmental health and safety. Here, we look at the agencies governing forestry, manufacturing, and building construction that have the greatest impact on mass timber.

Forestry

Forest management in WA is governed by the 1974 Washington Forest Practices Act. It was significantly updated in 1999 with the Forests & Fish Law, which regulates forest practices on private and state lands. The Forests & Fish Law was designed to fully comply with the Federal Endangered Species Act (ESA) and Clean Water Act (CWA). It was negotiated with Tribes, timber companies, State and Federal agencies, and made salmon recovery central. The Washington Department of Natural Resources regulates and enforces compliance, and the Forest Practices Board adopts administrative rules under the WFPA.

Forest management in OR is governed by the Oregon Forest Practices Act (1971). The Oregon Department of Forestry (ODF) oversees enforcement, develops rules, and monitors compliance. The Board of Forestry, a seven-member citizen board, sets forest policy and adopts administrative rules under the OFPA. The ESA and CWA shape many ODF rules through safe-harbor agreements and habitat conservation plans.

Tribal Nations exercise sovereign authority to manage their forests in ways that align with their cultural values, economic goals, and ecological priorities. Through the U.S. Bureau of Indian Affairs (BIA), the U.S. government holds Tribal lands in trust and has a legal and fiduciary responsibility to assist Tribes in managing their forests. The Indian Self-Determination Act allows Tribes to contract with the BIA to run their own forestry programs.

Third-party certification (Forest Stewardship Council, Sustainable Forestry Initiative, etc.) also plays a role in regulating forest management—though not for Federal lands.

Manufacturing

A variety of product and manufacturing quality assurance standards govern mass timber manufacturing. CLT manufacture is governed by ANSI/APA PRG-320 Manufacturing Standard for Performance-Rated CLT, and the manufacture of glulam is governed by ANSI A190.1, Standard for Structural Glued Laminated Timber. For both standards, APA serves as the ANSI-accredited secretariat and publisher. APA – The Engineered Wood Association, headquartered in Tacoma, WA, is a nonprofit trade association whose membership includes industry leaders from approximately 175 companies in 24 states and seven provinces. APA income is based on member dues and other client fees and is governed by a Board of Trustees and several member advisory committees. In developing the PRG-320 standard, APA allows all structurally graded lumber with specific gravity of 0.35 or higher. This has resulted in well over 30 PRG 320 panel grades (including proprietary grades) with likely over 800 total panel layups. This large variety of grades and layup combinations can complicate specification, but it also ensures an optimum panel at a specific cost point for a given species and supply chain. This allows optimization in one direction but also illustrates lack of standardization in material property specifications. Due to regional differences in species, this is unlikely to change anytime soon.

The American Institute of Timber Construction (AITC) of Federal Way, WA is another regulatory trade association, founded in 1952 to be the national trade association for the structural glued laminated timber (glulam) industry. In 2013 West Coast Lumber Inspection Bureau assumed the Structural Glued Laminated Timber Certification Program of the AAITC. In 2019 AITC became a part of the Pacific Lumber Inspection Bureau (PLIB) when the West Coast Lumber Inspection Bureau merged with PLIB to form a single, unified organization. AITC continues to serve the glulam industry by developing and maintaining standards, providing technical information to manufacturers and glulam users, and providing advocacy and market support on behalf of the entire glulam industry. While CLT can be made with many regionally specific grades of lumber, it is very difficult, time-consuming, and costly to add or develop new glulam grades.

ASTM International also plays a role in setting standards, and ICC-ES is a third-party agency that provides technical evaluation of products for code compliance. Third-party certification agencies such as Intertek, PFS TECO, and APA monitor plants for quality assurance. Manufacturing facilities must also comply with environmental and worker safety regulations, outlined by Occupational Safety and Health Administration (OSHA), the Environmental Protection Agency (EPA), and states' Departments of Environmental Quality.

Construction

Construction in the United States is regulated by national, state, and local codes that determine what can be built in each jurisdiction. At the national level, the International Code Council (ICC) develops and maintains the International Building Code (IBC), which is updated on a three-year cycle. While heavy timber has long been accepted by the code, CLT was first introduced to the 2015 IBC, and tall timber code provisions were adopted in the 2021 IBC—with revisions to loosen the requirements for Type IV-B construction integrated into the 2024 IBC. Oregon and Washington have led the nation in rapid adoption of the latest version of the IBC, which has served to benefit the mass timber industry. Use of mass timber in other regions will depend on states adopting the latest codes, and in the mass timber industry's ability to stay attuned to modernization efforts across the country.

Associated with the IBC are several standards, developed by the American Wood Council (AWC), that govern the design of wood structures. These include the National Design Specification for Wood Construction (NDS) and the Special Design Provisions for Wind and Seismic (SDPWS). Industry professionals have noted that while much progress has been made, both the IBC and the AWC are overly conservative due to the politicization of codes, the sway of special interest groups, and the limited research and testing available for more innovative materials and building assemblies. This brings us to the next aspect of the ecosystem: the process of developing and advancing the science of mass timber.

3.3 Research & Testing

Advancing the use of mass timber in construction relies on robust research led both by academia and industry, as well as testing facilities for structural, fire, acoustic, and seismic performance.

Prior to the development of mass timber manufacturing in the PNW, FPInnovations served as the regional leader for research and testing on innovative wood products. A Canadian research institute headquartered in Vancouver, BC., FPInnovations is best known for publishing two editions of the CLT handbook (separate for Canada and the U.S.) before any such compendia of knowledge were available in the U.S.

Oregon and Washington both have strong research programs through state universities, and the capability of testing facilities relevant to mass timber is growing.

The TallWood Design Institute (TDI) is a leading collaborative between the College of Forestry and College of Engineering at Oregon State University (OSU) and the College of Design at the University of Oregon (UO). It is one of the first interdisciplinary research hubs in the United States with a strong focus on mass timber. Through diverse faculty expertise, cutting-edge facilities, and dynamic partnerships with manufacturers, designers, and other stakeholders, TDI oversees a wide range of testing and applied research and provides unique educational opportunities for a growing mass timber workforce. Their core research areas are structural and seismic engineering, fire performance, moisture performance and durability, sustainability and supply chain, acoustics, and energy performance. Notably, TDI conducts collaborative R&D through REACTS (Research on Engineering, Architecture and Construction of Timber Structures),an industry-led research consortium with membership across AEC and manufacturing.

While TDI is the region's research and testing powerhouse, several other research initiatives also exist:

- The OSU Wood Engineering Lab (within the Civil & Construction Engineering department) conducts research on wood behavior and mechanical performance.
- The UO Oregon Mass Timber Innovation Engine (OMTIE) project (currently in pursuit of NSF funding) builds on the work of the Oregon Mass Timber Coalition to transform the emergent mass timber ecosystem in the state by leveraging Oregon's strengths in resilient design, applied research, abundant forest resources, and advanced wood products manufacturing.
- The NSF Regional Innovation Engines project is developing a strategic plan for advancing mass timber innovation across the region through a partnership between UO, OSU, WSU and others.
- Through a Federal EDA Build Back Better Grant, the Oregon Mass Timber Coalition (OMTC) is funding, the construction of the Oregon Acoustic Research Laboratory to be built in Portland, and a fire testing lab to be built at OSU's Corvallis campus.
- The University of Washington is launching the Center for Timber Innovation within the College of Built Environments, which will focus on mass timber research and coursework.
- The University of Washington Center for International Trade in Forest Products (CINTRAFOR) was established by the Washington State Legislature in 1985 to conduct research on policies and strategies for expanding forest-based international trade, develop technology or commercialization support for manufactured products that will meet the evolving needs of international customers, conduct research on the quality and availability of wood raw resources, and develop market and technical information relevant to international trade in forest products.
- Washington State University's Composite Materials & Engineering Center research areas include design and manufacture of wood composite materials, performance-based design methodologies for wood materials, novel building systems, CLT and mass timber.
- While not in the PNW, FPInnovations is a Canada-based research institute headquartered in Vancouver, BC providing significant scientific research and testing related to wood products in the region often for large corporate entities and cutting-edge bio product research. Combined, the research and testing programs in the PNW cover a broad range of subjects critical to the mass timber ecosystem, from forest resources to material performance and international

trade. While the programs in Oregon seem well coordinated, there is opportunity to strengthen collaboration and partnership with Washington's programs for the benefit of all in the mass timber ecosystem.

3.4 Education & Workforce Development

A skilled workforce is critical to the success of the PNW's mass timber industry. This workforce spans across the entire ecosystem from forestry to building design and construction, fabrication modeling, and advanced manufacturing. At present, most people working in mass timber develop knowledge and skills on the job, with onboarding timelines depending on the role, and ranging from a few months to two years for full proficiency. A small portion of the mass timber workforce is hired with prior experience from other timber-focused companies (architecture, engineering, manufacturing, construction), and these people are sought after for their rare experience and expertise. This is true in other regions manufacturing mass timber except Central Europe (Germany, Austria, Switzerland), where a robust trade-education system covering the forest products industry (along with many others) has long tradition predating mass timber.

Currently, there are limited options in the PNW to gain mass-timber specific training in preparation for a job in the sector. UO, OSU, UW, WSU, and Gonzaga offer a small number of mass timber-focused courses (design studios, for example) to architecture and engineering students. OSU has just launched the online Professional Science Master's in Wood Innovation for Sustainability program with specialization options in mass timber and the timber circular economy, and TallWood Design Institute will roll out a non-credit certificate program in mass timber in 2026.

Through the Oregon Mass Timber Coalition (OMTC), with funding from the U.S. EDA, the Port of Portland is leading a team to develop a regional training cluster that will build a skilled workforce positioned to assume new jobs in construction and advanced manufacturing (CNC machinists, robot operators, specialized industrial engineers). This project has two core components: (1) to establish training locations around the state to connect rural and urban communities to jobs in mass timber fabrication, construction and manufacturing, and (2) to create and provide resources for pre-apprenticeship programs and space for hands-on training and classroom education.

While mass timber companies have been successful hiring people without mass timber-specific training, there is exciting potential in fueling the industry with new perspectives and energy from people who start their mass timber jobs with some understanding and know-how. Many other jurisdictions are working to develop cross-training programs for mass timber specialization in an array of offerings from micro-credentials to two-year diplomas and certificates. Section 8.2 provides context around the types of jobs in the mass timber industry, and the number of positions likely available.

3.5 Building Design and Construction

Architecture, Engineering, and Construction (AEC) firms play a critical role in bring mass timber to market. They are the bridge between manufacturers and building developers and owners, transforming the vision for a building into a buildable design and then constructing that design.

The Rentech Digital database lists 154 architecture firms in Oregon, with AIA Portland noting over 100 AIA member firms in the Portland area alone. Rentech Digital also estimates 236 architecture firms in Washington. Of these, the WoodWorks Wood Innovation Network database (WIN) hosts projects from 15 architecture firms with offices in Oregon and/or Washington, out of a total of 42 architecture firms. In other words, PNW firms represent 36% of all architecture firms tied to WIN projects across the United States.

What this also means is that only 4% of architecture firms in Oregon and Washington have mass timber projects in the WIN database.

A large caveat to this data is that many projects do not identify an architect, likely indicating that those firms are not focused on mass timber as a core product type, and therefore are not advertising their mass timber work. The top ten PNW architecture firms with the most projects in the WIN database are: FFA Architecture and Interiors, Inc. (16 projects), LEVER Architecture (15), Miller Hull Partnership (13), DLR Group (12), Mithun (11), Mahlum (9), Opsis Architecture (8), Hacker (8), Bassetti Architects (6), Bora Architecture & Interiors (4).

Direct counts of structural engineering firms in OR and WA do not seem to exist, though the number is likely in the hundreds. Of the 49 structural engineering firms registered with the WIN database, 10 of the firms (nearly 20%) have offices in the PNW. One can conclude that there is still significant work to be done to prepare PNW structural engineering firms to deliver mass timber projects. The top five PNW engineering firms with the most projects in the database are: KPFF Consulting Engineers (73 projects), DCI Engineers (32), Holmes (22), Coughlin Porter Lundeen (20), and IMEG (14).

General contractors (GCs) often hold the key to mass timber's utilization on a project. According to Manta, out of a total of 4,107 general contractors in Oregon, according to Rentech Digital there are 682 commercial general contractors in Oregon. According to PoiData, there are 3,971 general contractors in Washington across both the commercial and residential sectors. Based on the Oregon data, we can assume roughly 10% (roughly 400) of those contractors are commercial. The Association of General Contractors Washington Chapter (AGCW) has more than 600 member companies, more than 180 of which are general contractors. There are very few general contractors listed in the WIN database; Swinerton (36 projects), Skanska (13 projects), and Owen Gabbert LLC (2), are the only GCs with profiles and projects. Though there are several leading mass timber GCs not represented in the database, such as Andersen Construction, there are not many GCs making mass timber a core part of their business. Many would benefit from training.

3.6 Real Estate Development

Real estate development spans a wide spectrum including private developers building a range of products including multifamily housing, commercial office, retail and industrial buildings; institutional owners (colleges and universities) expanding their campuses; build-to-suit owners (corporations) building new office space, retail, warehouses and data centers, and public agencies (municipalities, school districts, etc.) building community centers, schools, libraries, and recreational facilities.

Enabling the developers and owners are often investors who are allocating funds toward real estate projects, and brokers who work to connect developers and investors on building projects. Recently, more attention has been given to educating real estate developers and owners on the benefits of mass timber construction, the total cost of ownership and occupancy. Along with this still more is needed to support them in securing funding for their projects.

NAIOP and the Urban Land Institute (ULI) convene and support the real estate development community in Oregon and Washington and could be good partners for the PNW Mass Timber Tech Hub for making the case for mass timber to the market.

3.7 PNW Ecosystem Self-Sufficiency

When evaluating the Pacific Northwest's potential as a globally competitive hub of mass timber manufacturing and construction, it is important to consider whether the PNW mass timber ecosystem is conceptualized as an internally self-sufficient cluster or as a node within a broader, integrated mass timber network.

While the PNW has developed significant local capabilities in manufacturing, education, and design leadership, it does not function as an isolated or self-contained system. Rather, its growth has been supported, and in many ways enabled, by external inputs of material, labor, equipment, and expertise. Additionally, the products coming out of the PNW are being distributed across the continent, which forms a much larger demand market than the PNW alone. Attempting to define the region as a closed "island" risks overlooking the economic and strategic advantages gained through selective integration with adjacent and international geographic regions and economies.

An integrated ecosystem strategy recognizes the value of regional interdependence and seeks to amplify influence through cross-boundary linkages. For example:

Input Lumber (Species) Flexibility

Oregon and Washington producers of CLT have historically made (and continue to make) strategic use of Western SPF, a cost-effective input material sourced from British Columbia and Alberta. If these manufacturers were encouraged or forced to source input lumber domestically, they might utilize Douglas-fir (to their disadvantage, due to the relative price point) or find a pathway for certification of SPF-S lumber (a cost-effective but historically underutilized alternative). Limited incorporation of Southern Yellow Pine (SYP) could also help to make PNW manufacturers more cost-competitive and support strategic entry into southern U.S. markets where this species dominates construction practices.

Project-Based Knowledge Transfer

Engagement with technical design and engineering professionals from other North American regions can accelerate learning curves, broaden innovation pipelines, and strengthen institutional capacity. Oregon experienced the benefits of these international connections through working with timber engineers from British Columbia on project such as the First Tech Federal Credit Union project, which enabled the largest installation of CLT in the United States at the time of construction in 2017. Other notable leading projects included OSU's Peavy Hall and Emmerson Lab—or Carbon 12, the first tall wood project in the U.S.

Industry Growth Strategy Alignment

Partnerships with leading Canadian provinces, particularly British Columbia and Ontario—which represent two of the largest and most well-developed mass timber markets in North America—can accelerate industry growth through collaborative strategic planning around standardization, technology demonstration, policy, and incentives, and workforce development. As the PNW has become a leader in mass timber construction in the U.S., PNW companies can also participate in strategic partnerships across the country and beyond to help accelerate the growth of mass timber in other regions.

Export Preparation

Long-term expansion into Asia-Pacific export markets (e.g., Japan, South Korea, Australia) will require integration with international logistics networks, certification regimes, and trade partnerships.

These linkages do not dilute the regional value of a strong PNW ecosystem, but rather expand its radius of influence, the reach by which the region can shape, direct, and benefit from broader market dynamics. The more diverse and integrated the ecosystem becomes, the more resilient and strategically agile it is.

From a strategic planning perspective, this raises a fundamental set of questions:

- Which components of the mass timber value chain must be directly controlled or developed within the PNW (such as manufacturing capacity, design leadership, and workforce development)?

- For the components that exist outside of the PNW, which can be effectively influenced through partnerships, procurement strategies, or policy (e.g., adhesive production, hardware supply, equipment manufacturing)?
- Where does it make economic and strategic sense to move toward self-sufficiency by building capacity internally within the PNW, and where should the region leverage existing external infrastructure?

To support the analysis of how PNW mass timber manufacturers relate to other parts of the ecosystem, a boundary-condition matrix was developed that classifies each ecosystem element by (1) its current availability within the PNW, (2) its strategic importance to regional competitiveness, and (3) the feasibility of internal development versus external integration.

Table 3-2 presents a summary of these relationships. Current availability, strategic importance, and feasibility of internal development are all given ratings on a 1-5 scale, based on the consulting team's best judgment. The values assigned should be interpreted for directionality only, rather than for accuracy.

While regional leadership remains the goal, integration—not isolation—is essential to achieving long-term global competitiveness. A strong internal core must be complemented by deliberate and strategic connections to external ecosystems that contribute complementary strengths. The PNW can thus position itself not only as a production hub, but

Table 3-2 - PNW Mass Timber Ecosystem Self-Sufficiency

		Current Availability (maximum of 5 if widely available)					
Category	**Ecosystem Element**	**PNW**	**Western NA**	**NA**	**Global**	**Strategic Importance**	**Feasibility of Internal Dev.**
Input	feedstock lumber - Glulam	2	4	4	1	5	5
Input	feedstock lumber - CLT	3	5	5	2	5	5
Input	adhesives			4	1	2	3
Input	coatings	3	4	5	5	3	5
Input	equipment			2	5	2	1
Value Add	3D fabrication modeling	3	3	3	3	4	5
Value Add	CNC machining	5	2	1		5	5
Core	manufacturing	3	4	3		5	5
Service	architecture	4	5	3	2	5	5
Service	timber engineering	3	5	2	1	5	5
Service	installation services	4	3	1		5	5
Education	technical design workforce development	2	3	1		5	5
Education	technical labor workforce development	3	2			5	5
Research	fire testing		2	5		2	3
Research	acoustic testing	2	2			3	3
Research	seismic testing		4	1		2	3

Note: Range of 1-5, 1 being low and 5 being high as a systems-level coordinator across a global mass timber network.

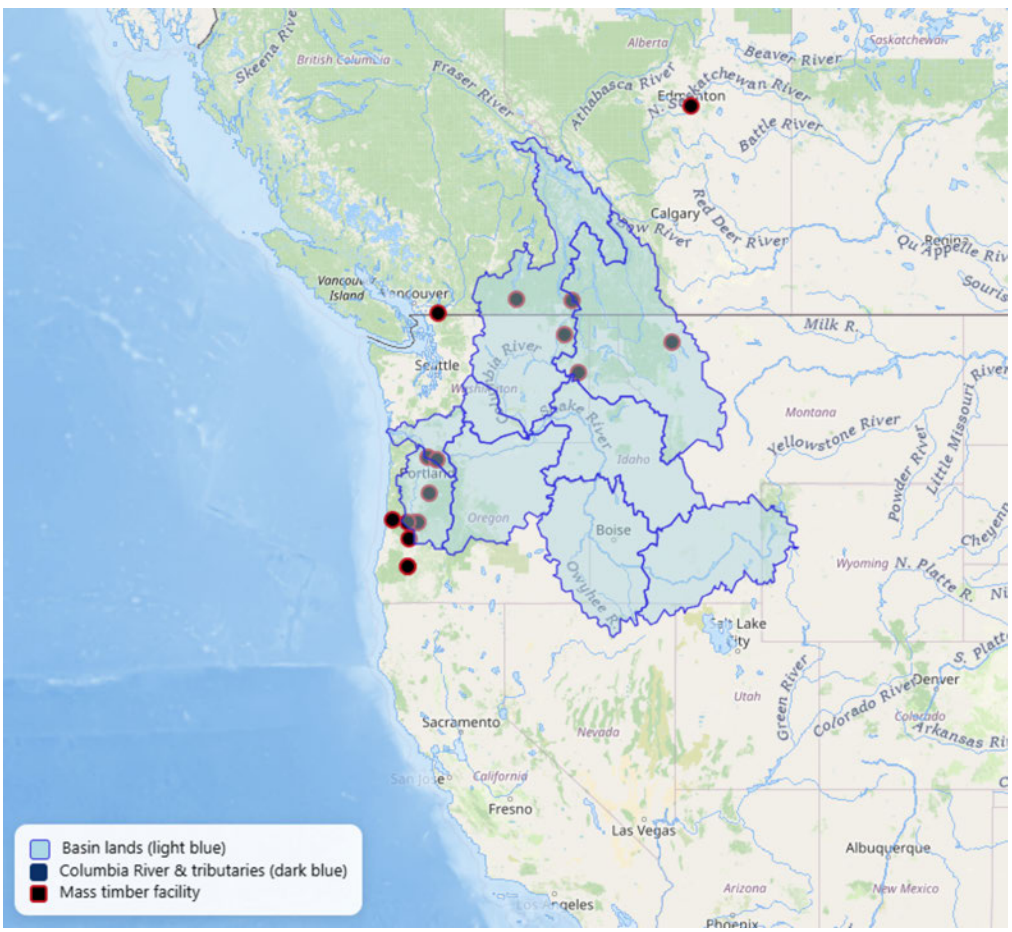
With that ethos and philosophy, there is still work to be done to strengthen the ecosystem in the PNW. The consulting team recommends a sharp focus on addressing feedstock lumber for glulam, growing manufacturing capacity and capability, educating current and future timber engineers, BIM system deployment, and developing workforce training programs for both technical design and skilled labor.

3.7.1 Ecosystem View Point

During project discussions, it was noted how many facilities appeared to operate within the drainage basin of the Columbia River, as shown in **Figure 3-6**. This common eco-region and trade corridor might be able to be further empowered and refined to ensure that strong market and production attributes are shared across boundaries. This ecosystem drainage basin may be considered in a larger context for water management, forestry practices, biomes, snow-water melt implications, forest fire impacts, and economic interconnectivity.

Regional leadership will rely on integration with, and not isolation from, other regional mass timber ecosystems across the globe.

Figure 3-6 - Mass Timber Manufacturing in the Columbia River Drainage Basin



Logging Operation

Photo Credit: Roy Anderson, The Beck Group

4. PNW Fiber Supply: Forests, Logs, and Lumber

Mass timber panels and glulam beams rely on consistent, high-quality inputs such as structural-grade lumber and, in some cases, veneer. This makes it important to understand the fiber supply chain that underpins these products. The cost, availability, and reliability of these fiber inputs are foundational to the economic viability and scalability of mass timber manufacturing. This is especially true in Oregon and Washington, where the industry is most concentrated and market demand is strong.

More specifically, this section examines the past, current, and projected availability of raw materials for mass timber panel and glulam manufacturing in the region. It traces the supply chain from standing timber through logging and transportation to sawmill infrastructure, with a focus on key raw material inputs such as logs and structural lumber.

Importantly, unlike commodity wood building materials markets (which can tolerate a broader range of log and lumber grades), mass timber production requires a more specific mix of species, grades, and sizes since the quality and consistency of these inputs directly affect panel performance, aesthetics, and structural certification. At the same time, mass timber manufacturers face the same broader supply chain pressures that affect the regional wood products industry, such as logging and trucking capacity constraints, sawmill consolidation, and volatile log markets that at times create higher fiber acquisition costs than other regions. As demand increases, these challenges may constrain growth or increase costs unless proactive strategies are implemented across the supply chain.

4.1 Key Definitions

Small diameter log

This term refers to logs that are large enough to produce lumber, but which are smaller than most sawmills prefer. Although the precise definition may vary by region and mill, small diameter logs are generally considered to be 6” (or slightly less) to 8” in diameter on the small end of the log. Note that logs can be up to 40’ long. Given that all tree stems have a natural taper in the diameter, a 40’ long log with a 6” small end diameter will have a large end diameter between 9” and 11” depending on the taper rate. Since ‘long logs’ are cut to short lengths called “blocks” before processing into lumber, some of the blocks from the butt end of a log may not be considered small diameter, but the top of the block from the small end of the same tree/log is considered small diameter.

Timberland

In the U.S. Forest Service’s Forest Inventory and Analysis (FIA) database, “timberland” is defined as forested land capable of producing at least 20 cubic feet of wood per acre per year and not administratively withdrawn from timber harvesting. In practice, this category represents the portion of the forest base that is both biologically productive and legally available for harvest. Lands such as National Parks, Wilderness Areas, and other restricted designations (e.g., roadless areas) are excluded. Because timberland encompasses the publicly and privately owned forests that can be actively managed, it serves as the foundation for evaluating wood supply in this report.

Lumber Species Groupings

A common practice in the softwood lumber industry is selling lumber as a mixed species group. These groupings are listed and described below and used in this report:

- **DF-L (Douglas Fir–Larch):** Combination of Douglas-fir and western larch, valued for strength, stiffness, and durability. Widely used in structural framing and engineered wood.
- **SPF (Spruce–Pine–Fir):** Canadian grouping of white spruce, lodgepole pine, balsam fir, and related species. Known for

light weight, good workability, and consistent fiber, commonly used in studs and general framing.

- **SPF-S (Spruce–Pine–Fir, South):** U.S. grouping (mainly in the Inland West and Rockies) that includes Engelmann spruce, lodgepole pine, and alpine fir. Slightly lower strength values than Canadian SPF.
- **H-F (Hem-Fir):** Mix of western hemlock and true firs (such as grand fir, noble fir, Pacific silver fir, white fir). Offers good strength and treatability, used in both structural and appearance-grade applications and modest use in mass timber.
- **SYP (Southern Yellow Pine):** Grouping of several southern pine species (loblolly, longleaf, shortleaf, slash). Very strong and stiff, with high density and excellent treatability. It is commonly used in trusses, decking, and pressure-treated products. It is seeing increasing use in CLT and glulam.

Westside Versus Eastside

In Oregon and Washington, the westside of the Cascades supports highly productive, fast-growing conifer forests dominated by Douglas-fir and hemlock. The drier east-side forests grow more slowly, with ponderosa pine, larch, and mixed conifers found in lower-density stands that often require thinning for wildfire risk reduction. This divide shapes regional wood supply, with the westside driving species specific high-volume structural lumber production and the Eastside providing a mix of species and generally smaller logs.

Stud, Dimension, and Specialty Sawmills

Stud mills are optimized for speed and high-volume output of lumber in widths of 2 x 6 or less and in lengths of 12′ or less. They frequently process smaller logs, and their products are generally used in wall framing. Dimension mills process a broader range of widths (2 x 4 through 2 x12) and lengths (usually 8′ to 16′, but sometimes up to 24′). They generally process larger logs to and serve structural markets like floor joists and roof trusses. Specialty mills focus on non-standard products such as large timbers, decking, cedar, pine boards, hardwoods, or lamstock for engineered wood. They often target large diameter, high-quality logs, operate at a smaller scale, and target niche, value-added markets.

4.2 Regional Forest Resources

The foundation of the Pacific Northwest's mass timber fiber supply chain begins with the region's forests. Oregon and Washington contain vast and diverse timberlands that vary by ownership, species composition, and management intensity, all of which influence the availability and cost of fiber for mass timber production.

This section provides an overview of the regional forest resource base, including acres of timberland by ownership category, standing inventory by species and owner type, and key indicators of sustainability such as growth-to-drain ratios. These metrics help illustrate the long-term potential of the forest to support increased production of mass timber products, while also highlighting differences in fiber accessibility across public and private lands.

Understanding how much timber is growing, how much is being harvested, and how that balance varies across ownerships and species is critical to evaluating future fiber supply for mass timber and glulam manufacturing.

It is important to note that the data presented in this section largely come from the U.S. Forest Service's Forest Inventory and Analysis (FIA) program. This long-running national forest monitoring system is based on a network of permanent sample plots, many of which have been in place for over 100 years. These plots are distributed across all ownerships and forest types and are revisited periodically, typically on a 10-year cycle in western states. With each return visit to a plot, measurements are made of the tree cover at the plot. In this way, information is gathered about the forests such as number, size, and species of trees.

Because of the large sample size and consistent methodology, FIA data provides statistically reliable estimates of forest conditions and trends over large geographic areas. However, due to the periodic nature of data collection, the results represent an average of conditions over the prior decade, not a single point in time. As such, the data must be interpreted as a rolling snapshot of long-term forest dynamics rather than a reflection of immediate or localized changes.

4.2.1 Timberland Ownership

Table 4-1 shows the acres of land in Oregon and Washington classified as timberland.

As shown in the table, Oregon and Washington together contain approximately 41.5 million acres of timberland. Of that total, about 23 million acres(56%) are publicly owned, managed by entities such as the U.S. Forest Service, Bureau of Land Management, Oregon Department of Forestry, and the Washington Department of Natural Resources. The remaining 44% are privately owned, split among small non-industrial landowners, timber investment management organizations (TIMOs), real estate investment trusts (REITs), industrial forest companies, and Tribes.

To provide additional context, Table 4.1 also includes timberland area by ownership type across a broader secondary region including California, Idaho, and Montana. While mills in these states primarily serve their own local markets, they occasionally supply logs to mills in Oregon and Washington. Collectively, these three states contain nearly 53 million acres of timberland, with roughly 70% under public ownership. This is a significantly higher share of public ownership than most other U.S. regions. For comparison, in the Southeastern U.S., a major structural lumber producing region, nearly 90% of the timberland base is privately held.

This heavy reliance on public ownership contrasts sharply with the U.S. South, which is the other major lumber-producing region. It means Federal and State policy decisions, more than biological capacity, are the gating factor in future supply.

Table 4-1 - Area of Timberland by Owner Type in Oregon and Washington and Secondary States (Acres)

	National Forest	Other Federal	State & Local	Private	Total	% of Total
Oregon	11,139,616	2,365,856	1,107,474	9,234,792	23,847,737	57%
Washington	5,695,320	153,390	2,783,898	9,036,364	17,668,969	43%
PNW Subtotal	**16,834,936**	**2,519,246**	**3,891,372**	**18,271,156**	**41,516,706**	**100%**
% of Total (PNW)	**41%**	**6%**	**9%**	**44%**	**100%**	
California	8,726,811	233,034	159,190	7,159,115	16,278,150	31%
Idaho	12,046,221	631,200	1,122,196	2,849,543	16,649,164	31%
Montana	11,986,618	840,449	1,006,004	6,172,692	20,005,769	38%
Secondary Region Subtotal	**32,759,650**	**1,704,683**	**2,287,390**	**16,181,350**	**52,933,083**	**100%**
% of Total (Secondary)	**62%**	**3%**	**4%**	**31%**	**100%**	
Grand Total	**49,594,586**	**4,223,929**	**6,178,762**	**34,452,506**	**94,449,789**	

These differences highlight the importance of forest management policies on public lands in the Pacific Northwest. Since the majority of the region's timberland is managed by public agencies, changes in Federal or State harvest policy can have a significant impact on the long-term availability of logs and, by extension, the supply of structural lumber and veneer needed for mass timber products. Forest management policies for public lands are discussed in Section 6.

Figure 4-1 provides a visualization of the parts of Oregon and Washington where trees are present (green shaded areas) and the portions of the forested areas that have been excluded from harvesting because they are Wilderness or Roadless areas, or National Parks.

4.3 Standing Timber Inventory by Owner Type

In addition to the total area of timberland, it is also important to consider the volume of standing trees, commonly referred to as the standing inventory. This metric provides insight into the amount of merchantable timber potentially available to support mass timber manufacturing in the region.

Table 4-2 shows that the PNW contains nearly 700 billion board feet (Scribner Log Scale) of standing sawtimber. Roughly 60% of that total is in Oregon, with the remainder in Washington. An additional 635 billion board feet of standing inventory are located in the surrounding secondary region of California, Idaho, and Montana. As with timberland acreage, the majority of this volume is located on publicly owned lands.

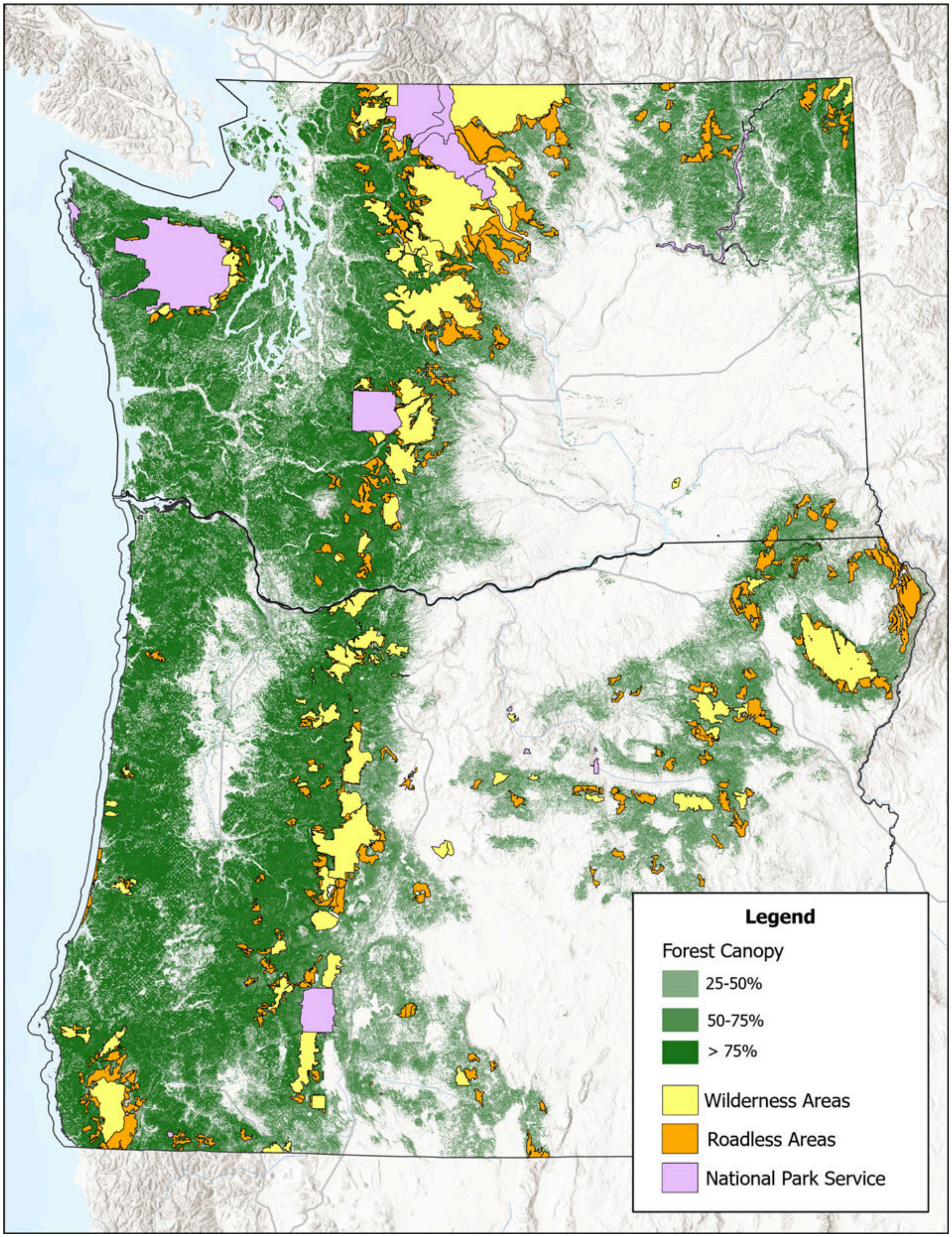
Several key points are worth noting about the data presented in Table 4-2:

- **Measurement Method:** The volume is reported using the Scribner Log Scale (see Section 2.2.2), which estimates how many board feet of lumber can be produced from a log. However, this scale was developed in the mid-1800s and includes assumptions that underestimate actual lumber recovery. These assumptions include full 1" lumber thickness, 1/4" saw kerf, and no allowance for log taper. As a result, modern mills typically recover 1.75 to 2.75 times more lumber than the Scribner scale predicts. For example, 1,000 board feet Scribner of logs may yield 1,750 to 2,750 board feet of lumber, depending on which variation of the Scribner scale is being used, log diameter, and mill efficiency.

Table 4-2 - Standing Volume of Sawtimber by Owner Type in Oregon, Washington, and Secondary States (Scribner Log Scale Board Feet in Billions)

	National Forest	Other Federal	State & Local	Private	Total
Oregon	230.6	75.9	24.3	83.2	414.1
Washington	129.9	4.3	54.6	93.7	282.4
PNW Subtotal	**360.5**	**80.2**	**78.9**	**176.9**	**696.5**
California	193.1	3.9	6.2	130.9	334.2
Idaho	142.9	6.2	11.8	21.5	182.5
Montana	89.4	2.9	5.4	20.6	118.2
Secondary Region Subtotal	**425.4**	**13**	**23.4**	**173.1**	**634.9**
Grand Total	**785.9**	**93.2**	**102.3**	**350**	**1,331.40**

Figure 4-1 - Map of PNW Forest, Wilderness, Roadless, and National Park Areas



- **Saw Timber Only:** The inventory volume reported here includes only sawtimber-sized trees, generally defined as those with diameters of 10" to 12"or larger (as measured at 4.5'above the ground), a small end diameter of at least 7" inside the bark, and a minimum length of 12'. Smaller trees that have not yet reached sawlog size are excluded, meaning that these data reflect only the currently merchantable portion of the standing timber resource. The smaller trees, while large in number, contain little cubic volume. Thus, excluding them from the inventory does not materially impact the reported inventory levels.

- **Contextualizing Supply Versus Demand:** Over the past five years, total North American lumber consumption has averaged approximately 59 billion board feet per year. Of that, Oregon and Washington produced about 9.4 billion board feet annually, or roughly 16% of total demand. Assuming an average 2:1 ratio of lumber recovery to Scribner log scale, this implies that annual log consumption to produce lumber in the region is about 4.7 billion board feet Scribner.

  When this annual log demand is compared to the region's total standing inventory of nearly 700 billion board feet, it represents just 0.67% (4.7 divided by 696.5) of the standing sawtimber volume being harvested per year across all ownerships. On public lands, recent annual harvests are estimated to only equal about 0.22% of the standing sawtimber volume. The annual harvest on private lands, in contrast, equals about 2.0% of the standing sawtimber volume on private lands. These statistics suggest that annual harvests are well below the total standing inventory, reinforcing the notion that there is ample timber in the forest. This is especially true on publicly owned and managed lands. Also, in addition to comparing growth to standing volume (as noted in the growth to drain analysis in **Section 4.7**), net annual growth exceeds harvests and natural mortality in Oregon and Washington.

  However, this picture is more complicated in practice. Not all standing inventory is economically or legally available for harvest due to a variety of constraints including land use designations, habitat protections, terrain limitations, and infrastructure access. Similarly, not all harvested logs are used for structural lumber and veneer production—the key raw materials for mass timber.

  These complexities are explored in the next section, which considers timber growth and removal dynamics, and how ownership and management influence the availability of fiber for mass timber manufacturing.

4.4 Standing Timber by Major Species Group

Beyond total standing timber volume by ownership, it is important to examine how that volume breaks down by species. The suitability of logs for mass timber products depends heavily on species characteristics such as strength, stiffness, and dimensional stability. The PRG-320 Standard for Performance Rated Cross-Laminated Timber requires lumber used in CLT to have a minimum specific gravity of 0.35 as published in the National Design Specification for Wood Construction (NDS).

In the Pacific Northwest, two species groupings dominate the available timber supply. The first is Douglas-fir, or mixes of Douglas-fir and western larch. Both are particularly valuable for both CLT and glulam applications. The second is Hem-fir, which is also used for CLT but is less preferred. It is not commonly used for glulam, but efforts are currently underway toward achieving broader market acceptance.

Importantly, as market dynamics affect the price of CLT and glulam lumber inputs to the mass timber sector, the manufacturers of CLT and glulam commonly look to substitute the locally available species with lower-cost species from other regions. Most commonly PNW mass timber manufacturers purchase Canadian SPF lumber, which is used for both CLT and glulam. Also used is SPF-S which is the same species group but denotes lumber that is produced south of the U.S./Canada border. Canadian SPF typically has better strength characteristics and is generally preferred over SPF-S. The threat of tariffs and the recent imposition of anti-dumping and countervailing duties are likely to affect the ability of CLT and glulam manufacturers to shift easily toward lower-cost sources. If tariffs and duties become long-term policy and as the size of the CLT and glulam market grows, close attention to the PNW supply chain will be needed. More lumber for the mass timber sector can become available through a variety of means.

Table 4-3 presents the standing inventory of sawtimber-sized trees in Oregon and Washington by ownership and species group, using the Scribner Log Scale. These figures reflect only trees that meet the minimum diameter thresholds for sawtimber, typically 10” or greater in diameter at breast height and excludes smaller trees or pulpwood-sized material.

Key Observations from **Table 4-3** include:

- **Douglas-fir/Larch Dominance:** Douglas-fir and larch dominate the standing sawtimber inventory in the region, accounting for approximately 379 billion board feet, or more than 54% of total volume. This makes them the principal fiber source for glulam and CLT production.
- **Significant Hemlock/Fir Volume:** Hemlock and true firs contribute an additional 154 billion board feet, concentrated particularly in western Washington and

Table 4-3 - Standing Volume of Saw Timber by Species and Owner Type in Oregon and Washington (Scribner Log Scale Board Feet in Billions)

	National Forest	Other Federal	State & Local	Private	Total
Oregon					
Douglas-fir/Larch	125	59.8	16.3	47.3	248.4
Hem/fir	50.9	0	0.7	14.2	65.8
All others	54.7	16.1	7.3	21.7	99.8
Oregon Total	**230.6**	**75.9**	**24.3**	**83.2**	**414.1**
Washington					
Douglas -fir/Larch	57.1	3.4	26	43.9	130.4
Hem/fir	53.4	0.4	16.4	17.7	87.90
All others	19.4	0.5	12.3	32	64.1
Washington Total	**129.9**	**4.3**	**54.6**	**93.7**	**282.4**
PNW Total					
Douglas- fir/Larch	182.1	63.2	42.2	91.2	378.8
Hem/fir	104.3	0.5	17.1	31.9	153.8
All others	74.1	16.5	19.6	53.8	164
PNW Total	**360.5**	**80.2**	**78.9**	**176.9**	**696.5**

parts of southwest Oregon. While generally lower in strength than Douglas-fir, these species are used in secondary structural components and lamstock.

- **Diverse "Other" Species:** Other species, including red cedar, ponderosa pine, lodgepole pine, hardwoods, and other miscellaneous softwoods, collectively represent 164 billion board feet, much of it concentrated on private lands and in mixed-conifer zones.
- **Public Land Concentration:** Public lands hold most of the inventory, with over 360 billion board feet in National Forests alone, reinforcing the impact of public land management policies on long-term fiber availability.
- **Substantial Base:** This species-level inventory confirms that the Pacific Northwest has a substantial base of suitable timber for mass timber manufacturing. However, access to this inventory is subject to a range of ecological, regulatory, and market constraints, which are explored in later sections of the report.

4.5 Implications of Ownership Distribution & Species Mix

As shown in the preceding sections, the species composition and ownership of forests in Oregon and Washington play a central role in determining the availability, reliability, and suitability of fiber for mass timber manufacturing. Ownership influences land management practices, harvest levels, and regulatory constraints, while species mix determines structural properties, market value, and processing compatibility.

Ownership Distribution

Based on USFS FIA data, approximately 56% of the forested land base in Oregon and Washington, shown in Figure 4-1, is publicly owned, which means it is managed by agencies such as U.S. Forest Service, Bureau of Land Management, Oregon Department of Forestry, and Washington Department of Natural Resources. The remaining 44% is privately held by a mix of small landowners, Tribes, and industrial forest companies, including TIMOs and REITs.

Public lands tend to encompass more remote or higher-elevation forests, with lower harvest levels due to ecological protections, road access limitations, and shifting policy priorities. In contrast, private lands (particularly industrial ownerships) are typically located in more productive, accessible areas and are actively managed for timber production on shorter rotations.

This ownership pattern has direct implications for fiber supply. Public land harvests are often subject to legal, political, or procedural delays, making supply from these sources less predictable. Private lands, by contrast, offer more stable and market-responsive log flows—especially important for mills producing mass timber components that require consistent input species and grades.

Species Mix and Forest Type

As shown in Table 4-3, Douglas-fir and larch account for over 54% of the standing sawtimber inventory in Oregon and Washington. These species are favored for mass timber applications due to their strength, stiffness, and availability in long, straight logs suitable for structural-grade lumber.

Hemlock and true firs make up an additional 22% of the standing inventory, with concentrations in western Washington and mixed conifer stands across both states. These species are often used in lamstock or for secondary elements of mass timber assemblies, but are generally less desirable for primary structural components due to their lower strength values.

The remaining 24% includes red cedar, ponderosa pine, lodgepole pine, and various hardwoods. While some of these species are commercially valuable, they are less commonly used in mass timber due to dimensional limitations, fiber properties, or lower market demand.

Intersection of Ownership and Species Mix

Private industrial lands are disproportionately weighted toward fast-growing, highly productive Douglas-fir forests, making them key to the structural lumber supply chain. National Forest lands have a broader species mix, with a higher share of true fir, hemlock, and pine, and are often located in more ecologically sensitive or lower-yield areas.

These differences are critical to understanding both current supply patterns and future risks. Mass timber producers that rely heavily on Douglas-fir from private lands might be more insulated from supply volatility than those dependent on variable or restricted public land harvests. At the same time, shifts in public land management or market utilization of underused species could significantly reshape the supply landscape over the next decade.

4.6 Timber Harvest Trends

Understanding recent timber harvest trends is essential to assessing fiber availability for mass timber manufacturing. While standing inventory and growth rates indicate the potential resource base, actual harvest levels determine how much of that resource enters the supply chain.

Figure 4-2 and Table 4-4 present annual timber harvest volumes by ownership and state for Oregon and Washington from 2002 through 2024, measured in million board feet (MMBF) Scribner. The data are segmented by private and public ownership and reflect commercial removals of sawtimber-sized logs across Oregon, Washington, and selected neighboring western states.

Key Observations from Figure 4-2 and Table 4-4 include:

- **Private Lands Dominate:** Private lands drive most harvests. In both Oregon and Washington, private landowners consistently account for most timber removals. From 2015 to 2024, private lands in the two states have averaged 4.7 billion board feet per year, or roughly 73% of total harvest volume.

Figure 4-2 - Average Annual Timber Harvest in Oregon and Washington

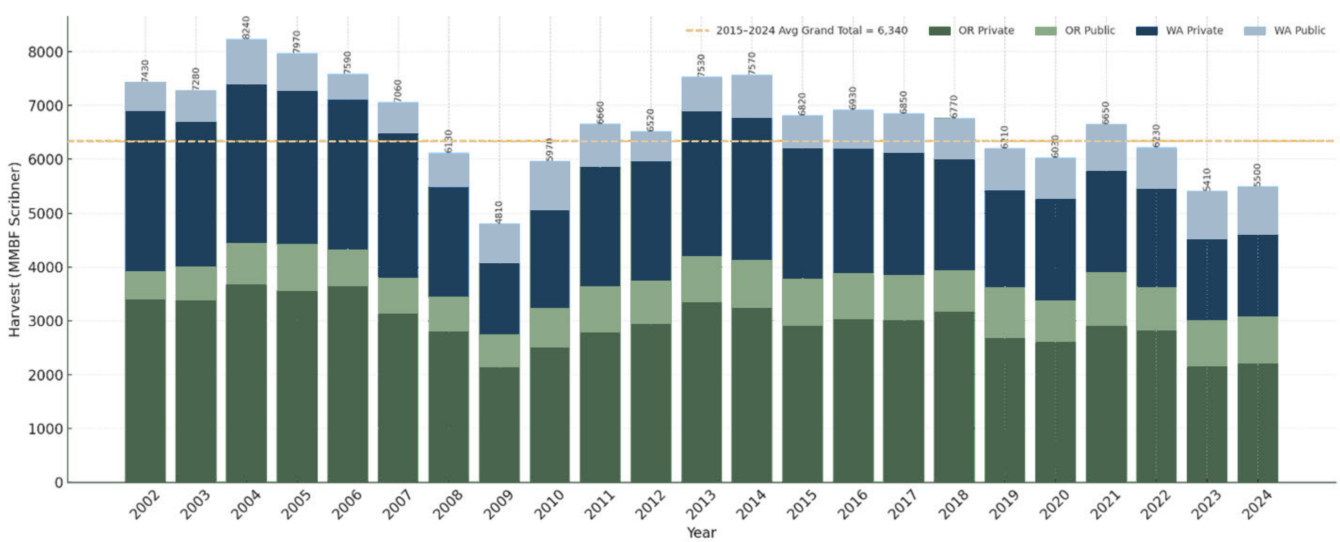


Table 4-4 - Average Annual Timber Harvest in Oregon and Washington 2002 to 2024 by Landowner Type (MMBF Scribner)

Year	OR Private	OR Public	OR Total	WA Private	WA Public	WA Total	Grand Total
2002	3,390	530	3,920	2,970	540	3,510	7,430
2003	3,380	630	4,010	2,690	580	3,270	7,280
2004	3,680	770	4,450	2,950	840	3,790	8,240
2005	3,560	860	4,420	2,860	690	3,550	7,970
2006	3,650	680	4,330	2,780	480	3,260	7,590
2007	3,130	670	3,800	2,690	570	3,260	7,060
2008	2,800	640	3,440	2,040	650	2,690	6,130
2009	2,140	600	2,740	1,340	730.00	2,070	4,810
2010	2,510	720	3,230	1,830	910	2,740	5,970
2011	2,790	860	3,650	2,200	810	3,010	6,660
2012	2,940	810	3,750	2,210	560	2,770	6,520
2013	3,340	860	4,200	2,700	630	3,330	7,530
2014	3,240	890	4,130	2,640	800	3,440	7,570
2015	2,900	890	3,790	2,420	610	3,030	6,820
2016	3,030	860	3,890	2,310	730	3,040	6,930
2017	3,010	840	3,850	2,280	720	3,000	6,850
2018	3,170	760	3,930	2,070	770	2,840	6,770
2019	2,680	950	3,630	1,790	790	2,580	6,210
2020	2,600	780	3,380	1,890	760	2,650	6,030
2021	2,900	1,000	3,900	1,880	870	2,750	6,650
2022	2,820	810	3,630	1,820	780	2,600	6,230
2023	2,150	850	3,000	1,520	890	2,410	5,410
2024	2,200	870	3,070	1,530	900	2,430	5,500
Annual Average 2015 to 2024	**2,750**	**860**	**3,610**	**1,950**	**780**	**2,730**	**6,340**

- **Oregon's Harvest Leadership:** Oregon remains the region's harvesting leader. Among the states shown, Oregon's private landowners harvested an average of 2.75 billion board feet annually between 2015 and 2024. Oregon's public lands contributed another 860 million board feet per year on average during the same period, bringing the state's total to over 3.6 billion board feet per year.
- **Washington's Significant Output:** Washington harvests are smaller but still significant. Washington private lands have averaged approximately 1.95 billion board feet per year since 2015, with public lands contributing an additional 780 million board feet for an annual total of about 2.73 billion board feet.
- **Shifting Harvest Levels:** Harvest levels in the early 2000s were strong, averaging over 7.5 billion board feet (Scribner) per

year. During the Great Recession, harvests declined severely, then rebounded to about 7.5 billion board feet per year by 2013-2014. For the past decade, harvest levels have been lower and more volatile, averaging about 6.3 billion board feet per year, which is about 15-20%lower than pre-recession peaks. The table also shows that Oregon consistently produces about a third more sawtimber annually than Washington.

- **Public Lands Lag:** Public land harvests remain low relative to forest area. Despite large areas of timberland on public lands (as shown in Section 2.1), public harvests in Oregon and Washington combined have averaged less than 1.7 billion board feet per year over the past decade.

- **Supply to Sawmills:** The harvest volumes presented in the preceding table and figure are the primary flow of logs into the region's sawmills, which in turn supply lumber and veneer for mass timber production. As discussed in later sections, constraints on harvest—especially on public lands—can limit the reliability of supply, even in areas with abundant standing timber.

4.7 Growth-to-Drain and Mortality-to-Drain Ratios

Growth-to-Drain (G:D) and Mortality-to-Drain (M:D) ratios are key indicators of forest resource sustainability and supply risk. The G:D ratio compares how much wood is growing annually versus how much is being removed through harvest or land use change. A ratio above 1.0 suggests a sustainable or expanding resource base. The M:D ratio compares natural mortality (insects, disease, fire as the cause of mortality) to harvest removals (harvest as the cause of mortality). In actively managed forests, the M:D ratios are commonly 0.25 or lower. As the value of an M:D ratio begins increasing above the level of about 0.25, it signals forest health concerns or underutilized volume. Together, these metrics help assess whether regional forests can support long-term, reliable feedstock for mass timber manufacturing.

Table 4-5 summarizes key forest sustainability metrics for Oregon and Washington timberlands, based on U.S. Forest Service FIA data. It breaks down annual net growth, mortality, and harvest removals (drain) across major ownership categories: USFS, other Federal, State, and local, and private. G:D and M:D ratios are calculated from these figures, providing insight into both the long-term sustainability of harvest levels and the extent of forest health challenges across ownerships. Recall that all data reflect timberland, which is forested land capable of growing at least 20 cubic feet of wood fiber per acre per year and that has not been administratively removed from timber harvesting. Also recall that FIA data should be interpreted as representing the average forest conditions over the prior 10 years.

Key Observations from Table 4-5 include:

- **Positive Growth-to-Drain:** The FIA data show that both Oregon and Washington maintain positive G:D ratios, indicating that forests across all ownerships are growing more than they are being harvested—a key sign of long-term sustainability.

- **Oregon Growth Ratios:** In Oregon, the total G:D ratio is 1.50, meaning annual growth exceeds annual total mortality by 50%. However, the ratio varies significantly by ownership. USFS lands have a high G:D of 3.01, suggesting significant underutilization. Private lands show a G:D of 1.02, indicating harvest levels are close to growth, but still sustainable. State and local lands also show a moderate buffer at 1.51.

- **Oregon Mortality Trends:** M:D ratios in Oregon are highest on USFS lands (2.10), implying that natural mortality is exceeding harvest by over 2:1. This is a possible signal of unmanaged or unhealthy forest conditions. In contrast, private lands have a low M:D of 0.13,

Table 4-5 - Timberland Area, Growth, Mortality, and Harvest by Ownership in Oregon and Washington (FIA Data)

Metric	Units	USFS	Other Fed	State & Local	Private	Total
Oregon						
Area	Million acres	11.14	2.37	1.11	9.23	23.85
Growth	Million FT3/year	537	243	118	930	1,827
Mortality	Million FT3/year	374	85	28	122	609
Drain	Million FT3/year	178	48	78	916	1,220
G to D	Ratio	3.01	5.03	1.51	1.02	1.5
M to D	Ratio	2.1	1.75	0.36	0.13	0.5
Washington						
Area	Million acres	5.7	0.15	2.78	9.04	17.67
Growth	Million FT3/year	250	15	268	826	1359
Mortality	Million FT3/year	309	6	122	206	643
Drain	Million FT3/year	74	15	270	753	1112
G to D	Ratio	3.37	0.99	0.99	1.1	1.22
M to D	Ratio	4.18	0.43	0.45	0.27	0.58

Legend for Shading of Cells in Preceding Table:

Growth-to-Drain (G/D) Ratio
- **≥ 3.0 – Dark Green:** Very high growth relative to removals (underutilized, potential for increased harvest)
- **2.0 – 2.99 – Medium Green:** Strong growth surplus
- **1.2 – 1.99 – Light Green:** Moderate growth surplus
- **0.8 – 1.19 – Light Orange:** Near balance (growth ≈ removals)
- **< 0.8 – Red:** Growth deficit (over cutting or declining productivity)

Mortality-to-Drain (M/D) Ratio
- **≥ 2.0 – Dark Red:** Mortality more than double removals (significant forest health concerns)
- **1.0 – 1.99 – Orange:** Mortality approaching or exceeding removals
- **0.5 – 0.99 – Yellow:** Moderate mortality relative to removals
- **< 0.5 – Light Gray:** Low mortality pressure

indicating active management and utilization.

- **Washington Mortality Trends:** In Washington, the overall G:D ratio is slightly lower at 1.22, with similar patterns by ownership. USFS lands again show the highest G:D at 3.37. Private lands remain near parity at 1.10, while State and local lands are at 0.99, just below the sustainability threshold. The M:D ratio on USFS lands in Washington is especially high at 4.18, indicating substantial natural mortality relative to harvest. This is a strong signal of potential forest health issues and underutilized wood fiber. Private and state lands again show lower M:D values (0.27 and 0.45, respectively), suggesting more active management.

4.8 Future Timber Availability

Reliable long-term timber supply is essential for supporting current and future mass timber manufacturing. While current growth-to-drain ratios suggest a sustainable forest base in

Oregon and Washington across all ownerships, actual future availability will depend on a range of policy, environmental, and legal factors, particularly on public lands. Future availability will depend on successful coordination between agencies, stakeholders, and the private sector to balance ecological goals with wood product demand.

4.8.1 Trends in Federal and State Land Access

Starting in the early 1990s, access to timber on Federal and State lands declined, largely due to protections afforded to endangered species such as the spotted owl. As a result, timber harvest levels remain well below biological growth, especially on Federal lands. However, Federal policies are beginning to change to increase harvesting, especially that aimed at reducing wildfire risk and improving forest health since there is growing recognition that unharvested forests are also highly susceptible to wildfire. State lands in Oregon and Washington have historically been managed more actively than Federal lands and they remain an important source of commercial supply. However, harvest levels on both ownership types are subject to political and administrative change. For example, in early 2025, the Washington Department of Natural Resources enacted a pause on timber harvesting in structurally complex mature forests to allow for analysis to establish criteria for managing them in a way that balances public values, climate commitments, and economic needs. Originally intended as a 6-month pause, in late August 2025 it was announced that of the nearly 500,000 acres of timberland being actively managed by the WA DNR, 77,000 acres are set aside from further harvesting.

4.8.2 Climate Impacts, Wildfire, and Forest Health Considerations

Climate-driven stress, including drought, insect outbreak, and increasingly severe wildfire, is having a growing impact on timber availability and forest conditions. High M:D ratios on public lands reflect unmanaged or deteriorating forest health, which in turn affects the quality and predictability of supply. While these challenges pose risks to traditional supply chains, they also create opportunities to align mass timber production with forest restoration goals, particularly in fire-prone landscapes. In some areas, this is affecting the viability of species where stands that were once Douglas-fir or Hem-fir are no longer viable, and pine species must be planted as replacements, reflecting a significant degradation in log value.

4.9 Logging and Log Trucking Capacity

The supply of logs to regional sawmills and veneer plants, and ultimately to mass timber manufacturers, depends on the availability of both logging and trucking capacity. Across much of the Pacific Northwest, the number of active logging contractors has declined over the past two decades due to an aging workforce, limited entry of new operators, high equipment costs, and cyclical market demand. Remaining contractors are generally well-equipped and experienced, but capacity can be constrained during peak harvest seasons, when weather compresses work windows, or when fire salvage operations drive urgent harvesting needs.

Trucking capacity faces similar pressures. Shortages of qualified drivers, rising fuel and maintenance costs, and stricter hours-of-service rules have tightened hauling availability. Average one-way haul distances for logs delivered from the forest to mills in the Coastal Pacific Northwest are typically about 60 miles. Haul distances typically increase east of the Cascades, with some mills hauling logs over 100 miles. As haul distances increase above those averages, load cycle times increase, which has the combined effect of increasing delivered log cost and reducing the trucking fleet's hauling capacity. Still, in some instances, large-diameter, high-quality logs are transported hundreds of miles. While these logging and trucking constraints are typically managed by sawmills and veneer producers rather than mass timber manufacturers directly, they can still result in higher lumber and panel prices, longer lead times, and greater exposure to supply chain volatility for downstream users.

Logging contractors in Oregon and Washington are generally well-equipped for handling the clearcut harvesting prescriptions that are commonly applied to industrial timberlands and that favor Douglas-fir plantation-style forest production. In this type of forestry common to industrial lands in Oregon and Washington, trees are typically harvested by a feller buncher. Then they are yarded to a landing in whole tree form, using ground-based machines, or if the ground is too steep, with cables. At the landing, the trees are manufactured into logs with a machine called a processor. Recently, feller bunchers have been tethered to anchor points so that they can operate on very steep slopes.

Selective thinning projects on Federal lands, particularly those tied to fire risk reduction, often use a different equipment configuration where trees are felled and then immediately processed into logs. Since the logs are shorter than the whole tree, the material can more easily be moved to a landing without damaging the remaining trees in the stand. These systems are called cut-to-length and are also used in the Pacific Northwest.

Looking ahead, modernization of equipment will depend less on technical capability—which already exists globally—and more on market integration and policy frameworks. Federal procurement, insurance considerations, and new value chains for small-diameter wood could shift the economics, making selective thinning more financially viable, especially if it were aimed at integrating with higher value products such as mass timber panels and beams.

4.10 Sawmill Infrastructure

CLT manufacturing relies on a consistent and high-quality supply of structural softwood lumber, typically kiln-dried 2x6 and 2x8 graded as No. 2 & Better. Glulam manufacturing also requires lumber as an input, but the quality requirements are more stringent, and a broader range of widths is commonly used. The availability, scale, and specialization of regional sawmill infrastructure directly affect the viability and competitiveness of mass timber and glulam production. As the following sections illustrate, Oregon and Washington have long been the leading lumber-producing states.

4.10.1 PNW Sawmill Capacity

This section examines the number, location, and output of mills producing mass timber-grade material, with attention to species mix, product types, and the degree of integration with downstream engineered wood production. We provide a broad overview of historical lumber production in North America and then analyze the PNW in more detail.

Table 4-6 provides an estimate of the number of stud, dimension, and specialty sawmills in Oregon. It also shows the number of veneer mills and plywood mills in both states. As the data in the table illustrates, Oregon and

Table 4-6 - Operating Wood Products Mills by Type in Oregon and Washington (Count of Mills, Beck Group Estimate)

Mill Type	OR	WA	Total
Dimension	19	12	31
Stud	11	7	18
Specialty	18	21	39
Lumber Total	**48**	**40**	**88**
Veneer	6	3	9
Plywood	13	4	17
Veneer/Plywood Total	**19**	**7**	**26**
Total	**67**	**47**	**114**

Washington together have 114 mills producing lumber and panel products. Lumber mills account for the majority, with 88 facilities across both states including 31 producing dimension lumber, 18 producing studs, and 39 classified as specialty mills, which includes those producing any combination of hardwood lumber, large timbers, pine shop/boards, cedar, or other specialty products such as CLT and lamstock. Oregon has a slightly higher share of lumber mills (48) compared to Washington (40). Panel production is concentrated in 26 veneer and plywood mills, with Oregon again holding a larger share (19) than Washington (7). Overall, Oregon's total of 67 mills represents nearly 60% of the combined regional total on a count basis. Additionally, **Figure 4-3** provides a map showing the location of the mills in the PNW region.

Table 4-7 provides an estimate of the annual production capacity of the mills in Oregon and Washington. The combined lumber production capacity in Oregon and Washington totals nearly 11.7 billion board feet (MBM) annually. Dimension mills account for the largest share at 5.62 billion MBM, followed by stud mills at 4.17 billion MBM and specialty mills at 1.91 billion MBM. Oregon holds a capacity advantage in both dimension and stud mills, while Washington has a slight edge in specialty mill capacity.

Panel production capacity totals 5.18 billion square feet (3/8" basis), split between veneer (2.13 billion MSF) and plywood (3.06 billion MSF). Oregon again leads, with more than 78% of total veneer and plywood capacity located in the state. Please note that several facilities produce veneer only, without on-site plywood manufacturing. They then sell their output to other plywood producers or laminated veneer lumber (LVL) manufacturers.

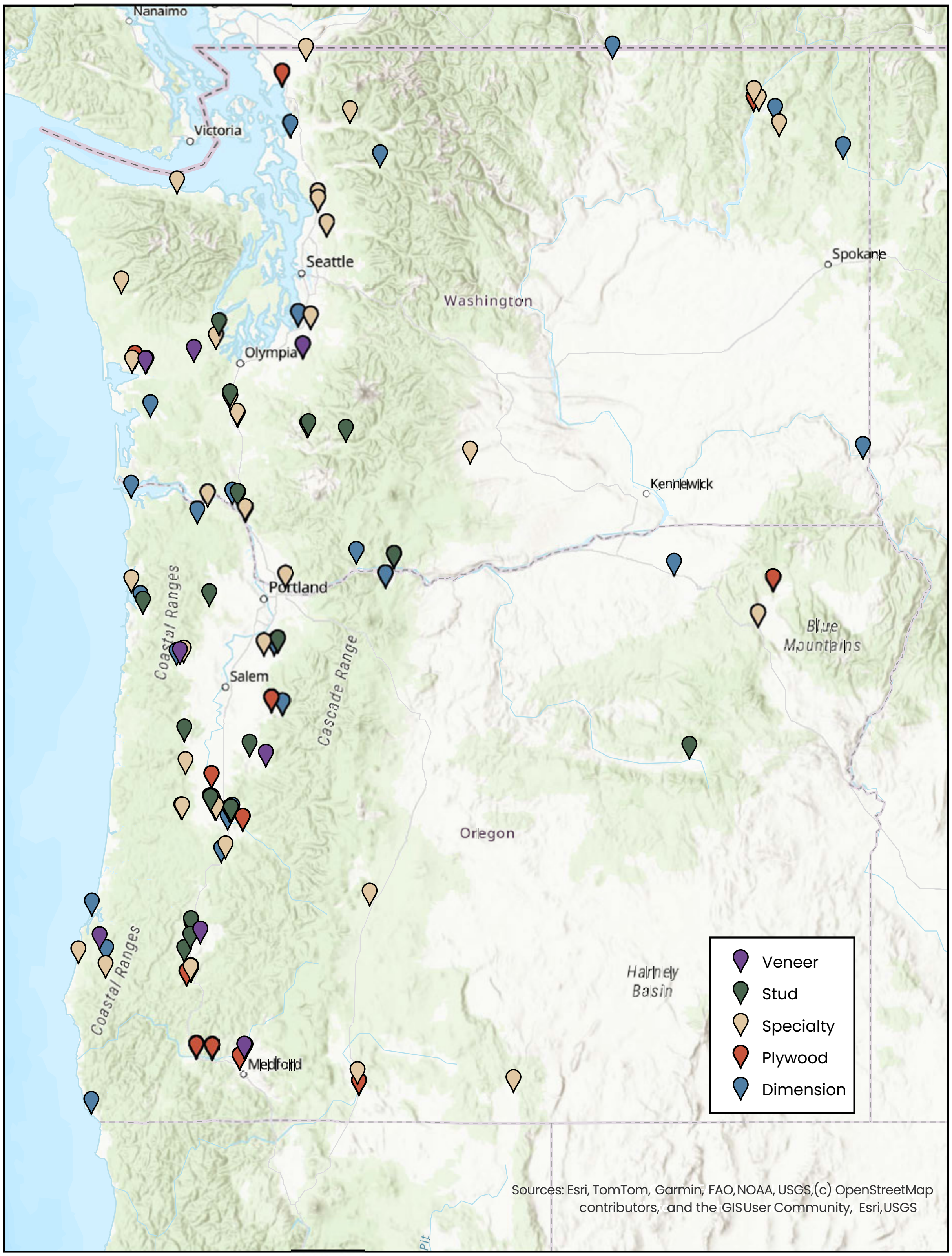
This information indicates that the high concentration of dimension and specialty lumber production in both states provides a substantial supply of raw material well suited for value-added engineered wood products. Lumber from these mills, particularly in structural grades and wider dimensions, serves as feedstock for mass timber panels and for glue laminated timber (glulam) beams and columns. Unlike many other lumber-producing regions of North America, Oregon and Washington also have significant downstream engineered wood manufacturing capacity located close to the source of supply. This tight geographic integration between primary lumber production and engineered wood manufacturing has supported rapid growth in the Pacific Northwest's mass timber sector and reinforced regional demand for high-quality lumber.

Despite these positive findings, several factors that limit mass timber manufacturers' ability to source raw materials that consistently

Table 4-7 - Estimated Annual Production Capacity of Mills Operating in Oregon and Washington (Beck Group Estimate)

Mill Type	Unit of Measurement	OR Capacity	WA Capacity	Total Capacity
Dimension	MBM	3,170,000	2,452,000	5,622,000
Stud	MBM	2,465,000	1,703,000	4,168,000
Specialty	MBM	864,000	1,042,500	1,906,500
Lumber Total	**MBM**	**6,499,000**	**5,197,500**	**11,696,500**
Veneer	MSF (3/8" basis)	1,745,000	380,000	2,125,000
Plywood	MSF (3/8" basis)	2,330,000	725,000	3,055,000
Veneer/Plywood Total	**MSF (3/8" basis)**	**4,075,000**	**1,105,000**	**5,180,000**

Figure 4-3 - Mills in the PNW Region



match their exact specifications. It is estimated that about 15% of the softwood lumber produced in the western U.S. is produced to sizes other than the 1.5" nominal thickness characteristic of stud and dimension lumber. For example, this includes stud and dimension mills that produce small timbers (e.g., 4x4, 4x6, 6x6, etc.; large timbers, and lumber than is only 1" thick (which is currently usually graded as non-structural)). Also, about 15% of the stud and dimension production is below#2 grade lumber. While #3 grade lumber can be used in CLT panels, it is not common. Yet another limiting factor is that price and usage specifications combine to favor using 2x6 and 2x8 in mass timber. Those widths typically account for about 30% and 10% of dimension and stud production, respectively. Other limiting factors are described in more detail in **Section 7**.

Per data from the Western Wood Products Association (WWPA), **Table 4-8** illustrates actual lumber production figures for Oregon and Washington over the last five years. The data show that both states have consistently produced large volumes of structural softwood lumber, with Douglas-fir and larch dominating output in both states. These species are particularly valued in mass timber panel and glulam production for their high strength, stiffness, and dimensional stability.

In Oregon, Douglas-fir and larch accounted for roughly 79% of total production in 2024 (3.79 billion board feet out of 4.79 billion), while Hem-fir represented about 16%. Washington's mix is more diversified, with Douglas-fir and larch making up 68% of output in 2024 (2.64 billion board feet out of 3.90 billion), Hem-fir at 21%, and smaller volumes of other mixed softwoods. Most of the latter is commonly sold as SPF-S, which denotes a mix of spruce, pine, and fir produced south of the U.S./Canadian border.

While total production has trended slightly downward since 2021, the sustained high share of Douglas-fir and larch ensures a steady supply of prime feedstock for mass timber panels and glulam manufacturing. Hem-fir, while somewhat lower in strength properties, remains an important component for certain mass timber layups.

Also note that, when compared to estimated mill capacity, recent lumber production in both Oregon and Washington has been operating below potential. In 2024, combined output from the two states totaled roughly 8.7 billion board feet, or about 74% of the estimated 11.7 billion board feet of capacity. This gap reflects a combination of factors, including market demand cycles, log availability, labor constraints, and downtime

Table 4-8 - Oregon and Washington Softwood Lumber Production by Species, 2020–2024 (MMBM/Year)

Oregon	**2020**	**2021**	**2022**	**2023**	**2024**
Douglas-fir & Larch	4,270	4,576	4,357	4,180	3,786
Hem-Fir	807	791	793	771	778
Other Mixed Softwood	223	252	239	226	222
Oregon Total	**5,299**	**5,620**	**5,390**	**5,177**	**4,785**
Washington	**2020**	**2021**	**2022**	**2023**	**2024**
Douglas-fir & Larch	2,662	2,808	2,671	2,665	2,640
Hem-Fir	1,050	931	898	812	799
Other Mixed Softwood	391	382	394	356	322
Ponderosa Pine	124	157	121	122	140
Washington Total	**4,228**	**4,278**	**4,084**	**3,954**	**3,900**

for maintenance or capital projects. While some level of unused capacity is normal, sustained underutilization can signal structural issues such as log supply pressure or persistent weak demand. Conversely, it also indicates that the region's manufacturing base has room to respond quickly if market conditions strengthen and raw material availability improves.

In summary, compared to many other lumber-producing regions, the Pacific Northwest's combination of species mix, high structural grades, and proximity to established engineered wood manufacturers offers a competitive advantage for downstream mass timber production. However, as noted in the constraints section, mill sorting practices, kiln drying capacity, size availability, and competition from other markets can limit the ability of mass timber producers to source material that matches their precise specifications.

Finally, per data from the Western Wood Products Association (WWPA), **Table 4-9** illustrates how lumber production in Oregon and Washington dwarfs that of other western states, further illustrating the PNW's dominance in lumber production across the western U.S. Combined, the two states account for two-thirds of the production in the U.S. West. However, the table also shows how lumber production declined from 14.7 billion board feet in 2021 to 13.0 billion board feet in 2024. While a small percentage of the change is due to changing forest policy's restrictions on log supply, most of the change in production can be attributed to poor market conditions and relatively low lumber demand.

Table 4-9 - Western U.S. Lumber Production by State 2020-2024 (MMBM/Year)

State	2020	2021	2022	2023	2024	Average
Oregon	5,299	5,620	5,390	5,177	4,785	5,254
Washington	4,228	4,278	4,084	3,954	3,900	4,089
California	2,246	2,189	2,151	2,069	2,056	2,142
Idaho	1,852	1,818	1,793	1,824	1,693	1,796
Montana	446	429	324	319	314	366
South Dakota/Wyoming	238	204	171	148	136	179
Four Corners (AZ, CO, NM, UT)	144	163	181	152	131	154
Total	**14,453**	**14,701**	**14,094**	**13,643**	**13,015**	**13,981**

Given all the preceding information, **Table 4-10** provides a "step-down" filter of the suitability of lumber produced in the PNW for CLT manufacturing. Oregon and Washington together annually produce about 9.3 billion board feet (BBF) of lumber. Of this volume, roughly 1.4 BBF consists of products that are not 1.5" thick (the most common thickness for North American softwood lumber), leaving 7.9 BBF in standard thicknesses. From there, about 1.2 BBF falls short of #2 grade, reducing the supply of usable higher-grade lumber to 6.7 BBF. Note, that while #3 grade can be used in the minor direction layers of CLT panels, most manufacturers elect to only purchase #2 grade to simplify their production processes. Finally, filtering out dimensions other than 2x6 or 2x8 excludes about 4.0 BBF. This leaves 2.8 BBF of well-suited lumber for CLT applications.

Groups like Nordic in Quebec primarily use small diameter black spruce in 2x3 or 2x4 dimensions for both glulam and CLT input lumber; however, this requires different

Table 4-10 - "Step-Down" Filter of Lumber Supply Suitability (all units in board feet of lumber in billions)

Annual Volume	Description
9.3	Annual Production in OR and WA
1.4	Less: Portion of annual production that is not 1.5" thick
7.9	Equals: Remaining volume
1.2	Less: Portion that is not at least #2 grade
6.7	Equals: Remaining volume
4	Less: Portion that is not 2x6 or 2x8
2.8	**Equals: Remaining "well-suited" CLT volume**

manufacturing throughput speeds, particularly on finger jointed lumber, meanwhile lamstock (laminating stock for glued laminated timber) has more stringent quality requirements, which constrains suitability, but uses a broader range of widths. Thus, the annual volume of well-suited material for lamstock is likely similar. However, given the more stringent grade requirements, longer drying time and the associated increased risk of degrade in the kilns, relatively few mills are actively producing lamstock in the PNW. As described in other sections of this report, there are opportunities to increase the proportion of the lumber supply well suited to mass timber.

This table illustrates that while the region produces nearly 9.3 BBF annually, only ~30% aligns with CLT specifications—underscoring the importance of species, grade, and mill configuration in mass timber viability. For glulam the well-suited annual volume is much lower due to limited willingness of mills to produce lumber to its strict specifications. Additionally, the tighter quality specifications for CLT and lamstock translate into mass timber manufacturers paying significant premiums for their lumber feedstocks.

While both Oregon and Washington produce more lumber and have more sawmills than most other states, provinces, and regions of North America, the infrastructure is not fully optimized for the requirements of mass timber feedstock.

4.10.2 Byproducts and Residuals

Although it depends heavily on log size and the sizes of the lumber being produced, on average only about 50% of the cubic volume of each log is recovered as lumber. The balance is a mix of bark, sawdust, planer shavings, and chips. These materials are part of the region's well-developed "fiber cascade," in which wood fiber is first used in its highest-value application, then recovered and repurposed in progressively lower-value products over its lifecycle. For example, in the Pacific Northwest, much of this fiber is already captured by established markets. Chips from sawmills and plywood plants are a critical feedstock for the region's pulp and paper mills. Sawdust and shavings are in demand for animal bedding, wood pellets, particleboard, and medium-density fiberboard (MDF) production. Bark is widely used for landscaping mulch and soil amendments. At certain times of the year and under specific market conditions, all mill residuals can also be consumed in biomass boilers for process heat or to generate electricity, either for internal use or for sale to utility-scale biomass power plants.

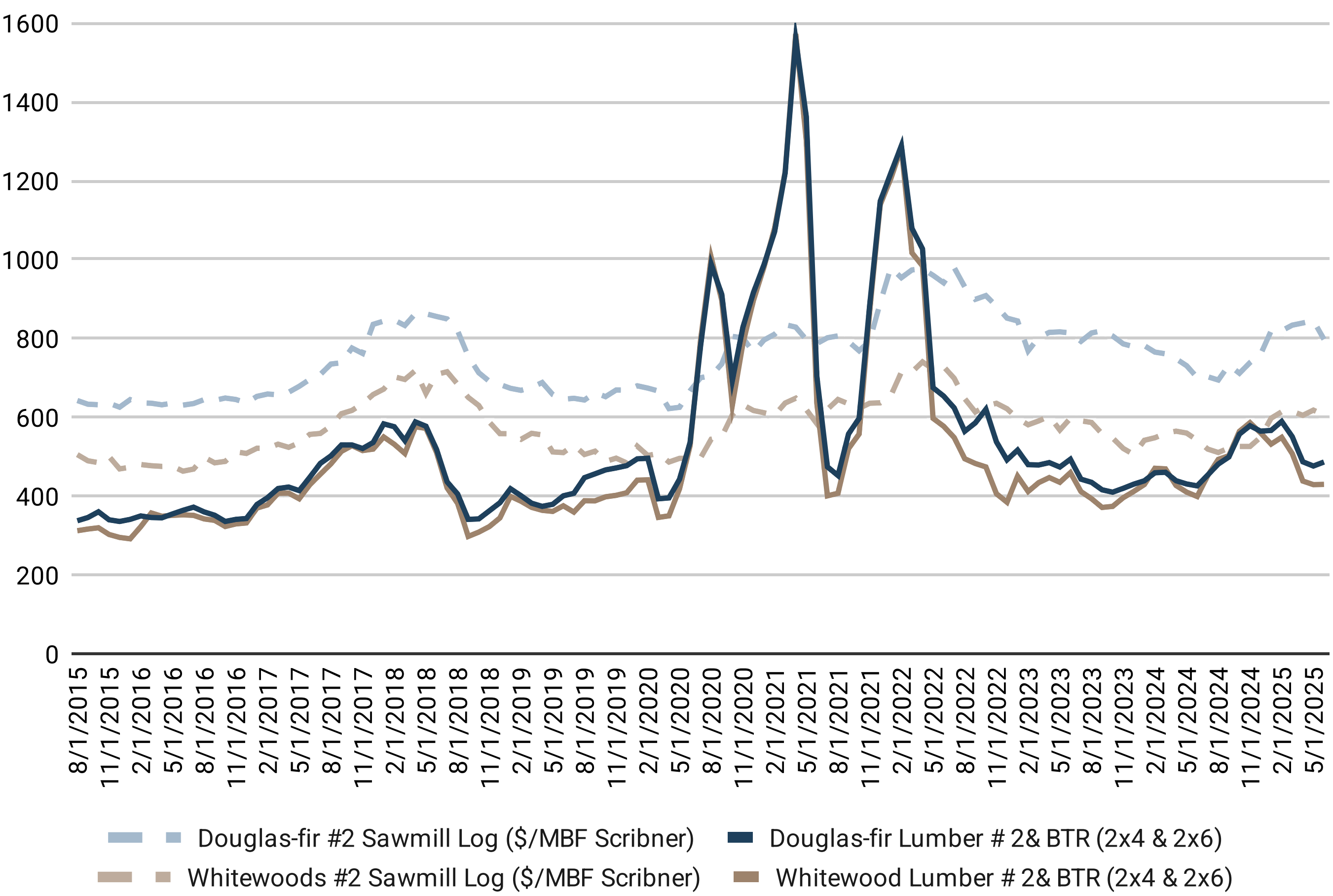
This high utilization is important to the long-term viability of sawmills and veneer/plywood producers because it not only creates an additional revenue stream but also ensures by-products can be moved offsite cost-effectively before they begin to occupy excessive space. In contrast, some other lumber-producing regions lack this level of supporting infrastructure, which can result in fewer dependable outlets for by-products. In those areas, mills may face higher disposal costs, lower residual values, or even operational constraints when by-product stockpiles build up. The Pacific Northwest's robust by-product markets therefore provide a competitive advantage by helping maintain both economic and operational efficiency in primary manufacturing.

4.11 Delivered Log Cost and Lumber Price Trends

Figure 4-4 illustrates a log cost and lumber price history in the PNW from 2015 to the present. While the information is specific to the PNW, the major patterns are consistent across all North America. As the data indicate, lumber prices have been on a rollercoaster since 2020. Prices reached nearly $1,600/MBM during the pandemic-era housing boom (May 2021), then fell to about $400/MBM in late 2023 and have steadied around $500/MBM through mid-2025. The wild swings during the COVID era were driven by a combination of increased demand in the repair and remodeling sector and limited availability of labor to increase production. Mass timber has remained a bit player, drawing well under 2% of the continent's framing lumber output. At that scale, CLT and glulam have virtually no leverage over headline price indices.

The same distinction applies to raw logs. Pacific Northwest sawmills often point to "tight" log supply, yet delivered-log prices did not increase dramatically during the period when lumber prices were at historic highs. Still, 9 mills (8 sawmills and 1 plywood plant) have shut down in OR and WA over the last several years. Most have attributed the cause to log supply shortages. Importantly, note that log prices in the figure are on a $/MBF Scribner basis. Since 1,000 board feet of logs translate into anywhere from about 1.75 to 2.75

Figure 4-4 - PNW Log and Lumber Pricing History 2015 to 2025 (source: RISI $/MBF for logs and $/MBM for lumber)



thousand board feet of lumber, the price for logs is higher than the price for lumber.

Specific to the mass timber sector, the real chokepoint is not how many logs are available, but what mills are willing to do with them. Standard 2×6 and 2×8 for CLT can be bought in the open market almost any week of the year; high-grade lamstock for glulam cannot. It requires extra kiln time and much tighter planing tolerances—steps that slow throughput and erode margin on a commodity mill's core business. Many producers simply decline to make the switch, so occasional shortages in glulam fiber stem from opportunity-cost decisions, not a physical lack of timber.

Softwood lumber duties between United States and Canada add another layer of cost, raising the floor price on both sides of the border. Because mass-timber volumes are so small—and are diversified across Douglas-fir, SPF, and SYP—the duties do not single it out for special disadvantage. Canadian mills still pay the same continent-wide market rate as U.S. mills. If a vertically integrated firm discounts lumber to its own mass timber line, it merely shifts profit from the sawmill ledger to the manufacturing ledger without changing the enterprise-level economics.

Viewed from 2020-2025, mass timber has not moved the North American lumber-price needle. It has, however, exposed a niche gap in the supply chain for glulam-grade fiber. Incentives that make it worthwhile for mills to run tighter-tolerance lamstock, or invest in dedicated lamstock facilities, would likely have a far greater practical effect on project delivery than any broad policy aimed at log supply or lumber pricing.

4.12 Forest Restoration Activity Contribution to Fiber Supply

Increased levels of forest restoration work on Federal lands in Oregon and Washington can increase timber harvest volumes. This is expected to benefit the broader forest products supply chain by supporting mill infrastructure, sustaining logging capacity, and helping stabilize delivered log costs. For the mass timber sector, however, most of the material generated from thinning and fuel reduction treatments is in the form of smaller diameter logs, which yield narrow lumber. This log size profile from restoration work is not likely to be a direct benefit to the mass timber sector, since relatively little 2x4 dimension lumber is used. Rather, wider dimensions (e.g., 2x6 and wider) are much more commonly used. The factors constraining 2x4 use include that it cannot easily be used in CLT panel cross layers because of potential for rolling shear with narrower pieces. Also, production in the finger jointing part of the process is heavily reduced when running 2x4 versus wider widths; this translates into higher cost. Still, other regions of North America such as eastern Canada, where log sizes are small, are using a narrower mix of widths to make CLT panels. However, those producers must take extra measures, such as edge-gluing 2x4 used in cross layers.

Additionally, sawmills must have specialized equipment to cost-effectively process small diameter stems. In other words, because sawmilling is a linear process and because there are fewer board feet per linear foot in small diameter logs, the mills must run very fast to still achieve volumes equivalent to mills running larger average log sizes. Few mills in the region have invested in this type of equipment, given that up to this point there has been adequate supply of larger sawlogs.

Restoration material is not a direct volume solution, but it can play a niche role in strengthening the lamstock supply chain while reinforcing contractor and mill capacity.

A notable exception is the Vaagen Brothers sawmill in Colville, Washington. Their mill is surrounded by Federally managed lands where the focus is on removing small diameter trees. The owners at Vaagen recognized this and purchased sawmilling equipment that can cost-effectively process smaller logs.

There is a notable upside. Many of the trees removed from overstocked stands have grown slowly in diameter due to intense competition for light and nutrients. The result is trees with much more tightly spaced growth rings, which translates into improved stiffness and strength—key properties for lamstock used in glulam and veneer used in LVL and mass plywood panels. Over time, restoration also promotes forest stand health and growth conditions that support higher-quality logs in future harvests. While the immediate forest restoration log size mix may not perfectly match mass timber's needs, the long-term effect can be a stronger, more reliable industry infrastructure and healthy forests that produce high-grade fiber.

4.13 Regional Fiber Supply Compared to Competing Regions

Table 4-11 provides shows a five-year history of the North American lumber balance. It provides an important context for assessing current and future raw material availability for mass timber manufacturing. In 2024, total U.S. lumber production declined slightly to 36.7 billion board feet (BBF), with the South contributing the majority (22.1 BBF) and the West continuing a downward trend to just over 13.0 BBF. This output from the PNW reflects ongoing weak demand, constraints on log supply, mill closures, and wildfire-related impacts.

The table shows that Canada's production also declined, reaching 20.3 BBF, with British Columbia continuing to see significant contraction. Exports from Canada to the U.S. remain substantial at 11.9 BBF, though down from a high of 13.7 BBF in 2021.

Overall, apparent U.S. consumption in 2024 stood at 50.4 BBF, while North American consumption totaled 57.6 BBF. Imports from offshore and declining domestic output have helped balance the supply gap, but this trend raises long-term questions about raw material availability for engineered wood products like CLT and glulam, especially as demand grows.

These figures highlight the importance of regional sawmill infrastructure and the need to strengthen domestic supply chains, particularly considering declining western output and increasing reliance on southern and offshore lumber sources.

Note from **Table 4-11**, for the whole period shown, U.S. per capita lumber consumption is about 150 BF/ year, compared to about 180 BF/ year in Canada. However, Canada's consumption has softened; per capita use in Canada peaked in 2021 around 210 BF and has since fallen back toward 180. This drop mirrors the decline in Canadian housing starts and affordability constraints. These factors have implications for the lumber industry. Because of the U.S. market's sheer size, even small changes in per capita consumption (for example, +5 BF), equate to 1.5 to 2.0 BBF in additional demand. This makes U.S. housing and non-residential building construction policy critical to global trade flows. Regarding the Canadian market, though smaller in absolute terms, the higher per capita use reflects stronger cultural reliance on wood. Canadian consumption is less likely to grow significantly, but maintaining consumption around 7-8 BBF/year helps stabilize domestic producers. Still, Canada is heavily trade-dependent, since more than 60% of production goes to the U.S. This trade reliance will persist as domestic demand softens, meaning U.S. per capita consumption trends will drive Canadian mill viability. This opens questions for further discussion as to why Canada has a higher lumber utilization than the U.S., to be further explored in the policy section.

Table 4-11 - North American Lumber Production, Trade, and Consumption Balance, 2020–2024 (Board Feet in Billions, as reported by WWPA)

The U.S. Lumber Balance (Billion Board Feet)	2020	2021	2022	2023	2024
U.S. Production Total	36.907	37.304	37.712	37.311	36.655
U.S. West	14.453	14.7	13.97	13.642	13.016
U.S. South	20.793	20.932	22.161	22.127	22.097
U.S. Other	1.661	1.672	1.581	1.542	1.542
Plus Imports	15.227	16.01	16.611	15.552	15.027
From Canada	13.122	13.699	12.786	11.9	11.932
Non-Canadian Imports	2.105	2.311	3.825	3.62	3.096
Less Exports	1.117	1.444	1.328	1.322	1.316
= Net Trade	-14.11	-14.566	-15.283	-14.23	-13.711
= Apparent U.S. Consumption	**51.017**	**51.87**	**52.995**	**51.541**	**50.366**
The Canadian Lumber Balance (Billion Board Feet)	**2020**	**2021**	**2022**	**2023**	**2024**
Canadian Production Total	23.056	23.666	21.423	20.418	20.297
British Columbia	8.921	9.213	7.867	7.018	6.656
East of the Rockies	14.135	14.453	13.556	13.4	13.641
Plus Imports	0.31	0.404	0.358	0.288	0.271
Less Exports	15.436	15.629	14.271	13.417	13.371
To U.S.	13.122	13.699	12.786	11.9	11.932
To China	1.24	0.706	0.531	0.643	0.55
To Japan	0.581	0.588	0.473	0.392	0.421
To Other	0.493	0.636	0.481	0.482	0.468
= Net Trade	15.126	15.225	13.913	13.129	13.1
= Apparent Canadian Consumption	**7.93**	**8.441**	**7.51**	**7.289**	**7.197**
North American Summary (Billion Board Feet)	**2020**	**2021**	**2022**	**2023**	**2024**
Total N.A. Production	59.963	60.97	59.135	57.729	56.952
Less: Canadian Exports to Offshore	2.314	1.93	1.485	1.517	1.439
Less: U.S. Exports to Offshore	1.117	1.444	1.328	1.322	1.316
Plus: Canadian Imports from Offshore	0.31	0.404	0.358	0.288	0.271
Plus: U.S. Imports from Offshore	2.105	2.311	3.825	3.62	3.096
= Apparent North American Consumption	**58.947**	**60.311**	**60.505**	**58.798**	**57.564**

In summary, from a raw material supply perspective:
South = Volume + Cost Advantage;
PNW = Structural Grade Douglas-fir Advantage;
Canada = Critical for SPF imports, but production levels are highly trade-dependent.

4.14 Forest, Sawmill, and Contractor Supply Chain Risks

Mass timber production depends on a complex, multi-stage supply chain that begins in the forest and extends through sawmills and panel plants before reaching the manufacturer. Several factors influence the availability, price, and reliability of raw material supply, and disruptions at any stage can affect downstream mass timber producers.

Forest Inventory and Growth

The long-term sustainability of wood supply depends on the balance between timber growth and harvest. While Pacific Northwest forests remain highly productive, certain species, sizes, or grades required for structural lumber may be in tighter supply depending on location, ownership, and management objectives.

Increasing Wildfire Activity

Larger, more frequent wildfires in the region can disrupt supply in multiple ways. Fires can damage standing timber, making it unsuitable for structural use; temporarily restrict access to forests; and shift harvesting priorities toward salvage operations, which often require rapid logging and can displace planned green-timber harvests.

Forest Management Policy and Regulation

Federal, State, and local forest management policies influence both the volume and timing of timber harvests. Regulatory processes such as environmental review, endangered species protections, and road access permits can lengthen planning timelines and create uncertainty around supply.

Sawmilling Capacity

Mass timber producers depend on regional sawmills for structural-grade lumber, and in two cases in Oregon and Washington, veneer. Mill closures, equipment downtime, or capacity constraints(often driven by market cycles) can reduce availability of the specific products mass timber requires.

Log Supply and Market Volatility

Log prices fluctuate with housing demand, export market activity, and competing uses such as biomass or non-structural panel products. Short-term supply disruptions can have an outsized effect on specialty grades and dimensions used in mass timber production.

Tariffs and Trade Policy

Import and export tariffs can alter the competitive landscape, affecting both the cost of imported lumber and the market for domestically produced products. For example, duties or tariffs on Canadian softwood lumber have historically influenced pricing and supply in U.S. markets, pushing lumber prices higher but enabling more U.S. supply to come online in the longer term.

Logging Contractor Availability

The number of active logging firms in the Pacific Northwest has declined over the past two decades due to workforce aging, high equipment costs, and cyclical demand. Reduced capacity can limit the pace of harvest, particularly during short seasonal windows or in post-fire salvage situations.

Log Trucking Capacity

Hauling logs from forest to mill is challenged by driver shortages, rising fuel and maintenance costs, and hours-of-service regulations. Long haul distances, challenging terrain, and seasonal road closures can further tighten capacity and increase costs.

4.15 Fiber Supply Summary and Key Takeaways

Key takeaways from the preceding fiber supply analysis:

Demand Context

Mass timber (CLT, glulam) usage is expected to grow sharply, and to do so it needs consistent, high-quality lumber and veneer, especially Douglas-fir and larch, but also SPF.

For mass timber manufacturers, these risks are often indirect but nonetheless significant. Disruptions in the upstream supply chain can lead to higher input prices, longer lead times, and reduced availability of key grades and sizes of lumber or veneer—factors that can affect project scheduling, costs, and competitiveness in the marketplace.

Fiber Base

Oregon and Washington combined contain about 41.5M acres of timberland, with 56% publicly owned. Standing inventory in PNW is about 700 billion board feet Scribner log scale.

Harvest

Despite large standing inventories, annual harvests in the range of 5-7 billion board feet Scribner represent annual harvest removals of less than 1% of standing stock. Harvests are constrained by ownership policies, forest health, and infrastructure bottlenecks.

Sawmill Infrastructure

Oregon and Washington host a combined total of 114 mills with about 11.7 billion board feet of production capacity. Production in 2024 was about 8.7 billion board feet, dominated by Douglas-fir and larch. Capacity exists, but not all is configured for mass timber specifications (kiln drying, lamstock tolerances).

Constraints

Key bottlenecks are kiln drying, specialized lumber sizes (2×6, 2×8), and willingness of commodity mills to run lamstock. Other constraints include log trucking, contractor shortages, and fire-driven salvage cycles.

Forest Health

Growth-to-drain ratios are healthy overall (1.2-1.5), but high mortality-to-drain ratios on USFS lands signal unmanaged forest conditions. This creates risk but also opportunity if restoration harvests are mobilized.

Comparisons

Relative to the U.S. South where 90% of forests are privately owned and there was about 22 billion board feet of production in 2024, the PNW is smaller in total output but stronger in structural-grade Douglas-fir lumber. While the South provides more volume, has tree species with desirable strength characteristics, and offers lumber that is generally lower cost than

PNW species, up to this point the PNW species have generally been preferred for mass timber applications.

Byproducts

A well-developed forest products manufacturing infrastructure creates complementary and supporting businesses that create markets and revenue for sawmill by-products such as chips, planer shavings, sawdust, and bark. Outlets for these products provide important economic support to mills in the region; not all regions have this infrastructure advantage.

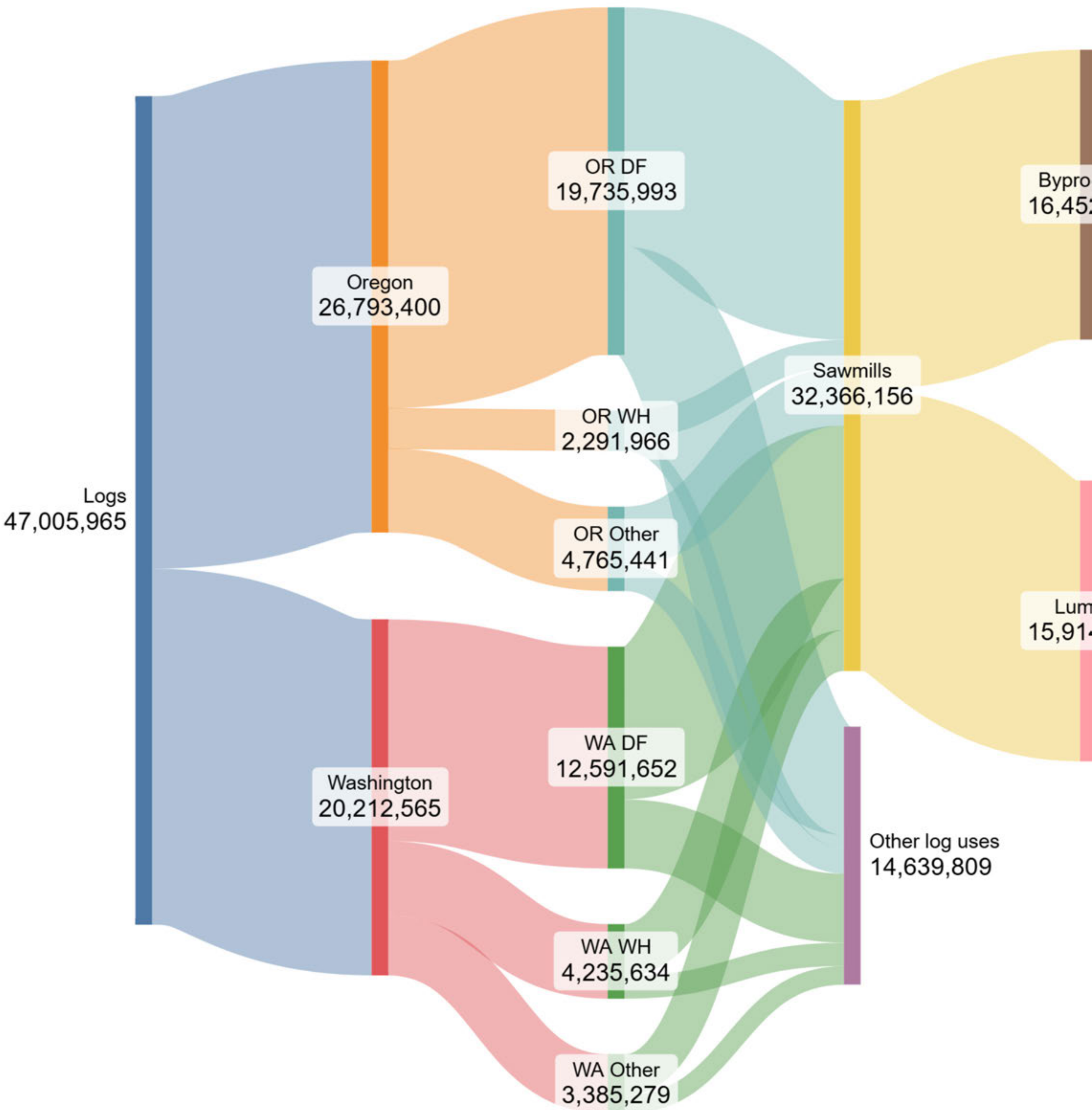
Table 4-12 provides a summary of the key pieces of raw material supply-related information presented in this report section. The PNW contains about 41.5 million acres of timberland with a standing sawtimber inventory of roughly 696 billion board feet of sawtimber, more than half of it's Douglas-fir and larch. Annual harvests have averaged 6.3 billion board feet over the last decade, which is less than 1% of standing volume, indicating a biologically sustainable base. However, much of the inventory is on underutilized public lands. G:D ratios remain favorable (1.2–1.5 overall), but high M:D values on U.S. Forest Service lands point to forest health challenges. Regional sawmill capacity is nearly 11.7 billion board feet, but recent production has been closer to 8.7 billion, leaving some slack but also revealing bottlenecks in kiln drying, grading, and size sorting that all affect the availability of raw material inputs for the mass timber sector. After filtering for mass timber-suitable dimensions and grades, only about 2.8 billion board feet (roughly 30% of total production) can be considered well-suited for CLT and glulam. This highlights both the strength of the region's fiber base and the structural constraints in aligning raw material supply with mass timber demand.

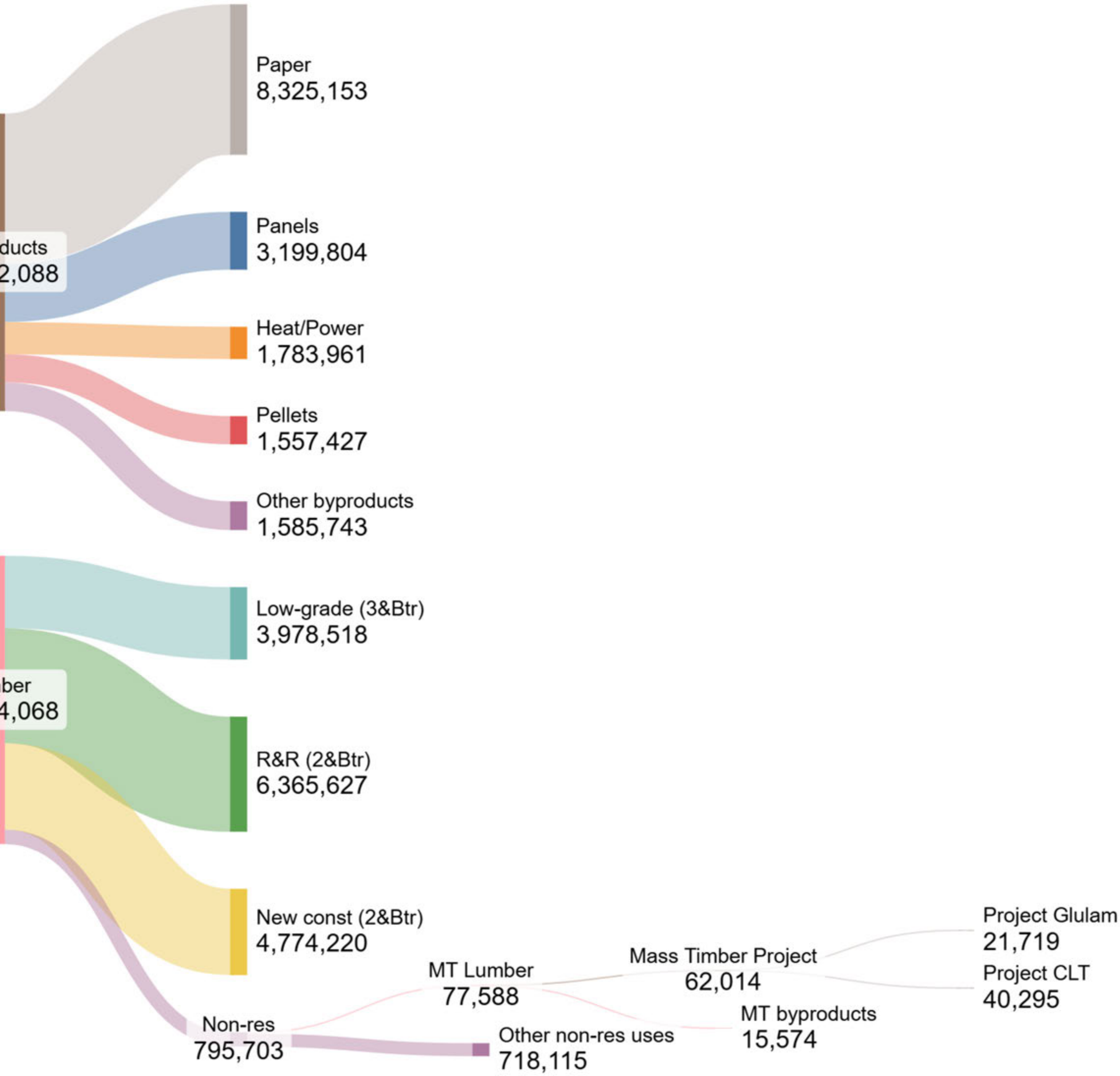
While units of measure become complicated in multi-modal operations, a Sankey diagram (see Figure 4-5) was developed to showcase the scale of project-based mass timber fiber utilization in comparison to some of the pre-steps in the value-added processing chain and fiber classification process. Cubic meters of end product, which is consistently used throughout the report, was used and back tracked to physical m3 of logs in an indirect dried format. Future iterations might show drying as a volume loss where m3 can be used consistently throughout the process. This Sankey chart illustrates some 47 million m3 of logs being harvested in the PNW, and while many products and by products are produced, only 62,000 m3 end up in mass timber project materials produced in the PNW. This diagram also does not illustrate any imported lumber potentially used for CLT manufacturing and should only be used for illustrative volume scale comprehension purposes.

Table 4-12 - Summary of PNW Fiber Supply: Forests, Logs, and Lumber

Metric	PNW (OR & WA)	Secondary Region (CA, ID, MT)	Notes / Implications
Timberland Area	41.5 million acres	52.9 million acres	PNW = 56% public vs. South = ~10% public.
Standing Inventory (Sawtimber)	696 billion bf Scribner	635 billion bf Scribner	~54% Douglas-fir/larch, 22% Hem-fir.
Annual Harvest (2015–24 avg.)	6.3 billion bf Scribner	3.5 billion bf Scribner	~73% from private lands.
Growth-to-Drain Ratio	1.5 (OR), 1.2 (WA)	>2.0 typical	Sustainable overall; higher on public lands.
Mortality-to-Drain Ratio	0.5 (avg.), >2.0 on USFS	Higher in some areas	Indicates forest health challenges.
Lumber Production (2024)	8.7 billion bf	6.1 billion bf	PNW = 2/3 of Western U.S. output.
Well-Suited Lumber for CLT	2.8 billion bf	1.8 billion bf	After filtering thickness, grade, and dimension.

Figure 4-5 - Sankey, Log to Mass Timber Process (m3 per year)




ducts
2,088
Paper
8,325,153
Panels
3,199,804
Heat/Power
1,783,961
Pellets
1,557,427
Other byproducts
1,585,743
ber
4,068
Low-grade (3&Btr)
3,978,518
R&R (2&Btr)
6,365,627
New const (2&Btr)
4,774,220
Non-res
795,703
MT Lumber
77,588
Other non-res uses
718,115
Mass Timber Project
62,014
MT byproducts
15,574
Project Glulam
21,719
Project CLT
40,295

The Canyons - Project in Construction

Photo Credit: Kristin Slavin, Conifer Advising LLC

5. Mass Timber Project Demand

Mass timber is a relatively new building material in the United States. As such, there is not a long history with detailed information about projects that have been built using mass timber materials. This chapter provides an analysis of available project data from multiple sources to determine the mass timber building project demand within the PNW. Additionally, while this market study is primarily focused on the PNW region, manufacturers from the region supply material across the continent, so information related to the entire continent's project demand is included in this section.

5.1 Key Definitions

General Construction

Public and private construction categorized by Commercial, Industrial, Institutional & Government, and Multifamily Residential. Excludes Improvements & Infrastructure spending such as Highway & Street, Sewage & Waste Disposal, Water Supply, and Conservation & Development as well as all single-family housing.

Construction Year

The year that a project was completed. The mass timber could be manufactured up to three years in advance of construction completion.

Put in Place

Construction installed or erected on site during a given period.

Project Demand

The demand for mass timber in projects in a given region, regardless of where manufactured. This represents how much mass timber construction is being built in an area, as opposed to the mass timber products being manufactured in that area.

5.2 PNW General Construction Volumes

Mass timber projects are built within the context of the broader real estate market. To meaningfully interpret the mass timber project demand, we need to contextualize the data and understand how the regional real estate market has impacted the growth of mass timber. The general construction trends vary across the country, so the analysis follows the geographic delineations indicated in the Introduction. These construction volumes help benchmark construction volumes, productivity, and relative market penetration across a given region.

Table 5-1 presents total construction spending in the PNW in 2024 based on data from the U.S. Census Bureau, normalized to 2024 dollars. This database covers the total construction spending for every state, across both publicly and privately owned buildings. Single-Family Residential and Infrastructure spending were excluded from the totals, and further state-by-state proportionalization of categories is overlaid to the total private and public spending volume. This results in a spending volume per category per state. The PNW has seen a decrease in total building construction spending since a 2020 high of $36 billion, down to a current level of $29 billion in 2024 dollars.

Table 5-1 - Construction Spending, Put in Place, $ Millions, U.S. Census Bureau

	2020	2021	2022	2023	2024
$ Conversion 2024	**1.33**	**1.23**	**1.09**	**1.03**	**1.00**
PNW TOTAL	**$36,131**	**$34,733**	**$32,134**	**$31,343**	**$29,125**
Oregon	**14,732**	**11,815**	**10,949**	**9,568**	**9,191**
Private	**10,385**	**7,814**	**6,933**	**5,527**	**5,296**
Commercial	5,856	4,350	3,682	2,832	2,672
Industrial	995	606	816	668	640
Inst & Gov	1,552	1,126	1,093	942	1,047
Residential (Multifamily)	1,982	1,732	1,342	1,085	937
Public	**4,347**	**4,001**	**4,016**	**4,041**	**3,895**
Commercial	$207	$230	$253	$269	$226
Industrial	$ -	$ -	$ -	$ -	$ -
Inst & Gov	$4,140	$3,771	$3,763	$3,772	$3,669
Washington	**21,399**	**22,918**	**21,185**	**21,775**	**19,934**
Private	**10,880**	**13,615**	**13,367**	**14,759**	**12,846**
Commercial	6,135	7,579	7,099	7,564	6,481
Industrial	1,042	1,055	1,574	1,783	1,553
Inst & Gov	1,626	1,963	2,107	2,515	2,540
Residential (Multifamily)	2,077	3,018	2,587	2,897	2,272
Public	**10,519**	**9,303**	**7,818**	**7,016**	**7,088**
Commercial	$501	$536	$492	$467	$411
Industrial	$ -	$ -	$ -	$ -	$ -
Inst & Gov	10,018	8,767	7,326	6,549	6,677

Table 5-2 builds on the data presented above, using an average construction cost per square foot foreach category (derived from Rider Levett Bucknall) to translate construction spending into a total square footage of construction in each category. The results coming from the Rider Levett data are presented below. Rider Levett Bucknall construction data were taken from the nearest city node and assigned to the state or province. This might artificially inflate rural construction costs, though with minimal impact to the overall analysis as construction tends toward urban environments.

Table 5-2 - Square Footage of Construction in PNW by State and Year, Public/Private, and Building Type

	$/FT2 2024	2020	2021	2022	2023	2024
PNW TOTAL		**86,110,000**	**83,410,000**	**78,720,000**	**76,980,000**	**69,800,000**
Oregon		**37,630,000**	**29,310,000**	**26,830,000**	**22,490,000**	**21,270,000**
Private		**31,520,000**	**23,600,000**	**21,060,000**	**16,650,000**	**15,700,000**
Commercial	$303	19,320,000	14,350,000	12,150,000	9,340,000	8,820,000
Industrial	$240	4,150,000	2,520,000	3,400,000	2,780,000	2,670,000
Inst & Gov	$762	2,040,000	1,480,000	1,440,000	1,240,000	1,370,000
Residential (Multifamily)	$330	6,010,000	5,250,000	4,070,000	3,290,000	2,840,000
Public		**6,110,000**	**5,710,000**	**5,770,000**	**5,840,000**	**5,570,000**
Commercial	$303	680,000	760,000	830,000	890,000	750,000
Industrial	$240	0	0	0	0	0
Inst & Gov	$762	5,430,000	4,950,000	4,940,000	4,950,000	4,820,000
Washington		**48,480,000**	**54,100,000**	**51,890,000**	**54,490,000**	**48,530,000**
Private		**31,480,000**	**38,940,000**	**39,090,000**	**42,960,000**	**36,960,000**
Commercial	$338	18,150,000	22,420,000	21,000,000	22,370,000	19,170,000
Industrial	$205	5,080,000	5,150,000	7,680,000	8,700,000	7,580,000
Inst & Gov	$645	2,520,000	3,040,000	3,270,000	3,900,000	3,940,000
Residential (Multifamily)	$363	5,730,000	8,330,000	7,140,000	7,990,000	6,270,000
Public		**17,000,000**	**15,160,000**	**12,800,000**	**11,530,000**	**11,570,000**
Commercial	$338	1,480,000	1,580,000	1,450,000	1,380,000	1,220,000
Industrial	$205	0	0	0	0	0
Inst & Gov	$645	15,520,000	13,580,000	11,350,000	10,150,000	10,350,000

As shown in Table 5-3, the same methodology was used to compare the PNW general construction market to the rest of North America to better understand the context and scale of the region's project demand. While the PNW holds about 3.8% of the GDP of the U.S. and Canada combined, it represents only 1.87% of the applicable general construction. This shows that there is less construction happening in the PNW relative to the GDP than other parts of the country, which affects the overall demand for the mass timber project market.

Table 5-3 - Comparison of PNW to Western NA and Eastern NA General Construction Data

	PNW (% Total NA GDP = 3.8%)		Western NA (% Total NA GDP = 22.44%)		Eastern NA (% Total NA GDP = 73.76%)		Total
Year	Project Area (FT2)	% of Total	Project Area (FT2)	% of Total	Project Area (FT2)	% of Total	Project Area (FT2)
2020	86,110,000	2.31%	584,220,000	15.68%	3,055,500,000	82.01%	3,725,830,000
2021	83,410,000	2.30%	616,080,000	16.96%	2,932,500,000	80.74%	3,631,990,000
2022	78,720,000	1.93%	816,220,000	20.02%	3,181,640,000	78.05%	4,076,580,000
2023	76,980,000	1.58%	946,450,000	19.37%	3,863,100,000	79.06%	4,886,530,000
2024	69,800,000	1.45%	891,710,000	18.47%	3,865,920,000	80.08%	4,827,430,000
Total	**395,020,000**	**1.87%**	**3,854,680,000**	**18.23%**	**16,898,660,000**	**79.91%**	**21,148,360,000**

Over the last five years, construction in North America has grown almost every year. However, in the PNW, construction has declined every year during the same period, and the growth has been spread across the rest of the country, with the most construction happening in eastern NA. This trend is expected to affect the amount of mass timber construction happening in the PNW, which we would expect to be higher if the general construction market were growing.

5.3 Current PNW Mass Timber Project Demand

There are currently no comprehensive publicly available databases that accurately quantify the demand for mass timber. The WoodWorks Wood Innovation Network (WIN) database relies on the industry to enter project information but requires a paid membership to contribute. This is part of the reason that some individuals and companies may not list their projects in the database. European manufacturers and Canadian projects are underrepresented in the data set as well. Even when a project is listed, the information related to the project size, completion date, manufacturer, etc. is inconsistently entered, leaving significant gaps in the information available. The database is also not available for public download, and extracting information is time-consuming and leaves room for human error in the information exchange. Other sources, such as the Natural Resources Canada (NRCAN) 2021 State of Mass Timber in Canada (SMTC) report, are publicly available and put together by a government employee but are not consistently maintained. This leaves many newer projects unreported until funding is allocated to updating the database, and it can be years between updates.

In most cases, the volume of mass timber is not reported, so a material intensity factor must be assumed and applied to translate between project area and mass timber volume. It should also be noted that the project data include the completion year of the building, not necessarily the year that the mass timber was manufactured or even installed. While we can use the project data to understand trends and the overall demand, there is a lag when aligning that with mass timber supply data. This inconsistency and lack of publicly accessible data is problematic for the industry because it makes it difficult for manufacturers, investors, policymakers, and developers to estimate the demand for mass timber in a given market, leading to a lack of targeted investment in the growth of the sector.

This analysis is based on the best information available with adjustments to account for some of the known constraints that the information available presents.

5.3.1 Available Project Data

This method aggregates publicly available data from WIN, NRCAN, manufacturers' websites, and public searches to develop a record of projects across North America. The project data are multiplied by the rate of claimed versus unclaimed projects in the WIN database to distribute the 445 projects that have no information. The data likely only captures 65% to 80% of the total mass timber projects. For this reason, we introduce an additional Not-in-System multiplier to include an additional 25% of total area and total number of projects.

Average project wood fiber intensity (the net volume of wood per square foot of building) varies significantly based on project type and structural system, but the consulting team has assumed an average intensity of 0.020 m3/FT2 to calculate the annual volume of mass timber products. This is based on historic project data for different project construction types, including project case studies and sales funnels from industry. On average, projects in the PNW are approximately 54,500 FT2 in size and consume 1,091 m3 of mass timber material per project. For perspective, this is equivalent to approximately 27 truckloads of material.

Table 5-4 summarizes the mass timber project demand in Oregon and Washington from 2020-2024, utilizing the available project data and average wood fiber intensity described above. Ultimately, through this analysis methodology, we calculate that an estimated 60,500 m3 of mass timber went into projects in the PNW (from manufacturers across the globe) in 2024.

These data show relatively consistent PNW mass timber demand for the last five years, except for 2024, which showed a growth of almost 44% by volume year over year. Over

Table 5-4 - Mass Timber Projects in the PNW by Year, Count of Buildings, Square Footage of Building Space, and Mass Timber Volume Consumed

	OR		WA		Grand Total		Adjusted for Unclaimed Projects		Adjusted for Not in System Factor (25%)		Timber Volume (m3)
Year	Count	Area	Count	Area	Count	Area	Count	Area	Count	Area	0.02 m3/FT2
2020	12	740,000	7	710,000	19	1,450,000	26	1,950,000	32	2,430,000	48,600
2021	16	990,000	7	350,000	23	1,340,000	31	1,800,000	39	2,250,000	45,000
2022	13	430,000	12	820,000	25	1,250,000	34	1,690,000	42	2,110,000	42,100
2023	14	530,000	18	730,000	32	1,260,000	43	1,680,000	54	2,110,000	42,100
2024	**21**	**800,000**	**10**	**1,000,000**	**31**	**1,800,000**	**42**	**2,420,000**	**52**	**3,030,000**	**60,500**

the whole five-year period, growth averaged 5.63% per year in the PNW region.

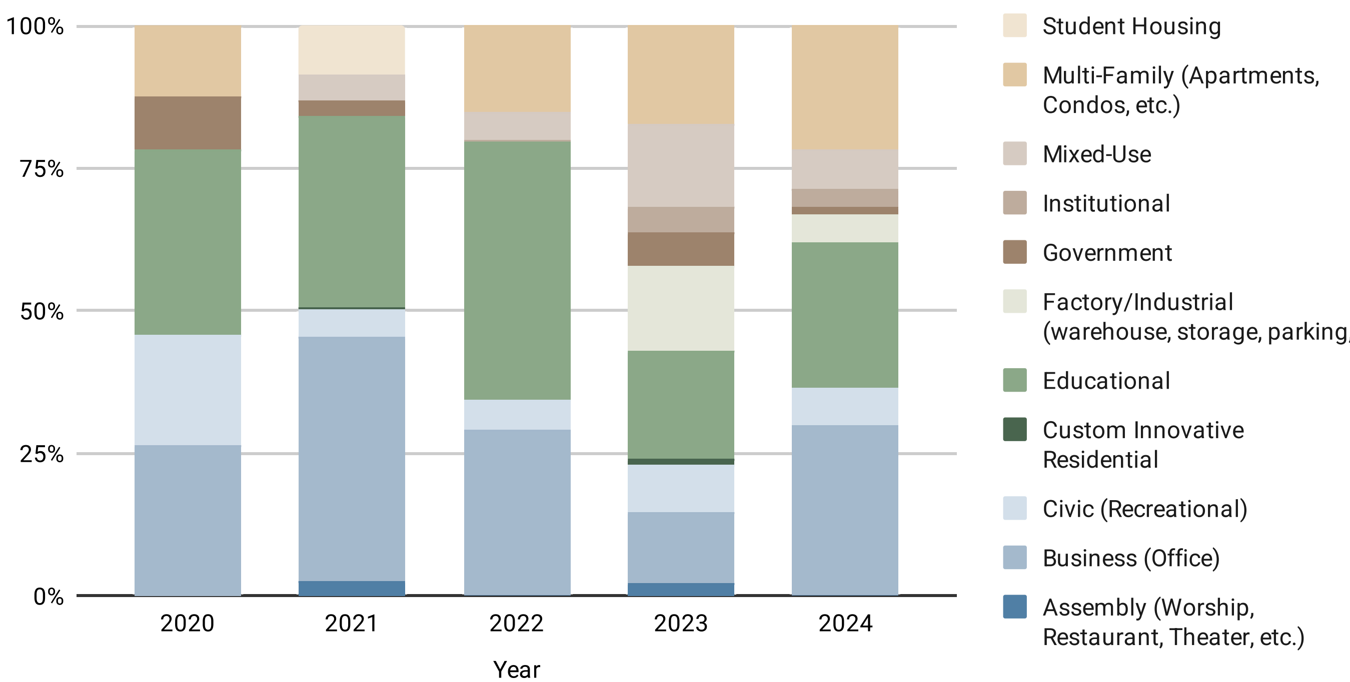
The distribution of building types being built with mass timber has changed over the last five years. The percentages in **Table 5-5** and **Figure 5-1** reflect the distribution per year over that timeframe. While Business (Office) has been maintained a consistently significant portion of the mass timber projects built, some years reflect more public investment (specifically Civic and Educational) being completed vs. private investment, such as Multifamily.

Compared to the rest of North America, the PNW has a significantly higher percentage of mass timber projects relative to the GDP. In 2024, the PNW completed construction on 11.72% of all mass timber projects in North

Table 5-5 - Percentage of PNW Mass Timber Projects by Building Type per Year

Building Type	2020	2021	2022	2023	2024
Assembly (Worship, Restaurant, Theater, etc.)	0.00%	2.65%	0.14%	2.17%	0.19%
Business (Office)	26.42%	42.71%	28.96%	12.50%	29.58%
Civic (Recreational)	19.35%	4.86%	5.20%	8.24%	6.66%
Custom Innovative Residential	0.00%	0.25%	0.20%	1.18%	0.00%
Educational	32.63%	33.52%	45.14%	18.98%	25.44%
Factory/Industrial (warehouse, storage, parking, etc.)	0.00%	0.00%	0.00%	14.77%	4.88%
Government	9.27%	2.80%	0.00%	5.88%	1.43%
Institutional	0.00%	0.00%	0.43%	4.41%	3.28%
Mixed-Use	0.00%	4.44%	4.68%	14.57%	6.66%
Multi-Family (Apartments, Condos, etc.)	12.34%	0.00%	15.25%	17.31%	21.87%
Student Housing	0.00%	8.77%	0.00%	0.00%	0.00%

Figure 5-1 - Percentage of PNW Mass Timber Projects by Building Type per Year



America, compared to the PNW's GDP percentage of 3.8%. This shows that the PNW mass timber project market is significantly more mature than other regions, but those regions are also catching up as shown in the increasing market share of mass timber projects. For example, as shown in **Table 5-6**, the market size in western NA grew at an average of almost 42% annually for the period 2020-2024. In eastern NA, in particular, market growth averaged nearly 50% annually during the period.

Table 5-6 - North American Mass Timber Project Data by Year, Square Footage of Building Space, and Mass Timber Volume Consumed

	PNW (% Total NA GDP = 3.8%)				Western NA (% Total NA GDP = 22.44%)				Eastern NA (% Total NA GDP = 73.76%)				NA Total	
Year	Project Area (FT2)	Mass Timber Volume (m3)	% of NA Total	Mass Timber to GDP Ratio*	Project Area (FT2)	Mass Timber Volume (m3)	% of NA Total	Mass Timber to GDP Ratio*	Project Area (FT2)	Mass Timber Volume (m3)	% of NA Total	Mass Timber to GDP Ratio*	Project Area (FT2)	Mass Timber Volume (m3)
2020	2,430,000	48,600	33.20%	8.73	1,740,000	34,900	23.77%	1.06	3,150,000	63,100	43.03%	0.58	7,320,000	146,600
2021	2,250,000	45,000	23.15%	6.08	2,660,000	53,100	27.37%	1.22	4,810,000	96,100	49.49%	0.67	9,720,000	194,200
2022	2,110,000	42,100	12.54%	3.30	5,730,000	114,700	34.05%	1.52	8,990,000	179,800	53.42%	0.72	16,830,000	336,600
2023	2,110,000	42,100	12.25%	3.22	5,340,000	106,800	31.01%	1.38	9,770,000	195,400	56.74%	0.77	17,220,000	344,300
2024	**3,030,000**	**60,500**	**11.72%**	**3.08**	**7,060,000**	**141,200**	**27.31%**	**1.22**	**15,760,000**	**315,300**	**60.97%**	**0.83**	**25,850,000**	**517,000**

* Mass Timber to GDP Ratio = % of Total / GDP %. A ratio over 1 shows that the region is building a higher percentage of mass timber projects relative to the GDP of the region. Higher ratios show a region pulling more than its proportional share of mass timber projects.

As shown in **Table 5-7**, the majority of mass timber construction in 2024 was made up of three market segments across the country: Business (Office), Educational, and Multi-Family (apartments, condos, etc.). The consistency of these categories as the top three in all of these geographic regions could reflect general construction trends as well as perceived suitability of project types for mass timber construction.

5.3.2 Current Growth Rates and Market Penetration

The range of estimates is large for the compound annual growth rates (CAGR) of mass timber projects in North America. Over the past five years, there was a nearly 40% CAGR in volume of material delivered per year based on project data. However, industry average growth rate estimates are more conservative. Many estimates are available in open publications, with a selection reviewed below.

Based on project data across North America, growth rates vary significantly between regions. Over the last five years there has been a CAGR of 6.06% across all construction in Canada and the U.S., according to the Census Bureau and Statistics Canada. The mass timber project area CAGR across the continent, however, has been 37% over the same period, reflecting an increase in the adoption of mass timber compared to other construction types.

Table 5-7 - 2024 Percent of Mass Timber Projects by Market Segment, per Region

Building Type	Region		
	PNW	Western NA	Eastern NA
Assembly (Worship, Restaurant, Theater, etc.)	0.19%	0.06%	2.07%
Business (Office)	29.58%	18.28%	50.45%
Civic (Recreational)	6.66%	9.06%	0.73%
Custom Innovative Residential	0.00%	0.00%	0.37%
Educational	25.44%	17.03%	10.88%
Factory/Industrial (warehouse, storage, parking, etc.)	4.88%	0.00%	1.11%
Government	1.43%	1.01%	1.09%
Hotel/Motel	0.00%	0.00%	2.71%
Institutional	3.28%	2.70%	5.08%
Mercantile (Retail)	0.00%	0.00%	0.43%
Mixed-Use	6.66%	7.76%	7.06%
Multi-Family (Apartments, Condos, etc.)	21.87%	37.21%	13.79%
Student Housing	0.00%	6.88%	4.16%
Transportation (Airports, Train or Subway Stations)	0.00%	0.00%	0.07%

Table 5-8 illustrates a comparison of total North American construction spending relative mass timber spending for all of NA. The information is based on the same methodology listed above. This comparison shows that while General Construction in North America has grown at a modest rate, Mass Timber Construction has grown significantly in the same time, outpacing General Construction by over 30%. While the growth is promising for the industry, the market penetration of mass timber is still very low—showing a lot of room to continue to grow as it takes more market share from concrete and steel structures.

Table 5-8 - Total NA General Construction Relative to Total NA Mass Timber Construction

	Total NA Construction Spend*		Total NA Mass Timber Projects				
Year	Project Area (FT2)	YoY Growth	Project Area (FT2)	Mass Timber Volume (m3)	YoY Growth	Market Penetration	Market Penetration YoY Growth
2020	3,055,500,000		7,320,000	146,600		0.24%	
2021	2,932,500,000	-4.03%	9,720,000	194,200	32.79%	0.33%	38.36%
2022	3,181,640,000	8.50%	16,830,000	336,600	73.15%	0.53%	59.59%
2023	3,863,100,000	21.42%	17,220,000	344,300	2.32%	0.45%	-15.73%
2024	3,865,920,000	0.07%	25,850,000	517,000	50.12%	0.67%	50.01%
CAGR		**6.06%**			**37.08%**	**0.44%**	**29.25%**

* Construction estimates from the US Census Bureau and Statistics Canada. Areas exclude single-family residential, Highway and Street, Sewage and Waste Disposal, Water Supply, and Conservation and Development.

Specific to the PNW, **Table 5-9**, shows that both general construction growth as well as mass timber project area growth have been more subdued than in other parts of the U.S. and Canada. While mass timber project growth outpaced general construction growth, this was primarily due to a significant uptick in 2024. Other years showed a relative stagnation in the mass timber project area.

This may reflect a slowdown in mass timber adoption as the region matures, external economic factors related to the COVID-19 pandemic, pricing influences, or other factors. In 2024, mass timber represented around 3 million square feet of project construction in the PNW out of a total application construction volume in the PNW of 69.8 million square feet, representing a 4.3% market penetration.

Table 5-9 - PNW General Construction Relative to PNW Mass Timber Construction

	PNW General Construction*		PNW Mass Timber Projects				
Year	Project Area (FT2)	YoY Growth	Project Area (FT2)	Mass Timber Volume (m3)	YoY Growth	Market Penetration	Market Penetration YoY Growth
2020	86,110,000		2,430,000	48,600		2.82%	
2021	83,410,000	-3.14%	2,250,000	45,000	-7.41%	2.70%	-4.41%
2022	78,720,000	-5.62%	2,110,000	42,100	-6.22%	2.68%	-0.64%
2023	76,980,000	-2.21%	2,110,000	42,100	0.00%	2.74%	2.26%
2024	69,800,000	-9.33%	3,030,000	60,500	43.60%	4.34%	58.37%
CAGR		**-5.11%**			**5.67%**	**3.06%**	**11.37%**

* Construction estimates from the US Census Bureau and Statistics Canada. Areas exclude single-family residential, Highway and Street, Sewage and Waste Disposal, Water Supply, and Conservation and Development.

One consideration for the PNW to account for is the chasm between early adopters and mainstream adoption of new technologies. This is commonly documented in startups as the classic bell curve distribution framework that helps understand how users adopt and integrate a new product. In the PNW, the slowdown in growth could be attributed to the phase in the lifecycle of mass timber in the region. Once the mass timber market crosses into the next phase, from early adopters to the early majority, the growth can be expected to return to a high rate until it reaches a closer to business-as-usual status. Many in the industry already believe that mass timber has crossed the chasm and is now in an early majority project lifecycle phase. See **Figure 5-2** for an illustration of the chasm concept.

Figure 5-2 - Technology Adoption Lifecycle per "Crossing the Chasm"

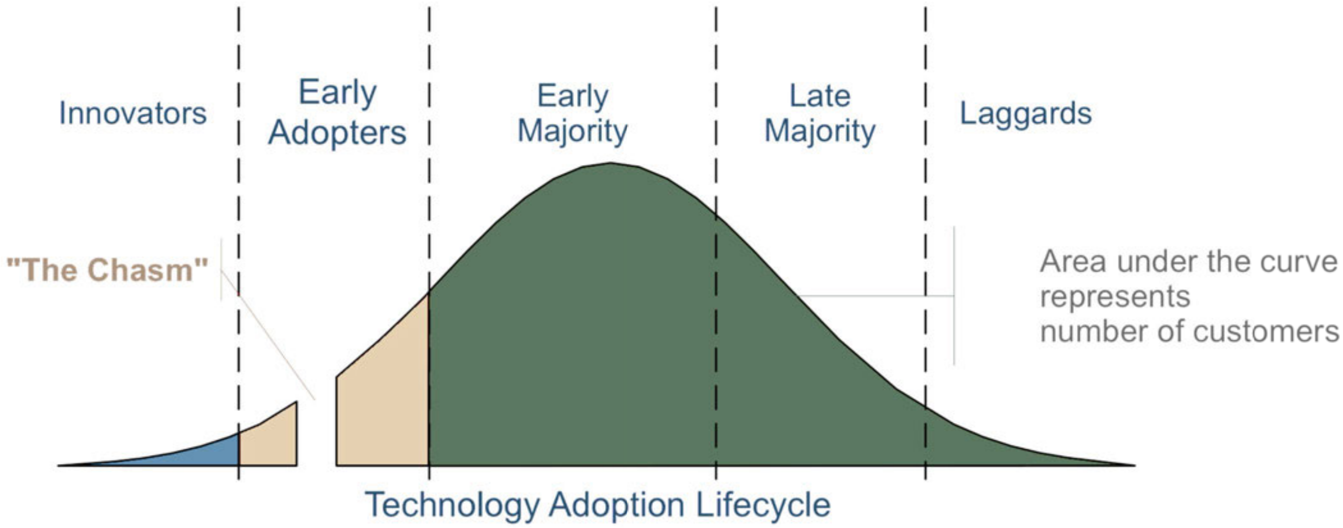


Table 5-10 compares mass timber construction in western NA to general construction in western NA. The comparison contextualizes the growth of mass timber in the PNW within a greater geographic region. The data highlights that growth in the western NA region was significantly higher than the PNW for general construction as well as mass timber projects. There was a significantly greater increase in mass timber project area than general construction growth, however, indicating mass timber market share increasing compared to other construction types as codes and incentives are put in place to enable mass timber projects. Nearby high-value markets like California could be an area of focus for PNW manufacturers to accelerate growth. California alone has a CAGR of 64.73% for the past five years.

Table 5-10 - Western NA General Construction Relative to Western NA Mass Timber Construction

	Western NA General Construction*		Western NA Mass Timber Projects				
Year	Project Area (FT2)	YoY Growth	Project Area (FT2)	Mass Timber Volume (m3)	YoY Growth	Market Penetration	Market Penetration YoY Growth
2020	584,220,000		1,740,000	34,900		0.30%	
2021	616,080,000	5.45%	2,660,000	53,100	52.87%	0.43%	44.97%
2022	816,220,000	32.49%	5,730,000	114,700	115.41%	0.70%	62.59%
2023	946,450,000	15.96%	5,340,000	106,800	-6.81%	0.56%	-19.63%
2024	891,710,000	-5.78%	7,060,000	141,200	32.21%	0.79%	40.33%
CAGR		**11.15%**			**41.93%**	**0.56%**	**27.69%**

* Construction estimates from the US Census Bureau and Statistics Canada. Areas exclude single-family residential, Highway and Street, Sewage and Waste Disposal, Water Supply, and Conservation and Development.

Table 5-11 presents the same analysis for eastern NA. In the eastern half of the continent, there was an even greater difference between general construction growth and mass timber adoption. As awareness of mass timber grows, the supply chain develops (with Smartlam and Mercer complementing Nordic's capacity and European imports), and embodied carbon policies are implemented.

Table 5-11 - Eastern NA General Construction Relative to Eastern NA Mass Timber Construction

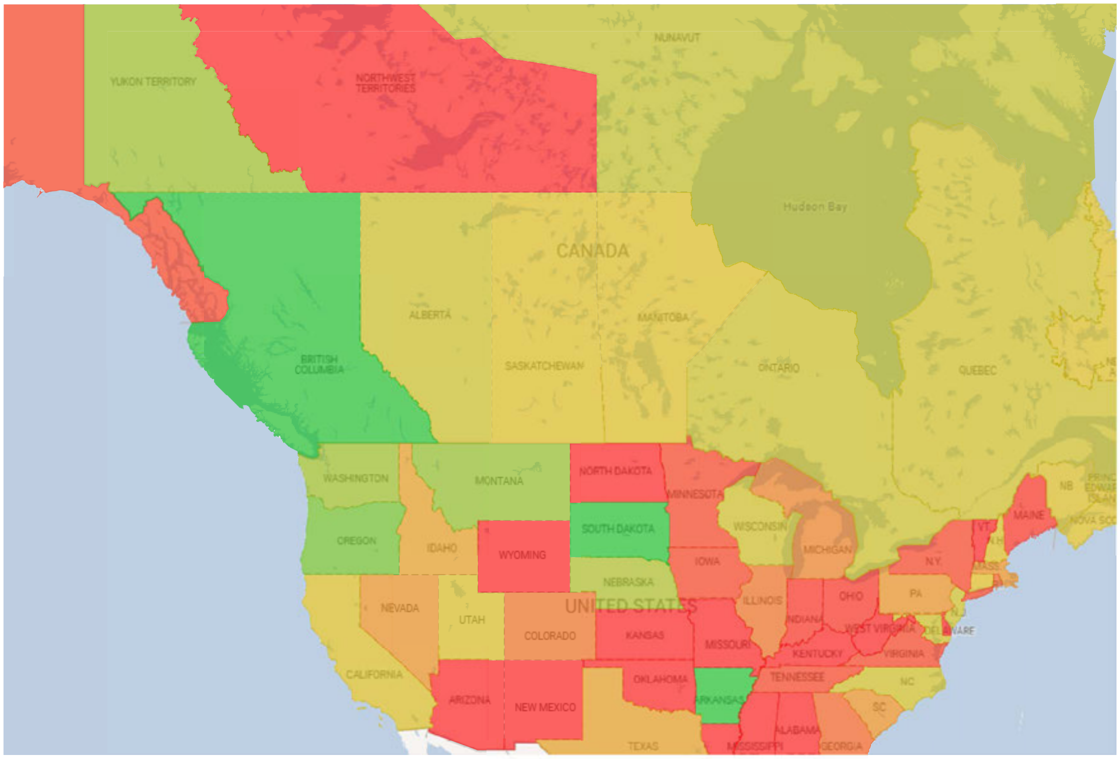
	Eastern NA General Construction*		Eastern NA Mass Timber Projects				
Year	Project Area (FT2)	YoY Growth	Project Area (FT2)	Mass Timber Volume (m3)	YoY Growth	Market Penetration	Market Penetration YoY Growth
2020	2,385,170,000		3,150,000	63,100		0.13%	
2021	2,233,010,000	-6.38%	4,810,000	96,100	52.70%	0.22%	63.10%
2022	2,286,700,000	2.40%	8,990,000	179,800	86.90%	0.39%	82.51%
2023	2,839,670,000	24.18%	9,770,000	195,400	8.68%	0.34%	-12.49%
2024	2,904,410,000	2.28%	15,760,000	315,300	61.31%	0.54%	57.71%
CAGR		**5.05%**			**49.56%**	**0.33%**	**42.37%**

* Construction estimates from the US Census Bureau and Statistics Canada. Areas exclude single-family residential, Highway and Street, Sewage and Waste Disposal, Water Supply, and Conservation and Development.

Market penetration rates and growth can be compared between regions to understand the degree to which mass timber construction is enabled (how mature a mass timber project market is) and to forecast growth in less mature regions relative to more mature regions across the country. We can see that while the average market penetration in the PNW is 3% and growing, western and eastern NA fall at or below .5% but are growing even faster than the PNW.

A heat map (**Figure 5-3**) was generated to illustrate mass timber project adoption ratio per capita throughout North America. The heat map shown below illustrates western North America including the PNW as a distinct per capita hotspot for mass timber projects. Arkansas, with the Walmart New Home Office project, is sizable enough to adjust the entire consumption scale around the project.

Figure 5-3 - Per Capita Mass Timber Project Heatmap, 2024



State/ Prov	Average of m3/ person
AR	0.0366
SD	0.0147
BC	0.0107
OR	0.0063
MT	0.0046
WA	0.0042
YT	0.0042
NE	0.0034
NU	0.0024
AB	0.0019
NJ	0.0019
ON	0.0019
NC	0.0018
QC	0.0018
WI	0.0018
MD	0.0017
CA	0.0013
UT	0.0013
NB	0.0012
NH	0.0012
DC	0.0011
MB	0.0011
NL	0.0011
NS	0.0011
PEI	0.0011
SK	0.0011
CT	0.0010
ID	0.0008
TX	0.0008
MA	0.0007

5.4 Future Mass Timber Project Demand

5.4.1 Past Informs the Future

Table 5-12 presents how the mass timber project market would grow if the CAGR from the past five years—as determined in **Section 5.3.2**—were to continue in a linear fashion. While we expect the PNW growth to be higher per the discussion related to **Table 5-9**, and all these growth rates to change over time as explained below, this analysis shows how significantly markets outside of the PNW will

Table 5-12 - Projected Demand for Mass Timber Materials, Based on Historic Market Growth Rates from 2020-2024

	CAGR	2024 Volume	2025	2026	2027	20
PNW Mass Timber Projects	5.67%	60,500	63,900	67,500	71,300	75,3
Western NA Mass Timber Projects	41.93%	141,200	200,400	284,400	403,600	572,8
Eastern NA Mass Timber Projects	49.56%	315,300	471,600	705,300	1,054,800	1,577,5
Total NA Mass Timber Project Volume		**517,000**	**735,900**	**1,057,200**	**1,529,700**	**2,225,6**
$/m3 AVG.		$1,945	$1,945	$1,984	$2,024	$2,0
Total NA Mass Timber Product Value		**$1,005,600,000**	**$1,431,300,000**	**$2,097,400,000**	**$3,095,500,000**	**$4,593,700,0**

contribute to the demand funnel for all manufacturers, including those within the PNW. Average construction intensity material supply package costs were developed from 2024 average cost data outlined in **Section 2.2.1**, and forward-enhanced for inflation at 2% per year. The expected growth curve is described in more detail in **Section 5.4.3**.

While this type of constant growth over this period is deemed unlikely, it can be reviewed for impacts and feasibility. A significant portion of these projects would be in eastern NA, which has the highest current growth rate and market size. We can anticipate that growth would slow as the markets mature, as discussed in **Section 5.4.3**, so while these growth rates might not be maintained over the whole 10-year period, it does illustrate the financial importance to PNW manufacturers of exporting mass timber goods from the region. Levers to grow the PNW manufacturing market include increasing the project demand in the PNW and increasing the market penetration of PNW-manufactured products across the rest of the country.

Based on 2024, the growth rate for PNW mass timber projects could very well be expected to exceed the 5.63% CAGR that we have seen over the past five years but will rely on general construction market growth. As more suppliers come online, we can also expect them to take a share of the product supply market. Those suppliers will choose to locate based on proximity to raw material and construction projects. The PNW has direct access to much of the raw material supply, but the long-term demand will be spread across the country rather than concentrated in the PNW as we have seen historically.

5.4.2 Additional Mass Timber Growth Examples

In 2023 the Forest Products Association of Canada (FPAC), the Canadian Wood Council (CWC), the Energy Futures Lab (EFL) and the Transition Accelerator published a report called the Mass Timber Roadmap. It cites several growth rates, including:

- "While lagging behind Europe, North American production has grown about 15 percent in 2022, with an even larger increase in production capacity."
- "In 2022, the building square footage constructed with mass timber products increased about 40 percent over 2021, with almost all of that increase accounted for by the use of CLT."
- "Projected annual growth rates for the mass timber sector both in North America and globally are 13–14 percent, through 2030, representing an increase of approximately 150 percent."
- Total market value of 876 million by 2030 and 1.7 billion by 2025 in North America.

The IMARC (International Market Analysis Research and Consulting) group, a global management and consulting firm, has estimated a CAGR of 14.3% for CLT from 2025-

28	2029	2030	2031	2032	2033	2034	2035
00	79,600	84,100	88,900	93,900	99,200	104,800	110,700
00	813,000	1,153,900	1,637,700	2,324,300	3,298,800	4,681,900	6,644,900
00	2,359,300	3,528,500	5,277,200	7,892,500	11,803,900	17,653,700	26,402,600
00	**3,251,900**	**4,766,500**	**7,003,800**	**10,310,700**	**15,201,900**	**22,440,400**	**33,158,200**
64	$2,105	$2,147	$2,190	$2,234	$2,279	$2,324	$2,371
00	**$6,846,300,000**	**$10,235,800,000**	**$15,341,000,000**	**$23,036,100,000**	**$34,643,300,000**	**$52,161,700,000**	**$78,616,200,000**

2033. It should be noted that several generic market analysis firms—not directly experienced in the industry—are citing similar figures. These types of reports are often made for purchase and marketed openly online to support capital plans of various entities. By contrast, Forest Economic Advisors offer a paid service in which they are working on fine-tuning models for actual production, overall capacity, and future projections.

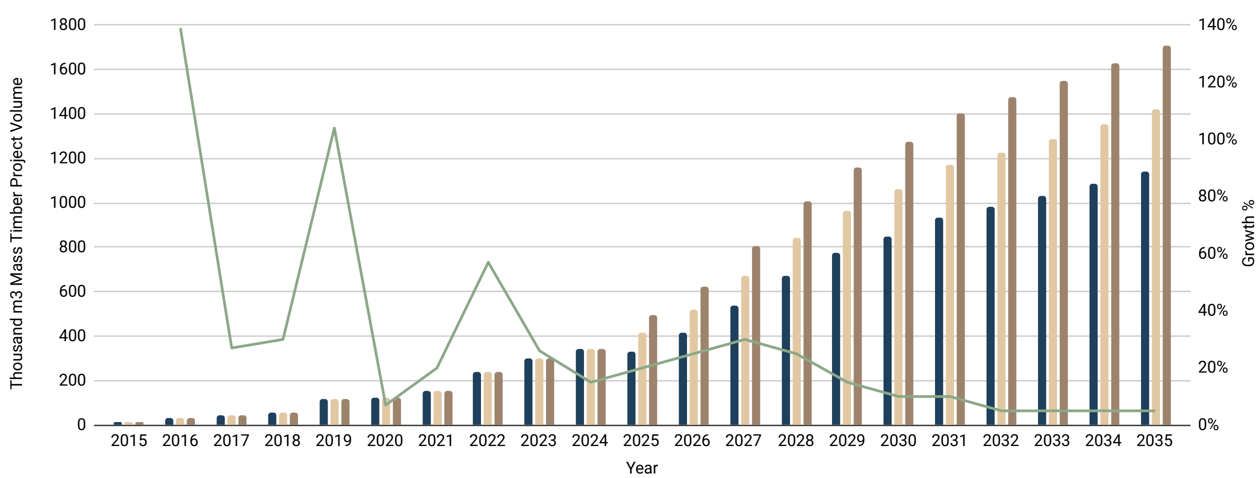
As a point of comparison, WoodWorks BC has documented a CAGR rate of 37% in British Columbia over a 10-year period from 2013 to 2023, with a 2023 market demand in the province of just under 50,000 m3. This also indicates a growth trajectory on which the PNW could continue if further enhanced market characteristics were adopted/ developed. This is discussed further in Section 7.5.

5.4.3 Growth Rates Tapering

As presented in Figure 5-2, as markets mature their growth rates accelerate through the early adopter and early majority phases, and then growth starts to slow as the market matures into equilibrium, or business as usual. We expect the adoption of mass timber to follow a similar growth pattern, which is described in this section. While a linear CAGR can be used to understand where we will start and end a given period of growth, in reality growth will accelerate and then decline, and be affected by the general construction market along the way.

As another point of comparison, Whirlwind Consultants has tracked prior project-based deployment of mass timber across North America. This includes mapping project material use, annual CAGR, and developing projections for future years. Figure 5-5 illustrates the results. While the precision in this model is not high, it illustrates a smoothed growth rate line with a decreasing CAGR after 2027. This perception on a slowing growth rate is primarily based on lumber material supply prices, along with increased construction penetration rates and constrained technical expertise, which will start to exert pressure on mass timber project delivery if overall lumber supply becomes more constrained, or prices increase over time.

Figure 5-5 - Historical and Projected Mass Timber Consumption in North America, Thousand m3



Year	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Downside (-20%)	14.5	34.6	44.1	57	117	126	152	238	300	345	331	414	538	673	774	851	936	983	1032	1084	1138
Basecase	14.5	34.6	44.1	57	117	126	152	238	300	345	414	518	673	841	967	1064	1170	1229	1290	1355	1422
Upside (+20%)	14.5	34.6	44.1	57	117	126	152	238	300	345	497	621	807	1009	1160	1277	1404	1474	1548	1626	1707
Growth %		**139%**	**27%**	**30%**	**104%**	**7%**	**20%**	**57%**	**26%**	**15%**	**20%**	**25%**	**30%**	**25%**	**15%**	**10%**	**10%**	**5%**	**5%**	**5%**	**5%**

The base case of this model positions North American project mass timber at a value of $805 million in 2025. According to Whirlwind Consultants, the North American market is expected to reach $1 billion in 2026, $2 billion in 2029, and $3.3 billion by 2030, including a marginal 2% inflation rate.

In 2024 Oregon and Washington had a total project demand of 60,500 m3 for in-region project construction. The total in North America for project demand is estimated at 517,000 m3, leaving the PNW at 11.72% of North American demand. Meanwhile, the PNW only contributes 3.8% of the GDP in North America. From a GDP benchmark, this indicates a 3-5x of the average demand for the rest of NA.

Going forward, it is important to understand market growth and capacity from both a regional PNW and a North American perspective. Within the PNW we discussed a domestic project production volume of 62,000 m3 in 2024 and a regional project consumption of 60,500 m3. These production and consumption values can be compared to an estimated 2-shift Effective Capacity among current manufacturers within the region of 225,000 m3. Thus, in 2024 the PNW manufacturers were estimated to be using only about 28% of their effective capacity (2-shift operating basis).

5.4.4 Growth Rate Summary

Global industry benchmark reports place CAGR rates at 14-16%. WoodWorks WIN Network captures a growth of 20% in mass timber building volume, acknowledging that they have incomplete data, and WoodWorks BC has documented a 37% CAGR in British Columbia. With this framework of data, the consulting team estimates a potential PNW growth rate of 20-30% in the short term subject to economic activity, and a tapering of regional growth over the next 10 years as shown in **Table 5-13**. Mass timber adoption rates are likely to be led by competitive price, and by regional business and policy factors, as discussed in **Section 7.3**.

Table 5-13 presents potential mass timber project demand, expressed in cubic meters of mass timber material consumed per year in

Compound annual growth rates (CAGRs) have been documented between 14-39%. The consulting team believes we will see a tapering growth rate over 10 years, starting out at a high near 35% and leveling off to 5-10% with a 10-year average at 20% CAGR.

Table 5-13 - Estimated Mass Timber Material Demand in the PNW by Year and by Assumed Average CAGR in Market Size (m3 of Mass Timber Material per Year)

CAGR	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
15%	60,500	70,000	81,000	93,000	107,000	123,000	141,000	162,000	186,000	214,000	246,000	283,000
20%	60,500	73,000	88,000	106,000	127,000	152,000	182,000	218,000	262,000	314,000	377,000	452,000
25%	60,500	76,000	95,000	119,000	149,000	186,000	233,000	291,000	364,000	455,000	569,000	711,000
30%	60,500	79,000	103,000	134,000	174,000	226,000	294,000	382,000	497,000	646,000	840,000	1,092,000
35%	60,500	82,000	111,000	150,000	203,000	274,000	370,000	500,000	675,000	911,000	1,230,000	1,661,000
40%	60,500	85,000	119,000	167,000	234,000	328,000	459,000	643,000	900,000	1,260,000	1,764,000	2,470,000

the PNW across a range of potential CAGRs, from 2024 through 2035.

5.4.5 Market Valuation Maturity Date

The prior regional material demand chart can be extrapolated into a revenue production chart. In other words, rather than showing mass timber product volume demand by year and CAGR, Table 5-14 shows the estimated value of the mass timber products used in the PNW by year and CAGR. A key assumption is a conservative 2% per year price escalation factor. Like the preceding table, the cells highlighted in green, indicate the combination of CAGR and year that PNW demand for mass timber product will translate into $1 billion in value. The cells highlighted in yellow indicate the year and CAGR combination when mass timber product demand will translate into $2 billion in value of direct mass timber project demand.

Table 5-14 - Estimated Mass Timber Market Size in the PNW by Year and by Assumed Average CAGR in Market Size ($/Year)

CAGR	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
15%	$118	$136	$161	$188	$221	$259	$303	$355	$416	$488	$572	$671
20%	$118	$142	$175	$214	$262	$320	$391	$478	$585	$716	$876	$1,072
25%	$118	$148	$188	$241	$308	$392	$500	$637	$813	$1,037	$1,323	$1,686
30%	$118	$154	$204	$271	$359	$476	$631	$837	$1,110	$1,472	$1,953	$2,589
35%	$118	$159	$220	$304	$419	$577	$795	$1,095	$1,508	$2,076	$2,859	$3,938
40%	$118	$165	$236	$338	$483	$691	$986	$1,408	$2,011	$2,871	$4,100	$5,856
$/m3 AVG.	*$1,945*	*$1,945*	*$1,984*	*$2,024*	*$2,064*	*$2,105*	*$2,147*	*$2,190*	*$2,234*	*$2,279*	*$2,324*	*$2,371*

At a 25% CAGR, project demand would be some $500 million in 2030, $1 billion in 2033, and $1.7 billion in 2035. Meanwhile at 35% CAGR, 2030 would see project demand of $986 million and $2 billion in 2032, and a staggering $5.9 billion by 2035. The continuous increase in these total revenues starts to illustrate why there will likely be variable CAGR rates over the next ten years, though this results in a similar outcome.

For illustrative purposes, Table 5-15 shows a 10-year average annual growth rate at 20%, but with the growth rate front-loaded at 35% in the early years and tapering to 5% at the tail

Table 5-15 - Impact of a Dynamic CAGR Over Time on PNW Demand Value and Volume Consumed

Year	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	10 yr Avg CAGR
Yearly Growth Rate	35%	35%	35%	30%	25%	20%	15%	10%	5%	5%	5%	**20%**
Demand Value ($mil.)	$142	$196	$269	$357	$455	$557	$653	$733	$785	$841	$901	
Demand Volume (m3)	73,000	98,550	133,043	172,955	216,194	259,433	298,348	328,183	344,592	361,821	379,912	
$/m3 Avg.	*$1,945*	*$1,984*	*$2,024*	*$2,064*	*$2,105*	*$2,147*	*$2,190*	*$2,234*	*$2,279*	*$2,324*	*$2,371*	

end. This model more closely aligns with the tapering growth rates we expect to see, consistent with **Figure 5-2**. Linear CAGR models are useful for understanding the range of where the market may end up in a given period (10 years in this study), but as Table 5.15 illustrates, a dynamic growth rate can affect how supply capacity and investment might need to keep up with the demand.

This model puts the industry at $557million in revenue in 2030, and $900million in 2035, similar to the 2035 result based on the flat 20% CAGR growth rate illustrated in **Table 5-14**.

As shown in **Table 5-16**, in 2030 the PNW general construction volume is expected to be 107 million FT2 in eligible mass timber-friendly construction typologies. If the PNW mass timber project market were to hit $1 billion by 2030, this would occupy 26.1 million FT2 of construction and hold an 24% total market saturation for eligible construction in the PNW.

The PNW mass timber project material demand is currently estimated at $120 million and is expected to hit $1 billion in market revenue in 2035.

Table 5-16 - PNW General Construction Growth Projection

	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
PNW General Construction (million FT2)	69.8	73	75	79	82	85	88	92	96	99	103	107
General Construction CAGR	*4.0%*											

Based on a constant average linear 20% CAGR, the 2030 market valuation is expected to be $391 million in the PNW, resulting in 182,000 m3 of delivered mass timber materials within the PNW market—representing 9.1 million FT2 of construction with a corresponding market construction penetration of 8.5%. Based on average building size of 54,500 FT2, this would equate to 167 new projects per year in Oregon and Washington.

Based on **Table 5-15**, with a high initial growth rate tapering to a lower growth rate, the 2030 market might be $557 million in the PNW as opposed to $391 million based on a flat growth rate, although in the last few years CAGR rates have been low due to downturns in construction. In 2024, year-over-year growth was more than 45% as noted in **Table 5-9**, with prior years being minimal in growth.

5.4.6 Projected North American Mass Timber Demand

As seen in **Table 5-17**, the total North American demand using the same range of CAGR options as seen above, the range of demand in volume varies from 2.5 million m3 to 21 million m3 by 2035, for a value of between $4.5 billion to $40 billion. Based on the CAGR of each region described in **Section 5.3.2** and the trajectory of growth rates as shown in **Figure 5-2**, the CAGR for all of North America could exceed that of the PNW on average. Narrowing the range based on current growth rates and anticipated tapering, a CAGR range of 15%-30% will be referenced.

Although the growth rate is currently higher, regional expertise and manufacturing will likely limit overall total market penetration of mass timber projects to a smaller value than what the PNW is currently performing to. This could change if market attributes illustrated in **Section 7.5** change to enable mass timber, or the PNW becomes a professional service and product exporter to a greater extent. This volume of growth based on volume of construction may have a higher yield overall.

Table 5-17 - Estimated North American Demand by Total CAGR Range Options

North American Mass Timber Demand - Volume (m3)												
CAGR	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**
15%	517,000	594,550	683,733	786,292	904,236	1,039,872	1,195,852	1,375,230	1,581,515	1,818,742	2,091,553	2,405,286
20%	517,000	620,400	744,480	893,376	1,072,051	1,286,461	1,543,754	1,852,504	2,223,005	2,667,606	3,201,128	3,841,353
25%	517,000	646,250	807,813	1,009,766	1,262,207	1,577,759	1,972,198	2,465,248	3,081,560	3,851,950	4,814,938	6,018,672
30%	517,000	672,100	873,730	1,135,849	1,476,604	1,919,585	2,495,460	3,244,098	4,217,328	5,482,526	7,127,284	9,265,469
35%	517,000	697,950	942,233	1,272,014	1,717,219	2,318,245	3,129,631	4,225,002	5,703,753	7,700,066	10,395,089	14,033,371
40%	517,000	723,800	1,013,320	1,418,648	1,986,107	2,780,550	3,892,770	5,449,878	7,629,829	10,681,761	14,954,466	20,936,252

North American Mass Timber Demand - Value (Million $)												
CAGR	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**
15%	$1,006	$1,156	$1,330	$1,529	$1,759	$2,023	$2,326	$2,675	$3,076	$3,537	$4,068	$4,678
20%	$1,006	$1,207	$1,448	$1,738	$2,085	$2,502	$3,003	$3,603	$4,324	$5,188	$6,226	$7,471
25%	$1,006	$1,257	$1,571	$1,964	$2,455	$3,069	$3,836	$4,795	$5,994	$7,492	$9,365	$11,706
30%	$1,006	$1,307	$1,699	$2,209	$2,872	$3,734	$4,854	$6,310	$8,203	$10,664	$13,863	$18,021
35%	$1,006	$1,358	$1,833	$2,474	$3,340	$4,509	$6,087	$8,218	$11,094	$14,977	$20,218	$27,295
40%	$1,006	$1,408	$1,971	$2,759	$3,863	$5,408	$7,571	$10,600	$14,840	$20,776	$29,086	$40,721
$/m3 Avg.	*$1,945*	*$1,945*	*$1,984*	*$2,024*	*$2,064*	*$2,105*	*$2,147*	*$2,190*	*$2,234*	*$2,279*	*$2,324*	*$2,371*

Manufacturing Facility

Photo Credit: Nicholas Sills, Whirlwind Consultants

6. Mass Timber Product Supply

Mass timber product supply spans across commodity and project-based (custom) markets, and businesses old (1960s) and new (2020s). In this section, we shed light on the different types of supply; the history of mass timber manufacturing in the region; current and forecasted production volumes; current and forecasted manufacturing capacities; and how current supply is meeting current demand. Finally, we look at how fabrication, prefabrication, and integration companies are unlocking regional supply capacity by addressing production and personnel bottlenecks.

6.1 Key definitions

Commodity Mass Timber

Commodity mass timber supply is produced to standard sizes and delivered as billets cut to length. Primarily glulam but including other engineered wood products as well, this subset of mass timber products is most often sold to distributors for use in single-family home construction. Through partnering with fabricators and integrators, commodity manufacturers can sell material into the mass timber project market, and so we assume that some percentage of commodity mass timber becomes project mass timber. These materials are often semi-commodity in format as well, where order of unframed raw square billets are put through on custom depth or width configuration—although building centers will also carry standardized dimensions for framing purposes.

Note: This report has not focused on commodity mass timber products. While they have many uses, they are significantly varied, and growth mechanisms are based on diverse factors; this is not in line with mass timber project growth. When outlined, analysis will refer explicitly to both.

Project Mass Timber

Project mass timber is sold to project teams, primarily general contractors or timber installers. This material is fully fabricated, usually CNC-framed to project specifications, and delivered as a fully coordinated kit of parts including steel connections, fasteners, and assembly instructions.

Production Estimate

This is the total mass timber project volume estimated to be produced by the given facility and consumed by the market. In some cases, these data are provided by industry reports (WoodWorks Wood Innovation Network) and in others, estimated by the consulting team from other sources. Commodity Glulam materials have been excluded in this volume.

Theoretical Capacity

The nameplate capacity of a production facility, this number is based on a press bottleneck analysis. This is derived by multiplying the press volume by number of cycles per shift by three shifts per day to achieve a total maximum theoretical throughput. This ignores all other sales, design, or production bottlenecks, and is therefore considered an ideal (theoretical rather than realistic) state.

Estimated Effective Capacity

This is the estimated capacity for a healthy mass timber manufacturing environment, running at 66% (two shifts) of theoretical, at 90% of maximum production flow. This capacity is achievable by most operators with reliable sales funnels and bottleneck resolution processes. Commodity glulam materials have been excluded in this volume.

Table 6-1 - History of Mass Timber Manufacturers in the PNW

Year	Company	State	Product Launched	Primary Market Served
1947	Calvert (now Western Forest Products)	WA	Glulam	Commodity/Custom
1962	American Laminators (now Timberlab)	OR	Glulam	Commodity/Custom
1963	Rosboro	OR	Glulam	Commodity
1967	DR Johnson	OR	Glulam	Commodity/Custom
1977	Shelton Lam & Deck	WA	Glulam	Commodity/Custom
2015	DR Johnson (ended production in 2023)	OR	CLT	Project
2017	Freres Engineered Wood	OR	MPP	Project
2018	Vaagen Timbers	WA	CLT & Glulam	Project
2019	Katerra (now Mercer)	WA	CLT	Project
2021	Zip-O Laminators	OR	Glulam	Commodity/Custom
2023	Timberlab (acquisition of American Laminators)	OR	Glulam	Project & Commodity
2024	CRTC	WA	CLT	Project

6.2 History of PNW Mass Timber Manufacturing

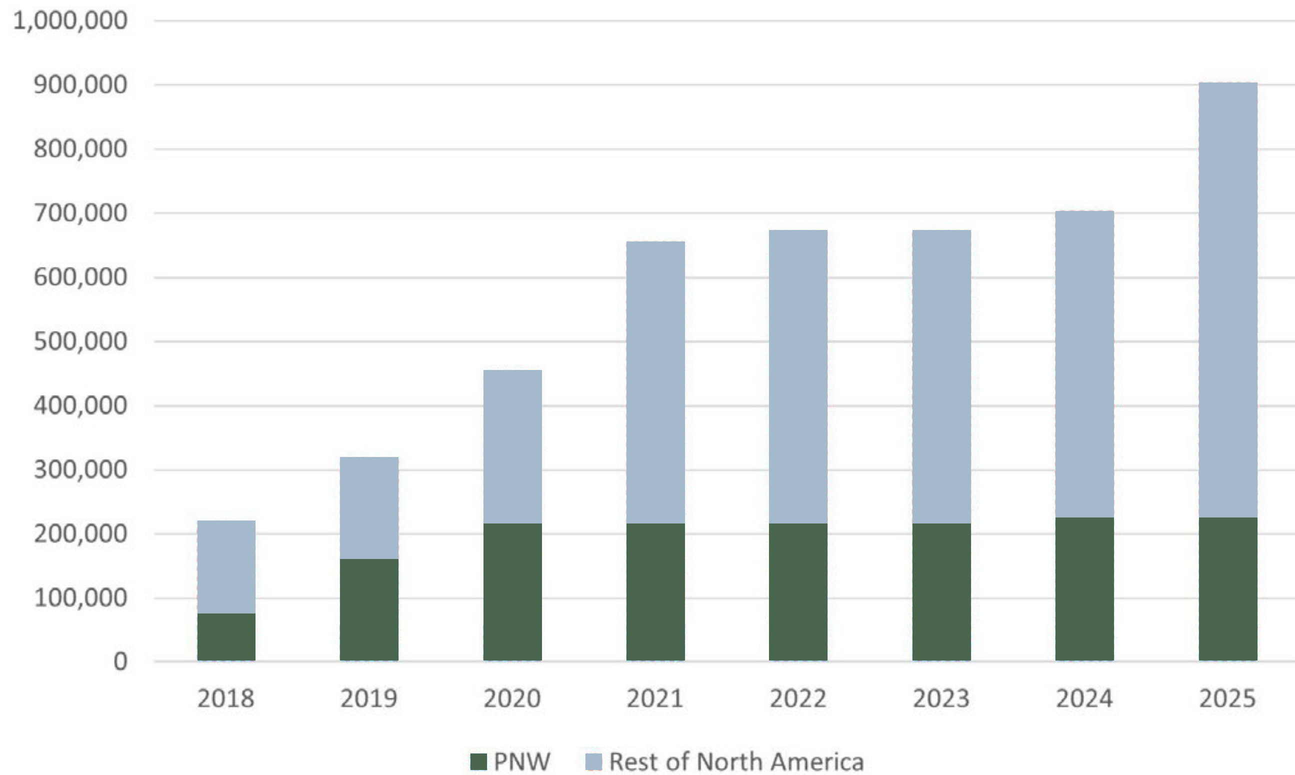
The Pacific Northwest has been manufacturing glulam for over fifty years, and CLT for over ten. **Table 6-1** highlights when manufacturers in the region came online with mass timber products, highlighting two key periods of product innovation and implementation in the 1960s and 2010s.

The rise of glulam manufacturing in the 1960s can be attributed to several key developments. During World War II, glulam manufacturing became more widespread as steel was diverted for military use. The creation of waterproof adhesives during that time also allowed glulam to be used for exterior applications such as bridges, expanding the total market. In 1962 the fingerjoint was introduced, increasing production rates and reducing cost as the product became stronger and more reliable. 1963, AITC published the first national manufacturing standard for glulam, building confidence among architects and engineers and spurring greater adoption of the material.

CLT emerged in British Columbia in the late 2000s to upcycle low-value beetle-killed (blue stain) pine dimension lumber. While the hoped-for outlet for vast low-grade volumes never fully materialized, the effort catalyzed codes, standards, and the first demonstration buildings. Canada's shift to an objective-based code path (2010) and the CLT Handbook (2011 Canada; U.S. edition soon after) gave designers a playbook. In 2015, CLT was introduced to the International Building Code (IBC). Other supportive industry efforts included the development of the CLT Handbook in 2011 (Canada) and 2012 (U.S.), which provided essential design information to the AEC sector.

Figure 6-1 illustrates the estimated effective production capacity among all North American mass timber manufacturers from 2018 to 2025. PNW capacity is indicated in blue, and the balance of North American capacity is indicated in red. Note that this chart includes only manufacturers who supply project mass timber and does not include commodity glulam manufacturers noted in **Table 6-1**.

Figure 6-1 - History of Estimated Effective Capacity of North American Project Mass Timber 2018 to 2025 (m3 per year)



The figure does not indicate this, but mass timber manufacturing capacity was established in earnest in the PNW in 2015 with the launch of DR Johnson's CLT production line. Effective capacity at this time also included a portion of custom glulam produced by the regional glulam manufacturers. By 2018, capacity was augmented with Freres Engineered Wood MPP production and Vaagen Timbers' CLT production. In 2019, Katerra opened its facility in the Spokane Valley, and production ramped up at facilities already online. In 2020, Katerra's facility reached its full effective capacity. Capacity increased again in 2024 when Timberlab acquired American Laminators, channeling more of their production into mass timber projects.

With the emergence of mass timber as a construction typology, establishing mass timber manufacturing is no longer simply a matter of making industrial products. Demand for mass timber means a demand for project mass timber, and while commodity mass timber might yet make its way into mass timber projects through fabricators and prefab/modular companies, most of the commodity supply is glulam beams of standard sizes that do not necessarily suit the needs of today's construction projects. This means that any manufacturing that comes online will necessarily involve a high level of professional services and CNC fabrication through in-house resources or strong partnerships.

6.3 PNW Project Mass Timber Production

6.3.1 Current Production Estimate

The production volume of project-based mass timber in the PNW has been estimated based on available project data across North America, primarily from the WoodWorks Wood Innovation Network. Project-based mass timber includes product supplied by PNW manufacturers.

We look first at where mass timber manufactured in the PNW is being installed in construction projects. Using the full project inventory from the WIN database, a total project area of PNW mass timber projects was tallied, enabling us to calculate a total volume of mass timber using a material intensity factor of 0.02 m3/FT2 of building area (an explanation of this factor can be found in **Section 2.3 Key Conversions**). **Table 6-2** displays the total FT2 area of mass timber projects supplied by PNW manufacturers, and the corresponding volume of material, as well as a percentage of PNW production that each geographic region consumed in 2024.

Table 6-2 - Location of Projects Supplied by PNW Manufacturers, 2024

Geographic Region	Total Project Area of PNW Mass Timber (FT2)	Total PNW Mass Timber Volume (m3)	% of PNW Production
PNW	1,280,000	25,600	41.29%
Western NA	510,000	10,200	16.45%
Eastern NA	1,310,000	26,200	42.26%
Total PNW Mass Timber Volume in North America (2024)	**3,100,000**	**62,000**	**100.00%**

According to this analysis, current project-based mass timber production totals around 62,000 m3 for 2024. At a price of $1,945/m3, 62,000 m3 of production in 2024 corresponds to roughly $120 million in revenue for project-based mass timber. Within this current production stance, the PNW industry is currently delivering approximately 3,100,000 FT2 of mass timber construction, 27% of a potential 11,500,000 FT2 of construction that could be delivered on a two-shift configuration, the estimated effective capacity basis. This production volume is estimated to constitute 0.5% of Oregon and Washington's lumber supply:46,125,000 board feet of lumber consumed to produce mass timber out of a production volume of 8.97 billion BF.

6.3.2 Forecasted Production Estimate

With mass timber production (project-based, not commodity) hovering around 62,000 m3 in 2024, we can forecast mass timber production in the region for a range of potential CAGRs. **Table 6-3** captures a wide range of possibilities from 15% CAGR to 40% CAGR.

As presented in **Section 5**, the CAGR for mass timber projects built in the PNW was assessed to average 20% over a 10-year outlook. In this section, we look at the CAGR for mass timber production in the PNW. As the PNW has many of the components to continue to be a mass timber production leader in North America, it is likely that the growth rates for mass timber production will outpace the growth rates of projects built in the region. The effect should be to solidify the PNW as a net exporter of mass timber, one supplying other areas that lack the same mass timber manufacturing

Table 6-3 - PNW Mass Timber Production Forecast (m3/Year)

PNW Project-Based Mass Timber Product Volume (m3)												
CAGR	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**
15%	62,000	71,000	82,000	94,000	108,000	124,000	143,000	164,000	189,000	217,000	250,000	288,000
20%	62,000	74,000	89,000	107,000	128,000	154,000	185,000	222,000	266,000	319,000	383,000	460,000
25%	62,000	78,000	98,000	123,000	154,000	193,000	241,000	301,000	376,000	470,000	588,000	735,000
30%	62,000	81,000	105,000	137,000	178,000	231,000	300,000	390,000	507,000	659,000	857,000	1,114,000
35%	62,000	84,000	113,000	153,000	207,000	279,000	377,000	509,000	687,000	927,000	1,251,000	1,689,000
40%	62,000	87,000	122,000	171,000	239,000	335,000	469,000	657,000	920,000	1,288,000	1,803,000	2,524,000
PNW Project-Based Mass Timber Product Value ($ millions)												
CAGR	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**
15%	$121	$138	$163	$190	$223	$261	$307	$359	$422	$495	$581	$683
20%	$121	$144	$177	$217	$264	$324	$397	$486	$594	$727	$890	$1,091
25%	$121	$152	$194	$249	$318	$406	$517	$659	$840	$1,071	$1,367	$1,743
30%	$121	$158	$208	$277	$367	$486	$644	$854	$1,133	$1,502	$1,992	$2,641
35%	$121	$163	$224	$310	$427	$587	$809	$1,115	$1,535	$2,113	$2,907	$4,005
40%	$121	$169	$242	$346	$493	$705	$1,007	$1,439	$2,055	$2,935	$4,190	$5,984
$/m3 AVG.	*$1,945*	*$1,945*	*$1,984*	*$2,024*	*$2,064*	*$2,105*	*$2,147*	*$2,190*	*$2,234*	*$2,279*	*$2,324*	*$2,371*

capabilities. Subject to business acumen and practices, we believe material supply from the PNW could be between 25-35% CAGR.

Adding revenue values to this the mass timber project material supply market would hit $1 billion between 2030 and 2035 subject to CAGR, with $2 billion potentially following shortly behind.

6.3.3 How Current Supply is Meeting Current Demand

In 2024, regional production of project mass timber was estimated at 62,000 m3 (as laid out in Section 6.3). Meanwhile, regional demand for mass timber within the PNW was documented at nearly 60,500 m3/year (per Section 5.3). In effect, the PNW is consuming the same volume of mass timber as is produced in the region. We know, however, that not all product consumed in the PNW is from the region, and that mass timber manufactured in the PNW is transported to other regions across the U.S. We will examine this dynamic in finer detail.

Table 6-4 breaks down where the PNW mass timber products are installed across North America, based on available project data from the WoodWorks Wood Innovation Network database. The data show that within the region, roughly half of the demand for mass timber materials is supplied from PNW manufacturers.

Available project data show that the market penetration of PNW-made mass timber across different regions was found to decrease significantly as projects get farther away, and thus closer to competing manufacturers.

To rationalize and contextualize the market penetration rate of PNW-made mass timber, we examine penetration rates in British Columbia and California. Table 6-5 presents

Table 6-4 - Manufacturer Market Share by Project Location (m3/year)

PNW Projects			
Manufacturer Location	**Market Share of Projects Supplied (All-TIme)**	**Market Share of Projects Supplied (2024)**	**2024 Volume (m3)**
PNW	49.91%	42.35%	25,600
Balance of USA	7.02%	0.69%	400
Canada	39.93%	51.07%	30,900
Europe	3.15%	5.89%	3,600
Total	**100.00%**	**100.00%**	**60,500**

Western NA Projects			
Manufacturer Location	**Market Share of Projects Supplied (All-TIme)**	**Market Share of Projects Supplied (2024)**	**2024 Volume (m3)**
PNW	12.13%	7.23%	9,700
Balance of USA	6.28%	9.28%	12,500
Canada	77.91%	79.78%	107,500
Europe	3.68%	3.72%	5,000
Total	**100.00%**	**100.00%**	**134,700**

Eastern NA Projects			
Manufacturer Location	**Market Share of Projects Supplied (All-TIme)**	**Market Share of Projects Supplied (2024)**	**2024 Volume (m3)**
PNW	4.97%	8.32%	26,200
Balance of USA	22.62%	58.28%	183,800
Canada	51.09%	23.35%	73,600
Europe	21.30%	10.05%	31,700
Australia	0.03%	-	-
Total	**100.00%**	**100.00%**	**315,300**

Total NA Projects			
Manufacturer Location	**Market Share of Projects Supplied (All-TIme)**	**Market Share of Projects Supplied (2024)**	**2024 Volume (m3)**
PNW	14.99%	12.04%	61,500
Balance of USA	14.04%	38.49%	196,700
Canada	59.13%	41.49%	212,000
Europe	11.83%	7.89%	40,300
Australia	0.01%	-	-
Total	**100.00%**	**100.00%**	**511,000**

the percentage of mass timber projects using PNW-made mass timber in BC and California. In BC, where there is a robust mass timber supply chain, use of PNW mass timber is minimal. In California, where there is no mass timber manufacturing but where the distance from the PNW is modest, use of PNW mass timber is significantly higher than the average of all western North America.

Table 6-5 - Proportion of PNW-Produced Mass Timber Material Used in British Columbia and California

State / Province Example	% of Project Volume Using PNW Mass Timber
BC	2.47%
CA	40.85%

Table 6-6 provides a comparison between where mass timber is made (left side of the table) and where it is consumed (right side), from all projects available from all years. This illustrates the coincidental but relatively balanced supply and demand in the PNW, while Canadian manufacturers are a net exporter of mass timber.

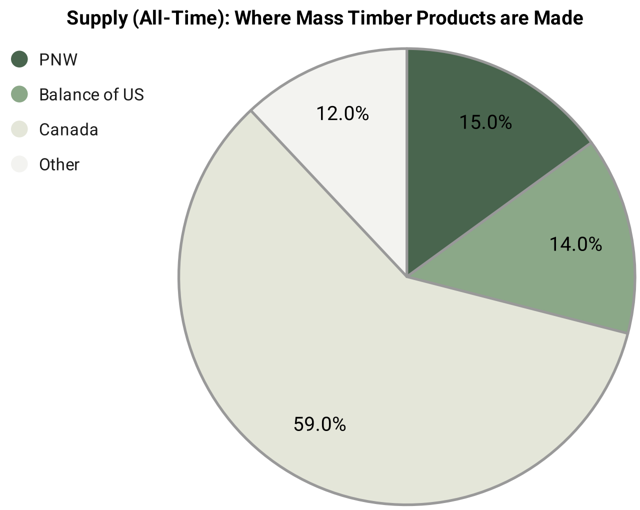
Table 6-6 - Projects by Manufacturer Location and Project Location (All-Time)

	% Supply: Where Mass Timber Products are Made	% Demand: Where Mass Timber is Consumed
PNW	15%	16%
Balance of US	14%	49%
Canada	59%	35%
Other	12%	NA*

*Note: The datasets include only projects in North America. Thus, data for where mass timber is consumed does not reflect projects outside the continent (Europe/ Asia).

Figure 6-2 presents the same information as **Table 6-6** in a pie chart format to show supply and demand as parts of a whole.

Figure 6-2 - Projects by Manufacturer Location and Project Location (All-Time)



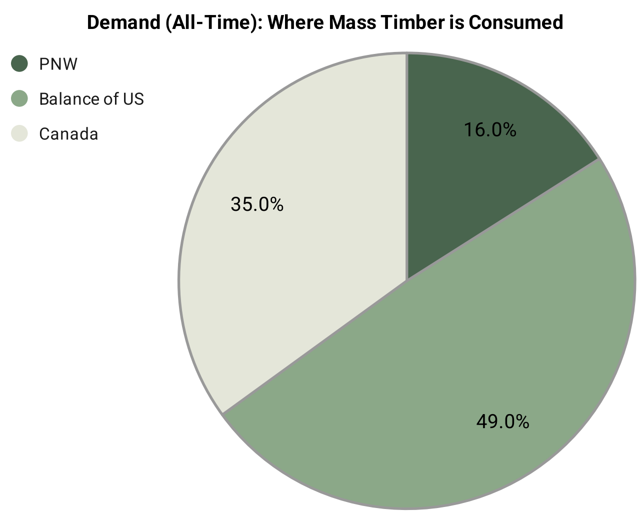
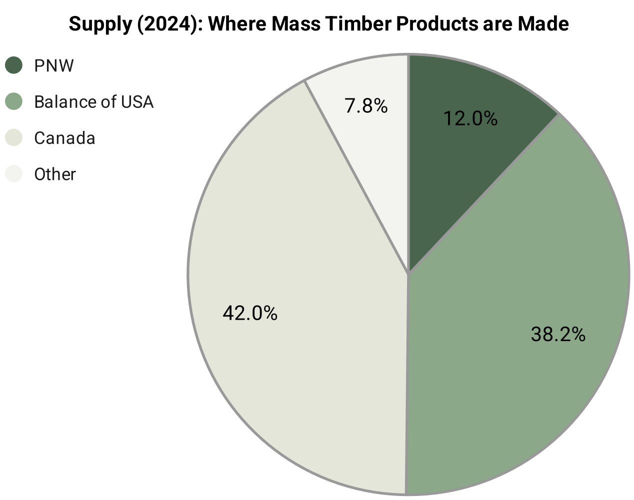


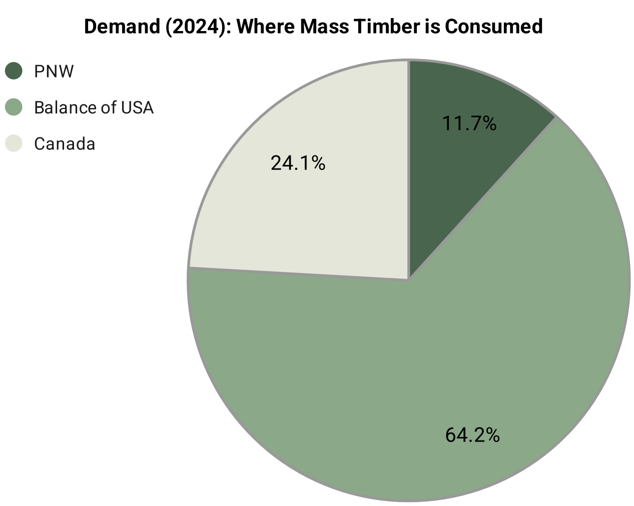
Table 6-7 and **Figure 6-3** compare the same supply location vs. demand location, but only for projects completed in 2024. This helps form a picture of how supply and demand have shifted as a percentage of all mass timber projects and products over time relative to the historic average.

Table 6-7 - Projects by Manufacturer Location and Project Location (2024)

	% Supply: Where Mass Timber Products are Made	% Demand: Where Mass Timber is Consumed
PNW	12%	12%
Balance of US	38%	64%
Canada	42%	24%
Other	8%	NA*
*Note: The datasets include only projects in North America. Thus, data for where mass timber is consumed does not reflect projects outside the continent (Europe/ Asia).		

Figure 6-3 - Projects by Manufacturer Location and Project Location (2024)





Canada has become a powerhouse manufacturer and a net exporter of mass timber due to several factors:

- Canada's longer-established mass timber supply chain
- Access to species already approved for use nationwide
- Strong Crown and provincial government support
- Greater product availability and consumer confidence
- Diversification to international markets (Japan/China)
- Competitive pricing

While the U.S. (including the Pacific Northwest) is still developing full-service mass timber supply capabilities, many Canadian companies unable to compete on commodity materials have decades of experience focused specifically on mass timber project delivery. For example:

- **Western Archrib** (1951): Custom glulam
- **StructureCraft** (1998): Dowel-laminated timber.
- **Chantier Chibougamau** (1961) (**Nordic Structures**, (1995)): Glulam and CLT.
- **Structurlam** (1961, acquired by **Mercer** in 2023): Glulam and CLT.

The two leading full-service U.S. firms have a much shorter history. SmartLam was founded in 2012, restructured in 2019, and only began scaled full-service project delivery in 2021. Mercer's acquisition of Structurlam in 2023 positioned it as a full-service provider. This relative difference in experience and professional capacity helps explain why Canada continues to hold a disproportionately large share of the North American market.

Since 2017, however, U.S. projects have increasingly relied on domestic suppliers. The total square footage of projects using U.S. manufacturers has grown every year, and the share of domestic supply has outpaced overall project growth, evidence of a maturing industry and rising reliance on U.S.-made mass timber.

Figure 6-4 presents a map, produced using PowerBI, of all mass timber projects built in North America from 2020-2024, and where the mass timber for those projects was manufactured. Bubbles indicate the size of the market by square feet of mass timber construction, while each bubble is split into pie shares for the origin area of each percentage of production. Within this context it can also be noted that while the data represent buildings listed as completed between 2020-2024, it is possible that the materials for these buildings (at least on the larger scale) might have been produced during 2018-2022. Thus, this representation does not fully represent a perceived manufacturing date of materials and market supply distribution.

6.4 PNW Manufacturing Capacity

PNW mass timber manufacturing capacity can be considered as a theoretical total, or as an estimated effective total (defined in Section 6.1, Key Definitions). Production volume is yet another subset of the estimated effective capacity; on the other hand, production is a measure of what was made for the market, rather than what could have been made. In the following sections, we describe the current and future capacity for both mass timber manufacturing and value-add services such as fabrication, prefabrication, and integration.

6.4.1 Current Manufacturing Capacity

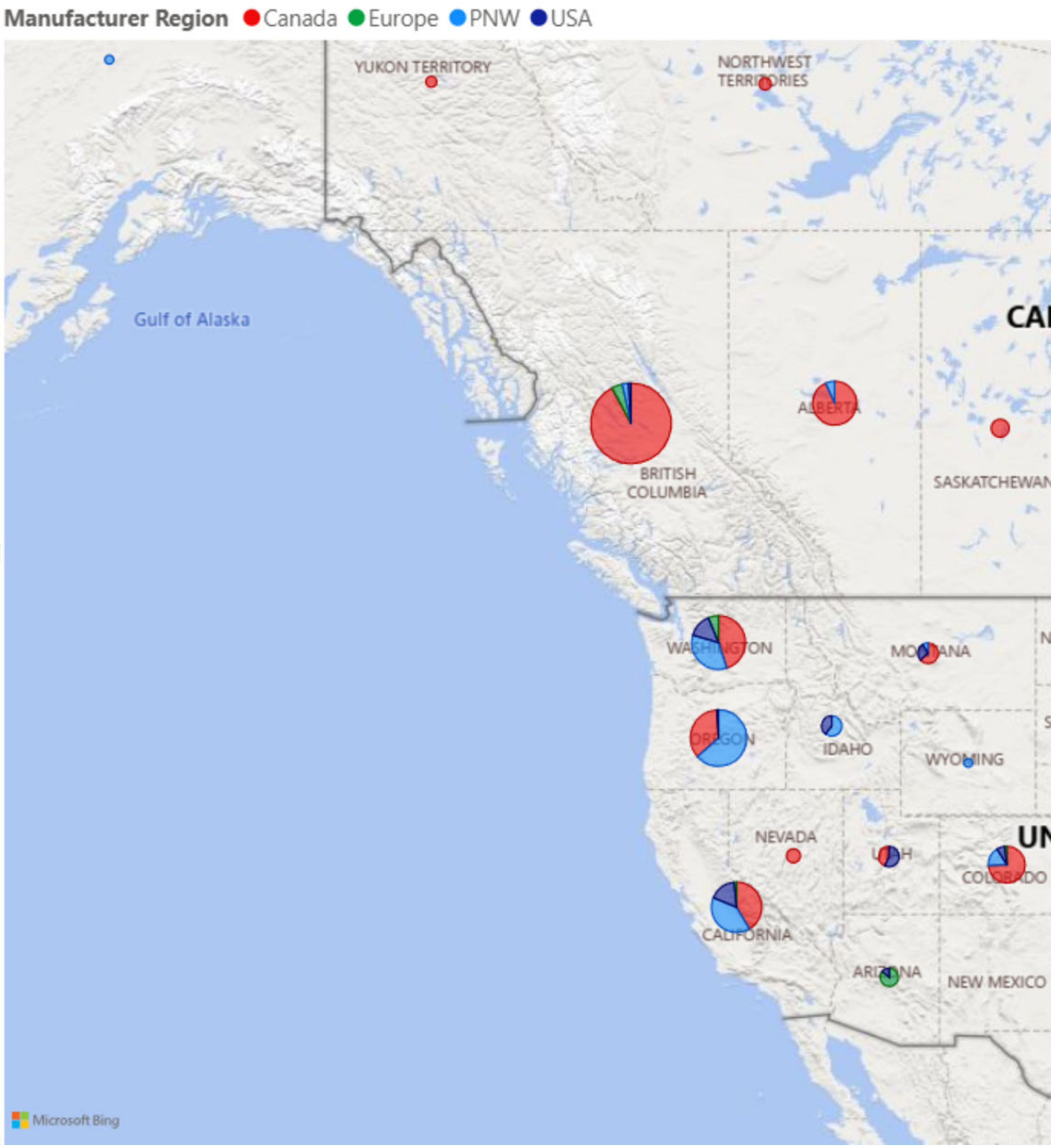
Manufacturing capacity is most quantified on an output volume basis: cubic meters of mass timber product produced in the facility. While some manufacturers may think about their capacities on a board foot basis, this unit of measure presents communication challenges as described in **Section 2.2 Units of Measure**. For the purposes of this report, manufacturing capacity is quantified in cubic meters, and care is given to distinguish between theoretical capacity and estimated effective capacity.

Interestingly, capacity is still an elusive measurement. True theoretical capacity relies on an understanding of where the bottlenecks exist when manufacturing different products, rather than on a simplistic calculation of press bed size. For the purposes of this report, theoretical capacities are taken as the “nameplate” value stated by the operating business, and effective capacities are assumed to ramp up over time for new facilities just coming online.

There are also several problematic production capacity statements from various suppliers where different bottlenecks in the project delivery pipeline are likely more limiting than their “nameplate” press production capacity. This includes finger jointing capacity, CNC framing capacity, and technical system capacity as opposed to theoretical press-only capacity. This might artificially inflate current standby capacity. This set of issues goes to illustrate that physical capacity is not the current primary bottleneck to market access, and that bottlenecks are more aligned to business planning, project execution, and knowledgeable, capable staffing. As highlighted in Section 3, the companies producing mass timber in the Pacific Northwest are structured and equipped in different ways and therefore have a range of capability to produce material for the commodity and project markets. **Figure 6-5** presents theoretical and estimated effective capacity alongside mass timber produced in 2024.

Figure 6-5 highlights several important realities about mass timber capacity in the PNW. Project-based mass timber (in blue) represents only 39% of total theoretical mass timber capacity. Similarly, project-based

Figure 6-4 - Mass Timber Projects Built 2020-2024 by Location of Manufacturer



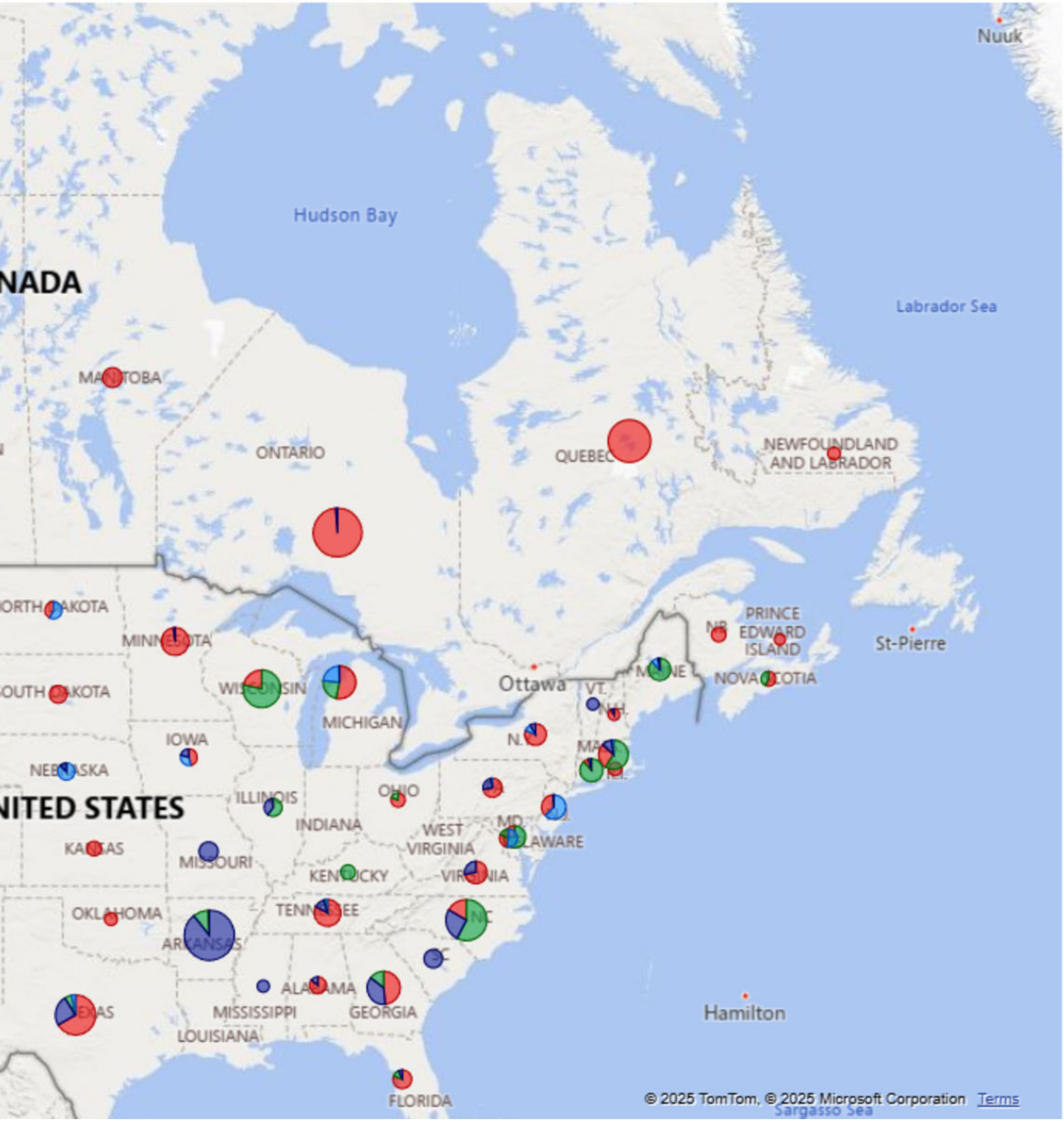

Nuuk
Hudson Bay
NADA
Labrador Sea
ONTARIO
QUEBEC
NEWFOUNDLAND AND LABRADOR
PRINCE EDWARD ISLAND
NB
St-Pierre
NOVA SCOTIA
Ottawa
MAINE
VT.
N.H.
MICHIGAN
IOWA
NITED STATES
ILLINOIS
INDIANA
OHIO
WEST VIRGINIA
KANSAS
MISSOURI
KENTUCKY
VIRGINIA
OKLAHOMA
ARKANSAS
TENNESSEE
NC
SC
ALABAMA
MISSISSIPPI
GEORGIA
LOUISIANA
TEXAS
FLORIDA
Hamilton
Sargasso Sea
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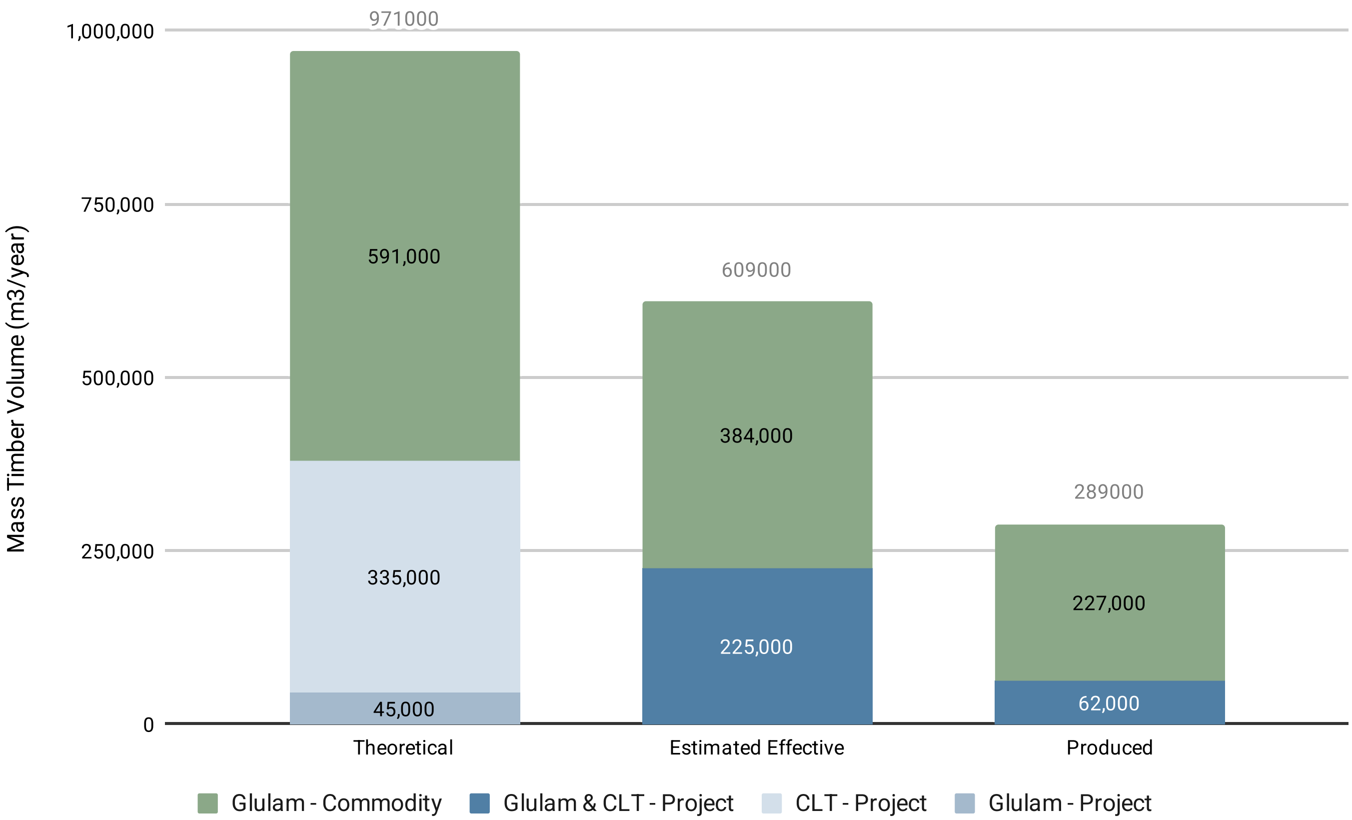
Figure 6-5 - Estimated Mass Timber Production Capacity in the PNW (m3/Year)



mass timber (in blue), represents 37% of estimated effective mass timber capacity.

This volume of project mass timber has a market estimated value of $120 million. Meanwhile, the commodity glulam has an estimated market value of $320 million, for a total of $440 million. This further shows the current size of commodity manufacturing and dominance in the PNW.

Of all mass timber produced in the PNW in 2024, 21% went to projects (27.4% of estimated effective project capacity), and 79% went to the commodity market (59.1% of the estimated effective commodity capacity).

Indeed, production volumes indicate a significant underutilization of capacity in the PNW. In **Section 7**, we explore key constraints impacting manufacturers' production.

There is an estimated effective project capacity in the region of 225,000 m3 per year while current production lags significantly behind at 62,000 m3 (27% utilization), valued at $120 million. Meanwhile, commodity glulam has an EE of 384,000 and production of 227,000 (59% utilization), valued at $320 million.

6.4.2 Anticipated PNW Mass Timber Capacity

The PNW is entering a clear expansion phase for mass timber manufacturing. As shown in Table 6-8, production will increase significantly with Timberlab's 100,000 m3/year CLT facility (≈186,000 FT2), upgrades made to Timberlab's glulam facilities acquired from American Laminators, and emerging efforts like CRTC's hemlock CLT line.

Table 6-9 reflects the estimated PNW production compared to announced anticipated effective capacity. Highlighted in green in the matrix is the year in which the PNW effective production capacity (two-shift basis, as defined in Section 6.1) is exceeded by demand for PNW manufactured products. The data show that at higher CAGRs, demand could exceed effective production capacity by 2029. As shown above, new capacity is anticipated to come online, but the amount and timing of that capacity is not publicly available.

Table 6-8 - Anticipated Capacity for PNW Mass Timber Manufacturing

Company / Facility	Product / Role	Facility Size	Stated / Indicative Capacity	Status / Notes	Source
Timberlab (OR)	CLT production	186,000 FT2	100,000 m³/yr (CLT)	Announced / In Development	Timberlab – advanced CLT production (news)
Timberlab (OR)	Glulam production				
Timberlab (OR)	Glulam production				
CRTC (WA)	CLT (hemlock)	n/a	n/a	New Venture Announced	CRTC partners with Makah Tribe (press)
Stoltze (MT)	Mass-timber (prior announcement)	n/a	n/a	No current outlook	Stoltze – prior announcements

It should be noted that it takes roughly 1.5 to 3 years to open a new modern mass timber production facility. In this case, while the market is currently far from saturated, if the CAGR rates are in the 30-40% range then right now would be a critical time to invest in new production capacity. There are several further discussion points to this, including the large impact of regional exports and imports (including materials from other U.S. states, Canada, and the EU).

Table 6-9 - Estimated PNW Production Relative to Anticipated PNW Capacity (m3)

CAGR	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
15%	62,000	71,000	82,000	94,000	108,000	124,000	143,000	164,000	189,000	217,000	250,000	288,000
20%	62,000	74,000	89,000	107,000	128,000	154,000	185,000	222,000	266,000	319,000	383,000	460,000
25%	62,000	78,000	98,000	123,000	154,000	193,000	241,000	301,000	376,000	470,000	588,000	735,000
30%	62,000	81,000	105,000	137,000	178,000	231,000	300,000	390,000	507,000	659,000	857,000	1,114,000
35%	62,000	84,000	113,000	153,000	207,000	279,000	377,000	509,000	687,000	927,000	1,251,000	1,689,000
40%	62,000	87,000	122,000	171,000	239,000	335,000	469,000	657,000	920,000	1,288,000	1,803,000	2,524,000
Estimated Effective Capacity	**225,000**	**225,000**	**225,000**	**325,000**	**325,000**	**325,000**	**325,000**	**325,000**	**325,000**	**325,000**	**325,000**	**325,000**

6.5 Fabrication, Prefabrication & Integration Capacity

Complementing and packaging the existing regional manufacturing capacity are the fabrication, prefabrication, and integration companies that serve to unlock regional supply capacity by addressing equipment, personnel, and know-how bottlenecks. Having a partner and an option for outsourcing project integration is good in a mature market. In new markets, companies relying exclusively on external integrators expose themselves to risks if the external integrators have superficial understanding of the specifics of mass timber construction and have other construction modality options to fall back on. Value-add companies serve to unlock capacity in several different ways, best explained through the following examples:

Fabrication Company Alleviates CNC Bottleneck

A mass timber manufacturer cultivates a project and is awarded the supply of the mass timber package. The project schedule shifts and comes into conflict with other projects the company is set to deliver, and it is clear they won't be able to meet the schedule for the newly awarded project. They decide to outsource the CNC fabrication and hardware installation to a fabrication company in the region. Capacity is thus expanded as the fabrication company enables the manufacturer to deliver on all its commitments. This scenario is most common with glulam beam manufacturing, as most panel manufacturers handle their own CNC machining, for logistical and cost reasons.

Fabrication Company Provides Pathway For Commodity Manufacturers

A fabrication company cultivates a project and is awarded the supply of a mass timber package. For commodity manufacturers capable of producing larger members required for commercial (non-single-family residential) projects. When member sizes align, the fabrication company can source mass timber from commodity manufacturers, opening the door for them to the project mass timber market. Project mass timber capacity is thus expanded.

Integration Company Alleviates Project Management Bottleneck

An integration company cultivates a project and is awarded the supply of the mass timber package. They handle design assist, timber engineering, budgeting, and project management, and procure the mass timber from the mass timber manufacturer(s) best suited for the job. The mass timber manufacturer produces the material for the project at a convenient time, without tying up limited project management resources that are dedicated to securing and executing on other projects. Capacity is thus expanded as the integration company augments manufacturing partners with additional professional services. This works especially well for small-scale projects that large manufacturers are less inclined to service.

Prefabricated Modular Company Addresses Sales Bottleneck and Mitigates Production Schedule Challenges

A modular mass timber company cultivates a project and wins the award to deliver prefabricated mass timber modules to the housing developer. They handle design assist and project management and procure mass timber billets from the manufacturer best suited for the job. In fact, the modular company may likely have a long-term supply agreement with the manufacturer to deliver a specific volume of material on a regular basis. The mass timber manufacturer is now better able to plan production schedules and is free to produce the material at a convenient time—perhaps when project work is slow—without tying up any professional services within the company. Capacity is thus expanded as the prefab modular company serves as a sales engine for the manufacturing company, and provides guaranteed work when manufacturer is slow.

The companies that provide fabrication, prefabrication and integration services to the market, identified in Section 3, are currently operating one shift of production with annual revenues in the $1-5M range and average employment between 5 and 40 full-time staff. The exception to this would be an integration company that is holding the contract with the GC for a full mass timber supply, in which case their revenue is significantly higher as it includes not just services but all material. While the economic impact of these companies may be small relative to manufacturing, the examples above highlight the important role they currently play in the ecosystem.

As mass timber manufacturing trends toward offering the full range of professional services required to deliver mass timber projects, the need for fabricators may decline. We know, however, that there are businesses that would like to take the leap into mass timber manufacturing but do not want to have to deal with the particulars and just-in-time delivery of construction projects. A robust network of fabrication, prefabrication, and integration companies might just give would-be manufacturers the confidence to step into manufacturing, as their existence decouples industrial processes from custom, project-based processes.

6.5.1 Future Facilities

When asked about plans to expand, fabrication, prefabrication and integration companies in the PNW expressed the need for greater regional support (financial and political), greater confidence in the size and potential of the market, and increased margins (achieved through price reduction of incoming mass timber products, or development and deployment of new innovative products).

That said, several notable expansions and new facilities are entering the region. Table 6-10 highlights the new fabrication and prefabrication capacity entering the region.

6.6 Summary of North American Supply, Demand & Capacity

Table 6-11 summarizes the consulting team's estimate of annual North American supply, demand, and capacity for mass timber.

As shown in Table 6-11, the 2024 dataset reconciles at 517,000 m3 of projects supplied and completed, against an estimated 718,000 m3 of effective North American capacity (PNW 225,000 m3, rest of U.S. 231,000 m3, Canada 262,000 m3). The headline outlier is Canada, where reported supply (227,400m3) is near the effective capacity of (262,000 m3), largely reflecting project timing. Several large buildings fabricated in 2021-2023 achieved

Table 6-10 - New Fabrication and Prefabrication Capacity Entering the PNW

Company / Facility	Product / Role	Size (m2)	Size (FT2)	Stated / Indicative Capacity	Status / Notes	Source
Zaugg Timber (Port of Portland)	Secondary / modular integration	9,290	100,000	n/a	Announced partnership	Port of Portland – ZTS factory announcement
Sauter Timber (OR)	Secondary manufacturing (CNC/finishing)	3,716	40,000	n/a	Facility build-out / accepting material	Sauter Timber – facility updates (LinkedIn)
Cut My Timber (Eagle Creek, OR)	Secondary manufacturing (CNC/assembly)	n/a	n/a	n/a	New facility announced	Cut My Timber – Eagle Creek note

Table 6-11 - Estimated North American Supply and Demand Balance (m3) for Mass Timber Materials by Region in 2024 with Comparison to Estimated Effective Capacity

Geographic Region	Supply	Demand	Effective Cap.
PNW	62,000	60,500	225,000
Balance of USA	197,300	331,800	231,000
Canada	217,100	124,600	262,000
Other	40,500	-	-
Total	**517,000**	**517,000**	**718,000**

occupancy in 2024 and were logged into the 2024 completions dataset (for example, Google Borregas—produced in 2021, occupied in 2024). That lag between fabrication/shipment and occupancy/completion pulls prior-year production forward into the 2024 “supply” column and artificially inflates Canada’s apparent throughput for the year. This has the effect of grossing up specific full-feature Canadian suppliers such as Kalesnikoff, Nordic, Western Archrib and the purchased Structurlam entities (now operating as Mercer Mass Timber). Some of these entities are known to be operating at three shifts, while others are currently operating at only one or two shifts.

A variety of data sources has been conglomerated to produce project construction economic outlooks. This includes both straight-line economic projections based on historic data and publicly available construction project data based on third-party research groups. For production capacity, the two-shift effective production ratio was used (66% x 90% = two-shift capacity). Survey information was conglomerated with publicly available information and presented in the chart below. The chart is purposefully not labeled (some producers are sensitive to public information on production capacity). The consulting team has also adjusted production value of three facilities where there appear to be differing opinions on true effective production capacity.

Similarly, Figure 6-6 illustrates a history of U.S. and North American mass timber theoretical production capacity. The figure also shows projections of total North American demand based on a 20%-30% CAGR rate.

Capacity projections were developed with a straight-line trend projection based on eight years of potential effective capacity data. It is likely that regional economics and large singular investments will buck some of these trendline predictions; however, this base outline gives us a vision of the future if conditions remain similar to recent history.

Within North America, production growth rates (CAGR) since 2018 have been an average of 23%. Meanwhile, U.S.-based production growth rates have been 31%.

Projections, Production Capacity:

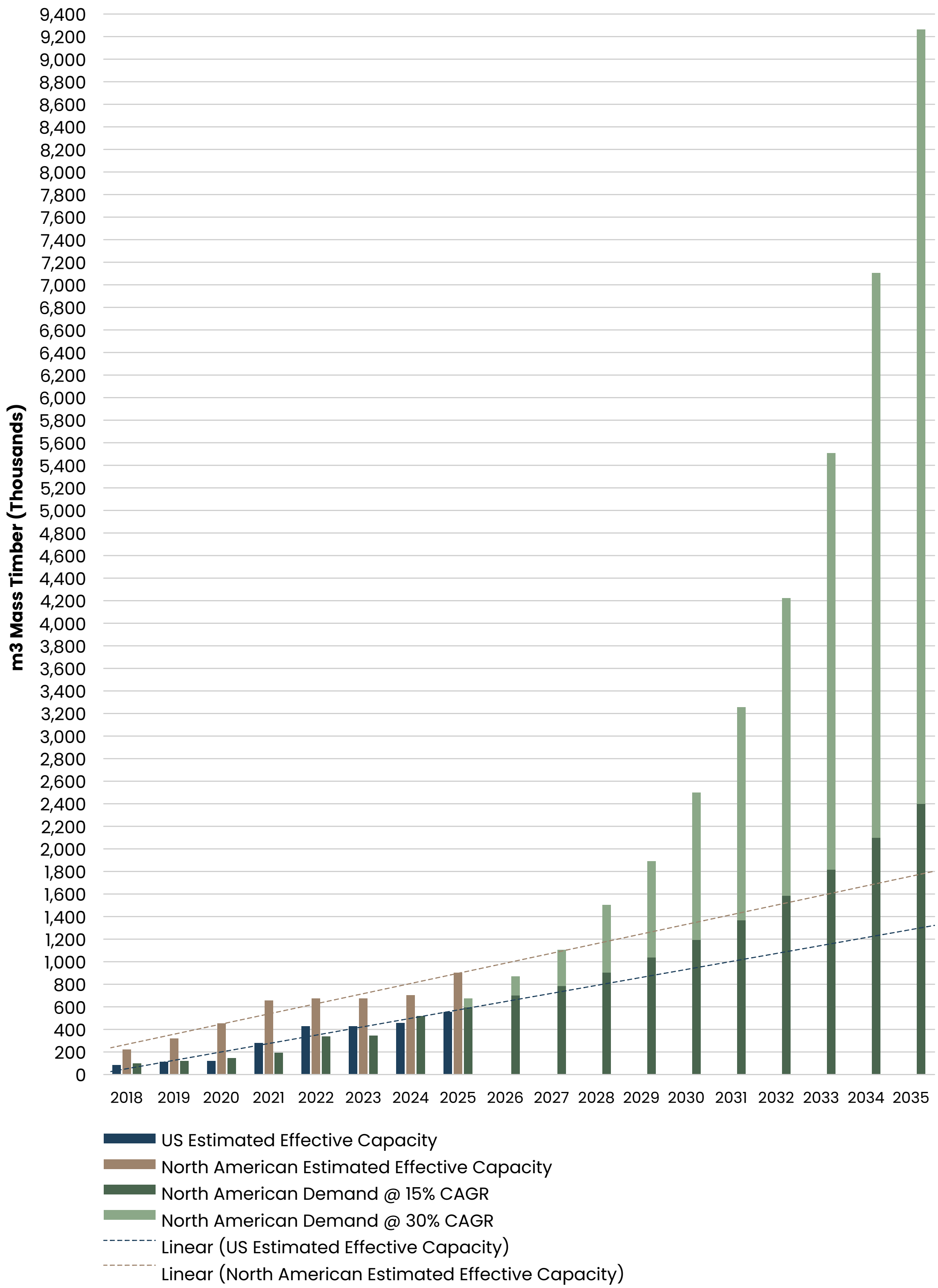
2030

US @ 31% CAGR	= 2,126,255 m3	Trendline:	925,000 m3
North America @ 23% CAGR	= 2,764,569 m3	Trendline:	1,400,000 m3

2035

US @ 31% CAGR	= 8,131,226 m3	Trendline:	1,300,000 m3
North America @ 23% CAGR	= 9,258,191 m3	Trendline:	1,900,000 m3

Figure 6-6 - North American Mass Timber Production Capacity (Estimated Effective Production Capacity 2018 to 2025)



Trendline vs. CAGR: Figure 6-6's linear trendline (built from 2018–2025 data) implies ≈1.4 million m3 by 2030 and ≈1.9 million m3 by 2035 for North America. That is ~27% below the CAGR projection by 2030 (2.76M vs. 1.4M) and significantly lower by 2035 (9.2M vs. 1.9M). The gap reflects different assumptions: Linear fits smooth history and understate the stepwise, lumpy nature of new lines and plant expansions, while pure CAGR likely overstates what is sustainable without corresponding growth in fiber, skilled labor, and project pipelines. Fitting project CAGR demand into this (separately from supply as mentioned above), demand is illustrated in yellow at a 20% CAGR with a demand of 1.5 million m3 in 2030 and 3.8 million in 2035. This gap illustrates that higher production growth rates will be required in the next few years, tapering after the 2030s but still demonstrating significant non-linear capacity growth.

The takeaway of this is that linear growth alone will not meet a strong-demand scenario; continued above-trend additions (new lines, shift adds, de-bottlenecking) are required. A prudent planning range is 1.4–1.8M m3 by 2030 and ~2–5M m3 by 2035, contingent on market pull, financing, and regional fiber/people constraints. If it can align all three, there is an opportunity for the PNW to lead.

6.7 Growth Projection Impact on Lumber Supply

Mass timber production requires a reliable supply of high-quality lumber that is dried to lower moisture content than conventional dimension lumber. Table 6-12 shows the estimated amount of lumber needed to

Table 6-12 - Projected Lumber Demand Based on Projected Mass Timber Project Demand

Cubic Volume of Mass Timber Product Demand (m3/Year)	MBM of lumber needed per year	Lumber Volume Needed as a % of Well-Suited Lumber Supply	Lumber Volume Needed as a % of All NA Softwood Lumber Production
25,000	18,000	0.09%	0.03%
50,000	36,000	0.19%	0.06%
75,000	54,000	0.28%	0.09%
100,000	72,000	0.38%	0.13%
200,000	145,000	0.76%	0.25%
300,000	217,000	1.14%	0.38%
400,000	290,000	1.53%	0.51%
500,000	362,000	1.91%	0.64%
1,000,000	724,000	3.81%	1.27%
1,500,000	1,086,000	5.72%	1.91%
2,000,000	1,448,000	7.62%	2.54%
2,500,000	1,810,000	9.53%	3.18%
3,000,000	2,172,000	11.43%	3.81%
3,500,000	2,534,000	13.34%	4.45%
4,000,000	2,896,000	15.24%	5.08%
4,500,000	3,258,000	17.15%	5.72%
5,000,000	3,620,000	19.05%	6.35%

produce various volumes of mass timber products. All values in the table reflect an annual basis. The data show that even at very large production scales, mass timber's pull on the overall North American lumber market is modest. For example, at 1 million cubic meters of annual mass timber demand, the industry would require about 724 MMBM of lumber, which is equal to just 1.27% of all North American softwood lumber production. However, because well-suited feedstock is scarcer, this same level of demand represents nearly 4% of the total well-suited supply. At 5 million cubic meters of mass timber produced, the draw on the broader lumber market would still be under 6.5% but would consume nearly 20% of the well-suited supply. This clearly demonstrates that the lamstock and kiln-drying bottlenecks, rather than aggregate lumber production, are the most critical constraints.

For historical context, North American lumber production has experienced significant fluctuations. In 2005, production peaked at roughly 75 billion board feet, while by 2024 it had fallen to around 57 billion board feet—a decline of nearly 25%. Despite this contraction, North America's forest resources remain robust. Across all ownerships, growth-to-drain ratios exceed 1, meaning forests are growing more wood annually than is being harvested. All of this indicates that from both lumber industry infrastructure and biological sustainability standpoints, there is capacity to increase harvest levels and lumber production if market demand and policy conditions warrant.

Together, these factors underscore that while the overall North American softwood lumber base is sufficient to support large expansions in mass timber production, access to and investment in specialty lamstock supply and kiln drying capacity will be key factors that determine how fast and how far the sector can realistically grow.

In the early days of CLT production offcut waste from sub-optimized billet nesting was rampant. Modern facilities have tighter billet optimization parameters and multiple off-cut product streams including solid offcut sales, bioenergy waste heat generation, and others. This represents some of modernization as the industry evolves.

Photo Credit: Nicholas Sills, Whirlwind Consultants

7. Influences on the PNW Mass Timber Ecosystem

The Pacific Northwest mass timber ecosystem is shaped by a complex interplay of supply chain dynamics, market demand, and policy frameworks. While the region has significant potential to lead in mass timber production and adoption, current constraints range from fiber availability and manufacturing capacity to buyer awareness and cost competitiveness, which continue to influence growth. At the same time, supportive policies, technological advancements, and shifting market preferences are creating new opportunities to strengthen the ecosystem. This chapter explores these drivers in detail, highlighting both the challenges and pathways to broader adoption across the region.

7.1 Current Constraints to Supply Chain

The results of a survey completed as part of this study indicated that among the 58 respondents, "activities to improve fiber supply" was the most often cited factor as "most strongly supporting the advancement of the mass timber industry in Oregon and Washington." Accordingly, the first four items in the list of identified supply chain constraints are related to fiber supply.

7.1.1 Kiln Drying

Kiln drying capacity is a significant market constraint influencing mass timber manufacturing, particularly impacting the availability and pricing of lamstock used in glulam and cross-laminated timber (CLT) production. Mass timber products demand stringent moisture content control, notably stricter than traditional dimension lumber drying requirements. Standard kiln-dried dimension lumber typically targets a moisture content (MC) of approximately 19% at one-fifth depth from the surface. However, mass timber manufacturing requires lamstock to achieve moisture content levels of 12% ±3%, with a maximum allowable limit of 14.99% at the time of manufacturing.

For CLT production, depending on manufacturing location and environmental conditions, dimension lumber dried to standard industry levels (19%) may undergo air drying, potentially reducing moisture content sufficiently (<15%) prior to billet formation. Conversely, glulam manufacturing necessitates a more exacting kiln drying process to ensure lamstock meets the specified moisture content directly upon procurement. This rigorous standard necessitates kiln drying cycles closer to 3.5 days (55 hrs + loading); meanwhile, shorter cycles for regular KD lumber can be closer to 2 days yielding approximately 75% greater throughput capacity compared to longer cycles for high-quality lamstock materials. Consequently, significant variations in kiln run times directly impact operational efficiency and overall capacity.

Current kiln drying capacity in the Pacific Northwest (PNW) is estimated to be approximately 10.5 billion board feet While kiln drying capacity is greater than recent lumber production, few mills are willing to take the extra time needed for kiln drying. This fact is what creates a constraint on CLT and lamstock supply.

There are several reasons sawmills are unwilling to perform extra drying:

1. The kilns are commonly the bottleneck in the output of the entire operation. Thus, any slowdowns at the kiln reduce the sawmill's entire annual output. Reductions in output reduce the number of units of production over which fixed costs can be spread. The result is higher per unit costs for sawmills when production drops.

2. Drying to 12-15%moisture for CLT and lamstock might seem little different than 19%, but the issue here is the way water interacts with wood. The lower moisture

content gets, the more "tightly" the wood holds the water. This means that even modest decreases in target moisture content require significantly more energy input and drying time.

3. As target moisture content gets lower, the chances for degrade due to warping, cupping, twisting, casehardening, etc. all increase significantly. This introduces the risk to the sawmill of not only reducing production, but also simultaneously lowering the grade of the lumber because of drying defects so that the material intended for high-value markets becomes even lower in value than conventional dimension lumber.

The kiln drying capacity shortfall creates a strategic bottleneck wherein kiln drying operations must optimize their throughput based on product value, cycle times, and overall annual capacity utilization. This bottleneck not only impacts lamstock prices but also restricts the broader industry's capacity to achieve target moisture levels efficiently.

Moreover, specific kiln technologies cater to distinct drying processes; conventional kilns focus on quicker, less conditioning-intensive cycles, whereas specialized kilns support longer-duration, higher-quality drying processes incorporating additional conditioning phases. Strategic selection of kiln technologies thus directly influences the overall quality, availability, and pricing dynamics for high-quality lamstock.

Kiln drying capacity limitations in the PNW represent a critical market constraint. Addressing this bottleneck through targeted investments in kiln capacity expansion or enhanced drying technologies will be essential for supporting sustained growth and stability in the mass timber sector.

7.1.2 Rough Lumber Planing

Planing operations represent another critical market constraint impacting the production of glulam lamstock, specifically for Douglas-fir materials. Douglas-fir lamstock requires precise and rigorous planing processes aimed at minimizing dimensional variations and surface defects, ensuring consistent product quality. Thus, when conventional planer mills are processing Douglas-fir for use in lamstock, they typically must operate at reduced speeds and necessitate frequent, rigorous maintenance to meet these stringent quality standards. This significantly limits overall production throughput, thereby increasing cost.

In typical framing lumber production, thickness tolerances can be relatively generous, often in the range of ±0.030–0.060" (±0.75–1.5 mm). In contrast, Douglas-fir lamstock demands considerably tighter thickness tolerances, typically within ±0.010–0.020" (±0.25–0.50 mm). Allowable defect percentages for Douglas-fir lamstock are similarly stringent, often targeted below 1–2%, compared to framing lumber where defect rates of 5–10% may be acceptable.

There is an option to plane at the mass timber manufacturing facility. However, this approach likely means that the material was already planed at a sawmill to a standard commodity thickness of 1.5" (38.1 mm). Planing it again at the mass timber manufacturing facility means it would be further reduced in thickness to 1-3/8" (35 mm). This would represent an 8% additional fiber loss, which would increase raw material cost—especially for Douglas-fir species. It also quickly translates into higher cost of mass timber glulam and panels since raw material cost is typically at least 50% of the cost of mass timber product manufacture.

For comparison, other species commonly used in mass timber, such as spruce-pine-fir (SPF) and southern yellow pine (SYP), are generally re-planed from their standard nominal thickness of approximately 1.5"(38.1 mm) down to 1-3/8"(35 mm) prior to adhesive application within a strict time limit, thus allowing greater initial tolerance flexibility. Douglas-fir, however, typically starts and remains at tighter thickness tolerances throughout the planing process due to its application-specific requirements.

Douglas-fir planer mills can exist as independent operations, integrated with kiln-drying facilities, or as part of comprehensive sawmill operations. Regardless of configuration, the necessity for slower operational speeds, tighter dimensional controls, lower defect tolerances, and increased maintenance frequency consistently creates a primary production bottleneck. Addressing these constraints through technological upgrades, operational enhancements, or dedicated planer mill investments is essential to overcoming capacity limitations in the mass timber manufacturing sector, particularly when processing Douglas-fir lamstock.

Key enhancements to next-level production would be for mass timber facilities to procure square-edge candidate lamstock in a rough dry or rough Fiber Saturation Point (30%) MC format. This would allow the mass timber manufacturer to plane properly, saving waste, and to kiln-dry the stock to tight tolerance specifications.

7.1.3 Log/Fiber Supply

While timber harvest levels have decreased in recent years in the Pacific Northwest, log and fiber supply does not appear to be a limiting constraint for mass timber production. Regional forests continue to provide sufficient harvest levels across Douglas-fir, Hem-fir, and other structural species suited to engineered wood products. Instead, the primary constraints are linked to how fiber moves through the process of converting logs into lumber, and the limited adaptability of existing sawmill distribution systems to meet the special requirements of lumber used in glulam and mass timber panel manufacturing.

Several manufacturers without full vertical integration have emphasized the challenges of working with sawmills, or even partially integrated sawmill partners, when attempting to make relatively minor modifications to improve efficiency. Adjustments such as specialized sorts, tailored labeling, or access to consistent technical and volume data are often met with resistance or delays. While these process changes may seem simple, the inflexibility of established mill operations creates friction that limits optimization for downstream engineered products.

While the PNW sawmill industry may be perceived as dismissive of mass timber's special requirements, it is important to note that most mills are focused on producing commodity materials, an arena where cost is nearly always the basis of competition. Slowing sawmill operations to cater to the needs of what has (so far) been a small lumber market is folly for most production-oriented mills. This is true even when mass timber producers are willing to pay considerable premiums for lumber that meets their specifications.

Beyond mill process issues, sales and communication channels could be improved between mills and mass timber manufacturers. Manufacturers in the PNW face difficulties in establishing streamlined communication with both upstream fiber suppliers and downstream customers. This lack of alignment complicates order flow, extends lead times, and reduces responsiveness to evolving project demands.

Taken together, these non-volume constraints, process rigidity, data gaps, and underdeveloped sales interfaces pose a more immediate barrier to upscaling mass timber production in the region than raw log and lumber availability.

7.1.4 Fiber Costs

It is important to separate and understand fiber supply versus fiber costs, as it is generally possible to buy any grade of mass timber input material desired provided one is willing to pay the required market premium.

Cost competitiveness is generally compared to the low-cost general supplier, often noted as European product. In some areas Canadian production may also be mentioned when applicable. It should be noted that production from South America is also coming online, and while it has made no significant market penetration to date, it should still be monitored for outcomes and lessons learned.

CLT Fiber: Fiber costs between the western U.S. and Europe have considerable differences subject to the product being produced, as shown in **Table 7-1**. Fiber used for CLT production in the PNW can be more cost-competitive than European product; however, this is subject to the species and grade used. Typically, CLT is made from 2&Btr SPF fiber, occupying around 60% of the market, while in Europe a spruce C16/C24 board is the typical bulk input grade with a majority C24 grade material.

Table 7-1 - CLT and Lamstock Cost Comparison

Grade / Basis	Spot €/m3 (Central/North Europe) Low	Spot €/m3 (Central/North Europe) High	$ USD/MBM Low	$ USD/MBM High	Notes
C16 (spruce)	€260	€320	$494	$609	"Structural spruce timber" traded around €250–€280/m³ in 2024 (Slovenia median); 2025 log cost push in SE/DACH supports upper end. (Skogsstyrelsen, Timber Online)
C24 (spruce)	€300	€360	$571	$685	Solid structural timber (KVH/C24) averaged ~€327/m³ in 2024; simple carcassing boards usually sit slightly below KVH, consistent with the range. (Timber Online)
US SPF 2×6 #2&Btr	€250	€342	$475	$650	Using Madison's composite (Aug 15, 2025) . Futures today ~$607/MBM for context. (Madison's Lumber Reporter, Trading Economics)

This gives North American producers a slight potential advantage on CLT fiber inputs; however, they also need to work with suppliers or fine-tune processes to bring the lumber into a more acceptable format for quality-oriented production as 2&Btr-grade lumber is not square-edge and may have more defects than C16/C24 European lumber. European lumber is regularly dried to 12%, while North American commodity CLT lumber input pricing is based on 19% MC, requiring further processing to achieve code-compliant 12% +/- 3%.

Glulam Fiber: Glulam fiber pricing between North America and Europe carries a stark

Table 7-2 - European Glulam Layups

Glulam grade	Type	C16	C24	C30	C35	C40
GL24h	Homogeneous	0 %	100 %	0 %	0 %	0 %
GL24c	Combined	34 %	66 %	0 %	0 %	0 %
GL28h	Homogeneous	0 %	0 %	100 %	0 %	0 %
GL28c	Combined	0 %	50 – 66 %	34 – 50 %	0 – 34 %	0 %
GL32h	Homogeneous	0 %	0 %	0 %	0 %	100 %
GL32c	Combined	0 %	0 %	66 %	0 %	34 %
Note: Pricing July 2025, Central Austria						

Table 7-3 - Comparison of Lamstock Pricing Euro vs. NA

Grade	Mean MOE (×10⁶ psi)	€/m3 (ex-works)	$/m3 USD	€/MBM	$/MBM
C16 (EU)	1.16	€320	$375	$519	$609
C24 (EU)	1.6	€340	$399	$552	$647
C30 (EU)	1.74	€360	$422	$584	$685
C35 (EU)	1.89	€390	$457	$633	$742
C40 (EU)	2.03	€435	$510	$706	$827
L3 & Btr Lamstock (US)	~1.68	€473	$555	$768	$900
Note: 1 EUR = 1.17234 USD					

difference in which European glulam is made from a variety of grades (commonly C16 boards, up to C40 boards. Douglas-fir lamstock carries a significantly higher price than these European common grades. **Table 7-2** and **Table 7-3** illustrate European glulam layups and compare lamstock pricing between Europe and North America.

Note over the last several months the USD has lost 8% compared to the Euro, which has reduced the price disparity between comparable strength products. The gap has previously been even higher.

While there are many detailed structural design differences, a grade between C24 and C30 has properties like average L3&Btr lamstock. Thus, we will conduct pricing comparison between the average of C30 and C24, choosing an approximate price of $660/MBM USD, compared to lamstock L3&Btr running around $900/MBM on a 2x6 count in central Oregon. This represents a 36% input fiber cost premium over European glulam suppliers producing a +/- 15% comparable product. In January of 2025, when the Euro and USD were trading at €1 = 1.035 USD, this lamstock fiber input advantage would have been 50% at $600/MBM USD compared to the $900/MBM domestic cost point.

Europe has a nearly homogenous fiber supply in terms of species and grades used for >80% of production. They have different thickness sections with more variation (20-30-40 mm). North America has many species and many more grades and layups when considering every custom product certified by the APA. This variation ensures there are niche products that maximize $/span but does not facilitate a more generic and simple lumber market such as Europe's. ore standardized species, grades, and layups simplify design and are better understood by the Architecture, Engineering, and Construction (AEC) industry. Europe has recently moved to standardize all primary panels, while some producers still offer additional panel types.

This cost advantage has, in many cases, allowed European producers to sell billet glulam for a lower cost than North American suppliers pay for the required input lumber alone.

7.1.5 Personnel Constraints

The PNW's mass timber build-out is increasingly people-limited rather than machine-limited, a pattern also highlighted in recent BC workforce analyses. The tightest bottlenecks are in project delivery and plant leadership. Project management talent that understands both factory and construction workflows along with contracts, logistics, QC, RFIs, and risk, is thin, so schedules slip when one PM is spread across multiple jobs. Fabrication design (detailing) is the scarcest capability: Suppliers carry BIM-to-CNC responsibility, so Cadwork/Revit alternative modelers with connection know-how effectively set the ceiling on how many projects can run at once. Technical estimating capacity is shallow at the senior level; juniors can price raw buildings but often miss costs tied to tolerances, edge conditions, and logistics, creating rework downstream. Technical sales work needs seller-doers who can redesign for manufacturability and lock scope early; the role competes for the same small pool as PM and design.

Timber framers remain essential despite automation, plants and job sites still rely on expert hands for fit-up, pre-assembly, and training, and the on-site nature of the work shrinks hiring radii. Production management is another gap: modern lines require leaders fluent in lean methods, ERP/PCS data, grading, finger jointing, and CNC, yet promotions often outpace training. Practical relief in the PNW comes from running remote-first teams for PM/design/sales to widen the recruiting funnel; establishing short, industry-backed micro-credentials and apprenticeships (detailer boot camps; operator → lead → supervisor ladders); standardizing details and connection kits to cut design hours per project; and cross-hiring electricians, controls technicians, and supervisors from adjacent sectors (steel, modular, advanced manufacturing) with targeted timber onboarding. Without deliberate talent pipelines, projects will queue behind people, not equipment.

7.1.6 Labor Costs

7.1.6.1 Workforce and Training

The development of a knowledgeable and experienced workforce is rapidly emerging as one of the primary bottlenecks to the growth and broader adoption of mass timber technology in the region. This workforce challenge extends across the entire project lifecycle, from production operations to engineering, project management, and on-site construction and installation.

7.1.6.2 Production & Manufacturing Labor

Primary labor shortages exist at mass timber manufacturing facilities, where skilled workers are required to operate specialized equipment, monitor quality, and handle lamstock and finished components.

Technical labor is also essential for tasks such as production management, equipment maintenance, and quality control. Recruiting and retaining talent with expertise in engineered wood products, advanced manufacturing, and automation remains a challenge, particularly as demand for production capacity increases.

A significant modernization gap exists where traditional sawmills and older mass timber facilities must transition from mechanical production lines to complex, computer-controlled systems. This shift requires a new generation of electricians, PLC programmers, and automation specialists to maintain and optimize production efficiency. Without this layer of technical support, facilities risk lower throughput and higher downtime.

Representative occupation: Woodworking Machine Setter / Operator (U.S. SOC 51-7042; Canada NOC 94124) – the employees who run planers, molders, CNC routers, and glue-line feeders that prepare lamstock and panel blanks. Table 7-4 assesses the relative cost differences on a regional basis.

It should be noted that in reviewing these government-documented wages most operations appear to be paying significantly higher than these media hourly wages. For instance, a central BC producer has been documented to pay \$25/hr (\$35 CAD/hr) compared to the documented \$19 for the 2024 Government of Canada Job Bank rate.

7.1.6.3 Technical Project Delivery

On the design and construction side, there is often a gap in specialized knowledge among architects, engineers, and construction managers. Many project teams might only have a handful of members with direct mass

Table 7-4 - Woodworking Machine Setter / Operator Labor Rates

Region	Median Hourly Wage (Local)	Urban Hot-Spot vs. Rural Delta
Washington	$21.23	Seattle–Tacoma mills pay ≈ +15-20 %; eastern-WA plants run –12-18 % below the state median.
Oregon	$22.69	Portland premium ≈ +10 %; coastal & interior non-metro at / below median.
Idaho	$19.46	Boise metro +9 %; Panhandle –5 %.
Montana	$22.04	Billings +5 %; western non-metro –9 %.
California	$20.36	Bay Area specialty shops +30 %; northern-coast rural similar to OR coast.
Texas	$16.62	Urban premium < 10 %.
Nevada	$21.07	Vegas/Reno +8–10 %; rural mills near Ely/Winnemucca –7 %.
Arkansas	$17.55	Little Rock +7 %; Delta counties –5 %.
Alabama	$16.56	Birmingham & Mobile +5 %.
Maine	$17.02	Portland +12 %; interior forest towns –10 %.
British Columbia	C$ 25.00 ≈ US$ 19.0	Lower Mainland +25 %; northern Interior at or just below median.
Ontario	C$ 20.79 ≈ US$ 15.8	GTA +20 %; northern ON –8 %.
Quebec	C$ 21.50 ≈ US$ 16.3	Montréal +18 %; Saguenay/Lac-St-Jean –6 %.

timber experience, while the remainder may lack familiarity with design nuances, fabrication constraints, moisture management, and risk-mitigating construction practices unique to mass timber. This learning curve can lead to increased project costs, design inefficiencies, and unnecessary risk. Industry groups such as WoodWorks have played a crucial role in bridging this gap, providing targeted education and outreach to build a broader base of AEC professionals with mass timber expertise.

7.1.6.4 Project Delivery Expertise:

Beyond the factory floor, labor challenges extend into project delivery roles. Specialized project managers, estimators, technical sales professionals, CNC programmers, and 3D fabrication designers are all essential for scaling the industry. These roles require not only general construction knowledge but also an understanding of digital design integration, BIM coordination, and mass timber's unique sequencing requirements. The scarcity of this talent pool slows project onboarding and complicates cost forecasting.

Table 7-5 illustrates wages typical of various regions throughout the continental U.S. Representative occupation: Architectural & Civil Drafter / Drafting Technologist (U.S. SOC 17-3011; Canada NOC 22212) the specialists who build detailed 3-D Building-Information-Models (BIM), generate fabrication-ready shop drawings and CNC files, run clash detection and coordination, and translate design intent into precise CNC instructions for mass timber projects.

This team set can work remotely, so are not necessarily a major constraint.

7.1.7 Production Schedule Balancing

Mass timber capacity in the Pacific Northwest (PNW) is now concentrated in fewer than a dozen production lines, each capable of supplying an entire mid-rise project. Although this scale underpins cost competitiveness, it also amplifies exposure to schedule volatility. A single 11,000 m2 (≈ 120,000 FT2) building can

Table 7-5 - Architectural & Civil Drafter / Drafting Technologist Labor Rates

Region	Median Hourly Wage	Urban Hot-Spot vs. Rural Delta
Washington	US $29.00	Seattle–Tacoma +18 %; Yakima/Spokane −12 %
Oregon	US $33.30	Portland +15 %; coastal/interior −10 %
Idaho	US $26.50	Boise +9 %; Panhandle −5 %
Montana	US $24.65	Billings +6 %; rural −8 %
California	US $27.78	Bay Area/LA +25 %; North Coast −6 %
Texas	US $26.23	Austin/Dallas +12 %; rural −5 %
Nevada	US $28.67	Vegas/Reno +10 %; rural −7 %
Arkansas	US $21.94	Little Rock +7 %; Delta −5 %
Alabama	US $23.20	Mobile/Huntsville +9 %; rest −6 %
Maine	US $27.25	Portland +12 %; interior −10 %
British Columbia	CAD $30.54 (≈US $23.2)	Vancouver +25 %; northern interior −10 %
Ontario	CAD $27.87 (≈US $21.2)	GTA +20 %; northern ON −8 %
Quebec	CAD $29.00 (≈US $22.0)	Montréal +18 %; Saguenay −6 %

Table 7-6 - Production Schedule Balancing

Risk Factor	Mechanism	Strategic Mitigation
High project concentration	One delayed contract can strand crews and working capital	Cap any single award at ≤ 35 % of rolling 90-day capacity; diversify mix of “small/fast” vs “large/slow.”
Long design & approval cycle	6- to 12-month pre-construction phase limits ability to back-fill gaps	Maintain a ready-queue: advance alternate projects to ~80 % design so they can be released to fabrication on 4-week notice.
Cash-flow cliff	Progress payments tied to fabrication start; delay pauses inflows while overhead continues	Integrate monthly Sales-and-Operations Planning (S&OP) that couples win-probability data with capacity models and cash forecasts.
Labor retention pressure	Skilled planer/CNC teams difficult to re-hire if furloughed	Keep baseline utilization ≥ 70 % with buffer work (mock-ups, R&D panels, secondary machining for peers).

consume 25-35% of a plant’s quarterly output; if that anchor job slips by even eight weeks, idle labor and fixed-cost absorption can swing the EBIT margin negative. **Table 7-6** illustrates several scheduling risk factors and potential mechanisms to help mitigate these.

A balanced sales funnel is not merely a commercial nicety; it is a structural prerequisite for sustainable growth in the PNW mass timber ecosystem. Firms that institutionalize capacity/diversification thresholds, design-buffer inventories, and integrated S&OP disciplines will outperform peers on cash-flow stability, talent retention, and ultimately valuation multiple, directly addressing one of the most critical constraints to market expansion.

Sales and corresponding production funnels can start to be leveled effectively around the time of a two-shift effective capacity adoption ratio. This is also dependent on the manufacturer’s production and sales methodology. A manufacturer might be running two or three shifts but only be working on one large project to anchor all this work.

7.1.8 Connection Component Availability

Reliable access to connection components is a critical factor in the timely delivery and cost control of mass timber projects. While overall availability has improved in recent years, several gaps remain across different categories of connection hardware.

7.1.8.1 Fasteners

The fastener supply chain for mass timber is relatively mature. In the U.S., Simpson Strong-Tie has established itself as the dominant domestic supplier, offering a broad catalogue of screws, nails, and other fastening systems suitable for engineered wood assemblies. In Europe, at least five major suppliers maintain strong market positions, with additional manufacturing capacity concentrated in Poland, China, and Taiwan. This diversified supply base has ensured steady availability, though lead times and price fluctuations can still affect projects with high-volume demands.

Tariffs will have notable effect on fastener costs as Simpson does not have significant U.S. competitors, nor a full range of product offerings.

7.1.8.2 Fabricated Steel Weldments

By contrast, fabricated steel weldments represent a notable constraint. There is a shortage of suppliers capable of delivering the combination of competitive costs, short reaction times, and the CNC precision required for modern mass timber assemblies. The need for hot-dip galvanization further compounds schedule risks, as this step often introduces delays in procurement and logistics. Quality control is also an ongoing issue, with reject rates averaging around 10%, creating rework costs and eroding project efficiency. The limited pool of qualified fabricators amplifies these challenges, making this one of the most vulnerable points in the mass timber supply chain.

7.1.8.3 Pre-Engineered Steel Connections

The market for pre-engineered steel connection systems is considerably stronger. Both European and U.S. suppliers have developed reliable offerings, with Simpson Strong-Tie and Hilti providing broad coverage for U.S. projects, while numerous European firms export well-proven proprietary connection solutions. These products benefit from standardized testing, code approvals, and widespread distribution channels, making them among the most dependable connection components currently available to the mass timber industry.

7.1.9 Transportation Infrastructure

Transportation infrastructure within the region is generally favorable for supporting mass timber manufacturing operations, with established highway networks providing reliable access to key markets. However, specific logistical considerations emerge for oversized and heavy components common to large mass timber projects. Elements exceeding approximately 60′ (18.3m) in length, 11′ 6″ (3.5m) in width, or significant load weights require additional logistical arrangements including pilot escort vehicles, adjusted driving schedules, and specialized transportation permits. These practices, while adding complexity and cost, align with typical industry standards across North America.

Currently, rail and barge transportation modes do not represent significant components of the supply chain for mass timber products in the regional market. However, as markets evolve and the potential for export-focused manufacturing increases, these transportation options may become critical strategic assets. Rail and barge offer cost-effective solutions for high-volume, long-distance transportation, particularly beneficial for accessing international ports or distant domestic markets efficiently.

Consequently, while road infrastructure remains the primary logistical channel for current market operations, manufacturers considering future growth into export markets should evaluate proximity to rail and barge facilities. Strategic foresight in locating manufacturing sites with access to multimodal transportation hubs may offer substantial competitive advantages, ensuring adaptability to shifting market demands and future expansion opportunities.

7.1.10 Wood Construction Culture

The Pacific Northwest's wood construction culture is anchored by a deep timber supply chain and a design/build community that treats mass timber as a mainstream option rather than a novelty. Using the population-usage factor as a proxy for market maturity, Oregon currently sits at ~0.0049 m3 per capita based on ~62,000 m3 of projects, below B.C. (0.0125) and behind European benchmarks (0.016–0.029), but ahead of California (0.0014), Texas (0.0011), and the U.K. (0.0018).

Within this context, a series of visible, technically sophisticated projects has normalized risk for owners and authorities: Portland's Albina Yard and Carbon12 proved early mid-rise feasibility; Oregon State University's Forest Science Complex showcased hybrid CLT and mass-ply systems; the PDX Main Terminal roof established timber's public-sector credentials at infrastructure scale; and in Washington, Spokane's Catalyst Building and the University of Washington's Founders Hall demonstrated low-carbon, large-program execution. These projects, paired with regionally based fabricators, CNC shops, and specialist installers, have created a repeatable delivery ecosystem that shortens learning curves, tightens bids, and improves schedule reliability.

That ecosystem now influences housing and civic workstreams in four practical ways:

1. Modular and panelized wood (volumetric and 2D CLT/light-frame) is increasingly used by public and workforce-housing sponsors to control cost and speed, with factories and timber erectors coordinating early through BIM to eliminate rework.
2. Passive House adoption in Seattle and Portland aligns naturally with timber: high-R, low-carbon assemblies, simplified thermal bridging, and factory-controlled QA support predictable performance.
3. Fire resistance is well-understood by local AHJs and consultants through char-rate design, encapsulation where required, and the 2021 IBC tall-timber pathways, reducing approval friction relative to newer markets.
4. Speed to deliver is now a bankable attribute: contractors routinely report 30–50% substructure installation savings for mass-timber frames, translating to lower general conditions and interest carry.

Together, these capabilities lift the region's effective m3 per capita and position Oregon and Washington to close the gap with B.C. and northern Europe as procurement pipelines and modular capacity continue to scale.

7.2 Current Constraints to Market Demand

7.2.1 Cost Premiums Relative to Alternatives

As cited by numerous respondents, one of the most significant barriers, is that there are two cost impediments to using regionally sourced mass timber. First, there is currently a meaningful difference between the cost of a predominantly mass timber building and the cost to construct a building with concrete or steel as the primary structural system, subject to design constraints and like-to-like outcomes. (Note: Many developers and projects have shown mass timber to pencil against steel or concrete alternatives. This is subject to design with the materials in mind and the right team to execute.) Second, domestically produced mass timber is currently more expensive than products manufactured in either Europe or Canada. These cumulative cost differences result from several factors ranging from mass timber still being in its early -adopter stage in the United States to cost-inefficient domestic mass timber manufacturing.

7.2.1.1 Mass Timber System Costing vs. Steel Concrete, PNW

The following comparative analysis benchmarks 2024 material and installed costs for mass timber, concrete, and steel structural systems in the Pacific Northwest. Cost ranges reflect regional market conditions, material intensities by typology, and a blended distribution of panel versus frame components.

Important Context: Pricing variability across the PNW is significant. Seattle generally represents the most expensive market, followed by Portland, then Spokane, and finally rural locations. Labor rates, subcontractor availability, and GC sophistication all influence outcomes as much as material pricing. These figures are therefore best understood as directional indicators rather than project-specific estimates.

For baseline reference, current market estimates for mass timber materials in the PNW are:

- **Glulam (GL):** ~$3,050/m3 (≈ $86.37/FT3)
- **Cross Laminated Timber (CLT):** ~$1,350/ m3 (≈ $38.23/FT3)

Actual project outcomes will vary (-20% to +100%) depending on site logistics, procurement strategy, and design variables. Where PNW data was unavailable, secondary market references were applied for directional pricing only.

Mass Timber vs. Conventional Systems

Table 7-7 through Table 7-11, and Figure 7-1, illustrate comparative costing for representative typologies. They apply average material intensities and published market data to generate indicative costs. While this provides a useful benchmarking lens, it is not a substitute for contractor-led estimating.

Interpreting the Results

- **Residential (5-story & point support):** In many scenarios, mass timber can achieve cost neutrality or better versus concrete, and competitive parity with steel, particularly when schedule savings are realized.
- **Typical Office:** Steel maintains a direct cost edge on a strict material + install basis, but timber can close the gap when schedule, branding, and early occupancy advantages are factored.
- **Industrial:** Timber positions as the low-cost system; however, subject to building design structure, steel boxes show extreme cost-effectiveness.

Table 7-7 - Comparison of Building Cost by Building Typology

Typology	Intensity (m3/FT2)	CLT %	Glulam %	Blended Cost ($/m3)	Cost ($/FT2)
LWF + Platform Residential	0.018	90%	10%	$1,520	**$27.36**
Point Support	0.016	70%	30%	$1,860	**$29.76**
Typical Office	0.025	60%	40%	$2,030	**$50.75**
Industrial	0.012	40%	60%	$2,370	**$28.44**
Full MT Projects (Other)	0.023	45%	55%	$2,285	**$52.56**

Figure 7-1 - Dollar per Square Foot Cost of Mass Timber Material by Average Material Use Intensity Average for 2018-2025 (building type)

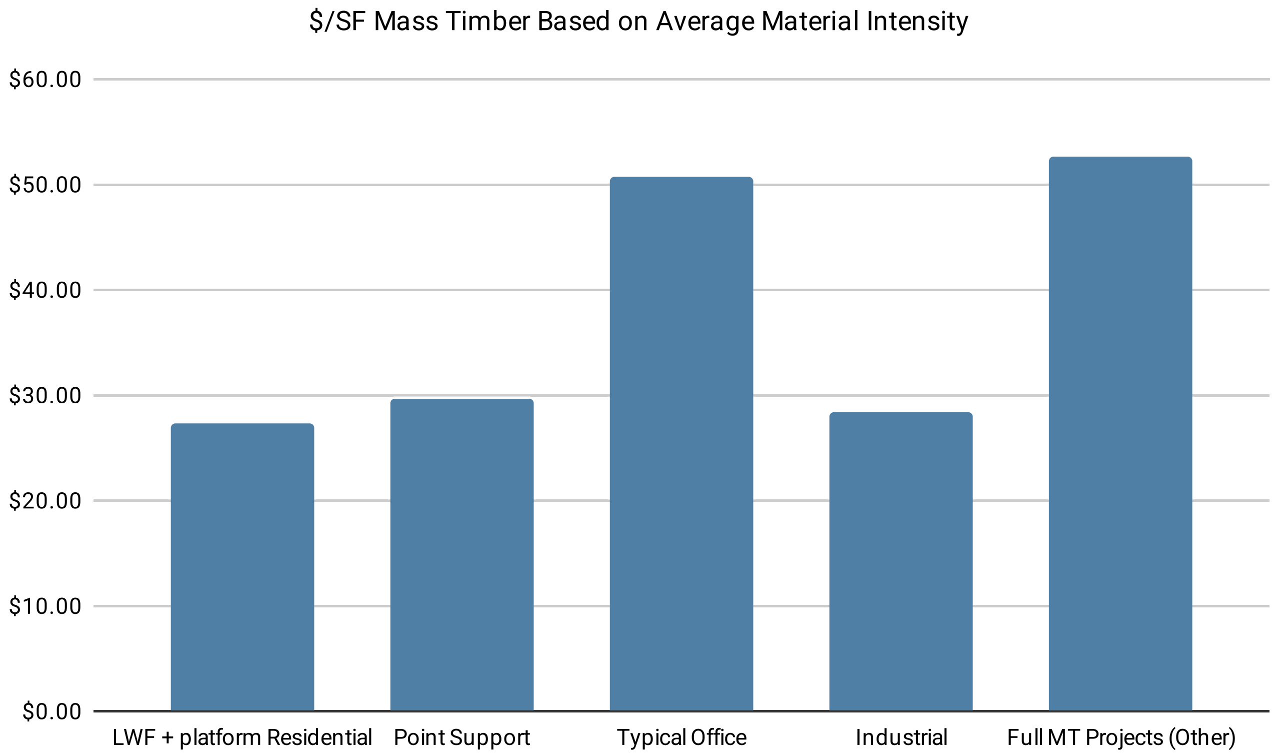


Table 7-8 - Mass Timber Construction Costs

Typology	Material Intensity (m3/FT2)	Material Costs	Material + Install	Mat + Install + Comparable Finish	Schedule Savings vs CIP	Estimated OH Savings (Interest + Site Generals)	Final After OH
5-story Residential	0.018	$27.36	$37.44	$40.44	20–35%	$1.93	**$38.51**
Point Support	0.016	$29.76	$40.64	$43.64	15–30%	$1.73	**$41.91**
Typical Office	0.025	$50.75	$69.25	$72.25	15–30%	$2.05	**$70.20**
Industrial	0.012	$28.44	$38.76	$41.76	15–25%	$1.26	**$40.50**

Table 7-9 - Concrete Construction Costs

Typology	Material Intensity (m3/FT2)	Material Costs	Material + Install	Mat + Install + Comparable Finish	Schedule Savings vs CIP	Estimated OH Savings (Interest + Site Generals)	Final After OH
5-story Residential	0.01652	$7.23	$42.23	$52.23	0	$0.00	**$52.23**
Point Support	0.0177	$8.65	$44.65	$54.65	0	$0.00	**$54.65**
Typical Office	0.02005	$9.83	$49.83	$59.83	0	$0.00	**$59.83**
Industrial	0.01536	$8.07	$39.07	$49.07	0	$0.00	**$49.07**
**Concrete intensities correspond to typical PT slab thicknesses by type: ~7.0", 7.5", 8.5", 6.5" respectively.*							

Table 7-10 - Steel Construction Costs

Typology	Material Intensity (lb/FT2)	Material Costs	Material + Install	Mat + Install + Comparable Finish	Schedule Savings vs CIP	Estimated OH Savings (Interest + Site Generals)	Final After OH
5-story Residential	7.5	$18.20	$36.30	$45.30	5–8%	$0.45	**$44.84**
Point Support	9	$21.30	$41.35	$50.35	6–10%	$0.62	**$49.73**
Typical Office	10.5	$24.00	$46.00	$55.00	8–12%	$0.91	**$54.09**
Industrial	12	$25.70	$50.30	$59.30	5–10%	$0.47	**$58.83**
**Steel intensity is structural steel weight only (excludes deck/topping – This adds further costs to the steel option $3-6 / FT2.*							

Table 7-11 - Construction Costs, Summary Results

Typology	Mass Timber	Concrete	Steel
5-story Residential (LWF + CLT hybrid)	**$38.51**	$52.23	$44.84
Point Support Residential	**$41.91**	$54.65	$49.73
Typical Office	$70.20	$59.83	**$54.09**
Industrial	**$40.50**	$49.07	$58.83

The competitive position of mass timber strengthens under the right delivery conditions: early contractor involvement, prefabrication, optimized BIM workflows, and close alignment between owner, architect, and GC.

Key Considerations

1. **Regional Market Variability.** Costs differ markedly between Seattle, Portland, Spokane, and rural contexts, often driven by labor rates and trade capacity.

2. **Perception vs. Reality.** Owner and GC perception of "first costs" can create bias. Successful projects often demonstrate cost neutrality once full delivery efficiencies are realized.

3. **Delivery Model Matters.** Integrated design and procurement strategies have proven critical. For example, First Tech Credit Union HQ was delivered 4% cheaper and 4 months faster than its concrete alternative.

This study should be interpreted as directional analysis, highlighting that cost neutrality with mass timber is achievable, but not automatic. Successful projects have demonstrated both cost competitiveness and 20-25% schedule savings when delivery models are aligned. Conversely, without early coordination, costs can appear higher than conventional systems.

By recognizing both the market variability and the delivery dependencies, stakeholders can better assess whether a given project has the conditions to unlock the full cost and schedule benefits of mass timber.

7.2.1.2 Canadian Cost Differences

Labor Cost Comparison: Canada vs. Rural WA/OR

When converted to U.S. dollars, Canadian mass timber labor rates are broadly competitive with those in rural Washington and Oregon. At a central BC producer, for example, a shop sweep earns approximately $28 CAD per hour, which converts to about $24.15 USD, while a floor framer earns $32 CAD per hour, or roughly $27.58 USD. These wages are close to the prevailing rates in rural

Oregon and Washington, where construction laborers earn on average $20-24 USD per hour and general construction workers average around $26.60 USD per hour. In Washington, foreman-level positions are higher, averaging about $35 USD per hour, which places Canadian floor framer wages below the supervisory tier but well within the upper range of field labor.

Taken together, these comparisons suggest that Canadian labor does not offer a dramatic cost advantage once currency conversion is factored in, but it remains competitive with Washington and modestly favorable compared to rural Oregon rates. The broader implication is that Canadian manufacturers are not significantly undercutting U.S. facilities on labor costs, but neither are they at a disadvantage. Instead, wages across the border are roughly in line, with exchange rates acting as the primary balancing factor.

Lumber Pricing and Cross-Border Dynamics

On the materials side, Canadian and U.S. producers currently pay comparable base prices for lumber used in mass timber production. Dimension lumber and lamstock prices remain largely harmonized on either side of the border, with only minor differences attributable to trucking distances, logistics, and currency conversion. At present, the U.S. duty regime on Canadian softwood lumber has not yet created a significant divergence in market pricing. As a result, raw input costs for mass timber remain consistent on both sides of the border, providing a stable baseline for project cost planning.

Looking forward, the recently enacted increases in anti-dumping and countervailing duties could disrupt this alignment, as discussed in **Section 7.4.5**. For example, prior to the recent changes, most Canadian softwood lumber entering the U.S. was subject to a combined anti-dumping and countervailing duty of about 15%. At the time of this writing, the duties have been escalated to a combined 35% for most companies with the exception of Canfor's lumber which is at nearly 48% and West Fraser's lumber at about 26.5%.

It remains to be seen, but these circumstances might cause Canadian producers to redirect lumber away from U.S. buyers toward domestic markets or alternative export destinations without holding a typical North American market price. In the short term, U.S. manufacturers would be forced to secure supply from higher-cost domestic or international sources. In the longer term, U.S. lumber manufacturing could increase if investors are confident that more log supply will be available from Federal lands. In the short term, this type of decoupling could lead to Canadian firms holding a relative advantage in their home market by shielding themselves from import costs, while simultaneously raising input prices for U.S. mass timber producers. In such a scenario, Canadian producers could increasingly emphasize value-added exports such as fabricated mass timber panels and components, rather than shipping raw lumber south.

At present, lumber price parity across the border allows for comparable material costs in Canadian and U.S. mass timber manufacturing. The key uncertainty lies in the trajectory of U.S. trade policy: as long as duties remain steady, price stability is likely to continue, but an aggressive shift could introduce volatility and alter the competitive balance between the two markets.

Production Stability

Canadian firms often operate with more consistent production loading, facing fewer schedule gaps. This stability is linked to their broader, more diversified sales markets and greater business experience in project-focused sales. Predictable throughput allows Canadian facilities to manage overhead more efficiently and deliver at steadier unit costs. Along with this, two of the leading Canadian firms—Nordic Structures and Kalesnikoff—have vertically integrated lumber supply chains, allowing them to hold more stable lumber input pricing on specific projects. Note: These supply chains might only account for a portion of their material usage.

Government Support and Incentives

Federal and provincial governments in Canada continue to support mass timber adoption through research funding, market development programs, and favorable procurement policies. These supports can offset certain cost categories (e.g., R&D, marketing) and further improve the competitiveness of Canadian producers relative to U.S. counterparts. Likely the largest form of support comes indirectly via balanced production schedules due to wood-first policies and similar directives. As a percentage of GDP, for instance, British Columbia's 2022 Forestry Profile (including value-added goods/services) is estimated at 5.4% of economy, meanwhile Oregon stands at 2.75% and Washington at 1%. Given the importance of this economic impact, it is understood that more attention might be paid to the forestry files in other jurisdictions.

Pricing:

Recent mass timber projects in Canada have been documented in Table 7-12. It is important to note that every project has unique materials, volumes, finishes, and connections, allowing a large range in volumetric price points.

Compared to current U.S. PNW rates, these values display a more competitive market, but not too far off PNW norms at $3050/m3 glulam ($86.37/FT3), $1350 /m3 CLT ($38.23/FT3).

Table 7-12 - Prices on Recent Canadian Mass Timber Projects

Item	Price (CAD/m3)	Price (USD/m3)
CLT Project 1	$1,450	$1,073
CLT Project 2	$1,843	$1,363
CLT Project 3	$1,696	$1,255
Glulam Package Project 1	$4,120	$3,048
Glulam Package Project 2	$3,450	$2,701
Glulam Package Project 3	$3,978	$2,943

Canadian mass timber project pricing is consistently a notch tighter than U.S. Pacific Northwest norms, driven more by market structure than by wage gaps. Converted to USD, Canadian shop and field labor is broadly on par with rural Washington and Oregon (roughly $24–28 USD/hour equivalents versus about $20–27 USD/hour), so labor does not explain a discount; the edge shows up in delivered package pricing and execution. Recent Canadian awards indicate CLT in the 1,070 to 1,360 USD/m3 range (mean ≈ 1,230 USD/m3) versus a PNW planning norm of ~1,350 USD/m3, and glulam around 2,700 to 3,050 USD/m3 (mean ≈ 2,900 USD/m3) versus ~3,050 USD/m3 in the PNW, roughly a 5–10% advantage, project-mix dependent. With lumber inputs still largely harmonized across the border, Canada's edge stems from steadier shop loading (leading to better capital utilization and reductions in overheads), more competitive bidding, and policy supports that smooth demand, translating into lower overhead per m3 and firmer unit pricing. Looking ahead, elevated U.S. softwood duties raise the risk of partial price decoupling; if that persists, Canadian home-market projects are likely to retain a modest input cost and delivery advantage while U.S. producers face more volatility in their lumber mix.

7.2.1.3 European Cost Differences

Project cost data was gathered from four large building projects across the U.S. This sample group is not large enough to accurately reflect true value, but does hold information as an indicator set. See Table 7-13.

Across comparable scope, Europe sets the low-cost baseline for both CLT and glulam. On CLT, U.S. pricing is only modestly higher: +23% at commodity (+$180/m3; +$5/FT3), +4.5% at CNC fabricated (+$50/m3; +$2/FT3), and +8.9% for full project packages (+$110/m3; +$3/FT3). The picture changes with glulam, where U.S. prices are substantially above Europe: +114% at commodity (+$880/m3; +$25/FT3), +124% at framed/CNC (+$1,580/m3; +$45/FT3), and +53% at project package

Table 7-13 - European Supply vs. U.S. Supply Costing

Region	Product	Scope	€/m3	$/m3	$/FT3
Europe	CLT	Commodity (material only)	€680	$770	$22
Europe	CLT	Framed (CNC, no hardware/eng.)	€970	$1,100	$31
Europe	CLT	Project package (CNC + connections + eng. + delivery)	€1,100	$1,240	$35
Europe	Glulam	Commodity (material only)	€680	$770	$22
Europe	Glulam	Framed (CNC, no hardware/eng.)	€1,120	$1,270	$36
Europe	Glulam	Project package (CNC + connections + eng. + delivery)	€1,760	$1,990	$56
United States	CLT	Commodity (material only)	€840	$950	$27
United States	CLT	Framed (CNC, no hardware/eng.)	€1,020	$1,150	$33
United States	CLT	Project package (CNC + connections + eng. + delivery)	€1,190	$1,350	$38
United States	Glulam	Commodity (material only)	€1,460	$1,650	$47
United States	Glulam	Framed (CNC, no hardware/eng.)	€2,520	$2,850	$81
United States	Glulam	Project package (CNC + connections + eng. + delivery)	€2,700	$3,050	$86

(+$1,060/m3; +$30/FT3). All values are roughly -15%+30% cost bands.

Holzcourier has developed a European CLT price index that has noted price swings of nearly +/-50% over the past 24 months. This should be taken into account whenever viewing European price potentials for material supply.

Because most European glulam is spruce, assume ~15% more volume is required to match Douglas-fir capacity common in U.S. work. After this capacity adjustment, the U.S. glulam premium narrows but remains significant: +86% (commodity), +95% (framed), and +33% (package).

The price deltas in the table are structural rather than incidental. For CLT, European and U.S. numbers converge once framing/CNC is included, reflecting broadly similar fiber costs and layup economics; by contrast, glulam shows a persistent European advantage. Part of that gap is species: Most European glulam is spruce. On a capacity-equivalent basis, spruce sections typically require ~15% more volume than Douglas-fir to match strength. Even after grossing up European €/m3 by that factor, the U.S. still trends higher, especially at framed and package scope, indicating that the differential is driven by system economics rather than species alone.

On the supply side, European producers benefit from lower input costs for glulam billets (abundant, nearby spruce and competitive log markets), fewer labor hours per m3 due to highly automated lines (scanning, finger jointing, lamination, robotized handling, and multi-axis CNC), and consistently higher utilization. The manufacturing scope is also more segmented: Modeling/engineering, hardware/fasteners, CNC services, finishing, and erection are frequently contracted to specialist firms. That segmentation reduces the risk and working-capital load held by any single manufacturer, so less contingency is priced into each cubic meter. Plants serve dense markets within one trucking day, making freight predictable and inexpensive per m3, and the financing conventions around prefabrication (deposits, off-site stored materials draws, and well-understood WIP controls) lower the cost of carrying inventory between factory and site.

On the demand side, Europe has a large, steady base of buyers, public clients, mid-rise housing programs, and especially a high-volume single-family prefabrication market that consumes standard glulam sections and growing volumes of CLT roof and wall elements. This base-load demand keeps lines full between commercial peaks, amortizing plant overhead and stabilizing prices. Longstanding code familiarity with char-rate fire design and standardized connection details further compresses soft-cost friction and rework. Taken together, these conditions explain the pattern in the table: modest, narrowing gaps for CLT as scope normalizes, and much larger, persistent gaps for glulam where automation, utilization, and supply-chain structure combine to keep the European €/m3, and even the D-fir-equivalent €/m3, materially below U.S. levels.

When European supply is fully paired with design conversion risk, shipping times, extra transport duties/fees, and code compliance issues, this often provides European glulam with minor advantages to North American alternatives. It takes complex analysis to bring products to a like-to-like basis and the straight-line numbers above make it appealing for many teams to consider European product before they understand the true costs of deployment.

7.2.2 Perception of Limited Regional Supply

There is a perception that the mass timber supply chain (regionally and nationally) is underdeveloped and inadequate to support the demand for mass timber. This perception prevents developers and project teams from considering mass timber for their projects, as they feel there is uncertainty around the availability, cost, and schedule predictability of material supply.

This barrier is more of a perception than an actual lack of supply. Currently, manufacturers are not operating at capacity and are actively pursuing and bidding on projects across the country to meet production goals. A more accurate reality might be that the supply chain is currently underdeveloped. Manufacturers are short-staffed in sales and preconstruction and are unable to provide adequate project support during an important phase of the project. As of 2024, the following manufacturers are operating in the PNW:

- Panels
    - Mercer Mass Timber in Spokane, WA
    - Vaagen Timbers in Colville, WA
    - Freres Engineered Wood in Lyons, OR
    - Boise Cascade in White City, OR
    - Composite Recycling Technology Center (CRTC) is in the process of building their facility in Port Angeles, WA
- Glulam
    - Vaagen Timbers in Colville, WA
    - Shelton Lam and Deck in Chehalis, WA
    - Western Forest Products produces Glulam in Vancouver, WA
    - Zip-O Laminators in Eugene, OR
    - Riddle Laminators (dba DR Johnson Wood Innovations) in Riddle, OR
    - Rosboro in Oregon
    - Timberlab in Oregon

Zooming out to the larger Cascadia bioregion, the following manufacturers are also producing mass timber:

- Kalesnikoff produces CLT and Glulam in Castlegar, BC
- Boise Cascade produces mass timber in Idaho
- QB Corporation produces Glulam in Idaho
- Smartlam produces CLT and Glulam in Columbia Falls, Montana

- StructureCraft producers DLT and fabricates Glulam in Abbotsford, BC
- Spearhead fabricates Glulam and is slated to produce Glulam in Nelson, BC

The perception of an inadequate supply chain stems from several factors, including limited preconstruction support from manufacturers to support project teams with cost-effective design, longer than conventional lead times for materials, and perhaps the 2021 bankruptcy of CLT manufacturer Katerra or the closure of DR Johnson CLT manufacturing. This created industry hype and material demand; however, supply timelines grew as other producers needed to pick up capacity either within or outside of the region.

7.2.3 Scarcity of Affordable Insurance Coverage

Builder's Risk coverage for mass timber remains materially more expensive and less predictable than for non-combustible systems. Across recent North American placements and published benchmarks, effective premiums span roughly 1.1× to 8× concrete/steel comparables, with credible broker guidance indicating $0.15-$0.75 per $100 of insured value per year depending on project size, timber share, protection measures, location, and broker/carrier appetite. Independent studies of like-for-like multifamily projects report 22–72% lower Builder's Risk costs for concrete versus combustible wood, i.e., wood at ~1.3–3.6× the concrete benchmark, while industry advocacy sources have cited even higher multiples in certain markets. The spread is driven by perceived fire risk during construction, water ingress/repairability concerns, and uneven underwriting familiarity; coverage is often assembled via quota-share among several carriers.

Carriers with public mass-timber programs or documented activity include Zurich, Chubb, AXA XL, and The Hartford; FM Global addresses mass-engineered timber through its data sheets. Appetite, terms, and limits vary by project characteristics, but the presence of named programs indicates growing institutional comfort. Notably, carrier capacity is improving: Zurich North America reports dedicated mass-timber Builder's Risk programs (single-project and master) and claims roughly one-fifth of available underwriting capacity in this niche, offering limits up to US $50 million for qualifying risks. They were one of the first insurers in North America to differentiate between light-frame construction and mass timber, citing the greater strength, versatility, and durability compared to light-frame construction. In parallel, Verisk/ISO is adding a mass timber construction category in 2025, which should normalize classification and support more consistent rating over time.

A project example of an innovative approach to insurance was Neutral's 14-story mixed-use building in Madison, WI. The team put together a quota share: a pro-rata reinsurance contract in which the insurer and reinsurer share premiums and losses according to a fixed percentage, insured by Zurich, CNA, Chubb, and two reinsurers. Zurich was the lead insurer and used their extensive mass timber experience and a comprehensive contract that all other carriers would accept to successfully insure the project.

Continuing to work with insurers to educate them on mass timber's structural and resilient properties, as well as partnerships on successful mass timber projects such as the example above, will provide more industry precedent for lower insurance premiums. WoodWorks provides the Mass Timber Insurance Playbook – U.S. Edition and a Mass Timber Project Questionnaire for Builder's Risk (a concise insurer checklist), and maintains a curated resource page that includes research, carrier interviews, and assistance for broker outreach. Time plays a big factor in this because insurers assess the risk profile of a construction type over many projects and years, and as an early industry that history is not readily available for insurers to draw on.

7.2.4 Lack of Standardized & Tested Assemblies

As an emerging technology, the efficient and code-compliant use of mass timber systems still relies too often on project-specific testing and engineering judgments, adding time, soft costs, and permitting uncertainty. The absence of widely standardized, tested assemblies spanning fire, acoustics, vibration, and moisture performance, deters teams seeking trusted, easily permitted solutions. Manufacturers of panels, pre-engineered connections, fire protection, and other ancillary products have limited incentive to fund broad third-party testing when demand is fragmented, so results are frequently kept proprietary and are not published in a form that AHJs can readily accept or cross-reference. Notwithstanding this, WoodWorks and FPInnovations (via the CLT Handbook) have materially advanced the state of practice and established a baseline of guidance and test data; the sector now needs more open, consolidated libraries of assemblies and clearer pathways to jurisdictional acceptance.

Directives, Near Term

- **Publish a common, open assembly library** (floor, wall, roof, shaft, and connection families) with minimum fields: geometry, grade/spec, fastener schedule, fire rating, acoustic ratings, vibration criteria, and moisture/durability notes, plus explicit code references.
- **Require transferable test data in procurements,** mandating full third-party reports/listings (e.g., UL/Intertek/ETA) for proposed assemblies so performance evidence is portable across projects, even where proprietary components remain.
- **Pre-agree parameterized "assembly families" with AHJs** (defining acceptable span/load/thickness ranges) to reduce dependence on engineering judgements and compress approval timelines.

7.2.5 Access to Capital

7.2.5.1 Investors for Building Projects

Developers face real, but evolving, capital constraints when building speculative commercial or multifamily projects with mass timber. These constraints stem from the perceived risks, unfamiliarity, and underwriting hurdles tied to a still-nascent construction approach. With respect to debt financing, many banks and lenders see mass timber as untested compared to steel or concrete, especially for taller or larger projects. Debt providers often require long track records, comparable projects, and standardized cost data—which can be scarce for mass timber. Lack of sufficient "like-kind" projects makes valuation more difficult, which can shrink loan-to-value ratios and force developers to bring more equity. In effect, developers often secure less favorable loan terms (higher rates, lower leverage) or face longer diligence processes.

With respect to equity financing, ESG-minded investors and green real estate funds are increasingly drawn to mass timber for its carbon benefits and market differentiation. That said, institutional investors need confidence that projects can be delivered on budget and schedule. Concerns about supply chain reliability (fabrication capacity, transportation, subcontractor familiarity) make some funds cautious. Some equity partners worry about cost premiums and whether tenants/buyers will pay higher rents or valuations to offset them. As a result, equity is often available but requires robust storytelling, risk mitigation strategies, and proof of market demand.

The constraints are loosening over time as more successful case studies emerge in North America (e.g., Portland, Seattle, Minneapolis, Milwaukee). Today, the financing gap is most acute in first-of-kind projects, taller buildings, and in regions without local precedent. Overcoming these constraints often requires layered capital stacks (traditional debt + equity + green/impact capital + incentives) and strong partnerships with experienced design and construction teams.

7.2.5.2 Timing of Payments from Bank Bridge Loans

Problem Statement:

Construction loan draw processes in North America are optimized for "work-in-place" reimbursement after monthly site inspections. Prefabricated and mass timber scopes invert that cash flow: significant value is created off-site during design finalization, mill order, and factory fabrication, weeks before installation. Without an adjusted release model, prime contractors and timber suppliers are forced to vendor-finance deposits for raw fiber, book production slots, and carry finished inventory in transit or storage. This elevates price, schedule risk, and sometimes drives bidders away. Lenders can safely accommodate prefabrication by allowing controlled advances for off-site stored materials and work-in-process (WIP), secured by title transfer, UCC-1 filings (or PPSA in Canada), segregated storage, all-risk/installation floater coverage (including transit), and step-in inspection rights. The owner's agreement should also fix prerequisites, BIM level of development, shop-drawing approvals, and design freeze before any factory-stage draws are eligible.

Recommended Release Model:

Adopt a milestone-based draw schedule for the mass timber package that mirrors value creation while preserving lender protections. Typical instruments include: (i) an off-site materials addendum to the loan agreement; (ii) evidence of title transfer to Owner upon each advance (bill of sale/assignment); (iii) segregation and labeling of goods with right-to-inspect; (iv) insurance certificates naming Owner/Lender for off-site storage and transit; (v) lien waivers and dual-payee checks to eliminate double-payment risk; and (vi) retainage (e.g., 10%) held through installation. This structure reduces total interest and general conditions by pulling installation forward (common 30–50% frame-installation time savings for mass timber), while aligning factory cash flow with bank disbursements instead of supplier balance sheets.

7.2.6 Developer Familiarity and Risk Profiles

Developers take on most of the risk associated with building a project. Among many other considerations, they are responsible for the financing, insurance, and market acceptance when deciding what to build. For developers considering mass timber as a building solution, they need to become very familiar with the pros and cons of the material to navigate both the general risks associated with development and the mass timber-specific risks that they may be taking on. Risk most often translates into higher cost, which can cause a project not to pencil.

Mass timber is a relatively new material, so there is a lack of general familiarity amongst developers. It can be seen as a solution to some risks including project schedule, market differentiation, sustainability requirements tied to funding sources, or other drivers that may cause them to consider it. However, without a deep understanding of the material, it could still be seen as a bigger risk than business-as-usual, which the developer will default to if the unknowns are too great. Below are some of the risks developers will need to consider:

- **Project Cost:** Understand what if any cost premium there will be using mass timber without spending a significant amount of their own equity doing feasibility studies before knowing if the project will work.
- **Financing:** Find investors and banks willing to finance a mass timber building.
- **Insurance:** Without having project experience with an insurer, they may not know where to look for insurance without significantly higher premiums associated with their builder's risk and fixed property insurance.
- **Supply Chain:**
    - Will suppliers have capacity?

    - Is there enough competition in the market to get a good price?
    - Will their business survive through the project and warranty period?
    - Will they deliver on time?
    - Will the quality meet expectations?

- **General Contractor Buy-in:** Critical to coordination between trades, protecting the timber during construction, and ultimately the success of the project.
- **Occupancy:**
    - How will the mass timber age?
    - Should the owner plan for any special maintenance or upkeep of the mass timber?
    - What is the plan for mitigation measures should a fire, floor, or other damage occur during occupancy?

7.2.7 Labor Ambassadors and Trade Familiarity

For mass timber project construction to continue to grow and truly unlock potential in construction market penetration, the industry will need more labor ambassadors. These would be tradespeople and firms in all areas of construction who have worked with mass timber, understand what it is, and are generally supportive of the system as a leading construction solution. This results in a trade cost profile where informed bidders know how to work with systems and do not add extra contingencies, while having accurate estimates of the efforts required to complete their tasks given the mass timber construction system integration. This not only goes to create cost efficiencies, but if done in a win-win manner can help further promote mass timber construction in general by way of good reputation.

7.3 Opportunities to Grow the Mass Timber Ecosystem

7.3.1 Cost Competitiveness

The Pacific Northwest can close the gap on European delivered prices by attacking cost per functional unit (span or capacity) rather than cost per cubic meter alone. Three levers matter most:

1. Fiber optimization via machine grading and layup engineering
2. Factory productivity (automation + training)
3. Code- and design-led reductions in non-structural scope (e.g., encapsulation, redundant membranes). Together, these shift the numerator (cost) and the denominator (capacity/span) in overall building structural package costs.

With these in mind, here are detailed recommendations to help PNW mass timber gain marketplace traction:

1. **Fiber optimization: engineer dollars per span, not $/volume.**

    This concept in $ per span refers to the cost to span a certain roof or floor area. This metric clearly communicates the material's functional value versus the costs. Purchasers generally want the lowest dollar-per-span ratio. This speaks to the overall structural efficiency of the system.

    - **Exploit MSR/MEL grading to up-value fiber.** Modern machine grading (acoustic, X-ray density/MOE proxies) yields stable MSR classes (e.g., 1650f-1.5E, 2100f-1.8E, 2400f-2.0E). For example, MSR/MEL grading lets SPF compete structurally with DF-L in face lamellas and dominate core lamellas at lower input prices. Matching each board to its highest value and best use through a precise grading process reduces the volume penalty, referring to increased material required to complete the same structural performance specification from visually graded SPF. The adoption of E-rated glulam combinations (e.g., 24F-E# families) rather than purely visual layups to tune MOE will allow further value recovery and optimization from fiber baskets. This same principle could be applied to Douglas-fir lamstock to produce even stronger beams with less overall depth (volume) required, further improving product economy.

- **Segment layups by demand envelope.** Build parameterized families (short-span, mid-span, long-span) with distinct face/core grade prescriptions: DF-L or SPF-MSR faces where needed; SPF-MSR/MEL cores elsewhere. Lock these in BIM libraries to eliminate over-spec.
- **Partner upstream on sorting.** Engage mill scanners (e.g., MiCROTEC) and MSR lines to deliver MOE-binned lamstock, shortening plant-side re-sort and lifting yield on high-MOE faces. Where feasible, specify finger-jointed, E-rated lamellas to convert short MSR cut-backs into face stock. There are also potential opportunities to partner with mills to eliminate end trimming in the sawmill and planer mill of lumber destined for use as lamstock or CLT. Also, planing lumber twice can be avoided. These changes could result in significant fiber recovery efficiency improvements. This partnership can also improve drying outcomes, and visual CLT quality with square edge materials where applicable. However, capitalizing on such opportunities will require very strong partnerships between the mills and their mass timber manufacturing customers.

2. **Factory productivity: automation + training.**
   - **Automation focus.** Prioritize high-leverage cells: lamella feed and glue application, beam pressing, CNC drilling/routing, kitting and labeling. These steps compress touch-time per m3 and reduce rework. Modern plants allow significant lumber sorting and grade storage trays to enable further optimize CLT and glulam layup design. This includes a variety of grades and thicknesses of material inputs.
   - **Workforce upskilling.** Pair automation with structured training (operator-technician cross-skills, QA on MSR/MEL acceptance). Developing a highly trained production workforce backed by automation can be the difference between a line producing 50,000 m3/year with 80 staff, and the same line being run by 20 staff. This enables more output per staff member, helping to remove overall staff bottlenecks.
3. **Code- and design-led scope reduction.**
   - **Use 2021/2024 IBC tall-wood pathways** (Types IV-A/B/C) and coordinated fire design to target less encapsulation and fewer redundant linings where permitted, shifting budget to structure and enclosure drying strategy. Early AHJ alignment, using WoodWorks guidance on tallwood provisions, avoids late adds.
   - **Standardize assemblies.** Adopt a small canon of tested floor/wall/connection families with explicit ratings and fastening schedules to shrink engineering judgment (EJ) time and bid spreads; leverage WoodWorks resources as the baseline and add plant-specific QA notes.

7.3.2 Offsite Assembly

Offsite assembly of prefabricated components using mass timber builds upon the prefabricated nature of mass timber while providing value-added processes and products that offer faster, more coordinated, and better-protected installation. This offers a new sales stream for mass timber manufacturers and can reduce the overhead needed to support those sales cycles. By selling more commodity mass timber products into secondary processing facilities, such as offsite manufacturers, the mass timber manufacturers can reduce their reliance on in-house CNCing, modeling, and coordination staff—and increase repeatability and standardization within their own factories.

7.3.2.1 Scaling

B2B vs B2C

Selling business-to-business rather than business-to-customer can reduce sales cycle times, pre-construction (and pre-revenue) staffing, CNC machine times, and help even out production planning by committing to larger, more consistent purchase orders over longer periods of time. Offsite manufacturers and mass timber manufacturers both gain efficiencies by increasing repeatability and systemization, which means ordering a higher quantity of fewer SKUs.

Building Permit Approval / Code Paths

By dictating through building code adoption which requirements need to be met, local jurisdictions have a large influence over product viability. While there are model codes for the United States and Canada, they differ from one another, so despite the cross-border market that exists within mass timber the code requirements vary depending on which model code an offsite manufacturer is designing for. Consistent and timely code adoption of the model code across jurisdictions, or a national or international standard for offsite-manufactured products (similarly to how cars are regulated) would streamline the product design process, improve approval predictability by removing location-specific nuances, and enable wider adoption of offsite-manufactured buildings or products using mass timber.

Testing and Certifications

Products made offsite need to meet testing and certification requirements per the building code under which they are being installed. This structural, fire, acoustic, weather resistance, and other testing can reduce customers' approval and performance risks, increasing adoption of mass timber and simplifying code review for jurisdictions.

7.3.2.2 Process

Supply Chain

Off-site manufacturers rely on their supply chains to deliver on project performance and schedule requirements. Mass timber manufacturers that are able to consistently provide high-quality material on time and with predictable pricing can lock in long-term supply contracts to off-site manufacturers, reducing sales cycle requirements and increasing predictability in the production schedule.

Production Planning and Balancing

When an offsite manufacturer scales and is consistently producing products, the mass timber manufacturer's production scheduling also stabilizes. In addition to less pre-

Table 7-14 - Sample of Current Lexicology Pain Points

Domain	Illustration of Terminology Gap	Commercial Impact
Digital Deliverables	*"Shop Drawings" still implies 2-D approval sheets; yet value creation lies in the 3-D fabrication model that drives CNC code and clash detection.*	Owners underestimate modeling scope, under-budget VDC services, and later face change-order friction.
Units of Measure	Board-feet vs cubic meters vs nominal thickness cause pricing confusion and yield miscalculations.	Cross-border procurement risk; financiers discount pro formas with opaque unit conversions.
Sales Offerings	Terms such as "glulam package", "supply-and-install", or "design-assist" vary by vendor.	Difficult for GCs to benchmark bids; slows adoption among less experienced builders.

construction design time due to the consistency of the material order over time, producing these commodity items can help fill lulls between projects if a long-term contract is in place.

7.3.3 System Standardization

7.3.3.1 Common Language and Terminology

Mass timber's next growth inflection will not be unlocked by additional capacity alone, but by reducing cognitive friction for buyers, designers, and regulators. Today, clients confront a patchwork of vendor-specific terms, legacy steel/concrete nomenclature, and regional code dialects. The resulting ambiguity inflates transaction costs, elongates pre-construction schedules, and suppresses latent demand (See **Table 7-14**).

Opportunity: Value-Creation Thesis. Standard vocabularies function as network protocols: when every participant "speaks" the same technical language, search costs collapse, and transaction velocity accelerates. Historical parallels include AIA contract series in commercial building and INCOTERMS in international trade; both catalyzed step-change growth by codifying expectations.

Codifying a common language transforms mass timber from a craft niche into a scalable product category. By standardizing terminology and deliverables, the PNW ecosystem can shorten selling cycles, de-risk first-time adopters, and unlock a broader addressable market. This will likely raise regional demand, decrease design schedules, and increase overall project deployment velocity.

7.3.3.2 Production Standards

ANSI glulam standards are slow to change, and are governed by long design processes and manufacturer buy-in. These current design provisions typically containing 4+ lamstock grades for each beam add increased capital cost to production facilities as they need better sorting solutions, more automated sorting tray systems, and larger inventory to ensure balanced fiber throughputs. This complex production standard helps to function to block out markets from European competition but also produces a high cost structure and lower industry innovation. A simplified production option of lower-grade but easier-to-produce homogenous or 2-zone glulam beams might lower capital costs for new industry entrants; however, existing industry players would likely not encourage such option.

Further to this, European markets are highly standardized with similar products covering a large geography and population basis while North American production has some 38 grades of glulam, showing an ability to innovate on lamstock layups within a certain set of boundary conditions.

While CLT PRG-320production standards are currently prescriptive based, it is possible that a second grade class of lower-value performance-based CLT could be developed allowing non-structural applications and more innovative layups.

7.3.4 Innovative Products

7.3.4.1 Large Format Glulam

As mass timber projects continue to grow in scale, there will be a continued desire to expose the wood as the finish material. Exposing the mass timber requires the timber itself to have enough char layer to accommodate the fire rating required by code based on the building type, which is dictated by the scale of the project. **Table 7-15** shows the fire resistance rating requirement for various building elements based on building type. While in the case of Type IV-A and Type IV-B some or all of the mass timber must be encapsulated per the prescriptive code requirements, a performance-based approach could allow for more exposure of the wood, and future codes informed by more fire testing and modeling could loosen the encapsulation requirements. See **Table 7-15**

Table 7-15 - IBC 2024 Table 601 Fire Resistance Rating Requirements for Building Elements (Hours)

Building Element	**Type IV**		
	A	**B**	**C**
Primary Structural Frame	3	2	2
Bearing Walls			
Exterior	3	2	2
Interior	3	2	2
Nonbearing Walls and Partitions			
Exterior	Based on Fire Separation Distance		
Interior	0	0	0
Floor Construction and Associated Secondary Structural Members	2	2	2
Roof Construction and Associated Secondary Structural Members	1.5	1	1

for a listing of fire rating resistance requirements.

Higher fire resistance ratings with exposed timber mean that the glulam beams and columns that are exposed will need to be larger to account for the larger char layers at 2- and 3-hour ratings. Large-format glulams can help avoid the need for drywall or other materials to take some of the fire resistance rating load.

7.3.4.2 Thin CLT

Thin CLT is a new material to the North American market, primarily marketed as a finish material application rather than a structural material. It is important to note that PRG320's current prescriptive requirements may make it difficult for thin CLT to qualify as a structural material. While this market may continue to grow, there are many other ways to apply a wood or wood-like interior finish to spaces. Thin CLT could have applications in low-rise construction or single-family homes as a structural element where fire ratings are not required.

European markets hold two larger commoditized applications for thin CLT products. The first is concrete formwork; while smaller in width than plywood formwork, many of the products have no expiration use limits and can be used on site for significantly longer periods. The second is homebuilder/millworker craft markets, where thin CLT board panels can be purchased in bulk from building marts for home projects such as garden sheds, garages, and kitchen cabinetry.

Another use for thin CLT could be in prefab housing applications, where smaller elements are joined together to make stronger and more materially efficient composite structural panels with integrated cavities. Currently MPP can be made as a thin structural panel, but North American suppliers of CLT could have an opportunity to enter this market as well. One advantage to a composite structural panel with integrated cavities is the ability to include mechanical and electrical distribution within the cavity as part of the prefabrication process, reducing the on-site work needed to complete the building. Thin panels could also be used as a non-load-bearing structure for prefabricated wall panels.

A potential constraint on thin CLT is that most structural lumber produced in North America is 1.5" thick. Thus, a 3-layer panel still has a minimum thickness of about 4.25" (105 mm) (after accounting for planing of the lumber lamellas). For context, most European manufacturers can pack 5 lamellas into the same thickness, delivering a more diverse product offering.

Note: Specialty procurement and process have allowed innovative firms to make 87 mm (3.42”) and 60 mm (2.36”) panels respectively subject to their internal lumber purchasing/processing practices.

7.3.4.3 Ribbed Panels

As mentioned above, composite panels can be used to create a materially efficient structural system. Ribbed panels provide the option to provide strength and stiffness to mass timber panels while allowing the total fiber to be reduced. Fiber is the primary cost driver in mass timber panels, so ribbed panels that are prefabricated could help reduce cost. This would be offset by the additional processing needed to make these composite panels but might also open up additional benefits for the building design, including longer spans and MEP pathways.

7.3.4.4 Small Diameter Input Log Material Products

Several engineered wood products, players in the mass timber material realm, could be upsized with further fabrication to be more regularly utilized materials. This includes products such as OSL, TSL, LVL, LSL, PSL, and other permutations of stranded or veneer lumber. For these to become accepted as standard mass timber materials we would need large dimension availability, fabrication services to project materials, and visuals amiable to the customer. Table 7-16 compares the relative strength values along with input fiber materials and capital costs for typical facilities.

Table 7-16 - Small Diameter Input Log Material Products

Product	Fb (MPa)	MOE (GPa)	Typical input log	Fiber geometry	Expected Capital Cost (2025 $)
LSL (1.55E)	16	10.7	Small-diameter aspen/poplar, SPF / DF-larch, southern pine (low-grade chips)	Flaked wood strands, L:t ≈ 150:1	$450–550M (greenfield; recent US benchmark)
OSL (1.5E)	12.1	10.3	Similar feedstock to LSL; softwoods & mixed hardwoods (low-grade chips)	Flaked strands, L:t ≈ 75:1	$150–300M (est.; OSB/SCL-like line scale)
LVL (2.0E)	17.9	13.8	Rotary-peeled veneer from Douglas-fir, southern pine, yellow poplar	3–4 mm veneers parallel laminated	$110–330M (recent EU greenfields →USD)
PSL (2.0E)	20	13.8	Veneer from DF-larch (W) or southern pine / yellow poplar (E)	Long veneer strands, L:t ≈ 300:1	$150–250M (est.; infl.-adj. from historical LVL/PSL mill)
Stranded MicroLam	24–40 MPa indicative	10–14 GPa indicative	Low-grade, small-diameter softwood/hardwood	Crushed “scrim” fiber mats, oriented & pressed	Pilot: $20–50M; industrial: $150–300M (est.)

The consulting team believes that some smaller-scale or augmented versions could be adapted and combined with visual veneer surfaces or other architectural finishes that could better utilize these materials within the mass timber space. While economical to transport, handling and waste ratios often do not favor smaller diameter materials. There is likely potential to utilize many of these materials within some of these products under the correct conditions.

7.3.4.4 Timber BRBs

One current limitation with mass timber is its low resistance values related to seismic design. Mass timber is typically paired with a steel or concrete core, which acts as the lateral system in the building. Concrete cores create construction schedule complications and are often built in advance of the mass timber starting construction. Steel cores can be prefabricated and erected with the mass timber structural system, which offers a better synergy between systems, reduces the overall project schedule, and allows for adjustment for tolerances as the building is erected.

An opportunity to increase mass timber's use in buildings is to replace steel lateral components with mass timber elements, such as timber buckling restrained brace frames (BRBs). Not only can this further reduce the embodied carbon of the structure, but the mass timber can also act as part of the fire resistance layer for the lateral system and reduce the need for intumescent paint or spray foam on steel elements.

The U.S. Endowment for Forestry and Communities1 helped fund research related to timber BRBs through the Forest Products Laboratory, showing that timber BRBs achieved excellent performance and providing data for further research, structural code development, and engineering review and use.

7.3.5 Fiber Utilization

7.3.5.1 Process Waste

A combined trimming, planing, and nesting losses for CLT and glulam average 15-28% of incoming fiber volume. Although most residuals are downcycled into biomass heat or particle products, they still represent forgone margin and embedded-carbon value. Every percentage point of avoidable waste translates directly into higher fiber yield, lower unit cost, and improved scope-3 emissions performance. These optimizations include better grading processes, finger jointing, planing specifications and process positions (to reduce volume of planing), and incoming lumber specifications.

7.3.6.2 Fiber Cost Optimization

Raw material acquisition cost is at least 50% of all operating costs for CLT and glulam manufacturing. It can be an even higher percentage during periods of high lumber prices. Mass timber manufacturers can work to reduce keep costs down by seeking to optimize fiber costs. The available strategies include purchasing widths and lengths that are less desired in the market. For example, 2x8 is often less desired than other widths. Also, 14' lengths are commonly sold at a discount to other lengths. Similarly, certain species that are still acceptable for use in CLT, such as Hem-fir or SPF, are often sold at a discount to Douglas-fir. Also, lower grades, such as #3, can be used in the middle layers of CLT panels subject to manufacturing capabilities and overall acceptability of lumber. Close attention to these market dynamics by mass timber manufacturers can lead to lower input raw material costs.

Process-Chain Insight

Planing: A sizable share of the loss is incurred before boards ever reach the mass-timber line. Sawmills typically surface-plane to 38 mm (1½") thickness, after which a secondary planing pass at the MT plant brings lamstock down to 35 mm (1-3/8") to meet tight tolerances. Eliminating or relocating this redundant pass could save 7.8% of fiber and one full handling cycle. The elimination of this pass would entail purchasing undressed lumber and performing planing only at the time of grading or manufacturing. This requires more complex pre-target grade systems in sawmills to ensure lumber meets the required target grade prior to full planing processing.

End Trimming: Another opportunity is that softwood lumber is trimmed back to a 2' length multiple (e.g. 8', 10', 12', 14', 16', etc.). If a run of lumber were destined for use in CLT and/or glulam manufacturing, the end trimming practice could be eliminated since both CLT, and glulam stock are finger jointed. While this would complicate drying, since not all pieces of lumber in a unit would be the same length and air flow around the irregular shape in the kiln would affect drying, the estimated 5% to 7% savings in fiber recovery is well worth the extra care needed during drying.

MSR Grading – CLT and Glulam: As previously described, using lower cost lumber, such as SPF that has been machine graded to quantify strength characteristics is an opportunity to lower the cost of the fiber in the panel. At the sawmill level, a variety of mills have MSR grading machines. However, those mills do not always run the lumber through MSR machines because during certain market conditions there is no perceived additional value. There is an opportunity to educate the sawmills that have MSR capability about the value of MSR-graded lumber to the mass timber supply chain.

Lumber Drying: Kiln drying is often the bottleneck at sawmills. This limits their willingness to dry lumber to 12% moisture content, which is the standard needed for CLT and glulam, as opposed to the 19% for conventional dimension lumber. There is likely an opportunity for custom dry kiln services to cater to the needs of CLT and glulam manufacturers. Additionally, there is likely opportunity for mills to invest in updated kiln controls and equipment, increase the quality and frequency of kiln repair and maintenance, and better train kiln operators in optimal kiln operating practices. All of these may reduce the low moisture content requirement that is currently constraining CLT and glulam raw material supply.

7.3.6.3 Stabilized Pricing

The pandemic-era lumber price spike revealed a key weakness in the mass timber supply chain: Suppliers must quote cross-laminated timber (CLT) fiber 6-18 months before production, yet those quotes are based on spot-market prices that can swing dramatically. With no protection against this volatility, manufacturers add large contingencies to their bids, and owners often respond by postponing or abandoning projects.

Lumber accounts for roughly 60% of a plant's cost of goods sold (COGS), about 55-70% depending on the operation, and 35-50% of the finished mass timber package once design, connectors, and installation are included. As a result, a 20% jump in lumber prices raises the total product cost by only about 8%, not 20%. Even so, that 8% can erase profit or break a project's budget unless the risk is managed.

Several tools are available to lock in or cap fiber costs well before production:

- **Fixed-forward fiber contracts** that set a price band with key mills for 12-24 months.
- **Guaranteed Maximum Price (GMP)** contracts with an open-book lumber ledger, so owners see actual costs while suppliers protect their margin.
- **Partial hedges on CME lumber futures**, paired with basis swaps to align the futures grade with mass-timber specifications.
- **Owner-financed fiber pools**, where developers pre-purchase lumber and store it at the mill until the project is ready.

By forward-pricing even part of the lumber spend, suppliers can keep margin exposure within about 3–4 percentage points and still offer firm bids up to 18 months ahead. This price certainty gives owners the confidence to green-light projects sooner, smooths plant scheduling and ultimately supports faster growth of the Pacific Northwest mass timber market.

7.3.6 Digital Delivery Models

Selling mass timber as a billet semi-commodity material on its own almost does not exist in North America in the same context that exists in Europe2. In the stream to make mass timber a project deliverable component, someone must design the specific connection details to a 1/16" (2mm) level of accuracy. Generally, this role falls on mass timber manufacturers, many of whom do not inherently have this skill set. As a result, this process of 3D fabrication design is considered one of the largest bottlenecks in the industry. While it might take four weeks to produce a large 250,000 FT2 project, this project could take 8-12 months in 3D fabrication design and client approval processes. This entire set of processes is ripe for innovation and smoothing out the technical delivery process to a point where this bottleneck is removed resulting in little to no friction with the client.

Opportunity: Develop streamlined tools to convert architectural and structural bid packages into mass timber quotes. Clearly identify and communicate issues to design teams for swift resolutions and simple guaranteed bidding and project delivery services. Enable 3D model sharing from architect to fabrication designer and ensure a higher degree of certainty to trust the model, thereby shortcutting 2D drafting processes.

It should be noted that by having this complex process, Europeans have had significant difficulty in accessing North American markets.

7.3.7 Potential AI-Driven Technical Efficiencies

AI has the potential to shorten cycles across several areas: Management (demand/pricing forecasts, smarter procurement, live dashboards), 3D Modeling (auto-conversion from design intent to shop drawings, CNC files, and nesting), Project Management (early warnings on schedule risk, resource leveling, logistics simulation), Quality Control (QA/QC as digitized reports with statistical process control and basic vision/sensor checks), and Accounting/Admin (automatic AP/AR capture, job-costing, variance reporting). The main current bottleneck is 3D model conversion and detailed connection design; progress here will depend on standardized components and rules, which make the problem easier for AI to solve reliably. Some benefits are available now (invoice capture, schedule-risk flags), while full model-to-machine and closed-loop QA could arrive in 2, 5, or 10 years. Timing varies with job complexity, data quality, and the scale of the plant or project.

7.3.8 Advanced Technology in Sawmills

Recent advances in AI-driven visual and MSR grading systems are transforming the precision and efficiency of lumber quality control. Automated scanners can identify knots, wane, slope of grain, and other strength-reducing characteristics in real time, assigning stress grades with a consistency that exceeds manual grading. Automated scanning is also being applied to logs. With the installation of the first Microtec CT log scanner installed for hardwoods in Washington, Cascade Hardwoods in Chehalis demonstrated how these systems could increase volume and value recovery and improve the predictability of downstream performance of products including mass timber. Expanding this technology across softwood mills could unlock greater volumes of usable feedstock from thinning and mixed diameter stands.

A parallel opportunity lies in small diameter log optimization and advanced log sorting systems. Technologies that enable precision cutting, CT scanning, and dynamic log sorting can create differentiated product streams—feeding mass timber lines with longer and stronger boards while diverting off-grade material into panel, pellet, or biochar production. Random-length (RL) optimization is particularly important, as it allows mills to tailor output for higher-yield mass timber layups, reducing waste and improving structural efficiency. These systems can shift economics by extracting structural value from logs previously considered marginal.

In addition to the kiln capacity bottleneck, kiln quality control is another critical factor. Mass timber requires lumber that is uniformly dried to tight moisture tolerances. Kilns with poor equipment controls and monitoring systems can cause uneven drying, casehardening, or over drying. All these factors can compromise adhesive performance and long-term durability of mass timber products. This circumstance is an artifact of many regional kilns being originally designed for commodity throughput, rather than precision drying at scale. Upgrades to kiln systems—whether through higher-capacity continuous kilns or more sophisticated drying controls—will be necessary to ensure reliable supply chains for mass timber producers. Without these improvements, even with AI grading and optimization, variability in moisture content could constrain the output and quality of CLT and glulam facilities.

In sum, while the Pacific Northwest has a strong sawmill base, modernization in lumber grading technology, optimizing lumber product mix decisions via internal scans of logs, and kiln infrastructure are required to align supply with the specific demands of the growing mass timber sector.

7.3.9 Business Models

Traditional PNW sawmills are increasingly curious about mass timber, yet most stop short of full project delivery because it demands services—architecture, engineering, BIM modeling, project management and site assembly—that fall well outside their core business areas. The region currently relies on only a handful of firms that bundle all those disciplines; Timberlab is the best-known local example, but its annual capacity is finite and the team is currently adding focused production capacity to both CLT and glulam lines.

A proven overseas model shows an optimal vision of what might be missing. EURBAN, founded in London in 2003, employs about forty architects, engineers, and site managers under one roof and has delivered more than 150 education buildings and nearly 400 mass timber projects. Overall, theirs is the largest portfolio in the UK. By absorbing the design-to-installation risk, EURBAN lets commodity mills focus on supplying fabrication only CNC'd materials while it handles detailing, sequencing and on-site assembly. Projects move faster, owners deal with a single accountable partner, and the entire supply chain grows.

In the PNW, however, relationships between producers and potential integrators remain thin. Some mills view integrators as competitors that capture part of the "value-add pie," or worry they will import offshore product and erode local work. These perceptions create friction and keep collaborative ventures from forming. Compounding this, many external integrators effectively function as project-acquisition agents for producers; when their pipelines surge or stall, plants inherit uncomfortable, uneven project flows.

By contrast, Canadian manufacturers with in-house integration often report steadier project cadence. Many European firms followed a similar trajectory, integrating internally until the external mass timber ecosystem matured, then selectively graduating to more third-party integration once reliability improved. This does not preclude collaboration: Partnering with external integrators on a proportion of projects can broaden reach and add specialist capacity. But the exposure should be capped and governed by clear allocation rules, schedule-priority agreements, and make/buy thresholds, to protect baseline plant loading and limit vulnerability to lulls and sharp fluctuations in production.

Closing the gap will require intentional, conflict-reducing moves:

- **Transparent partner models;** for example, joint venture agreements in which mills retain a share of the integration fee, allowing everyone to benefit from the added value instead of fighting over it.
- **Local-content milestones** can reassure producers that design and installation talent will be grown in-region rather than flown in.
- **Shared-risk insurance or bonding pools** lower the professional liability hurdle that

keeps many engineering boutiques from scaling into full integrators.

- **Industry-led matchmaking and training**, built around state workforce grants, can pair sawmills with design-build talent and fast-track BIM and erection skills.

If even a few additional integrators of EURBAN's calibre emerge in the Pacific Northwest, commodity sawmills will have a lower-risk route into mass timber, owners will gain confidence in project delivery, and the region's capacity to execute will expand well beyond the limits of today's players. The key is to turn potential competition into structured collaboration, aligning incentives so that every party gains when mass timber demand grows.

7.3.10.1 Scaled Production Leveling and Efficiency

Efficiency can be measured in many ways, but a key source of measurement would be daily shift production; this is subject to order file size, and after that, optimization of the production run.

This optimization includes details such as fingerjoint size switchovers, press batching size occupancy, and CNC framing complexity. Subject to the order, each of these stations can become the bottleneck in production on a given set of project schedules. While there is hope that AI systems might achieve better production schedule leveling than humans at some point in the future, this has yet to be documented in the industry.

7.3.10 Transparent Costing Hub

One of the strongest signals coming from developers, general contractors, and design firms is a desire for clear, reliable cost information. Many are attracted to mass timber for its sustainability profile and schedule advantages, but they hesitate because they cannot obtain apples-to-apples pricing early in the project cycle. In the absence of a recognized reference point, teams rely on anecdotal quotes or outdated case studies, inflate contingencies, and often revert to steel or concrete before mass timber proponents have a chance to demonstrate value.

The solution is an open, region-specific costing hub, essentially a living database and help desk where project teams can see typical price ranges for CLT, glulam, connectors, fire protection, and erection, calibrated to current lumber indices and labor rates. WoodWorks already offers a national cost-comparison tool, but the Pacific Northwest market could benefit from a finer-grained resource that reflects local fiber, transportation, and labor conditions. A transparent hub would shorten the learning curve for first-time adopters, reduce the perception of cost risk, and create a common baseline from which suppliers, integrators and owners can negotiate.

Setting up the hub need not be complex. A small consortium of producers, integrators and industry bodies could supply anonymized bid data on a quarterly basis; WoodWorks or a similar neutral party could curate the information, publish median unit costs, and provide guidance on how design choices influence price. Over time, the hub would evolve into the "go-to desk" for anyone exploring mass-timber, lowering entry barriers, speeding up feasibility studies, and ultimately drawing more projects into the regional pipeline.

7.3.11 Export Potential

To become a viable export locus production center, a few key attributes must be met by the business environment:

1. Knowledge of regional codes in export markets.
2. Certification for regional building codes in given export market (CSA for Canada, JAS for Japan).
3. Several U.S. facilities are already certified for CSA (Canadian products) and for JAS (Japanese products in terms of glulam materials).

4. Knowledge and interoperability to use metric measurement systems. Most other nations in the world use metric units of measure for construction documents and sales contracts. U.S.-based organizations would need to develop aptitude to work confidently within these means. Only the U.S. and Liberia use the Imperial system as a legal trade and design basis.
5. Cost-competitive solutions.
6. Viable shipping routes.
7. Free trade principles or significant cost advantages.
8. Speaking common language—not just English, but units of measure and standardized terminology.

7.4 Policy Impacts on Supply and Demand

Based on the analysis provided in this report, the current constraints in the mass timber industry are primarily on the demand side. Policy initiatives that focus on increasing demand for mass timber products through building code adoption, zoning code incentives and adjustments, public procurement policies incentivizing mass timber construction, and improved insurance options will have the greatest immediate impact for mass timber manufacturers.

While there are efficiencies to be gained in the supply chain to improve the cost competitiveness of mass timber, primary levers for these improvements rely on improved technology, process, and personnel, for which policy change will have limited impact. International trade policies, in particular with Canada, do impact the pricing of mass timber as discussed below. In a survey to manufacturer and fabricators across North America, the top policy-related concerns were:

- Building Codes (approval timeframes, inconsistencies across jurisdictions, and complicated approvals processes)
- Forestry Policies (related to a concern about the high cost of raw materials)
- Zoning Incentives (not enough incentive for developers to increase demand)
- Embodied Carbon Regulations (lack up-front spending to reduce embodied carbon)
- Tariffs and Duties

7.4.1 Building Code Adoption

Adoption of model codes that include tall timber provisions, including IBC 2021 and beyond for the U.S. and NBC 2020 for Canada, enables mainstream adoption of mass timber projects by de-risking the approvals process and creating a clear path towards compliance. Local jurisdictions are responsible for adopting their own building codes, and those jurisdictions vary in terms of coverage depending on the location. For example, in Oregon there is a statewide building code, while in California there is a state code that local municipalities can amend for a local code. Adoption timelines also vary by jurisdiction, leading to a patchwork building code environment across the continent. Canada and the U.S. also have different model codes, so while places like Vancouver and Seattle share a lot in common in terms of the environment and seismic conditions, the model building codes that the local jurisdictions have adopted are different, leading to some challenges in scaling across the border for some product types. The current rate of mass timber adoption, and how that relates to the GDP that each geography represents, can be seen in **Table 7-17**.

Once a new building code is adopted, there is a lag between the effective date of the new code and projects being reviewed and completed under that code. Depending on project size and jurisdiction review times, this lag can span years. In addition to this natural lag due to project timelines, there is additional lag as the professionals and reviewers become familiar and comfortable with the new code requirements.

The PNW has led the country in tall timber building code adoption, partially driven by the familiarity with timber products, economic incentive due to the forestry industry in the region, and a prioritization of sustainability in the region. As such, the region has had more time for the industry to mature, and the approval process is understood by both the design teams and the approval bodies. While 100% of the PNW has adopted tall timber building codes, this represents only 3.8% of the GDP of North America.

In western North America, a significant portion of the region has adopted tall timber building codes, reflecting the proximity to the PNW as a supply hub and a focus on sustainability. There is a small amount of growth potential related to completing the adoption of tall timber building code, but the primary focus for growth in this region should be on the maturation of the industry. The code adoptions in these states are generally several years behind the PNW, and significant gains are anticipated as design teams, approval bodies, contractors, and inspectors gain familiarity with the building material and approvals process.

In eastern North America, there is significantly less adoption across jurisdictions, with only 56% of the GDP living in a jurisdiction with tall timber building codes. Eastern North America in this analysis reflects 74% of the total GDP in North America, so there is a significant opportunity for growth in mass timber construction through the adoption of tall timber building codes and increasing the familiarity with the approval pathways throughout the value chain. See Table 7-17 for a summary of the preceding discussion.

Table 7-17 - Tall Timber Building Code Adoption Rates by Geography

Region	% GDP in Tall Timber Jurisdiction within Region	% GDP in Tall Timber Jurisdiction Relative to NA Total	% Region GDP Relative to NA Total
PNW	100.00%	3.80%	3.80%
Western NA	88.38%	19.83%	22.44%
Eastern NA	55.59%	41.00%	73.76%
Total NA	**64.63%**	**64.63%**	**100.00%**

7.4.2 Zoning Incentives

Zoning dictates the massing, shape, and density of a building, which can have a large impact on the efficiency of mass timber. In general, zoning requirements that require significant massing variation in the form of setbacks and/or cantilevers, balconies, irregular shapes, etc. result in less structural efficiency for mass timber (as well as other building materials) which increase the cost of the building. This can result in extra structural elements, thicker slabs, complicated roofing and envelope details, and expensive thermal solutions. While these challenges are not unique to mass timber, the structural and installation properties are different than a material like concrete which is formed on site. Cutouts from mass timber slabs result in increased waste, which the customer pays for regardless. Mass timber pricing is primarily driven by the amount of fiber used, so the more efficient the building massing can be for mass timber, the more cost-competitive it will be with other building materials.

Zoning / Land Use regulations can also provide incentives for mass timber. Seattle

Land Use Code 23.50A.120 allows mass timber as one of two pathways to get an extra 0.5 Floor Area Ratio (FAR) in Industrial Zones, increasing the building size that a given site in these zones could yield, which in turns increases profitability for mass timber projects and could help offset potential cost premiums.

Washington House Bill 1183 states that a city or county planning under RCW 36.70A.040 may not require façade modulation or upper-level setbacks as a condition of permitting mass timber residential projects, which reduces the structural complexity and cost for mass timber buildings. It also states that (with some exceptions) a city or county planning under RCW 36.70A.040 may not require off-street parking as a condition of permitting mass timber residential projects. This further reduces the cost of the building, incentivizing mass timber over other structural materials.

Examples From Other Jurisdictions

Additional local and state zoning / land use incentives are used around the world to increase profitability for mass timber buildings, offset cost premiums, incentivize sustainable building materials, and simplify massing to improve the viability of mass timber. Examples include:

- Vancouver Zoning Incentives
    - Additional height and density for mass timber in rezoning applications
    - Buildings in areas that allow 8 to11 stories can qualify for two additional stories
    - Buildings in areas that allow 12 or more stories can qualify for three additional stories
    - 10% extra height for applications under existing zoning
    - Additional support at the pre-application stage
- Upcoming Halifax Zoning Incentives

7.4.3 Digital Submittals and Review Mandates

Current practice vs. desired flow: Today's workflow typically runs: Architecture in 2D/3D Revit (or similar) → 2D Contract Doc PDFs → 3D Manufacturer Fabrication Model → 2D Approval Drawings → 3D Revisions → CNC code → Installation/coordination drawings → 2D single-piece shops. Each handoff forces re-interpretation, duplicate drafting, and version drift.

The preferred approach is 3D architectural authoring → 3D fabrication-grade model → 3D approvals and communications, with the model as the contract reference. Moving to a model-first path keeps object metadata (species/grade, fire rating, connection IDs, penetrations) intact, supports direct-to-CNC export, and enables field visualization (QR/AR) without redrawing. On mass-timber projects, this shift typically yields ~30–40% fewer RFIs, 25–40% less shop-drawing effort, and 4–8 weeks earlier fabrication release, compounding into lower contingency and faster schedules.

Mandate: Require applicants to submit a coordinated BIM model at permit intake and conduct plan check directly in the model, not through parallel PDFs. Projects that meet a simple standard, architecture, structure, and MEP, in one federated file with named fire/life-safety views, receive concurrent, expedited reviews and fewer re-submittals. The approved model becomes the single source for fabrication, inspections, and as-builts, eliminating duplicate drafting and reducing RFIs. Mass timber benefits most: Connection details, fire protection, penetrations, moisture controls, and erection sequencing are authored once and flow straight to CNC/fabrication, cutting rework and compressing schedules. Lenders and insurers can assess off-site quality controls from the same dataset, clarifying draw releases and coverage terms.

Implementation: Publish a short checklist (federated model; named code-check views; element properties for species/grade and fire rating). Require a fabrication-ready model update before shop release; track comments inside the model. Offer incentives, priority queue and firm review SLAs for compliant submissions. Seal, version, and archive a read-only record to protect professional liability while keeping approvals fast and transparent. Leverage the PNW technology sector's strengths (cloud, visualization, automation) to pilot model-based approvals with local authorities and manufacturers, aligning mass timber with Industry 4.0 production principles and positioning it as a technology-first, biophilic construction system.

7.4.4 Embodied Carbon Legislation

Embodied carbon regulation, influencing many types of materials, can give an advantage to mass timber construction, which has a significantly lower carbon footprint than steel or concrete. These regulations and policies all generally aim to lower the global warming potential (GWP; the measurement used to indicate embodied carbon) of new buildings but approach it in different ways. In some cases, high-embodied carbon materials are penalized, while in others, low-embodied materials are incentivized. In many cases, current requirements stop at documentation of embodied carbon, with the anticipation that future limitations will be put in place as benchmarking and familiarity with Environmental Product Declarations (EPDs) and Whole-Building Life Cycle Assessments (LCA) progress.

7.4.4.1 Regulating High-Embodied Carbon Materials to Increase Competitiveness

Embodied carbon regulation, influencing many types of materials, can give an advantage to mass timber construction due to the latter's significantly lower carbon footprint than steel or concrete. In some regulations, such as Portland's Low-Carbon Concrete Initiative, low-carbon concrete is required, increasing the potential cost of concrete structures, giving mass timber a pricing advantage. Other examples of regulation in this category are Marin County's Low Carbon Concrete Code, Denver Green Code: Embodied Carbon Reduction for Concrete and Steel, Buy Clean Colorado, the prescriptive path to meet California's CALGreen embodied carbon requirements, and the U.S. Inflation Reduction Act low-embodied carbon material requirements.

7.4.4.2 Regulating Whole Building Embodied Carbon

Some jurisdictions are starting to regulate whole building embodied carbon emissions without dictating a specific material or path to achieving those limits. Vancouver's Building By-laws' Low Carbon Materials and Construction and California's CALGreen embodied carbon performance-based requirements regulate the maximum amount of embodied carbon allowed in a new construction building, verified through an LCA. While the limits are currently relatively high, and the analysis usually only includes the substructure, superstructure, and shell, in the future, these limits are anticipated to be lowered, and more scope such as interiors could be included.

Mass timber can help offset other high-carbon materials in buildings, such as concrete foundations and glass, making it easier for teams to meet the requirements. As these limits are lowered, mass timber will have a competitive advantage over other structural materials, and if interiors are included can also reduce those emissions by requiring less drywall, etc.

7.4.4.3 Incentivizing Low-Embodied Carbon Materials

The EPA has issued grants to incentivize low-embodied carbon materials by funding EPD data and standards work, EPD development and verification, and EPD data platforms. More robust information helps with other regulations that limit GWP emissions, either by product type or building. California, Colorado, and Maryland have passed legislation that encourages the purchase of materials with low embodied carbon. There have been additional discussions in some jurisdictions about incentivizing low-embodied carbon materials through additional density or height in their zoning codes.

While embodied carbon regulations are an opportunity if passed, the industry should be aware that political change can reduce or eliminate this advantage, and relying only on embodied carbon regulation to make the case for mass timber can become a liability if that happens.

7.4.5 Tariffs and Duties

Tariffs and duties can play a major role in the cost-competitiveness of importing materials from international sources. Tariffs are country-specific and can affect some or all products being imported from that country. Duties, on the other hand, can be levied by company as well as country. Anti-dumping duties aim to address unfair trade that can happen if when a foreign company exports a product at a lower price than it charges in its home market or below production cost. Countervailing duties try to counteract the unfair competitive advantage that subsidized producers might gain over domestic producers who do not receive such government assistance.

In the context of mass timber, several materials could be imported along the value chain including logs, lumber, glue, steel components, coatings, etc. The tariffs and duties are applied to the import value and the import code of the material, so the lower the value of that material in the mass timber product, the lower the impact to the end product cost. Typically imported elements in mass timber might be lumber, glue, and specialty steel fasteners or connectors.

Canadian lumber is sometimes used in PNW mass timber products. A recent review of Canadian softwood lumber will result in an increase in Anti-dumping and Countervailing Duties, as shown in **Table 7-18** and **Table 7-19**. These additional duties may move some of the lumber supply that mass timber manufacturers buy to domestic sources if they are able to provide the material needed to the correct specifications. If there are not enough mills making lamstock that meets the requirements for mass timber products, this could incentivize additional mills to open long-term. Either way, if a manufacturer has been buying lumber from Canadian sources for a lower price than they could get domestically, the material cost and likely the end product cost will increase.

Table 7-18 - July 25, 2025 Anti-Dumping and Countervailing Duties Rates on Canadian Softwood Lumber Products

Company	Final AD - AR6	Final CVD - AR5	Combined Total
Canfor	35.53%	6.14%	41.67%
West Fraser	9.65%	6.85%	16.50%
JD Irving	20.56%	3.88%	24.44%
Tolko	20.56%	9.61%	30.17%
All Others	20.56%	6.74%	27.30%

Table 7-19 - Anticipated Final Anti-Dumping and Countervailing Duties Rates on Canadian Softwood Lumber Products

Company	Preliminary AD - AR6	Final CVD - AR6	Combined Total
Canfor	11.87%	35.53%	47.40%
West Fraser	16.57%	9.65%	26.22%
All Others	14.38%	20.56%	34.94%

International trade agreements, tariffs, and duties can shift quickly, creating uncertainty for both buyers and sellers and complicating long-term decision-making in terms of investment in a particular location for additional supply capacity of a given product.

7.4.6 Resource Independence

At the Federal level, Senator Jeff Merkley from Oregon has proposed the Mass Timber Federal Buildings Act, which would establish a contracting preference for public buildings that use innovative wood products in the construction of those buildings, and for other purposes. The mass timber elements would need to be procured from a facility located within the United States and harvested from forestlands located within the United States, consistent with responsible sources. This could increase demand in Federal buildings and increase the need for domestic fiber supply and manufacturing.

Executive orders, such as Executive Order 14223 - Addressing the Threat to National Security from Imports of Timber, Lumber, and Their Derivative Products, can also lead to policies that require or incentivize the use of domestic materials. This can come in the form of requirements for public buildings, increased regulation on imports, including tariffs, or other policy measures that restrict international supply and/or boost domestic supply.

7.4.7 Forest Management and Harvesting Policy

State and Federal forest management policies in Oregon and Washington strongly influence the availability, cost, and characteristics of wood supply. With the U.S. Forest Service (USFS) managing over half of the forestland in both states, and State agencies such as the Oregon Department of Forestry (ODF) and Washington Department of Natural Resources (WDNR) overseeing millions of additional acres, the contracting and partnership tools these agencies use have a direct impact on industry supply chains.

At the Federal level, the Stewardship Contracting Authority remains one of the most versatile tools for linking restoration work with timber supply. Through Integrated Resource Service Contracts (IRSCs), the USFS can exchange the value of removed timber or biomass for services such as thinning, road improvements, or habitat restoration. This contracting approach (and its typical lengthier term than a timber sale contract) often makes low-value material more accessible to mills. Larger-scale access is often achieved by partnering with nonprofits, Tribal entities, or local governments eligible to hold these contracts, which can extend up to 10 years and provide greater supply certainty. Master Stewardship Agreements (MSAs) take this further, establishing 10-year frameworks under which multiple task orders can be issued without repeated competitive bidding, enabling a steady pipeline of projects and predictable material flows.

States also play an active role in Federal land management through the Good Neighbor Authority (GNA), which allows ODF and WDNR to carry out forest management work on Federal lands by preparing, selling, and administering timber sales. While private companies cannot contract directly under GNA, partnerships with state agencies or counties holding GNA agreements can open access to timber from Federal forests on potentially faster timelines than Federal processes alone allow.

Both Oregon and Washington also manage extensive State trust lands, with ODF and WDNR tasked with generating revenue for public beneficiaries while meeting environmental stewardship obligations. Timber sales from these lands follow competitive processes and are governed by each state's Forest Practices Act—Oregon's was adopted in 1971 and Washington's in 1974. While similar in intent, Washington's law is generally considered more prescriptive, requiring wider riparian buffers, stricter road construction standards, and more explicit protections for unstable slopes. Oregon's law was significantly updated by the recent adoption of the Private Forest Accord, which expanded riparian buffers, increased stream protections, and tightened rules for aerial herbicide application. Both states require all landowners to reforest harvested lands within set timeframes, regulate harvesting near water bodies, and enforce road and erosion control standards, but the level of operational flexibility differs, which affects harvest planning and cost structures more on state-managed lands than private lands.

Newer collaborative models, such as A-to-Z and G-to-Z project structures, are emerging in the Pacific Northwest as well. Under A-to-Z, a private or public partner is responsible for everything from environmental analysis (including NEPA compliance) through implementation and monitoring. G-to-Z retains environmental review with the USFS but shifts project implementation to the partner. Both approaches can accelerate restoration work and secure higher certainty of material flow. Such projects have been applied to particularly in high-priority fire risk zones.

In both states, securing long-term raw material supply through these mechanisms requires more than contractual expertise. Success depends on strong working relationships with agency staff, active participation in forest collaborative groups, and alignment with restoration and wildfire resilience goals. Public engagement is also critical; opposition from local or statewide stakeholders can slow or halt projects, even when economic benefits are clear. Developers who anticipate concerns, address environmental and community priorities, and frame their operations as contributing to healthier, more resilient forests are best positioned to secure and sustain supply under current policy frameworks.

Additionally, there are many long-standing Federal laws that directly or indirectly affect forest management including:

- Multiple Use Sustained-Yield Act
- National Environmental Policy Act
- Clean Air Act of 1970
- National Forest Management Act
- 2012 Planning Rule
- Federal Land Policy and Management Act of 1976
- Tribal Forest Protection Act

7.4.8 Public Procurement Policies

As mentioned above regarding the Mass Timber Federal Buildings Act, there are proposed and existing public procurement policies that incentivize or require low-embodied carbon materials or mass timber specifically. These policies can help spur mass timber development by increasing its use in public buildings and taking the lead in new jurisdictions to reduce the hurdles for private development by increasing familiarity with the material, approvals, and ancillary industries such as insurance.

An example of a similar policy is British Columbia's Wood First Act (2009). This created more than a slogan: It set a durable demand floor by requiring wood to be considered as the primary structural material in new Provincially funded buildings (consistent with code). This consideration was not a mandate to use wood, but that teams must demonstrate they attempted to design with wood as a preliminary option. This steady public pipeline functions as a manufacturing backstop, giving mills and fabricators the confidence to invest in lines, QA, and people. Over 2013–2023, WoodWorks BC data illustrate ~37% compound annual growth in provincial mass timber activity, evidence that a clear procurement signal can scale a market. In parallel, the Province's Wood First Program funds capability, training, demonstration projects, and technical support—so skills diffuse across many firms, not just a few, deepening the regional talent pool from estimating and detailing to fabrication and install. Recent BC Building Code changes enabling EMTC up to 18 stories and across more occupancies widen the funnel further, locking in continuity of work. Net result: Policy + capability investment = a broader, more mobile team of manufacturers and builders who can plan together, share load when needed, and deliver buildings that combine function, low embodied carbon, and the kind of warmth and beauty communities take pride in.

7.5 Per Capita Adoption Ratio

There are two accepted methods of determining the success of mass timber demand in each market area: (1) per capita consumption of mass timber materials (m3 of mass timber per person), and (2) a Gross Domestic Product-based analysis that reviews m3 of mass timber product per GDP dollar. In this second method, strong economies such as the USA might have a lower threshold as mass timber demand does not play a role in the economy of magnitude comparable to (for examples) healthcare, tech innovation, or an oil-driven economy. Thus, the per capita analysis method is often preferred for a more equitable comparison across economies.

Table 7-20 - Comparable Per Capita Mass Timber Project Deployment, 2024

	Population (2024)	Project Built (m3)	m3 / Capita
PNW			
OR **WA**	12,240,000	60,500	0.0049
Benchmark Countries			
BC	5,600,000	61,200	0.0109
Austria	9,100,000	260,000	0.0286
Germany	84,000,000	450,000	0.0054
Norway	5,600,000	90,000	0.0161
Sweden	10,600,000	180,000	0.0170
UK	67,700,000	120,000	0.0018
Examples of Analysis from Large US Markets			
CA	39,400,000	42,500	0.0011
TX	31,300,000	19,300	0.0006
IL	12,700,000	0	0.0000
NY	19,900,000	3,300	0.0002

An analysis of eight global jurisdictions was developed with usage rates around +/-20% based on available data, this was conducted with best available data for the year 2024. These data developed the per capita adoption ratio as shown in **Table 7-20**.

These adoption ratios can be correlated with a jurisdictional market attribute score. Jurisdictions were rated on 13 market attributes with a flatline balanced weighting on a 0-5 scale, with 0 being the lowest and 5 being the highest. In a more robust analysis, these scores would be weighted and provide further descriptive justifications for each indicator. See **Table 7-21** for further details.

Table 7-21 - Jurisdictional Market Attribute Comparison

	Forests Resources	Lumber Availability	Grades / Drying	Commodity MT Suppliers	Full Project Service Mass Timber Supplier	Wood First Policy	Leading Building Codes	Environment al Policies	Co
PNW									
OR	5	5	3	4	3	0	5	3	
WA	5	5	3	4	3	0	4	3	
Benchmark Countries									
BC	5	5	3	3	5	5	4	4	
Austria	4	5	5	5	5	5	5	4	
Germany	4	5	5	5	5	3	5	3	
Norway	5	5	4	4	5	4	5	4	
Sweden	5	5	4	4	5	4	5	4	
UK	1	2	1	3	5	2	3	3	
Examples of Analysis from Large US Markets									
CA	4	5	2	2	2	0	3	3	
TX	1	4	1	2	2	0	3	0	
IL	1	3	3	2	3	0	4	0	
NY	2	2	1	3	3	0	3	0	

Wood nstruction Culture	Knowledge of AHJs	Knowledge of Architects	Knowledge of Engineers	Knowledge and Willingness of GCs	Trade Integration Knowledge	Number of Successfully Completed Projects	Market Attribute Score	m3 / Capita	Size Compare d to PNW
5	3	3	3	2	3	3	50	0.0049	X
5	3	3	3	2	3	3	49		
5	4	3	4	3	3	4	60	0.0125	2.6
5	5	4	4	4	5	5	70	0.0286	5.8
4	4	4	4	4	5	5	65	0.0054	1.1
5	4	4	4	4	5	5	67	0.0161	3.3
5	4	4	4	4	5	5	67	0.017	3.5
4	4	4	4	3	4	5	48	0.0018	0.4
3	2	2	2	1	2	2	35	0.0011	0.3
3	1	2	2	1	2	2	26	0.0006	0.2
3	2	3	3	2	2	2	33	0.0000	0.2
1	1	3	2	2	2	1	26	0.0002	0.1

Carbon 12 - Mass Timber Topping Out Ceremony with Oregon Governor Kate Brown

Photo Credit: Kristin Slavin, Conifer Advising LLC

8. Economic Impact of the Mass Timber Industry

For the Pacific Northwest, a region with a deep history in forestry and forest products manufacturing, project-based mass timber manufacturing and construction in Oregon and Washington together have an economic impact (gross output) of $756 million annually, at present. This value represents 0.08% of the regional GDP of $967 billion ($265 billion for Oregon and $702 billion for Washington). For context, Oregon's entire forest products sector contributes $8-10 billion or roughly 4% to the state's total GDP, while Washington's forest products sector contributes $36 billion annually, or 5% of the state's total GDP.

While not yet a significant contributor to the economy, mass timber manufacturing and construction present a unique opportunity for job creation and economic development in rural communities across Oregon and Washington, carbon reduction and schedule acceleration in construction, and improved well-being for occupants of the built environment.

This chapter provides a quantification of how mass timber's growth translates into real economic value for the Pacific Northwest. It includes an examination of how faster, lower-risk construction schedules ripple through project pro formas; how the industry supports direct, indirect, and induced job creation; and how carbon reductions, rural investment, and occupant health benefits strengthen the region's long-term competitiveness.

Also assessed are how current coalitions and programs (OMTC, EDA Grant, REACTS, MTTH) shape demand trajectories and capacity build-out, culminating in estimates of economic gross output and value added. Finally, an outline of the capital and financing required to scale responsibly is presented, including identifying gaps, mechanisms, and timelines to unlock the next wave of projects.

At present, project-based mass timber manufacturing and construction in Oregon and Washington together have an economic impact (gross output) of $756 million annually—0.08% of the regional GDP of $967 billion.

8.1 Construction Schedule Acceleration / Risk Reduction

Mass timber's factory-precision parts, repeatable details, and lighter frame shift work off site and compress the most variable, risk-prone portion of delivery, the structural frame, while improving coordination and safety on-site. This impact allows a faster pace of construction overall, increasing the number of potential housing units delivered per year, allowing regions to help make up shortages in delivered housing solutions. For the PNW specifically, this enables combinations of local economies and resources to address a shortage in housing, enabling double economic returns.

1. **Faster structural frame (superstructure) and shorter overall schedule**

    - **Superstructure:** Case studies and market surveys consistently show ~25% to 50% faster frame erection versus concrete/steel when components are fully prefabricated and logistics are planned (with 50% reductions documented on several projects).

- **Overall project:** Whole-project timelines commonly compress by ~20% to 25% where mass timber is paired with early coordination and off-site fabrication; 25% overall schedule savings have been published for tall timber comparisons.
- **Foundations & substructure enabling works:** Timber's lighter weight relative to concrete and steel can reduce the size and cost of the building's foundation (often cited ~30% reduction), shortening early critical-path work and reducing the cost of construction.

Developer Lens Velocity of Cashflows. Shorter builds reduce construction loan interest and pull forward project revenue: financial pro-formas show meaningful interest savings and earlier rent/revenue at 25–50% schedule reductions.

2. **Risk reduction via 3D Building Information Modeling (BIM) + prefabrication**
    - **Fewer change orders:** Empirical studies report 21–40% fewer changes during construction, major RFI reductions, and up to 20% construction-phase schedule savings with BIM; other syntheses show large drops in design errors and rework when BIM is used end-to-end. Prefabricated mass-timber packages amplify these gains because connection geometry and penetrations are resolved before fabrication.
    - **Schedule certainty:** Off-site work de-risks weather windows and site congestion, improving predictability and compressing critical paths—trends echoed across modular/prefab research.
3. **Lower on-site labor exposure and safer workplace**

    Mass timber frames install with smaller crews, fewer crane days, less hot-work, and cleaner sites, reducing exposure hours and incident potential while maintaining quality. Documented installation rates underpin fewer worker-hours at height and faster dry-in, both of which track to lower incident risk.
4. **Insurance & overhead: what improves, and what to plan for**
    - **During construction:** Insurers remain cautious about fire and water exposure during erection, and many projects still see premium and deductible cost increases compared to conventional systems.
    - **Once the system is stacked and enclosed:** Faster dry-in shortens the high-exposure window and moves the project sooner into a controlled environment, which can reduce overhead (field general conditions) and the risk profile relative to longer wet trades. Owner/GC playbooks from insurers and WoodWorks detail how teams can evidence this to underwriters.

Example: Assuming entitlements, utilities, and financing are in place, fully prefabricated mass timber with disciplined 3D/BIM typically delivers 30–50% faster superstructure and 15–25% shorter overall schedules. Shorter cycles mean more completions with the same teams and cranes; the effect scales with adoption. In respect to multi-family housing solutions, this can have serious positive impacts on volume of housing that can be deployed per year. With moderate adoption and realistic schedule cuts, mass timber can lift regional housing output by ~10–15%, higher at scale.

Table 8-1 - Housing Acceleration

Mass-timber share of starts	=+15% overall schedule cut	=+20% overall schedule cut
25% adoption	≈2,650 more units/yr	≈3,750 more units/yr
50% adoption	≈5,300 more units/yr	≈7,500 more units/yr

Developer finance & risk (single-project lens).

On a 24-month baseline, a 20% cut saves ~4.8 months of interest carry, pulls revenue forward the same, and trims general conditions. With an average drawn balance of $60M at 8%, that is ~$1.9M interest saved, plus earlier operating income on the building asset. Faster dry-in also reduces water/fire exposure and potentially improves insurance pricing when controls are documented.

Program Example: A large-scale 500,000 FT2/yr developer builds at $300/FT2, a 15–25% schedule reduction yields ~$3.4–5.7M/yr in carry and site-GC savings; at a 20% cut across $250–400/FT2, the range is ~$3.8–6.1M/yr. Bringing occupancy forward 4–6 months adds ~$3.3–7.5M/yr in earlier operating income. Combined, that is ~$7-13M/yr before considering certainty, reputation, and reduced weather/labor risk. While the market has yet to standardize these savings, the potentials are significant.

Housing Unit Equivalency

Assuming typical multifamily housing efficiency of 850–1,050 FT2 per unit (gross buildable to net rentable), 500,000 FT2 annually translates to ~475–590 housing units per year. Each unit delivered faster increases both developer return velocity and regional housing supply. This acceleration could allow the further development of ~20% additional units, or ~95–120 extra units annually for a developer of this scale.

Broader Implications

While these savings arrive without increasing crew counts, realizing cost parity with concrete or steel is not automatic. Success depends on:

- Standardized structural and connection details
- Rigorous BIM coordination to avoid rework
- Proactive water/fire risk controls
- Alignment with insurers and financiers

8.2 Job Creation

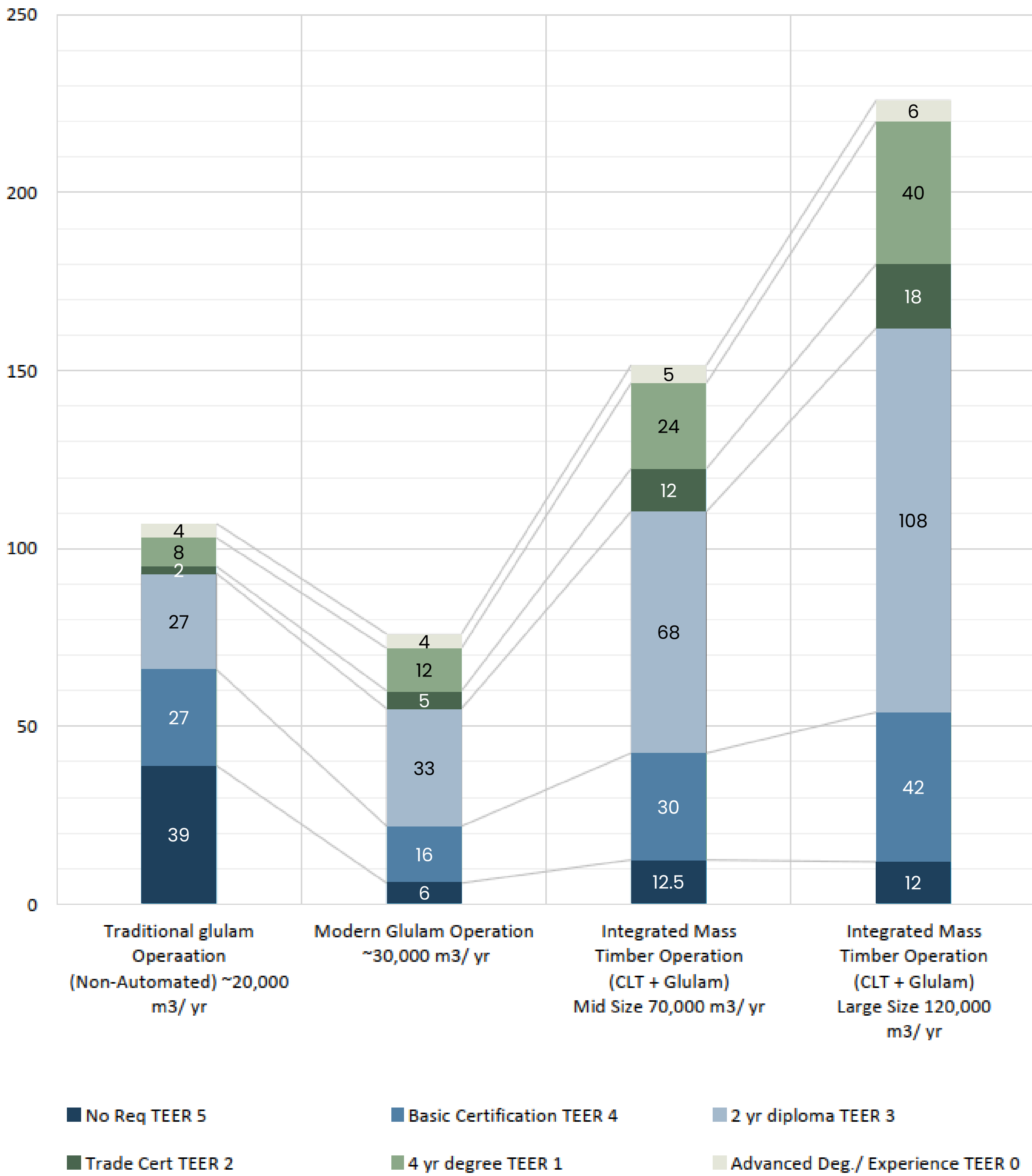
As with any economic impact study, this one sought to understand the job creation potential of the mass timber industry. We looked at core manufacturing jobs across a range of business types, as well as induced jobs across the forestry, design, and construction industries. Job creating becomes complicated between supply of mass timber materials from the PNW and demand for mass timber materials within the PNW, as construction, design, forestry and manufacturing jobs differ between the two components and where they occur. However, in this case with supply 62,000 m3 and demand 60,500 m3 the numbers are close enough within the error estimates that they may be viewed as one figure across job profiles (design work, forestry, manufacturing, construction, support services). We have not multiplied construction jobs by the 60,500 associated for the ratio between the two.

8.2.1 Core manufacturing jobs

Mass timber job creation varies significantly between type of operation, efficiency, scale and services provided. Jobs have been expressed in other reports as jobs per 100,000 m3 of mass timber product produced.

The 2023 Mass Timber HR Blueprint by Whirlwind Consultants and as illustrated in Figure 8-1 outlines four separate production business plans in the mass timber space at various production capacities. This correlated to a direct mass timber manufacturers job creation of between 188-535 jobs/100,000 m3 of product. This 5x difference in jobs per m3 illustrates the variance in scale and specialization of manufacturing facilities. Pure commodity production with high automation could entail fewer direct jobs per 100,000 m3 of product. However, outsourced design, framing, and project management jobs still must be counted at some point in their support of the mass timber ecosystem. The report references

Figure 8-1 - Number of Jobs and Educational Requirements



a Canadian Training, Education, Experience and Responsibilities (TEER) Standard.

With 60,500 m3 of documented project deployment in 2024, this would equate to 100 to 288 direct jobs in mass timber manufacturing in Oregon and Washington. Of these jobs roughly 12% have no educational requirement, 21% require a basic certification (2–6-week program), 42% require a 2-year diploma, 7% require a trade degree, 15% require a 4-year degree, and 3% might require a higher level of education.

The mass timber companies operating in Oregon and Washington, and listed in Section 3, shared the employee counts in a survey conducted during this study. **Table 8-2** displays the results.

As seen in the table, mass timber manufacturing companies seem to offer the greatest potential for job creation in both office (admin) employment and production employment. Across all company types, the greatest number of positions falls into the production category.

Table 8-2 - Mass Timber Company Employment Data, from Survey

Company Type	Total Office (Admin) Employees in OR/WA	Sales, Marketing, Estimating	Engineering, Modeling	Project Mgmt. in OR/WA	Production Staff per Shift per Facility	Total Staff in OR/WA
Commodity Glulam	1-5	1-5	0-5	0-5	50-75	Need data
Custom Glulam	5-10	1-5	0-5	0-5	15-25	25-75
Mass timber manufacturer (small)	5-10	1-5	5-10	0-5	25-50	25-50
Mass timber manufacturer (large)	25-50	5-15	1-10	5-15	25-75	50-150
Fabricator	3-15	1-5	1-5	1-5	3-10	5-20
Integrator	10-20	1-5	5-10	1-5	15-20 (install)	25-50
Prefab Modular	3-5	1-3	0	1-3	3-5	5-10

Outsourcing of 3D Modeling

3D modeling (also called fabrication design or digital construction), is a critical activity in the delivery of mass timber projects. The 3D modeling professionals translate construction documents (design intent) into fabrication-level information to be sent to the production team. People who fill these positions at mass timber companies typically have backgrounds in architecture or structural engineering and therefore bring a depth of understanding for how components of a building fit together. To become proficient as a junior contributor in this role can take six months to a year, and even then, this is time-intensive, detail-oriented work that is not suitable to all. Senior modelers often have 10+ years of experience and lessons learned on navigating complex building instructions.

As the quantity, scale, and complexity of projects going through a mass timber company at any given time is variable, many mass timber companies lack design-proficient teams with the capacity to adapt to this workflow and often are forced to outsource 3D modeling to companies for whom this work is a core competency, and that work with a range of materials including timber and steel. Outsourcing helps to balance workload, and avoids overburdening a small team, as well as the need for layoffs when times are slow. There are also significant drawbacks associated with outsourcing this process as each manufacturer has unique capabilities and non-standardized connections. It is not rare to end up with inexperienced teams (with woodworking or construction site conditions) designing sub-optimal production solutions.

The core skill set here is not only 3D modeling, but a strong understanding of mass timber woodworking and construction sequencing. The ripple effects of having knowledgeable designers create significant impacts on the production efficiency of a facility, overall uptake of mass timber projects, and profitability of firms engaged in manufacturing. Almost all firms with significant success in North America have internal fabrication design (3D modeling) teams.

Of eight PNW companies that responded to this survey question, four indicated that they outsource 3D modeling to some extent: one a little, two a moderate amount, and one a great deal. We note this reality because these are jobs that would count toward the overall total of mass timber jobs created, and that could one day be absorbed into the companies as demand grows.

One caveat is that some companies have opted to locate modeling teams overseas, where compensation is significantly lower; this also avoids the risk of competitors poaching highly valuable talent. It is unclear whether this approach is advantageous in the long run in terms of optimal workflow, but it is worth noting.

This specific work area is by many is seen as the key battleground to help determine if companies succeed or flounder. This process not only determines the schedule of all projects to fabrication but also informs the amount of effort and material usage on the shop floor to a finite degree—informing how an organization will prepare and deliver the final project commitment. This could be the differences between an 8-minute CNC milled connection and 2-hour hand-framed shop floor exercise. Multiply that efficiency across 400 connections and the scale of impact becomes evident.

8.2.2 Indirect jobs

The above analysis covers jobs created directly by mass timber companies. Below, we examine the indirect (incremental) impacts in job creation for the following business types: installation services, architectural design, structural engineering, contractor services, support services, and forestry.

Installation Services:

Industry benchmarks indicate that a dedicated installation crew can typically place 1-2 truckloads of panelized mass timber per day and 0.5-1 truckload of glulam framing per day. A standard truckload of mass timber material (by weight) contains approximately 40 m3. This equates to:

- Panels: 40–80 m^3/day
- Glulam frames: 20–40 m^3/day

Assuming a balanced project mix of 65% panel components and 35% glulam components (by volume), and using the midpoint of each range, the weighted average daily installation capacity is approximately 49.5 m3 per crew.

A typical installation crew consists of 4–6 tradespeople; for calculation purposes, a five-person crew is assumed. In practice, effective installation time must also account for site mobilization, demobilization, and completion processes, which can extend the total schedule by an estimated 40–50%. Applying a 45% productivity adjustment factor yields a net installation rate of 27.5 m3/day. These installation teams will also have a home office for management, estimating, and logistics support. The range of these services varies significantly from 1:5, one support to five ground team members, to 1:1—a support person for each ground team member.

Assuming 240 weather-working days per year, a single five-person crew can therefore install approximately:

27.5 m3/day × 240 days/year = 6,600 m3/year

This translates to approximately 76 full-time equivalent installation workers per 100,000 m3 of deployed mass timber. For the 2024 Pacific Northwest deployment of 60,500 m3, the direct installation workforce requirement is estimated at:

60,500 m3 ÷ 6,600 m3/year × 5 persons/crew ≈ 46 incremental installation jobs.

Architectural Services:

For this section we quantify only the incremental architectural effort attributable to implementing the mass timber system (panelization/logistics, connection and bearing detailing, exposure/encapsulation and fire strategy, moisture/temporary protection, coordinated penetrations, shop-drawing and RFI cycles), excluding base-building design.

Using material intensity expressed as m3 of mass timber product per FT2 of building area, a practical range is 0.014–0.023 m3/FT2 (mid-case 0.02 m3/FT2). Converting effort to labor with 1,800 billable hours per FTE-year and experience-based coordination loads of 0.0074–0.028 hours/FT2 (mid-case ~0.014 h/FT2), the incremental architectural staffing equates to roughly 30–67 FTE per 100,000 m3, with a mid-range base case of ~42 FTE/100,000 m3 for the Pacific Northwest project mix.

Applied to the documented 60,500 m3 deployed in 2024 across Oregon and Washington, this yields ~25 incremental architectural FTEs, with a sensitivity band of ~16–36 FTEs depending on project novelty, exposure level, and penetration pre-coordination.

Structural Engineering Services:

For mass timber projects, the Structural Engineer of Record (SEOR) carries additional scope beyond conventional steel or concrete systems, including panel and member design verification, connection detailing, staged stiffness and deflection checks, erection sequencing input, and moisture management considerations. Specialty engineering services may also be engaged for delegated design packages such as connection engineering, fire and acoustic detailing, or fabrication modeling.

Expressed in material intensity terms (m3/FT2), and using a mid-range deployment of 0.020 m3/FT2, typical incremental engineering effort for mass timber equates to:

- Low (experienced team, repeatable systems): ~0.0035 hours/ft^2
- Mid (typical complexity): ~0.0065 hours/ft^2
- High (first-of-kind, heavy exposure, complex interfaces): ~0.010 hours/ft^2

Using 1,800 billable hours per FTE-year as a base planning factor, this results in the estimate shown in **Table 8-3**.

Table 8-3 - Induced Structural Engineering Staff

Case	FTE/100,000 m3	FTE for 60,500 m3
Low	~14	~8
Mid	~24	~13
High	~38	~21

For the Pacific Northwest 2024 mass timber volume of 60,500 m3, we select the mid-range case (~24 FTE/100,000 m3) as the base estimate, reflecting a mix of experienced consultants and varied project types. This yields an incremental engineering head count of ~13 FTEs, with a sensitivity range of ~8–21

FTEs depending on novelty, design delegation, and project complexity.

Contractor Services:

Mass timber's impact on general contractor staffing is relatively modest. The core GC functions; reconstruction planning, procurement, site management, quality control, and safety oversight remain necessary regardless of structural system. However, compared to steel or concrete, the shorter installation schedule and reduced on-site labor scope can alter staffing profiles:

Preconstruction Phase: Slightly increased coordination demand in early stages to align procurement, shop drawings, logistics, and erection sequencing. This may induce a marginal uptick in project management hours before construction start.

Construction Phase: Shorter erection durations reduce the sustained on-site management load. Site superintendents and field teams are still needed, but the time horizon is compressed, which in turn lowers working days and total staffing requirements.

Net Effect: For projects of equivalent scope, mass timber tends to shift some GC effort forward in the schedule (front-loaded preconstruction coordination) but reduces total months of site management. This typically results in neutral to slightly reduced GC FTE requirements.

Quantitative Estimate

Using field staffing ratios benchmarked against installation crews, GC staffing for mass timber erection generally averages ~15% of installation FTEs. Applied to our mid-case installation figure of ~42 installation FTE/ 100,000 m³, GC field staff equates to the estimate shown in Table 8-4.

Table 8-4 - Induced Contractor Field Staff

Case	FTE/100,000 m3	FTE for 60,500 m3
Low	6	3
Mid	6–7	3–4
High	9	5

For the 2024 Pacific Northwest deployment of 60,500 m3, the base case assumption is ~3–4 GC field FTEs directly attributable to mass timber erection, with no evidence of sustained additional overhead in the rest of the GC organization. In fact, faster cycle times often free up project managers and superintendents for earlier redeployment, effectively improving labor productivity for the contractor's broader portfolio.

Steel Connection Supply:

For this report, steel component supply related to mass timber delivery is estimated by first establishing an average steel intensity per cubic meter of mass timber. Regional and project-type benchmarks suggest 40–90 lb/ m3, with the Pacific Northwest base case set at 65 lb/m3, reflecting a mix of mid-rise commercial, institutional, and housing projects. This is focused on steel connections within a standard full mass timber building, not hybrid mass timber steel buildings which are becoming much more popular and would take a more refined analysis. This steel is then divided by weight between commodity/pre-engineered hardware (such as proprietary connectors, hangers, screw systems, rod kits) and custom fabricated steel (for example: knife plates, bearing/collector plates, nodes, embeds, transfer beams). While commodity components dominate in unit count, custom elements typically account for the majority of total weight; the base assumption is 45% commodity and 55% custom by weight. Fabrication labor is assessed separately for each category, using mid-range shop productivity rates of 6 hours per 1,000 lb for commodity hardware manufacturing and 18 hours per 1,000 lb for custom fabricated steel weldments.

These rates capture cutting, drilling, welding, coating, and shop handling, but exclude transport and field installation. Applying a planning factor of 1,800 billable hours per FTE-year to the 2024 Pacific Northwest deployment of 60,500 m3 of mass timber yields an estimated 3.93 million lbs. of total steel: 1.77 million lbs. commodity and 2.16 million lbs. custom. This fabrication demand equates to approximately 5–6 FTEs in commodity process shops, which are often outside the region, and 19–20 FTEs in custom steel fabrication shops which are more often located within or nearby the region, for a total of ~25 FTEs. On a normalized basis, this represents ~46 FTEs per 100,000 m3 of mass timber product. The reallocation of resources due to the substitution of mass timber for steel or concrete construction is not included in this analysis.

Support Services (Insurance, Safety, Etc.):

Support services in mass timber projects cover a range of ancillary roles that ensure compliance, risk management, and operational continuity during design and construction. These include third-party inspectors (structural, fire, moisture), insurance and bonding administration, crane inspection services, code and standards administration, and health, safety, and environmental (HSE) management. While these services are required on most building projects regardless of the structural system, mass timber can influence the scale or intensity of certain activities, particularly where moisture monitoring, specialized fire protection verification, or unique insurance underwriting requirements apply.

For modeling purposes, support services employment is estimated as a percentage overlay on direct installation employment, reflecting the field-based nature of most of these roles. Industry benchmarks suggest a 5–10% ratio, with the Pacific Northwest base case set at 7%. Using the mid-range installation intensity of ~42 FTE/100,000 m3, this results in ~3 FTE/100,000 m3 for support services. Applied to the 60,500 m3 of mass timber deployed in Oregon and Washington in 2024, this equates to approximately 1.8 FTEs dedicated to support service functions.

This figure captures only the incremental support staff demand directly attributable to mass timber erection and related field oversight, and excludes general corporate overhead within contracting or consulting firms.

Induced Forestry, Lumber Supply Jobs:

This category captures direct jobs in logging, primary haul, and sawmilling linked to the region's 2024 mass timber deployment, using Washington and Oregon job-per-harvest benchmarks. The approach is straightforward: Starting with 42 million board feet of lumber, which is converted to Scribner Westside log scale using a conversion factor of 2,000 BF of lumber per 1,000 BF of logs, annual log usage is about 21 million board feet Scribner Westside log scale. Washington studies report ~15 direct jobs per MMBF harvested; Oregon sources show ~11. Applying these rates yields ≈231 direct jobs at the Oregon rate and ≈315 at the Washington rate. Taking the midpoint gives a base case of ≈273 direct jobs tied to forestry and primary lumber supply in 2024. Normalized to output, this is ≈790 jobs per 100,000 m3 of mass timber as incremental forestry-related jobs, assuming that this additional material is induced demand upon the forestry environment, with a realistic range of ≈515–1,172 jobs per 100,000 m3 depending on recovery rates and log size mix.

These figures represent only direct employment in harvesting and primary processing. They exclude indirect and induced jobs to prevent overlap with other categories in this report. The calculation uses widely recognized WA/OR job coefficients, mill recovery rates from regional industry studies, and Forest Service conversion factors for Scribner scaling.

Conclusion: 62,000 m³ PNW Production (2024).

At 62,000 m3, employment scales to ≈665 direct jobs—≈441 induced and ≈224 advanced manufacturing—using the same coefficients. Estimated direct payroll is ≈$60.1M (range $53.3–$67.0M), producing ≈$6.3M in state/

Table 8-5 - Job Estimate Summary

Category	Jobs per 100,000 m3	Jobs @ 62,000 m3
Installation (erection)	76	47
Architectural services – incremental to MT	42	26
Engineer of Record – incremental	24	15
Contractor services (GC field staff)	11	7
Support services (insurance, safety, testing)	6	4
Steel component supply – shop fabrication only	46	29
Forestry & lumber supply (harvest, haul, sawmilling)	505	313
Induced subtotal (ex-factory)	**710**	**441**
Manufacturing Organization (factory)	**362**	**224**
Grand total (incl. factory)	**1,072**	**665**

local revenues at a 10.5% midpoint (range $4.8–$8.0M at 9–12%). The added volume primarily expands forestry/sawmilling, steel fabrication, and installation headcount, while also lifting professional design and field management roles, reinforcing both rural employment and higher-skilled urban jobs in the regional mass timber ecosystem. Secondary induced jobs such as logistics support, housing, and regional services are often cited at 1.6X-2X, resulting in nearly a doubling of the impact painted above.

Mass timber manufacturing and construction currently create roughly 224 jobs in advanced manufacturing and 441 induced jobs in the region. Production-oriented jobs constitute the highest percentage of overall jobs.

8.3 Rural Communities

A compelling case for mass timber is its ability to revitalize rural communities through the creation of manufacturing jobs that add value to local forest resources. The impact is felt in the towns manufacturing mass timber, and the ripple effects are felt in surrounding towns that produce feedstock lumber and veneer, and again in the forests themselves. In Oregon and Washington, **Table 8-6** shows the communities have been impacted directly by mass timber manufacturing.

8.4 Carbon Reduction

Mass timber has the potential to reduce both the embodied carbon and operational carbon of our new buildings. Embodied carbon— the energy it takes to make and install a material or product—has historically been unaddressed when it comes to carbon reduction efforts. Recently embodied carbon has become a greater focus as energy efficiency codes and efforts have made substantial improvements in the operational carbon emissions of buildings. As operational emissions continue to decrease, embodied carbon makes up a larger percentage of lifetime building emissions. Mass timber impacts embodied carbon emissions in the following ways:

Table 8-6 - Economic Impact of Mass Timber on PNW Rural Communities

Town	Population (2024)	Mass Timber Company	Investment
Neah Bay, Makah Reservation	935	Makah Sawmill	$2.7M investment to build sawmill in 2024
Drain, OR	1,198	Timberlab	Timberlab acquires glulam manufacturer American Laminators in 2024
Estacada, OR (including Eagle Creek)	5,591	Carpentry Plus Inc CutMyTimber Sauter Timber	$1.2M by CutMyTimber to build out 14,000 FT2 fabrication facility in Eagle Creek, OR, 2023.
Lyons, OR	1,220	Freres Engineered Wood	Freres invests $36M in MPP manufacturing facility, completed in 2017. Freres builds 58,000 FT2 mass timber warehouse for plywood storage.
Millersburg, OR	3,541	Timberlab (in 2027)	Phase 1: Timberlab invests $117M to build new 185,000 FT2 CLT manufacturing facility. Phase 2: 85,000 FT2 fabrication and finishing building
Philomath, OR	5,795	Timberlab	Timberlab acquires Philomath sawmill from Interfor properties for $15M in 2024.
Riddle, OR	1,220	DR Johnson	Glulam production
Swisshome, OR	338	Timberlab	Timberlab acquires glulam manufacturer American Laminators in 2024
Colville, WA	5,009	Vaagen Timbers	Glulam/CLT production
Port Angeles, WA	20,112	CRTC	Building Innovation Center (Kiln-drying, CLT production)
Tieton, WA	1,610	Tieton Cabin Company	Modular mass timber housing production
Totals	**46,569**	**~ 520 jobs**	

Substitution: Mass timber manufacturing emits less carbon relative to concrete and steel production. The initial reduction in energy it takes to manufacture mass timber products (scope 3 emissions) results in a 30%+ reduction in the structure's embodied carbon per studies such as the study conducted by a coalition of PNW professionals titled "Comparative LCAs of Conventional and Mass Timber Buildings in Regions with Potential for Mass Timber Penetration".

Storage: After harvest, the carbon in the trees is stored in the products or structures that the timber was used to build; in this case, for the life of the mass timber material.

Circularity (End-Of-Life): Mass timber products, like the timber beams dismantled from old barns, could be reused or recycled in the future, reducing the consumption of (and energy demand for) new materials. Designers concerned with circularity are focused on designing buildings (and structures) for disassembly, specifying dry components and bolted assemblies that could be dismantled at the end of a building's useful life.

While modern mass timber buildings have yet to arrive at this juncture, there are great examples of mass timber structures used for research being constructed, deconstructed, and rebuilt in other locations. It is, therefore, conceivable that mass timber beams and panels could be repurposed as structural members or downcycled into architectural products and furniture. Indeed, even in a place where timber is not a scarce resource, there is a market for salvaged timber. We cannot yet imagine how our building stock may be used 100 years from now.

Mass timber can also improve the operational carbon of a building by providing a much less conductive structure or envelope system, reducing the thermal bridging from other structural or cladding attachment materials. It is also manufactured with very tight tolerances and can more easily meet stringent air tightness requirements to reduce infiltration and improve energy performance, particularly when used in exterior walls.

8.5 Occupant Health

Mass timber interiors can support occupant health by stabilizing the indoor environment and reducing common discomfort triggers. Wood behaves like "hygric mass," buffering humidity swings the way thermal mass buffers temperature; that smoothing helps keep indoor relative humidity in the comfort band and shortens the time assemblies spend in mold-friendly conditions. For design intent and verification, the ASHRAE 160 mold-risk check (≤ ~80% 30-day mean surface RH within 5–40°C) is a useful guardrail alongside ventilation and dehumidification.

On air chemistry, unfinished wood typically emits natural VOCs (e.g., terpenes/VVOCs) at modest levels, while adhesives, coatings, and some composites can dominate emissions if poorly specified, so material choices matter more than the timber concept itself. Modern CLT/glulam systems that use low-emitting adhesive chemistries and waterborne finishes can keep formaldehyde and TVOC low in practice. As a safety backstop, the 2018 update of PRG-320 added elevated-temperature/heat-delamination performance for CLT adhesives (a response to early fire tests), improving life safety without penalizing indoor air quality.

Psychologically, people tend to recover from stress faster in "biophilic" rooms that include natural materials like wood, with studies showing better post-stressor recovery and, in newer work, improved heart-rate-variability markers when occupants are in wooden interiors. That translates to perceived calm, lower stress, and potentially better cognitive performance when acoustics and ventilation are also handled well.

8.6 Economic Gross Output

The gross output approach measures the total economic activity generated across the entire supply chain, from forest operations to the final building product, including all intermediate transactions. This method can result in double counting, as the value of inputs used in successive stages of production is counted multiple times.

Table 8-7 traces every transaction in the Pacific Northwest mass timber supply chain, from standing timber to a completed superstructure, using a stacked (or "gross output") method. By design, each tier includes the value of the prior tier, so totals double-count intermediate purchases; the objective is to capture the *scale of economic activity* flowing through all linked industries, not the net contribution of incremental economic value added.

Log Through Lumber Tiers (USD 55M).

Virtually all sawlogs are harvested within Oregon or Washington, but a meaningful share of SPF lumber (especially 2×6 and 2×8 lamstock) is still imported from British Columbia interior mills when domestic mills are oversold, specifically for CLT production.

Mass-Timber Fabrication (USD 121M).

Oregon hosts the largest contiguous CLT press capacity in the United States; Washington's installed capacity is smaller but technologically comparable.

Connector, Hardware, And Specialized Engineering Tiers (USD 34M Combined).

High-margin connectors are still dominated by European OEMs; local distributors capture only warehousing and margin. Similarly, specialty steel and finite-element connection

Table 8-7 - Economic Gross Output Estimate

Revenue Center	Physical Basis (2024)	Units	Unit Price USD	Gross Revenue USD M	Key Components
Logs Delivered to Mill	5,650,352	FT3 logs	$3.96	$22,399,973	Stumpage; felling; in-woods processing; trucking
Rough-Sawn Lumber (KD-S4S)	46	MMBM	$720	$33,120,000	Sawing; drying; planing (mill-net ex-yard)
Steel Connections		% of MT pkg.	15%	$18,088,500	
Hardware Fasteners		% of MT pkg.	8%	$9,647,200	
Fabricator Side Engineering Services		% of MT pkg.	5%	$6,029,500	
Mass-Timber Components	62,000	m3	$1,945	$120,590,000	CLT & GLT manufacture; finger-jointing; trimming
On-Site Installation	3,129,515	FT2 of building	30%	$36,177,000	Crane rental; erection crews; temporary works; site management
Completed MT Super-Structure	3,129,515	FT2 of building	8.50%	$425,611,765	Sum of Delivered Package + Installation (GC line-item)
General Contractor Services		% of building	10%	$42,561,176	
Architectural Services		% of building	7%	$29,792,824	
Engineering Services		% of building	3%	$12,768,353	
Total				**$756,786,291**	

checks are subcontracted to engineering hubs in BC or Colorado. Hence, perhaps one-half of this tier's revenue accrues outside WA/OR.

On-Site Erection (USD 36M) And GC Layer (USD 43 M).

These dollars are overwhelmingly local, union carpentry, rigging, and general contractor overhead headquartered in Seattle, Portland, or Eugene.

Professional Design Services (USD 30M Architecture; USD 13M Engineering).

Large regional firms, especially those with embodied carbon portfolios, anchor most of this spend within the two states; however, signature "tall timber" projects frequently retain out-of-state speciality engineers.

Completed Super-Structure (USD 426M) And Building CAPEX.

The 8.5% factor indicates that mass-timber shell cost averaged ≈USD $136/FT2 in 2024 PNW construction. This would likely indicate that mass timber as a structural system is an even smaller portion of the total construction budget for most projects, possible down to 4% of total project build-out costs.

This estimate system puts mass timber project construction gross output at $750 million.

Project-based mass timber manufacturing contributed $121M to the PNW economy in 2024, out of total $756M gross economic output tied to mass timber projects in the region.

8.7 Economic Value Added

In contrast, the value-added approach, often referred to as economic value added (EVA) or net economic contribution, focuses solely on the incremental economic value created at each stage of the production process. This method isolates the unique contribution of mass timber production to the broader economy by excluding the value of intermediate goods and services already captured in earlier stages.

Economic Value Added (EVA) in the mass timber sector can be evaluated by analyzing the differential between the cost of input materials, principally structural-grade lumber, and the final market price of delivered and installed mass timber solutions. In this context, EVA refers to the incremental economic value generated through manufacturing, design, engineering, and project delivery processes, relative to the raw material cost base.

Two primary methods are used to approximate EVA in this report:

8.7.1 EVA Relative to Cost of Goods Sold (COGS)

This approach considers the full cost structure of mass timber fabrication (excluding capital expenditures), with lumber input value treated as a baseline. Industry feedback and case data suggest that gross value-added margins, net of direct labor costs, range from 250% to 350% of input COGS (excluding labor), depending on project type and service complexity. This implies that for every $1 of input material, $2.50 to $3.50 of additional economic value is generated through fabrication and delivery.

In 2024, the estimated mass timber market in the Pacific Northwest reached $120 million in project sales, supported by approximately 46 million board feet of lumber input. At a 300% EVA-to-COGS ratio, this suggests roughly $80 million in value was added to $40 million worth of material inputs, representing a significant contribution to regional industrial GDP.

8.7.2 EVA Relative to Lumber Cost Alone

A second model isolates lumber as the sole input variable, treating all downstream services, such as manufacturing, CNC fabrication, engineering, fasteners, and project management as economic value added. EVA multipliers in this model typically range from 300% to 500%, depending on the scope of work and level of prefabrication.

In this analysis, we began with the known project revenue of $120 million and an assumed EVA multiplier of 360%. Dividing total revenue by this factor suggests the underlying lumber input value was approximately $33 million. With an estimated 46 million board feet of lumber consumed across these projects, this yields a derived lumber price of approximately $720 per MBM. This figure is consistent with prevailing market rates in the region in 2024, providing validation for the back-calculation.

These modeling approaches are sensitive to changes in project type, pricing structure, and value chain integration, but they offer a consistent framework for understanding the scale and composition of economic value generated through mass timber manufacturing and delivery in the PNW.

8.8 Capital and Financing Needs of the Region

The capital needs of the mass timber industry were determined based on the results of a survey of mass timber companies across North America. Through the survey, the consulting team set out to understand the level and type of financial support currently received by the industry, the financing instruments utilized, and where investments are needed.

8.8.1 Financial, Political, and Public Support

Manufacturers in the PNW reported balanced responses on the degree of financial support received, ranging from no support to strong support. Notably, manufacturers in Canada report receiving moderate or notable support. This data supports the consulting team's understanding that the Canadian government is more invested in mass timber manufacturing than are Federal, State and local governments here in the United States. To preserve anonymity, the survey did not attempt to isolate whether Oregon or Washington manufacturers received more support.

Fabrication, prefabrication and integration companies based in the Pacific Northwest reported receiving either no financial support (29% of respondents) or low financial support (57% of respondents), with only one respondent (14%) receiving moderate financial support for their operations. Interestingly, the situation with respect to political support was different, with the majority (72%) stating they receive either moderate or notable support. The greatest support comes from the public; 72% of respondents indicated they receive either moderate, notable, or strong public support for their work. The consulting team concludes that while there is public and political support for mass timber in general, most of the financial resources have been channeled into manufacturing and not these supporting services.

8.8.2 Financing Instruments

Through the Market Study survey, mass timber companies across the continent shared information on the types of financing instruments used. Some companies relied on no financing instruments, instead funding their capital investments through internal sources or parent companies. Others utilized institutional debt financing (loans or credit provided by large financial institutions). Some indicated the importance of deposits on lumber for projects in aiding overall cash flow. Many respondents indicated their use of public grant funding, primarily from the USDA-Forest Service, the U.S. EDA and U.S. Department of Defense, Washington State, and the Province of British Columbia.

When asked about financing needs, respondents indicated the need for operating capital to allow the company to function between mass timber projects and commodity glulam orders. This could take the form of operating lines of credit or equity in the business. Others indicated a desire for low-interest loans, while still others shared a desire for access to less expensive fiber. One respondent indicated the effectiveness of grant funding for mass timber construction projects, which would lessen the burden on project teams exploring the viability of mass timber for their developments.

8.8.3 Areas Needing Investment

Survey respondents were also asked about where the MTTH should invest, if it is successful in its pursuit of large-scale federal funding. The following recommendations were made:

- Focus on growing demand through policies and incentives aimed at increasing the profitability of mass timber for developers and owners.
- Develop the technology domestically, rather than purchasing from Europe. (It was not clear whether technology, in this case, referred to the product itself, or supporting equipment/software.)
- Marketing Federal grants to make the industry aware of funding opportunities.
- Help make domestic timber available at a lower price.
- Support understanding of building code provisions and requirements in smaller, rural jurisdictions across the region, to make it easier to build with mass timber in those locations.
- Invest in R&D and certification for utilizing low-value wood species in CLT.
- Invest in R&D for various building systems.
- Invest in infrastructure (assumed to mean production facilities).

In summary, mass timber businesses are seeking financial support to grow the market, support capital expansion, develop new products, and reduce their costs of production.

Section 6.6 projects North American demand of 2.5-9 million m3/year by 2035. Against today's ~718,000 m3/year of effective project capacity, the incremental manufacturing requirement is ~1.68–8.5 million m3/year. Using installed costs of $1,350–$2,250 per m3 of annual effective capacity, this implies ~$3.0-$15.3 billion of capital between now and 2035—approximately $0.3–$1.5 billion per year (midpoint ≈ $0.9 billion per year), excluding inflation. These figures reflect greenfield/major brownfield additions and do not credit potential gains from higher utilization, de-bottlenecking, expansion on existing sites, or imports.

Capital costs are based on recent production facility investments combined with estimated effective capacities, which are different than theoretical, or nameplate capacities often called out in press releases.

Table 8-8 should be viewed in conjunction with **Figure 6-5**.

This estimate excluded investment in training and support services for the rest of the value supply chain—primarily in the Architectural, Engineering, and Construction ends, viewed by many to be a key bottleneck in uptake of mass timber building deployment.

Table 8-8 - Projected Mass Timber Demand, Capacity, and Investment Needs (2024–2035)

CAGR	2024 Demand (m3)	2024 Capacity (m3)	2035 Demand (m3)	Capacity Delta (2024-2035) (m3)	Investment Required @ $1800/m3
15%	517,000	718,000	2,405,000	1,687,000	$3.0 billion
30%	517,000	718,000	9,265,000	8,547,000	$15.3 billion

North American capital investments of $3-15 billion will be required over the next 10 years to meet demand requirements by 2035.

BC Passive House Factory, Mass Timber Construction System

Photo Credit: Nicholas Sills, Whirlwind Consultants

9. Conclusion

9.1 Key Takeaways

9.1.1 Growing Market Demand

1. **In 2024, ~60,500 m3 of mass timber went into buildings in the PNW.** This represents a value of roughly $120 million of mass timber demand in the region and a total project area of 3 million square feet. The top three market segments using mass timber were Business (Office), Educational, and Multi-Family (apartments, condos, etc.). Multi-family construction contributed to a greater percentage of mass timber construction in the PNW in 2024 than in previous years. While Business (Office) and Education both had a slightly higher contribution in 2024, they have consistently contributed to a significant portion of mass timber construction over the last five years. Note that these totals do not include commodity glulam, valued and used differently. Read more in Section 5.3.

2. **Growing demand in the PNW could have the greatest direct impact on the pipeline for PNW manufacturers, who supply roughly half of the mass timber consumed in the region.** For the last five years, the compound annual growth rate (CAGR) in the region was 5.67%, with year-over-year growth from 2023 to 2024 of 43.6%, showing significant growth potential in future years. Based on historic sales, increased growth of mass timber demand in the region most significantly benefits PNW manufacturers. Nearby high-value, high-growth markets like California will also drive growth for PNW manufacturers. Read more in Section 5.3.2 and Section 6.3.3.

3. **Mass timber growth exceeds that of general construction in the PNW.** General construction, which had a compound annual growth rate (CAGR) of –5.11% over the last five years, significantly impacts how much mass timber gets built in the region. Despite a slowdown in construction, mass timber construction grew during the same period, for a difference of almost 11% CAGR between general construction and mass timber construction. This demonstrates a strong appetite for mass timber in the region despite the recent trends in general construction. Read more in Section 5.3.2.

4. **Penetration rates vary across the continent but are highest in the PNW.** Market penetration of mass timber in the PNW has averaged 3% over the last five years—six times the continental average. Penetration continues to grow at a CAGR of 11.37% in the PNW and 29.25% across the continent. While the market penetration is currently lower in other regions, the uptake is happening at a faster rate. Uptake is happening fastest in the Eastern NA region. Read more in Section 5.3.2.

5. **PNW demand is currently less than half of BC's on a volume per capita basis.** Benchmarking the PNW mass timber demand relative to areas with a more mature mass timber market provides a roadmap for what we can expect to see in the PNW. British Columbia consumes 0.0125 m3 of mass timber per capita annually, while the PNW consumed 0.0049 m3 in 2024—39% of British Columbia's usage rate. The PNW would match that usage per capita at 153,000 m3 of mass timber used, which could happen in 2029 per the projections in this study. Read more in Section 7.5 and Section 5.4.4.

6. **Growth across the continent is significant relative to the PNW, with the greatest increase in mass timber projects in Eastern NA.** Western North America had a mass timber project CAGR of about 42% over the last five years, and eastern NA had a CAGR of almost 50%. This is significantly higher than the PNW's CAGR of 5.67%, reflecting the potential market that exists for mass timber across the continent, despite the delayed adoption relative to the PNW. North America's 2024 demand totaled 517,000 m3 and is tracking toward more than 7 million m3 in annual

demand by 2035. Read more in Section 5.3.2 and Section 5.4.6.

7. **Policy levers are critical to accelerating market demand.** Policies and incentives are being adopted globally to make mass timber a more profitable option for developers and to offset any cost premiums. Examples of effective policies that drive demand for mass timber projects include development bonuses (in the form of increased height and floor area (FAR) for mass timber buildings), and embodied carbon policies that place limits on the materials used in construction. British Columbia's Wood First Policy mandates early evaluation of mass timber for publicly funded projects. This creates a demand backstop, helps local firms gain experience with mass timber, and delivers cost-effective, high-quality legacy civic buildings, while shoring up the local forestry economy and speaking to regional values. Read more in Section 7.4.

8. **Contractor familiarity with mass timber is critical for market growth.** When mass timber is prioritized and the entire project team is familiar with its acquisition and usage, it is often the most cost-effective solution compared to concrete or steel. In particular, general contractors and trade partners (subcontractors) hold the keys to the financial viability of mass timber, and those with experience and commitment are able to harness the potential of mass timber to get projects built. Read more in Section 7.2.7.

9.1.2 Supporting Regional Supply

9. **Mass timber projects contribute $756 million to the PNW economy, or 0.08% of total GDP.** This valuation reflects gross economic output, from logs delivered to the mill to architecture, engineering, and construction services. The largest contributor to this total comes from mass timber manufacturing, valued at $120M. Note that this total reflects the project-based market only and does not include commodity mass timber products. Read more in Section 8.7.

10. **There are over 20 mass timber companies in the PNW, with manufacturers generating annual revenues on the order of $50-100M, and value-add companies on the order of $1-10M.** Mass timber companies in the region have different business models and offer different (but overlapping) products and services to the market. For a full picture of these businesses, read Section 3.1.

11. **In 2024, PNW manufacturers have a collective estimated effective capacity for project-based mass timber amounting to 225,000 m3. 62,000 m3 were produced (28% of that capacity). Commodity mass timber contributes another 384,000 m3 of estimated effective capacity, and 227,000 m3 of commodity mass timber products were produced.** These volumes correspond to a project-based mass timber product value of $118 million and a commodity mass timber value of $321 million, for a total of $439 million in mass timber products manufactured in the region. Read more in Section 6.4.

12. **Less than half of the PNW mass timber project area is built with mass timber from the PNW.** In 2024, project teams awarded over half of mass timber projects in the PNW to manufacturers outside the region—primarily Canada, with Washington importing more material from Canada than Oregon. While historically the percentage of PNW projects supplied by PNW manufacturers was higher, that supply is shifting as demand grows, with cost (see Section 7.2.1) and perceived supply-related risk (see Section 7.2.2) as primary drivers. While the percentage of project area supplied by PNW manufacturers has declined, the total volume of material they are supplying is still increasing, as demand has grown. Read more in Section 6.3.3.

13. **Multi-billion-dollar investments are needed in regional manufacturing.** Demand for mass timber across North America is expected to reach approximately 7 million m3 ($1.65 billion) per year by 2035. To meet this market demand, it is estimated that a total of 3.0-$15.3 billion of investment will be needed over the next 10 years to expand or commission new production facilities. The PNW is primed for this investment, and to serve as a globally competitive supplier of mass timber continent-wide. To read more please reference **Section 8.8**.

14. **The PNW is exporting to other North American regions—and this will increase over time.** To capture a share of the significant market growth expected in other parts of the continent, PNW manufacturers can continue to build markets in other parts of the continent through standardized structural system kits and connection details, and lock in install partners located in those markets. Historically markets closest to the PNW have been the strongest for PNW suppliers, and leaning into marketing and sales in high-growth, high-value markets adjacent to the PNW such as California could be a business growth strategy. Read more in **Section 6.3.3**.

15. **Full-service manufacturing can help with cost competitiveness and reduce customer risk.** No single PNW mass timber manufacturer currently provides CLT, glulam, hardware, engineering/BIM, logistics, and erection at the scale a typical commercial construction project requires, making it challenging for PNW companies to compete against full-service providers from other regions, both for projects within the region and beyond. Partnerships and service agreements across the regional supply chain can lower coordination risks until full integration is expected by 2027, though this approach can be more costly. Read more in **Section 3.1**.

16. **Timber and lumber supply are not a near-term constraint.** Current timber resources, sawmill output, and lumber size/grade mix in the PNW can easily meet current demand for mass timber production in the region. Mass timber currently only consumes ~0.5% of the annual lumber production in the PNW, and .01% of the standing inventory of sawtimber. While there is no fiber shortage in direct lumber volumes, there are many reports of lumber infeed materials being too costly for comparable quality—perhaps because only ~30% of sawmill output is suitable for mass timber products. The biggest current constraints in this portion of the supply chain are kilns and lumber sorted into long lengths for glulam, resin, and CNC throughput. Further constraints are only expected to appear under rapid adoption (>300–350k m3/yr). Read more in **Section 4**.

17. **Limited lamstock availability impacts cost competitiveness.** While the availability of fiber is not a current constraint, the availability of lamstock is. The cost difference between lamstock and commodity lumber reflects a scarcity of the former (machine stress rated (MSR) lumber, long lengths, lower moisture content), ultimately resulting in the high cost of feedstock lumber for mass timber production, and high material pricing in the PNW relative to other regions. Strategies for loosening this bottleneck include identifying mills willing to produce lamstock and securing multi-year sawmill supply agreements with them, encouraging sawmills to expand MSR/sorting and finger-joint capacity, and designing for mass timber materials containing mixed species/grade layups for further fiber optimization. Along with this, more mass timber manufacturers will contribute further vertical integration including planning and kiln drying practices. Read more in **Section 7.1.4**.

18. **Manufacturers' professional services must scale.** The mass timber industry

needs more project managers, fabrication designers, engineers, erectors and inspectors proficient in timber, as captured by our survey of mass timber companies across the region. With more people doing this work, we can expect reduced lead times and improved schedule reliability. Regional training programs can support this need in the long term, and manufacturer-agnostic digital libraries of products, details, and assemblies, can expedite workflows in the short term. Read more in **Section 3.1.2** and **Section 7.1.5**.

19. **Process standardization could address professional service bottlenecks and reduce cost.** Adopting a shared modeling standard, including 3D Building Information Modeling (BIM) Level of Development (LOD) targets, file formats, naming/revision rules, approved connection families, and a common data environment, can help reduce knowledge and process barriers for project teams and reduce the time manufacturers dedicate to project support. By standardizing the process across the region, there is more predictability for design and construction teams, an increased understanding of expectations for roles and responsibilities, and the opportunity to achieve clash-free models of record prior to manufacturing. Read more in **Section 7.3.3** and **Section 7.3.7**.

20. **Increasing manufacturing efficiency will reduce product cost.** Process optimization along the supply chain can yield more cost-effective structural building solutions. These modernizations and optimizations of equipment will positively impact lumber grading and lumber thicknesses, and result in reduced waste and handling between systems. The net result will be to lower overall project delivery costs by increasing the efficiency of fiber use, which accounts for roughly 35-50% of the cost of finished mass timber products. Read more in **Section 7.3.6**.

9.2 Additional Research Efforts

This Market Study served to illuminate the current and future landscape for mass timber manufacturing and construction in the PNW, and the growing demand for mass timber across North America. As the work unfolded, several questions emerged for which further exploration would be useful to the PNW Mass Timber Tech Hub. With additional funding, the project team would recommend further research in the following areas.

- **Building typologies:** Mass timber application research for current market segment volumes and growth, including success stories and key target areas.
- **Carbon analysis:** Study the impact on the region's carbon footprint of building publicly funded buildings with locally sourced mass timber.
- **Commodity mass timber:** Explore the economic impact of commodity mass timber products (commodity glulam, LSL, LVL, etc.).
- **In-depth cost study:** Cost data for mass timber supply packages and full lifecycle costing studies for mass timber projects to support feasibility studies.
- **Digital design & shop drawing process:** Conduct a deep dive into the digital design process, from construction documents to fabrication model, to illuminate opportunities for process refinement and optimization.
- **Standardization opportunities:** Explore opportunities to standardize the design of mass timber products and assemblies to make it easier for designers to specify mass timber on their projects, and to facilitate design for manufacturing.

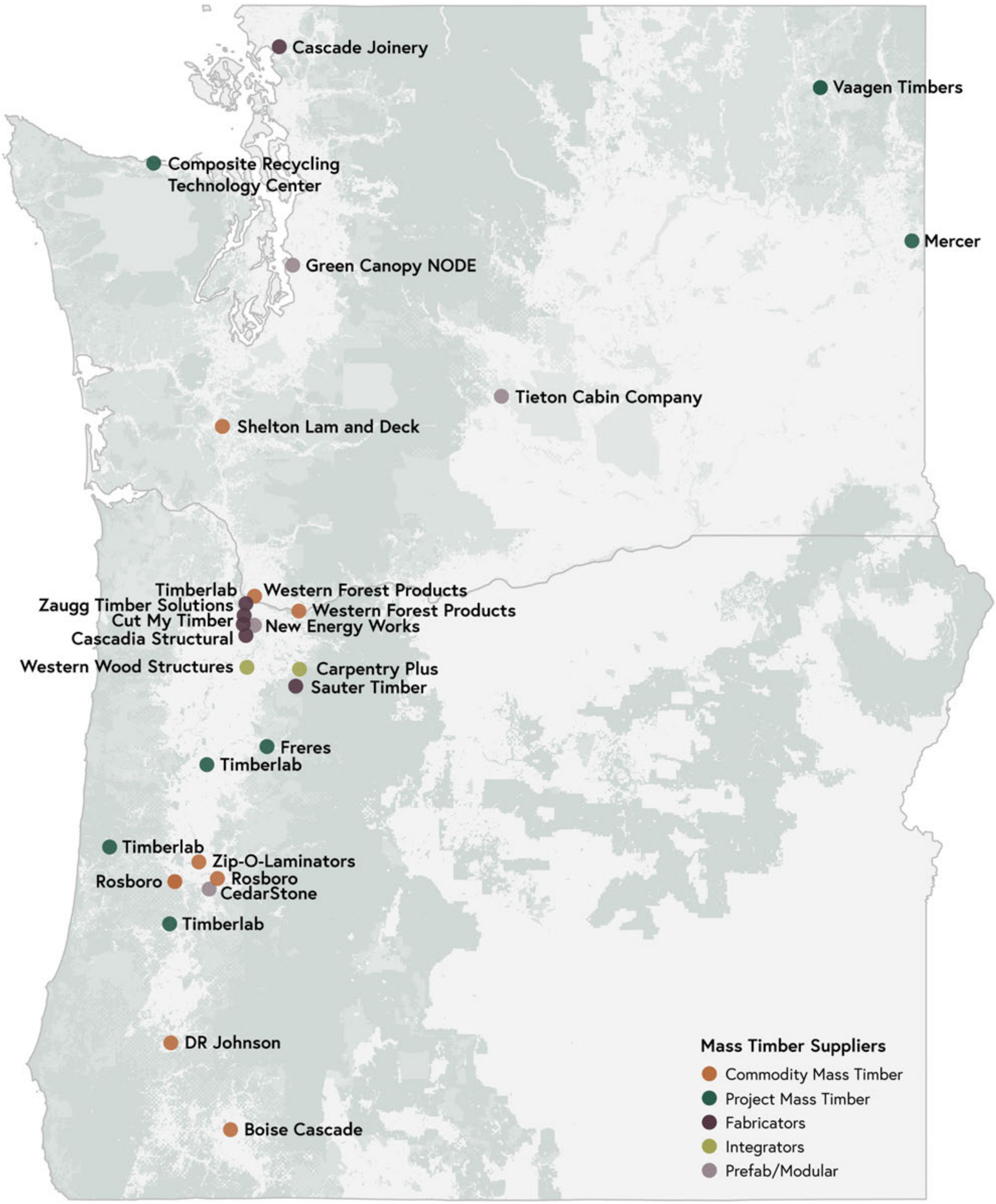
Logging Operation

Photo Credit: Roy Anderson, The Beck Group

10. Appendix

10.1 Map of PNW Mass Timber Companies

The mass timber companies listed.



10.2 Mass Timber Land to Product Conversion – Walkthrough

This document walks a Washington/Oregon user through the full conversion from standing timber to building floor area. Each step (A–F) lists the selectable factor, the WA/OR range and guidance, the example selection used for calculations, and the explicit math. In this case, we have selected several industry averages to showcase roughly the amount of land currently used in WA/OR to support mass timber projects in 2024.

Metric to Imperial conversions (quick reference)

Quantity	Metric⇄Imperial	Formula
Area	1 ha = 2.47105 ac	ha×2.47105 = ac | ac×0.404685642 = ha
Volume	1 m3 = 35.3147 FT3	m3×35.3147 = ft³ | ft³×0.0283168 = m3
Board measure	1 BF = 1/12 FT3	FT3×12 = BF | BF÷12 = FT3
Log tally	1 MBF = 1,000 BF	—
Density	m3/ha → FT3/ac	m3/ha×35.3147 ÷ 2.47105

Sample inputs used in this walkthrough

Item	Selected value	Metric⇄Imperial	Notes
Land base	1,450 acres	586.7942 hectares (1 ac = 0.404685642 ha)	Gross area
Merchantable density	350 m3/ha	5,002.0 FT3/acre	Green-log stem volume to roadside
Log scale	230 BF/m3 (Scribner)	1 BF = 1/12 FT3; 1 MBF = 1,000 BF	Scribner Decimal C standard in WA/OR
Mill recovery (LRF)	230 BF/m3	19.17 FT3/m3 (approx.)	KD-surfaced lumber tally per m³ of logs
Dimension set	2x6	57.29FT3 per MBF	Applies to surfaced KD lumber
Process waste	20%	—	Trims, CNC off-cuts, rejects during fabrication
Material intensity	0.0195 m3/FT2	0.689 FT3/FT2	Timber volume per floor area

A) Convert land base

Convert acres to hectares: 1,450 ac × 0.404685642 = 586.7942 ha.

No selection required in this step; it sets the area base for the remaining factors.

B) Select stand density and compute green-log volume

Selection range for stand density (merchantable m3/ha)

Typical Stand Density Range in PNW Region

Factor	Low	Typical	High	WA/OR cue
Merchantable density	150 m3/ha (~2,143 FT3/ac)	350 m3/ha (~5,002 FT3/ac)	1,000 m3/ha (~14,894 FT3/ac)	A: dry east-side pine →C: coastal WH/DF working forest → E: late-seral/park:

Typical Stand Density Range - General

Stand Density	A	B	C	D	E
m3/ ha- Standing	180	300	400	600	1200
m3/ha - Merch	150	270	350	550	1000
FT3/ac – Standing	2570	4290	5720	8570	17150
FT3/ac – Merch	2140	3860	5000	7860	14290
BF/ac — Scribner (Coast, long-log ~239 FT3/MBF)	8970	16150	20930	32890	59800
BF/ac — Scribner (Interior, short-log ~209 FT3/MBF)	10240	18470	23920	37610	68370
	Low (Class A) – characteristic of actively managed, dry-site stands or recently thinned plantations. Fire-adapted species (ponderosa pine, interior Douglas-fir) dominate in WA/OR east-side	Moderately low (Class B) – typical of mid-rotation managed forests just before or just after first commercial thinning. Provides a balance between growth and access for machinery without heavy ladder fuels.	Moderate (Class C) – reflects many “working forest” plantations on 40- to 50-year rotations across coastal WA and OR where intensive silviculture (genetic stock, fertilization) is practiced. Often targeted for structural lumber supply	High (Class D) – signals older second-growth or highly productive sites where thinning was deferred. Western hemlock–cedar mixtures on moister microsites commonly reach this density by 60 years in coastal BC/WA. Such stands begin to show self-thinning, increased stem breakage and windthrow risk	Very high (Class E) – corresponds almost exclusively to late-seral or old-growth ecosystems with multi-storied canopies, abundant coarse woody debris and complex structural habitat. These stands are now largely in parks, old-growth management areas or ecological reserves, with very limited industrial harvest.

Selected for example: **350 m3/ha**

Greenlog volume = hectares × density = 586.7942 ha × 350 m3/ha = 205,378 m3 (7,252,861 FT3).

C) Choose log scaling factor (Scribner) and tally total BF

Selection range for Scribner BF per m3

Factor	Low	Typical	High	WA/OR cue
BF per m3	180	220–250	290	Small dia./sweep/defect ⟶lower; large, straight, clean ⟶higher

Selected for example: 230 BF/m3

Scribner board feet = 205,378m3 × 230 BF/m3 = 47,236,932 BF (47,236.93 MBF).

D) Convert BF to KD lumber volume using dimension tally

Nominal size	FT3 per 1 MBF	m3 per 1 MBF
2x4	54.69	1.55
2x6	57.29	1.62
2x8	60.42	1.71
2x10	57.81	1.64
1x4	54.69	1.55
1x6	57.29	1.62
5/4x6	61.11	1.73

Selected for example: **2x6 → 57.29 FT3 per 1 MBF**

KD lumber volume = 47,236.93 MBM × 57.29 FT3/MBF = 2,706,204 FT3 (76,631 m3).

E) Apply process-waste allowance to get net product volume

Selection range for process waste (%)

Factor	Low	Typical	High	WA/OR cue
Process waste	10%	15–25%	30%	Lower with off-cut reuse; higher with heavy CNC & tight tolerances

Selected for example: **20%**

Net product volume = 76,631 m3 × (1 - 20%) = 61,305 m3 (2,164,963 FT3).

F) Convert net product volume to building floor area

System	Low (m3/FT2)	Typical	High	Notes
Thin CLT floors	0.01	0.012–0.017	0.02	Light framing, efficient spans
Post & panel	0.013	0.015–0.020	0.022	Panel walls + post/beam floors
Short-span commercial	0.018	0.020–0.024	0.026	Higher tenant loads, short spans
Tall-wood (2-hr FRR)	0.022	0.024–0.028	0.03	Added layers for fire & acoustics

Selected for example: **0.0195 m3/FT2**

Building area = net product volume ÷ intensity = 61,305 m3 ÷ 0.0195 m3/FT2 = 3,143,839 FT2.

In this sample calculation, 1,450 acres of medium/low stand density forest yields roughly 3,100,000 FT2 of building area. This is roughly a 20x ratio, meaning for the FT2 of building one wishes to produce will require 20x the amount of land. The range on this conversion process is likely +/-200% subject to local environmental, processing, and project factors.

10.3 Mass Timber Manufacturing Job Descriptions

The following jobs have been included in the direct mass timber system supplier labor analysis.

Table 10-1 - Mass Timber Manufacturing Job Descriptions

Role	Description
CEO	Sets vision, market positioning, and partnerships; secures capital and manages enterprise risk for long-cycle industrial projects.
CFO	Owns budgeting, cash flow, and cost accounting, including grants/tax credits and commodity/currency exposure.
COO	Runs day-to-day operations across the mill and fab shop, driving throughput, safety, OEE, and S&OP between sales and production.
Purchasing	Sources lamstock, adhesives, fasteners, and consumables; manages vendor qualification, contracts, and lead times.
Logistics	Plans inbound fiber and outbound panels/frames, load-builds oversize shipments, books carriers, and handles customs/compliance.
Accounting & Clerks	Processes AP/AR, payroll, job costing, and inventory reconciliation; keeps audit-ready financial records.
IT Infrastructure	Maintains ERP/MES, networks, plant data capture, and cybersecurity; connects machines (PLC/CNC) to dashboards.
Quality Control	Executes in-process and final QC per PRG-320/ANSI approvals, moisture, adhesives, press parameters, and destructive testing.
Sales Director	Leads pipeline and pricing strategy, builds GC/engineer/fabricator channels, and manages margins vs. capacity.
Technical Director	Oversees engineering, code compliance, product certifications, and R&D on processes, adhesives, and new SKUs.
Project Management	Owns orders from award to delivery: submittals, shop drawings, schedule, risk, and change management.
Estimator	Performs takeoffs and yield studies, nests parts, prices options/alternates, and builds cost/schedule scenarios.
Sales Engineer	Provides pre-sales technical support, feasibility and connection strategies, and value-engineering to win work.
Fabrication Design	Produces fabrication models and shop tickets (e.g., Cadwork/Tekla/Revit), nesting, and clash checks ready for CNC.
CNC Programmer	Generates/optimizes toolpaths and posts for gantry/5-axis routers; manages tool libraries and simulations.
Business Analyst	Builds dashboards and forecasts, analyzes bottlenecks and unit economics, and supports continuous improvement.
Maintenance Management	Plans preventive/corrective maintenance for presses, planers, finger-joint lines, kilns, and CNC cells; manages spares and downtime.
Maintenance Team	Executes mechanical/electrical/controls work, PMs, and troubleshooting with strict LOTO and safety procedures.
Production Management	Schedules shifts, balances takt and staffing, coordinates QC/logistics, and drives daily tier meetings.
Forklift (Operator)	Moves lamstock, bundles, and finished panels safely; handles yard organization, rigging, and load staging.
General Labor	Supports layup, adhesive spread, panel handling, packaging, rework, and housekeeping along the line.
Timber Framer	Performs precision pre-assembly and fit-out of connections, layout, and tolerances for shop-fab elements.
Lumber Grader	Grades lamstock (visual/mechanical), checks moisture/content and defects, and confirms stamp/compliance.
Technician	Electro-mechanical plant tech assisting with PLC/CNC troubleshooting, calibration, sensors, and minor repairs.
Machine Operator	Operates presses, planers, finger-joint, saws, and sanding lines; monitors parameters and SPC to meet quality.
CNC Operator	Sets up and runs CNC routers/gantries, performs tool changes and zeroing, and conducts in-process checks.
Automation Engineer	Designs and maintains PLC/robotics/HMI systems, integrates sensors/MES, and optimizes cycle times and uptime.

(Whirlwind Consultants Inc. , 2023)

10.4 Manufacturer Survey

In summer 2025, a manufacturer survey was conducted to gather information about raw material availability and purchasing, production capacity, employment, target market, capital access, material constraints, personnel constraints, production constraints, and business constraints.

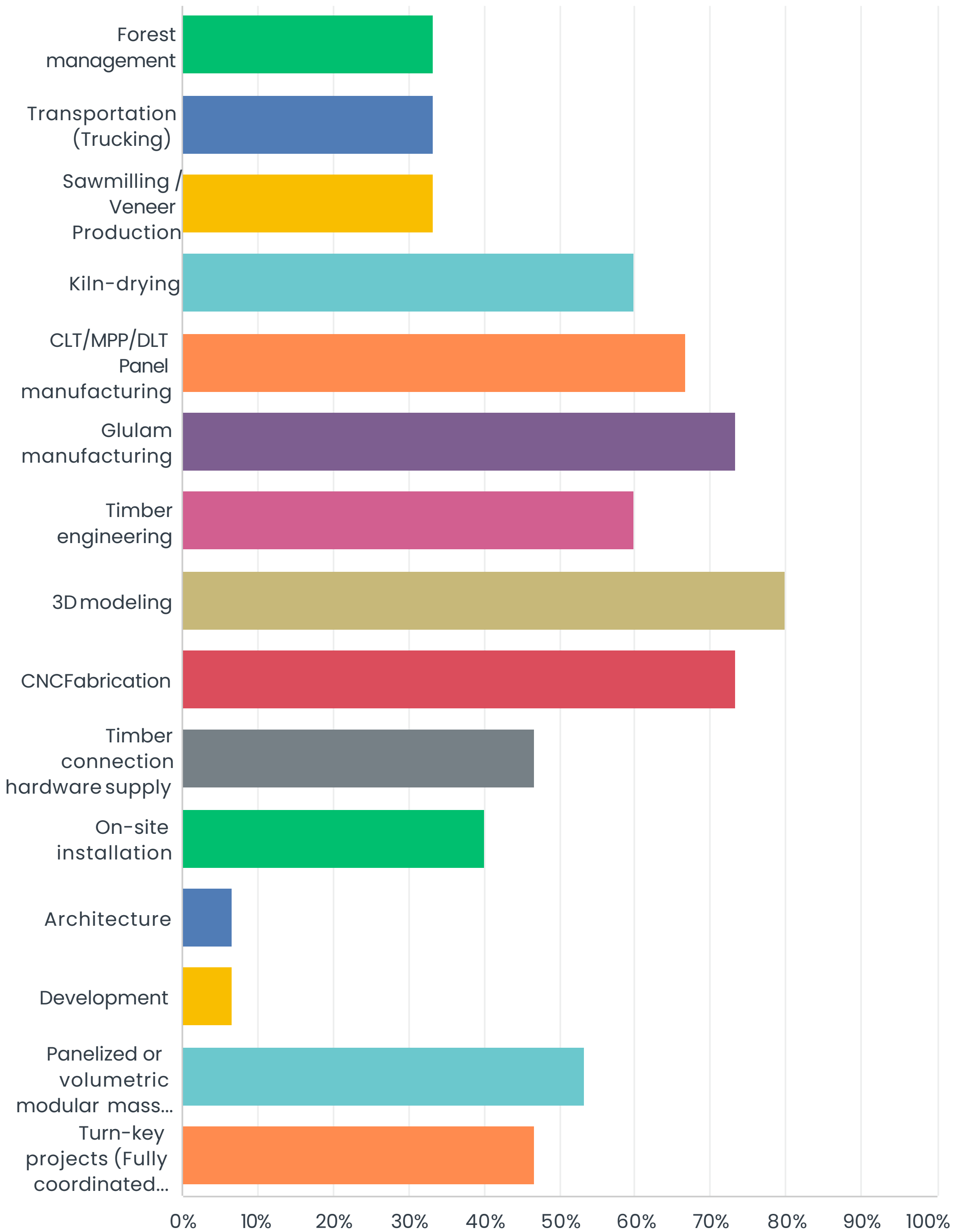
Recipients :

- PNW
    - Boise Cascade
    - CRTC
    - DR Johnson
    - Freres Engineered Wood
    - Mercer Mass Timber
    - Rosboro
    - Shelton Lam & Deck
    - Timberlab
    - Vaagen Timbers
    - Western Forest Products
    - Zip-O Laminators
- North America
    - Element 5
    - International Timber Frames
    - Nordic Structures
    - Kalesnikoff
    - SilvaSpan
    - Smartlam
    - Sterling
    - Structure Craft
    - Western Archrib

Responses to the survey are anonymous and not in a consistent or particular order.

Q1 What products and services do your company provide in-house? Please check all that apply.

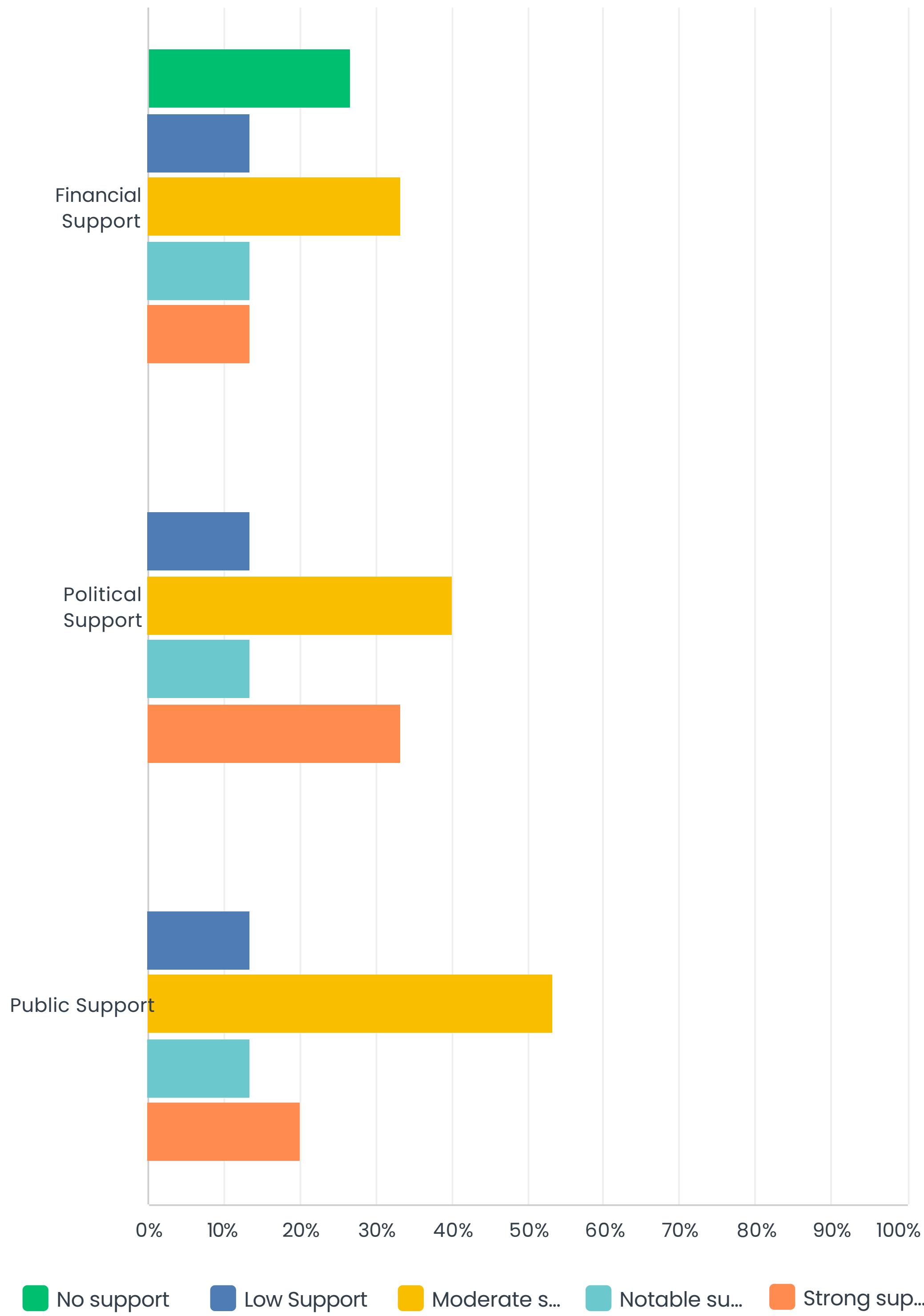
Answered: 15 Skipped: 0



ANSWER CHOICES	RESPONSES	
Forest management	33.33%	5
Transportation (Trucking)	33.33%	5
Sawmilling / Veneer Production	33.33%	5
Kiln-drying	60.00%	9
CLT/MPP/DLT Panel manufacturing	66.67%	10
Glulam manufacturing	73.33%	11
Timber engineering	60.00%	9
3D modeling	80.00%	12
CNC Fabrication	73.33%	11
Timber connection hardware supply	46.67%	7
On-site installation	40.00%	6
Architecture	6.67%	1
Development	6.67%	1
Panelized or volumetric modular mass timber	53.33%	8
Turn-key projects (Fully coordinated kit-of-parts material supply)	46.67%	7
Total Respondents: 15		

Q2 How would you rate the support for your operation in the area (city, county, state, province) in which you are located?

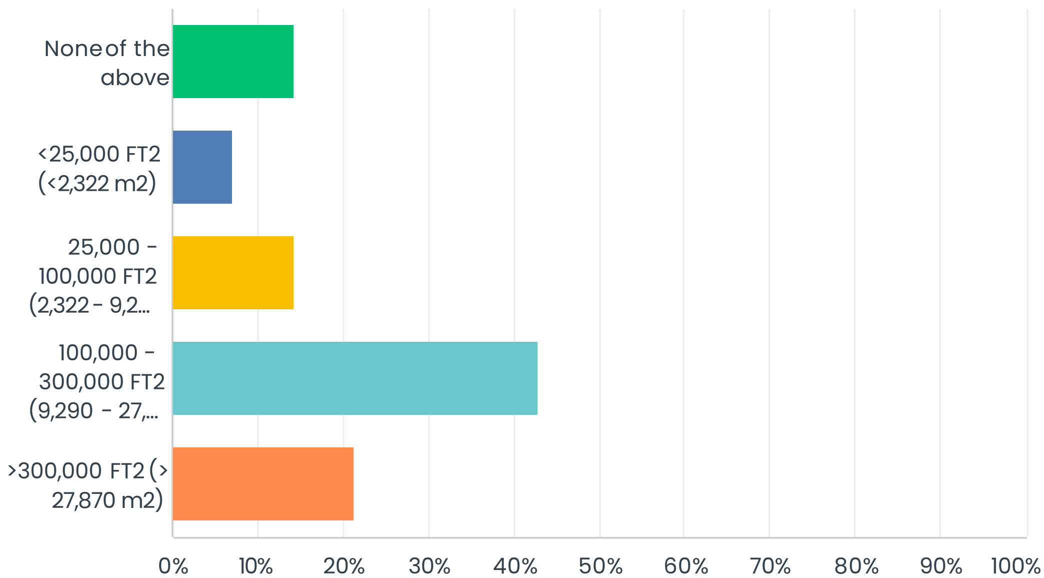
Answered: 15 Skipped: 0



	NO SUPPORT	LOW SUPPORT	MODERATE SUPPORT	NOTABLE SUPPORT	STRONG SUPPORT	TOTAL
Financial Support	26.67% 4	13.33% 2	33.33% 5	13.33% 2	13.33% 2	15
Political Support	0.00% 0	13.33% 2	40.00% 6	13.33% 2	33.33% 5	15
Public Support	0.00% 0	13.33% 2	53.33% 8	13.33% 2	20.00% 3	15

Q3 What is your ideal project size?

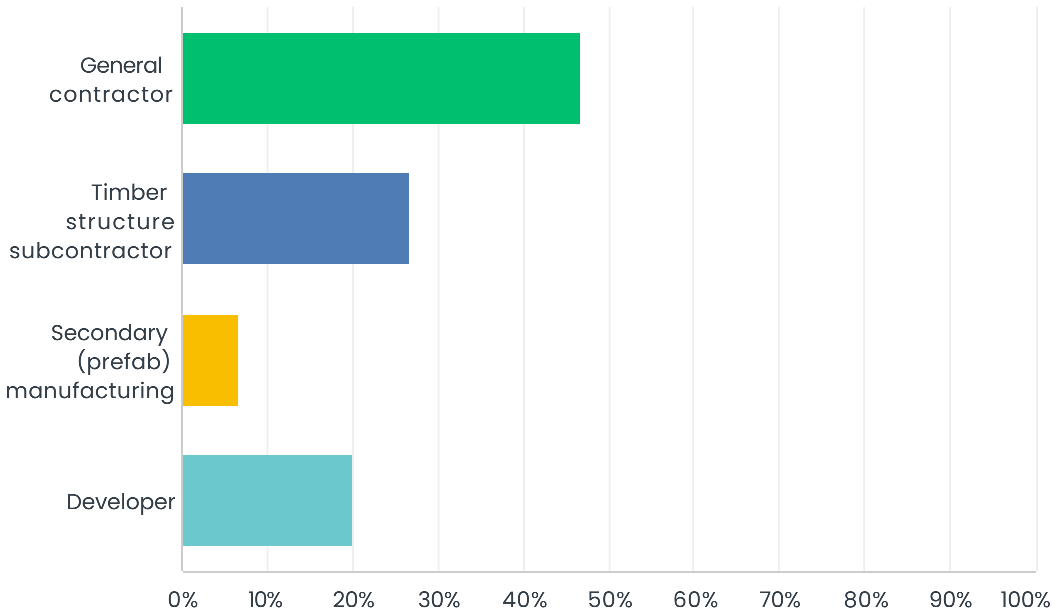
Answered: 14 Skipped: 1



ANSWER CHOICES	RESPONSES	
None of the above	14.29%	2
<25,000 FT2 (<2,322 m2)	7.14%	1
25,000 - 100,000 FT2 (2,322 - 9,290 m2)	14.29%	2
100,000 - 300,000 FT2 (9,290 - 27,870 m2)	42.86%	6
>300,000 FT2 (> 27,870 m2)	21.43%	3
TOTAL		14

Q4 Who is your ideal customer?

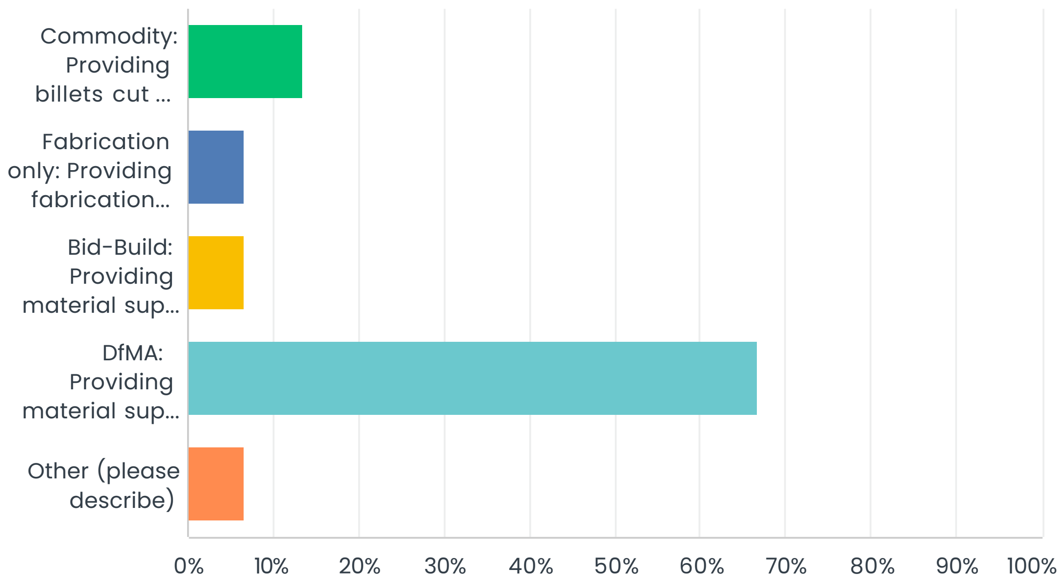
Answered: 15 Skipped: 0



ANSWER CHOICES	RESPONSES	
General contractor	46.67%	7
Timber structure subcontractor / installer	26.67%	4
Secondary (prefab) manufacturing facility	6.67%	1
Developer	20.00%	3
TOTAL		15

Q5 What is your preferred project delivery method?

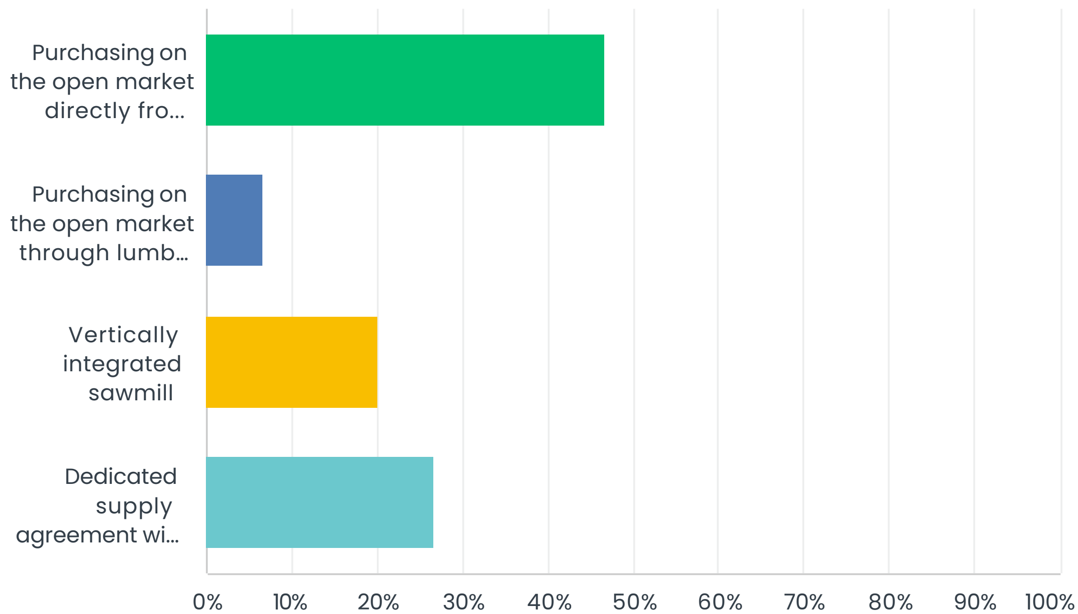
Answered: 15 Skipped: 0



ANSWER CHOICES	RESPONSES	
Commodity: Providing billets cut to length to a secondary manufacturing facility or client	13.33%	2
Fabrication only: Providing fabrication services (CNC fabrication) utilizing 3D models by others	6.67%	1
Bid-Build: Providing material supply package based on architectural and structural construction documents. The manufacturer is required to interpret these drawings to produce the 3D fabrication level model for CNC machines.	6.67%	1
DfMA: Providing material supply package for design assist projects, in which manufacturers are involved from an early stage to refine and optimize design.	66.67%	10
Other (please describe)	6.67%	1
TOTAL		15

Q6 What is your primary strategy for purchasing lumber?

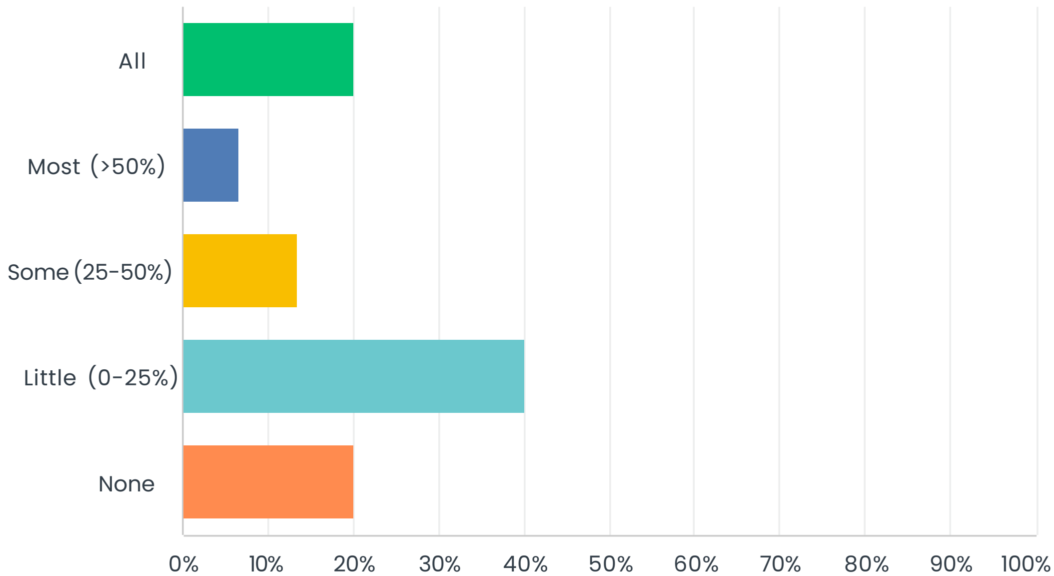
Answered: 15 Skipped: 0



ANSWER CHOICES	RESPONSES	
Purchasing on the open market directly from sawmills	46.67%	7
Purchasing on the open market through lumber broker	6.67%	1
Vertically integrated sawmill	20.00%	3
Dedicated supply agreement with sawmill partner(s) or distributor(s)	26.67%	4
TOTAL		15

Q7 What percentage of your feedstock comes from outside of the US?

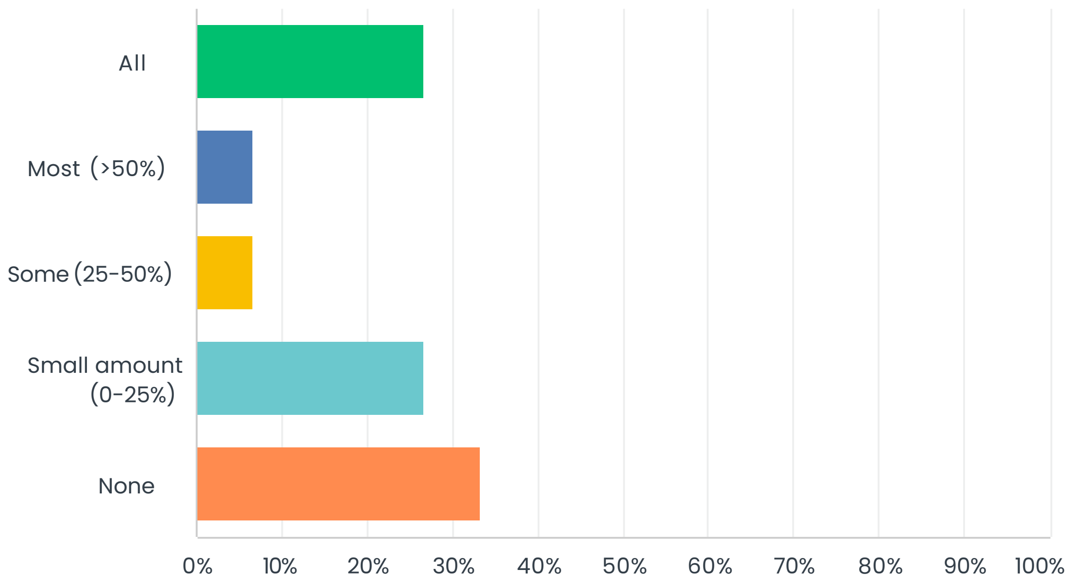
Answered: 15 Skipped: 0



ANSWER CHOICES	RESPONSES	
All	20.00%	3
Most (>50%)	6.67%	1
Some (25-50%)	13.33%	2
Little (0-25%)	40.00%	6
None	20.00%	3
TOTAL		15

Q8 What percentage of incoming fiber is dried on-site?

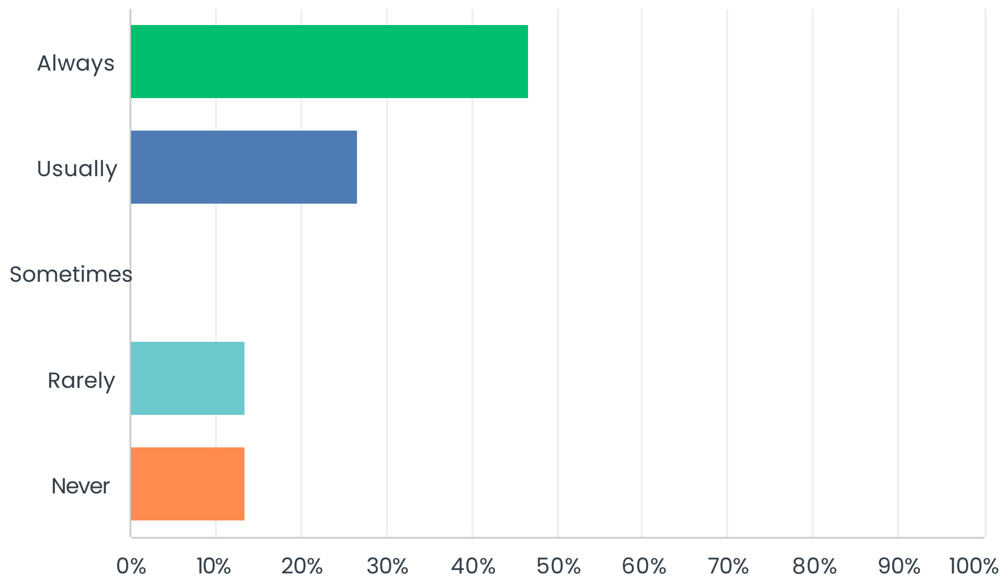
Answered: 15 Skipped: 0



ANSWER CHOICES	RESPONSES	
All	26.67%	4
Most (>50%)	6.67%	1
Some (25-50%)	6.67%	1
Small amount (0-25%)	26.67%	4
None	33.33%	5
TOTAL		15

Q9 Are you including steel connectors with your supply package?

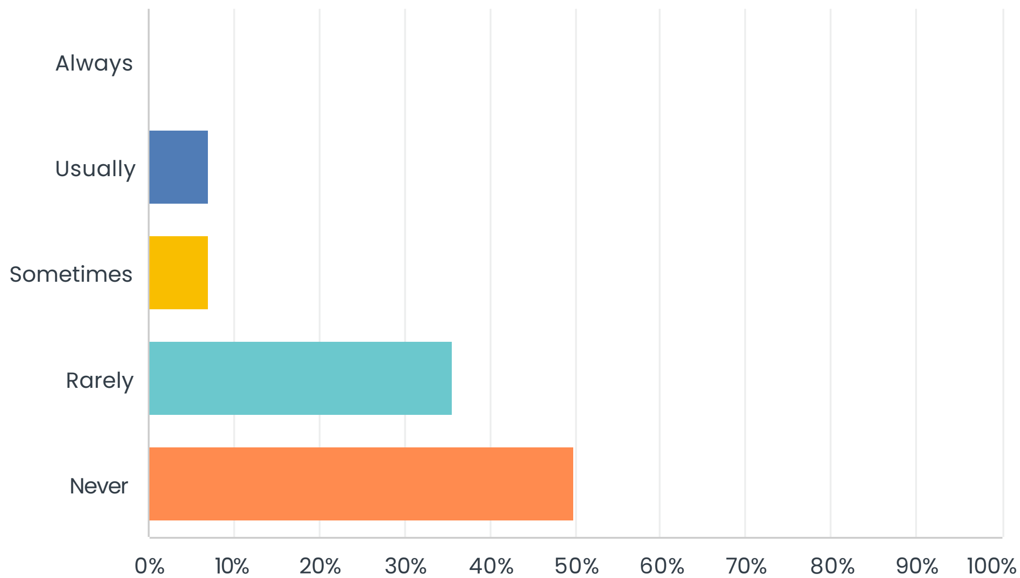
Answered: 15 Skipped: 0



ANSWER CHOICES	RESPONSES	
Always	46.67%	7
Usually	26.67%	4
Sometimes	0.00%	0
Rarely	13.33%	2
Never	13.33%	2
TOTAL		15

Q10 Do you struggle to procure custom steel assemblies for your projects?

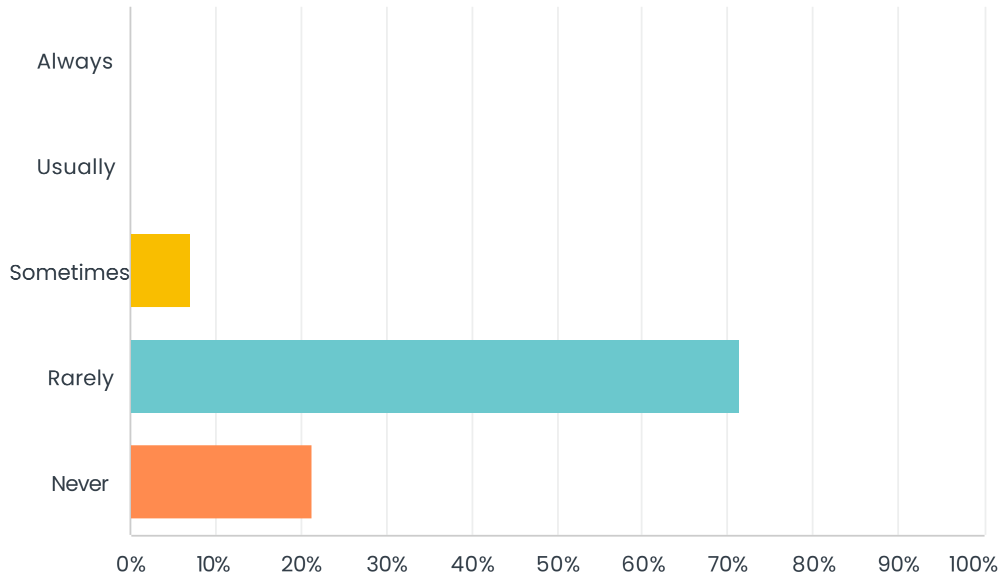
Answered: 14 Skipped: 1



ANSWER CHOICES	RESPONSES	
Always	0.00%	0
Usually	7.14%	1
Sometimes	7.14%	1
Rarely	35.71%	5
Never	50.00%	7
TOTAL		14

Q11 Do you struggle to procure pre-engineered off-the-shelf connectors and fasteners for your projects, due to availability or lead time?

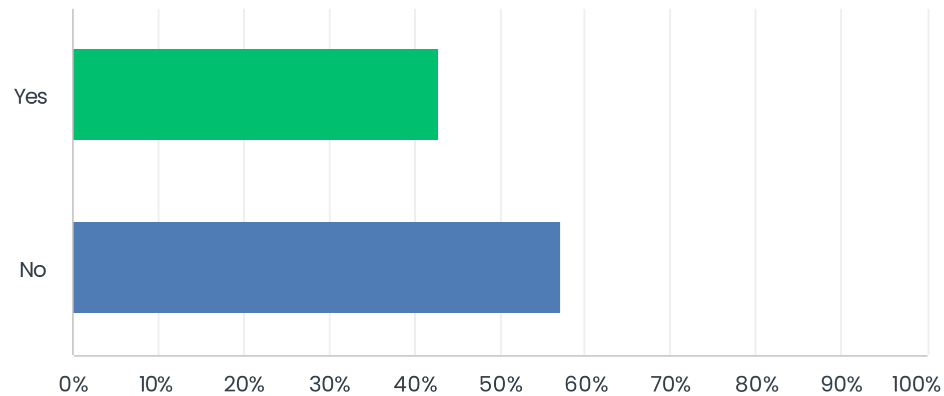
Answered: 14 Skipped: 1



ANSWER CHOICES	RESPONSES	
Always	0.00%	0
Usually	0.00%	0
Sometimes	7.14%	1
Rarely	71.43%	10
Never	21.43%	3
TOTAL		14

Q12 Are steel tariffs affecting how you procure fasteners and connectors?

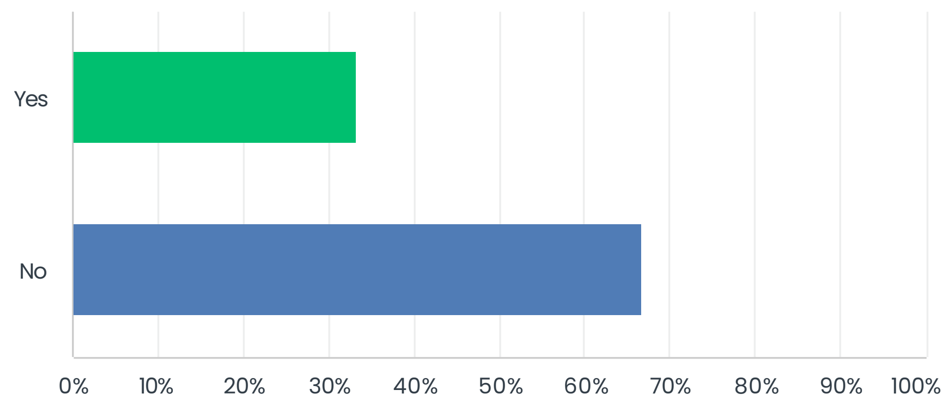
Answered: 14   Skipped: 1



ANSWER CHOICES	RESPONSES	
Yes	42.86%	6
No	57.14%	8
TOTAL		14

Q13 Are lumber tariffs or duties affecting how you procure lumber for your projects?

Answered: 15 Skipped: 0



ANSWER CHOICES	RESPONSES	
Yes	33.33%	5
No	66.67%	10
TOTAL		15

Q14 How many office workers do you have on staff?

Answered: 13 Skipped: 2

#	RESPONSES
1	10
2	23
3	90
4	6
5	7
6	5
7	75-100
8	50
9	30
10	20
11	85
12	4
13	75

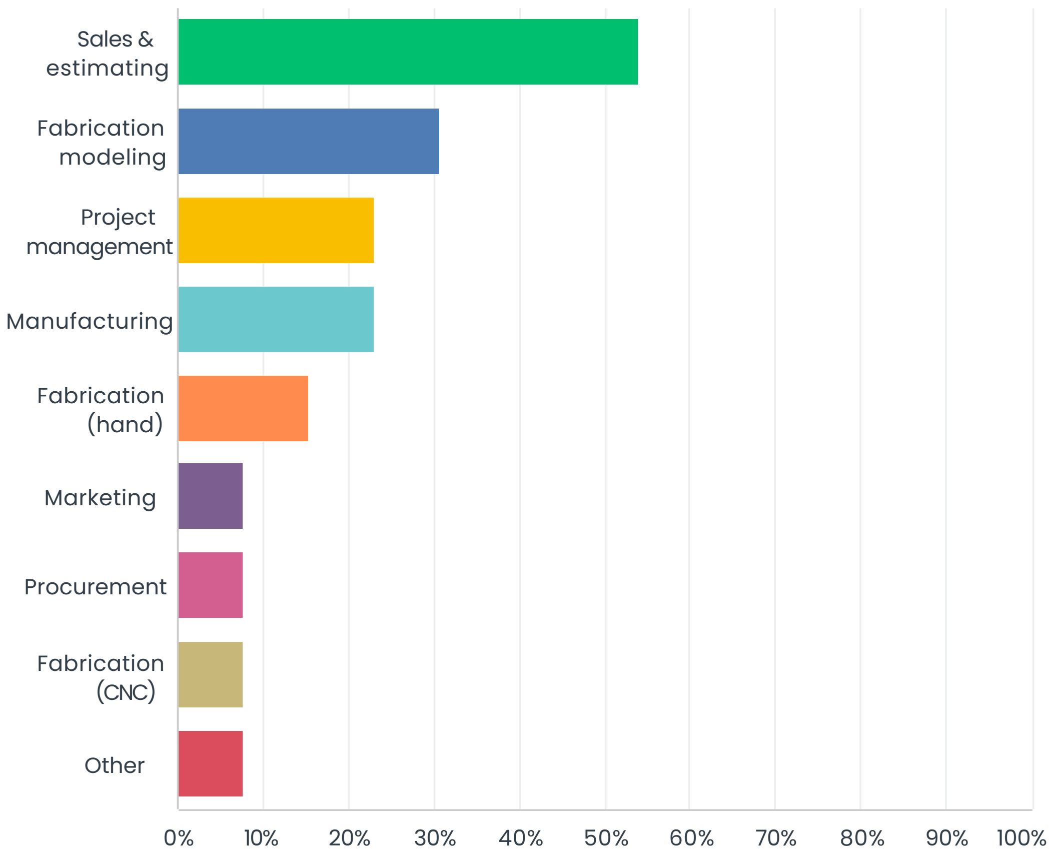
Q15 How many production workers do you have working each shift at each of your facilities? Please name facility and the number of employees.

Answered: 12 Skipped: 3

#	RESPONSES
1	35
2	52 for a single shift. We have a total of 66 production employees for various other shifts
3	120
4	30
5	17 on Days - 5 on Swing
6	65
7	75 - 125
8	211
9	55
10	164
11	~40
12	15

Q16 In what areas of your business do personnel constraints impact your team's ability to delivery mass timber projects? Please check all that apply.

Answered: 13 Skipped: 2



ANSWER CHOICES	RESPONSES	
Sales & estimating	53.85%	7
Fabrication modeling	30.77%	4
Project management	23.08%	3
Manufacturing	23.08%	3
Fabrication (hand)	15.38%	2
Marketing	7.69%	1
Procurement	7.69%	1
Fabrication (CNC)	7.69%	1
Other	7.69%	1
Total Respondents: 13		

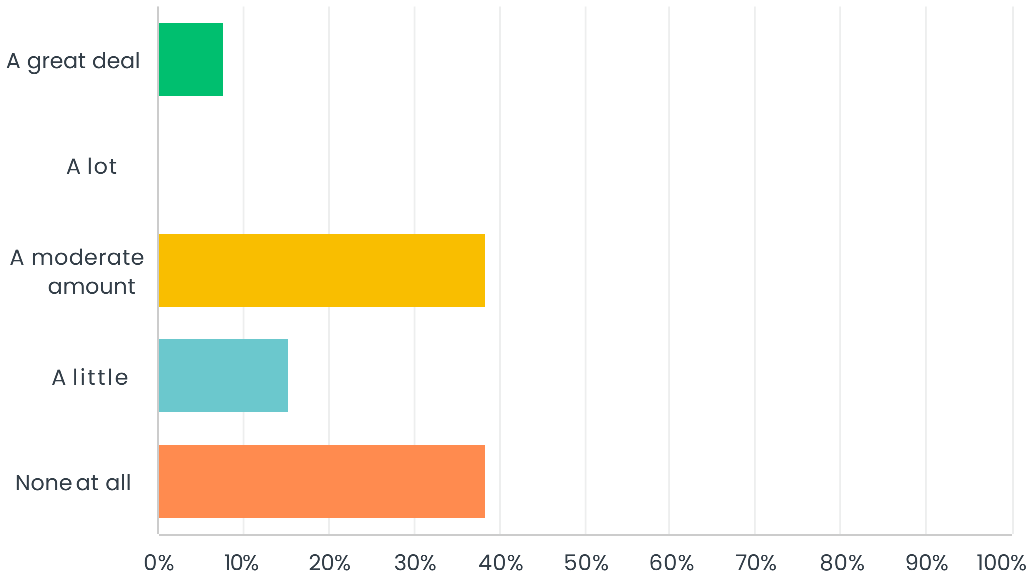
Q17 How many people do you have on staff doing digital design / 3D modeling?

Answered: 13 Skipped: 2

#	RESPONSES
1	3
2	4
3	10
4	0
5	1
6	0
7	5
8	35
9	12
10	2 full time engineers, 2 contracted employees
11	50
12	2
13	12

Q18 Do you outsource 3D digital modeling services for manufacturing and/or clash detection?

Answered: 13 Skipped: 2



ANSWER CHOICES	RESPONSES	
A great deal	7.69%	1
A lot	0.00%	0
A moderate amount	38.46%	5
A little	15.38%	2
None at all	38.46%	5
TOTAL		13

Q19 If you are comfortable sharing, which companies have you partnered with (past & present) for fabrication modeling? This will help us define the extent of the mass timber ecosystem in North America.

Answered: 5 Skipped: 10

#	RESPONSES
1	N/A
2	Cut My Timber
3	N/A
4	Aspect, Cad Makers primarily
5	MiTek- Vietnam Kellar Pacific

Q20 How many people do you have on staff doing timber engineering?

Answered: 12   Skipped: 3

#	RESPONSES
1	7
2	2
3	7
4	0
5	0
6	3
7	5
8	3
9	1
10	15
11	0
12	1

Q21 How many people do you have on staff doing sales/marketing and estimating?

Answered: 12 Skipped: 3

#	RESPONSES
1	2
2	6
3	12
4	2
5	2
6	7
7	10
8	14
9	4
10	10
11	1
12	5

Q22 How many people do you have on staff managing projects?

Answered: 12 Skipped: 3

#	RESPONSES
1	2
2	4
3	30
4	2
5	0
6	3
7	7
8	6
9	2
10	10
11	1
12	10

Q23 How many people do you have working in your production facilities?

Answered: 13 Skipped: 2

#	RESPONSES
1	10
2	66
3	140
4	60
5	22
6	70
7	25
8	211
9	Approx 100
10	420
11	650
12	15
13	150

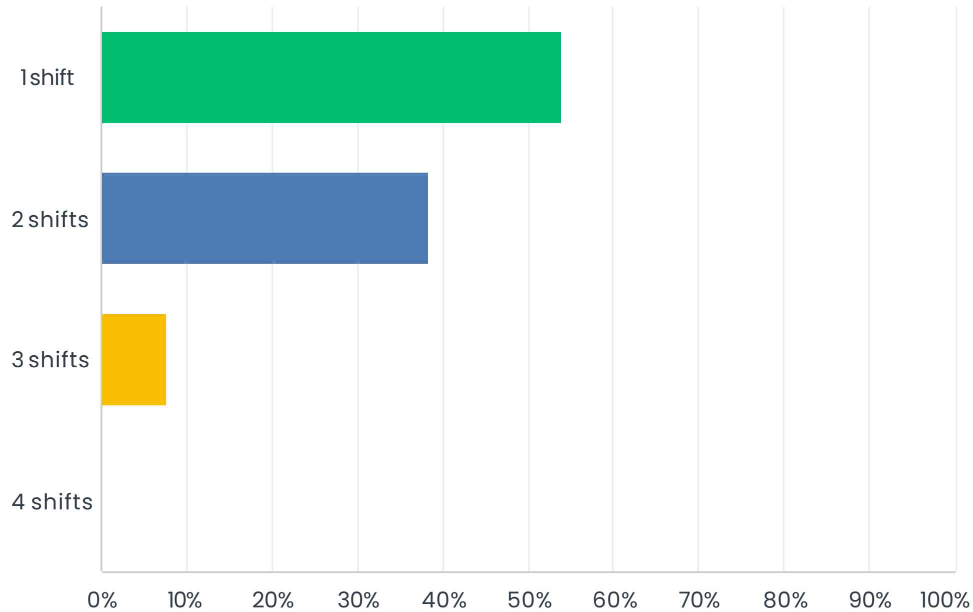
Q24 Please name the installation companies you have partnered with in Oregon and Washington (past & present)?

Answered: 9 Skipped: 6

#	RESPONSES
1	N/A
2	Kinsol, Faust, TCG
3	Swinerton and Self Perform
4	West Coast
5	N/A
6	Foust Evergreen
7	Timberlab, WWS, CPI,
8	Carpentry Plus, TimberLand, Prime Contracting, TimberBLDR, Schommer & Sons, Swinterton, TGerding Structural, Andersen, CD Redding, Kaufman Commercial, many more
9	n/a

Q25 What shift configuration per week have you run, on average, over the past year?

Answered: 13   Skipped: 2



ANSWER CHOICES	RESPONSES	
1 shift	53.85%	7
2 shifts	38.46%	5
3 shifts	7.69%	1
4 shifts	0.00%	0
TOTAL		13

Q26 What is your actual production capacity in a single shift of production, in m3 or MBF? Please include the unit of measure in your response.

Answered: 11 Skipped: 4

#	RESPONSES
1	1,300 bf
2	Glulam: 8 MMBF a year per shift; CLT: 25 MMBF a year per shift (planned)
3	30 mbf
4	35 MBF
5	12 MMBF
6	300,000/m3 per shift per year
7	59,000 m3
8	40,000 FT3 of CLT production per shift per month per plant
9	2500 FT3 in 1 shift of production
10	50000 m3
11	2500 FT2

Q27 What is your theoretical (upper bound / maximum) capacity for a single 8-hour shift?

Answered: 10   Skipped: 5

#	RESPONSES
1	3,500 bf
2	Glulam: 16 MMBF a year per shift; CLT: 25 MMBF a year per shift
3	80 mbf
4	50 MBF
5	14 MMBF
6	75,000m3
7	way way more. project complexity and design inefficiency greatly reduces theoretical to actual.
8	3000 FT3 in 1 shift of production
9	150m3
10	3600 FT2

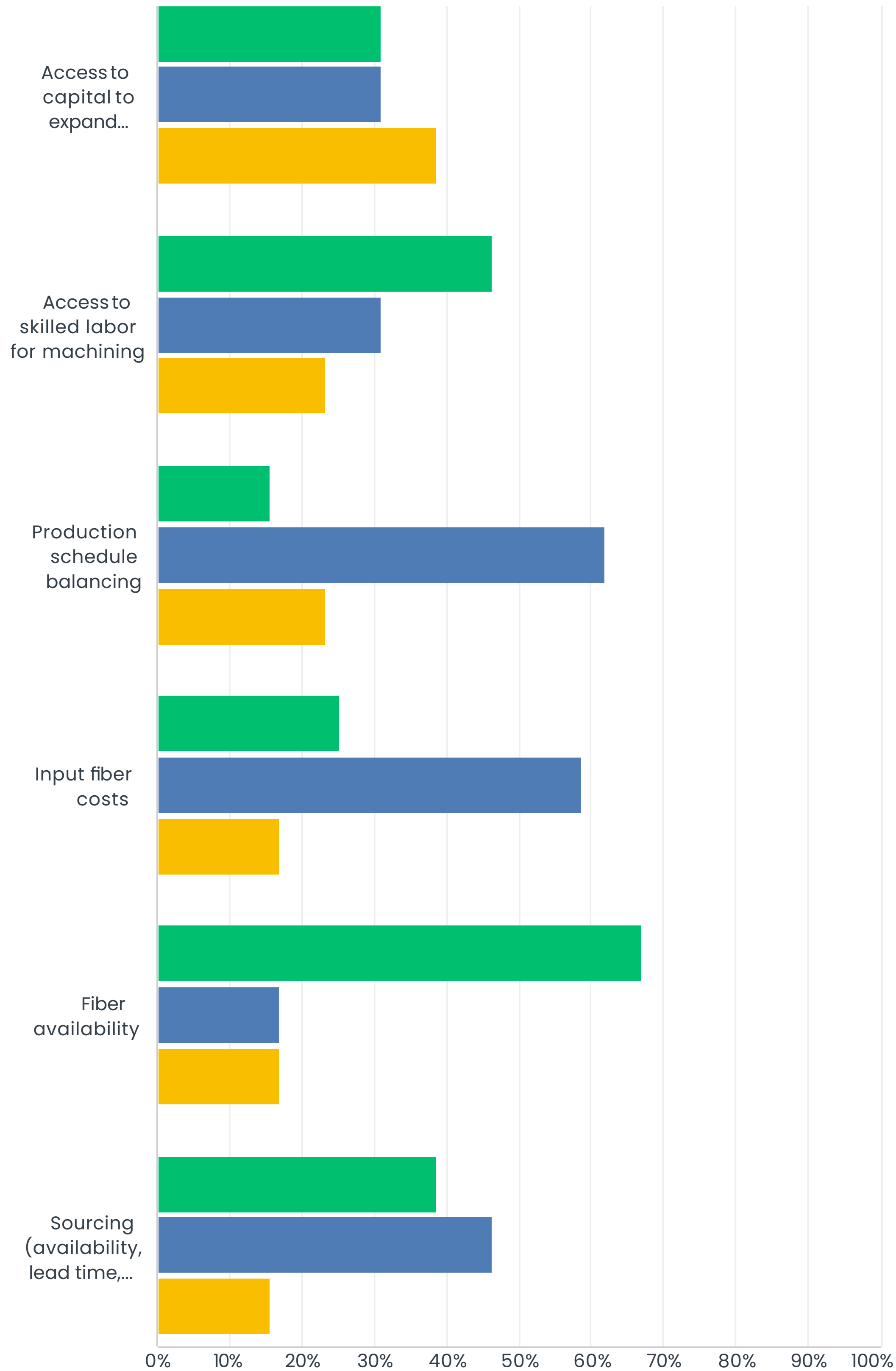
Q28 How do you calculate theoretical (upper bound / maximum) capacity for a single 8-hour shift?

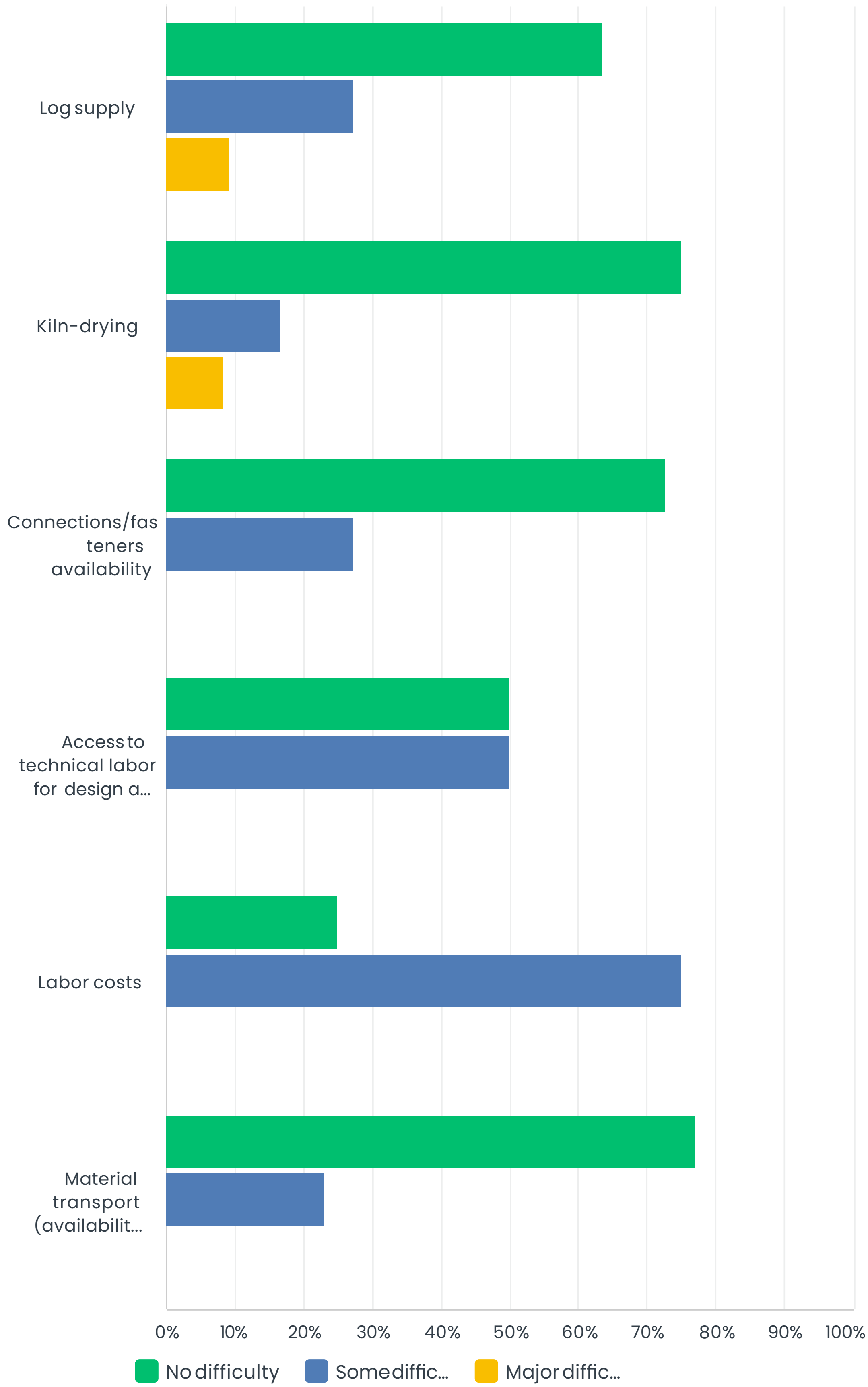
Answered: 9 Skipped: 6

#	RESPONSES
1	We use small-panel fabrication (4' x 12' for single family homes), maximum is set by the press cycles.
2	We calculate theoretical by factoring in downtime production losses and inefficiencies with product loading in our machines (eg not fully filling press bed to full capacity). Our calculations for shift capacity are based on realistic capabilities with all restraints factored in and not based on theoretical absolute maximums.
3	Adding employees and being able to procure enough Lam Stock to keep lockups larger, pre-glue change overs to a minimum, increased order file
4	Board footage of input lumber, with product mix skewed to highest productivity mix.
5	244,000m3 on a 3 shift
6	10 layers x 10' wide x 50' long. one cycle every 1.5 hours for 8 hours.
7	2500 FT3 is the average production level we hit for our highest month of production. WE have since installed equipment that has brought RF scarf joint production time from 1 minute 20 seconds to 1 minute, so a 20% increase over our best established level. These are actual numbers, not theoretical
8	volume cap'y/hour x 8 hrs
9	machine capacity

Q29 In which areas of your business have you been limited in your production?

Answered: 13 Skipped: 2

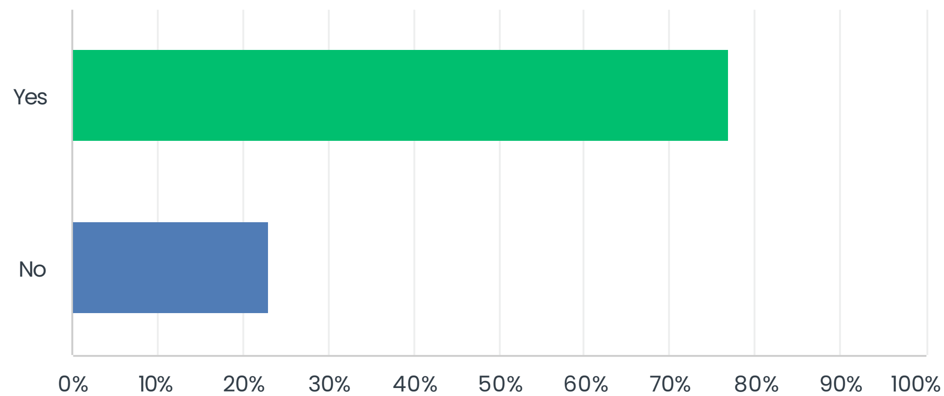



Log supply
Kiln-drying
Connections/fas
teners
availability
Access to
technical labor
for design a...
Labor costs
Material
transport
(availabilit...
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
No difficulty
Some diffic...
Major diffic...

	NO DIFFICULTY	SOME DIFFICULTY	MAJOR DIFFICULTY	TOTAL
Access to capital to expand operations	30.77% 4	30.77% 4	38.46% 5	13
Access to skilled labor for machining	46.15% 6	30.77% 4	23.08% 3	13
Production schedule balancing	15.38% 2	61.54% 8	23.08% 3	13
Input fiber costs	25.00% 3	58.33% 7	16.67% 2	12
Fiber availability	66.67% 8	16.67% 2	16.67% 2	12
Sourcing (availability, lead time, cost) of production equipment	38.46% 5	46.15% 6	15.38% 2	13
Log supply	63.64% 7	27.27% 3	9.09% 1	11
Kiln-drying	75.00% 9	16.67% 2	8.33% 1	12
Connections/fasteners availability	72.73% 8	27.27% 3	0.00% 0	11
Access to technical labor for design and engineering	50.00% 6	50.00% 6	0.00% 0	12
Labor costs	25.00% 3	75.00% 9	0.00% 0	12
Material transport (availability of trucks)	76.92% 10	23.08% 3	0.00% 0	13

Q30 Are you currently considering expanding your capacity in your current location?

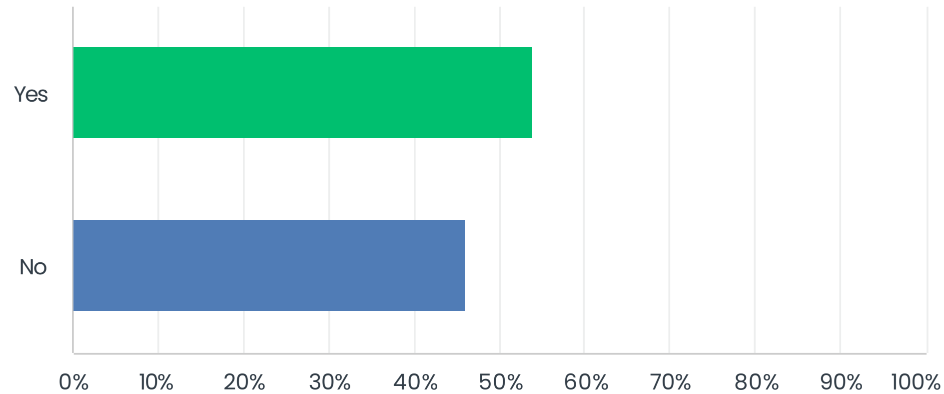
Answered: 13 Skipped: 2



ANSWER CHOICES	RESPONSES	
Yes	76.92%	10
No	23.08%	3
TOTAL		13

Q31 Are you currently considering expanding your capacity in a new location?

Answered: 13 Skipped: 2



ANSWER CHOICES	RESPONSES	
Yes	53.85%	7
No	46.15%	6
TOTAL		13

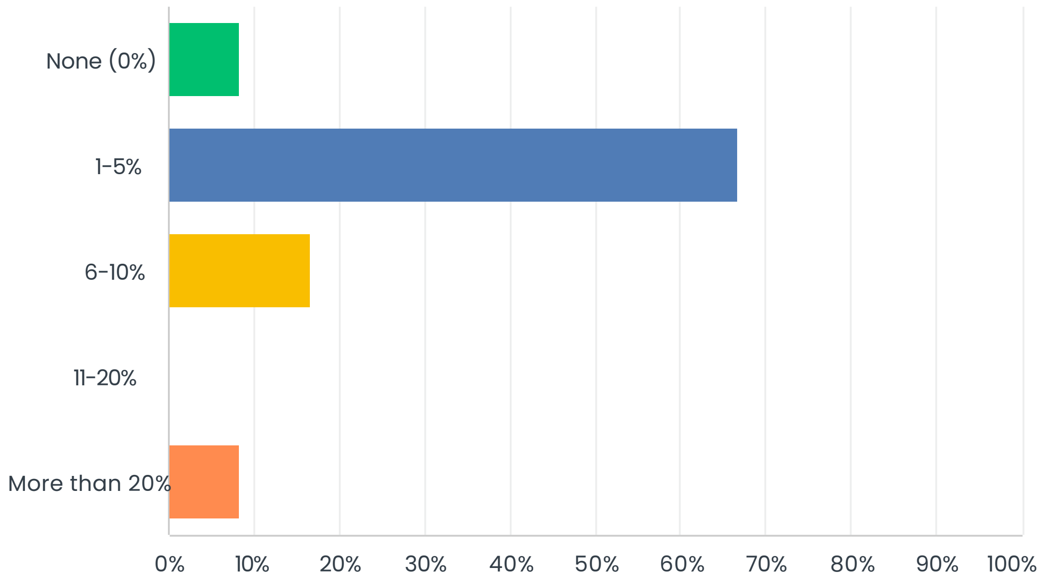
Q32 What would help you make the decision to expand?

Answered: 11 Skipped: 4

#	RESPONSES
1	Already made and in-motion,
2	We need to see the MT market grow and get our main plant to a consistent capacity.
3	Already in process.
4	Already in process
5	Increase in order file
6	Project pipeline of signed work
7	Market demand
8	Demand being greater than supply.
9	Less pressure from imported products. More consistently reaching full production on a single-shift and move toward a second shift. Confirmed lower cost of raw material so we are more competitive regionally and nationally.
10	Consistent market takeaway
11	sound market conditions, availability of qualified people and capital investment

Q33 What portion of your products are being sent to offsite assembly companies or used in prefab or modular products?

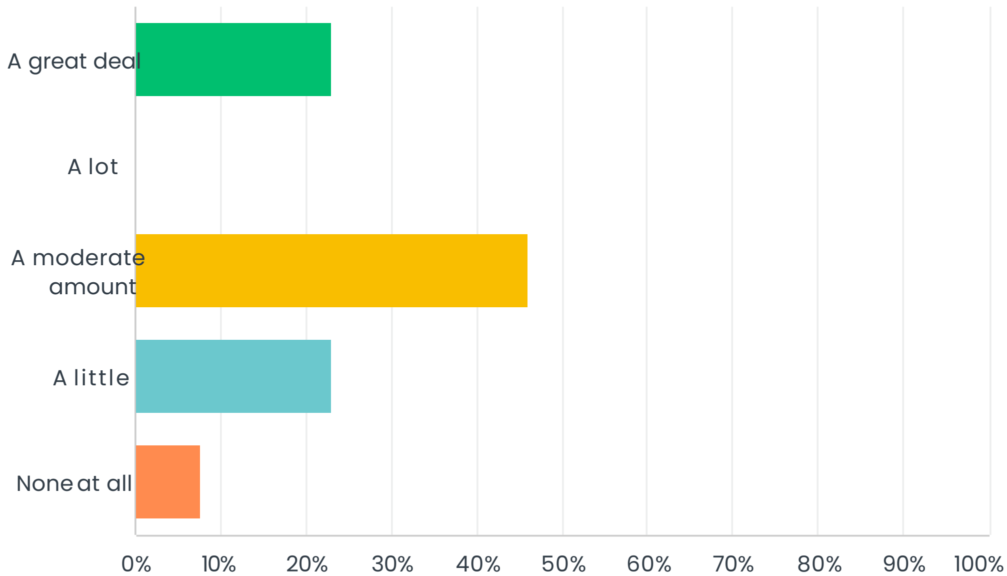
Answered: 12   Skipped: 3



ANSWER CHOICES	RESPONSES	
None (0%)	8.33%	1
1-5%	66.67%	8
6-10%	16.67%	2
11-20%	0.00%	0
More than 20%	8.33%	1
TOTAL		12

Q34 Is secondary manufacturing or modular mass timber housing a part of the market that you expect will grow?

Answered: 13 Skipped: 2



ANSWER CHOICES	RESPONSES	
A great deal	23.08%	3
A lot	0.00%	0
A moderate amount	46.15%	6
A little	23.08%	3
None at all	7.69%	1
TOTAL		13

Q35 What is the average project size you are delivering, in dollars revenue?

Answered: 10 Skipped: 5

#	RESPONSES
1	$250K
2	$500K to $1M
3	$3,000,000
4	$1,000,000
5	$32,300
6	$500K
7	$5m
8	$1 million
9	$250,000 to $500,000 but we don't turn projects away, bigger or smaller.
10	$5M

Q36 What is the average project size you are delivering, in FT2 area?

Answered: 10 Skipped: 5

#	RESPONSES
1	965 s.f.
2	30,000 FT2
3	50,000 FT2
4	150,000
5	Average job size is approximately the same. Do not ship a lot into this area
6	50,000
7	200,000 FT2
8	25,000 to 30,000 FT2
9	$1.2 million
10	100,000

Q37 What is the average project size you are delivering, in volume of product? Please include unit of measure in your response (m3, FT3, MBF).

Answered: 7 Skipped: 8

#	RESPONSES
1	5,000 bf
2	30,000 cuft
3	350 mbf
4	18.740 MBF
5	3500m3
6	25,000 FT3
7	2500 m3

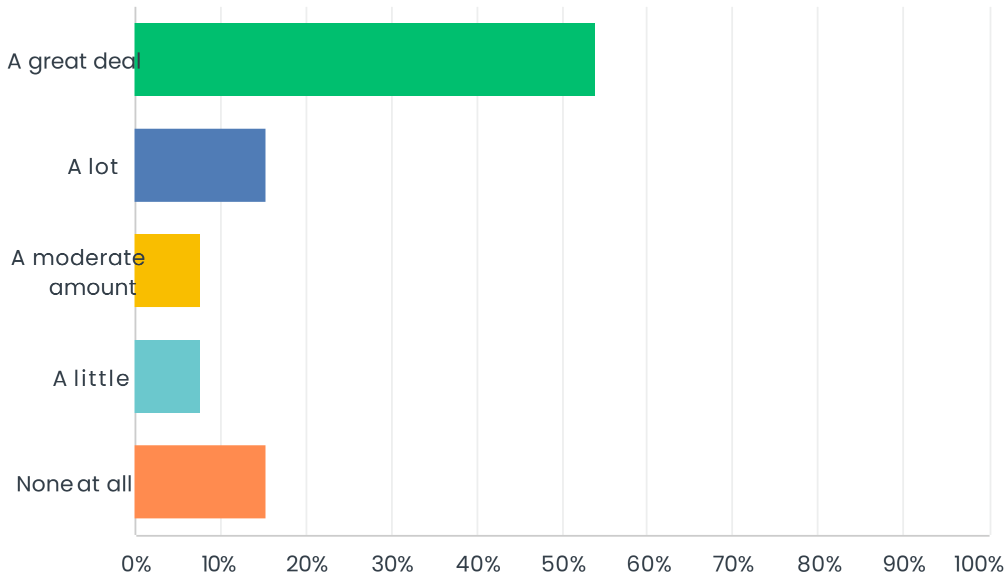
Q38 What current regulations or policies (ex: forest management, building codes, procurement policies, etc.) do you perceive to constrain your mass timber business?

Answered: 9 Skipped: 6

#	RESPONSES
1	Building Codes, specifically limitations of PRG320 with alternative species.
2	Lack of local incentives to incentivize development of mass timber buildings like increase in FAR for mass timber structures.
3	None noted
4	Building Codes
5	FSC specifications, ill-informed knot size specifications, European species specifications
6	Clients insurance
7	forest management/ cost of raw materials
8	inconsistencies in building codes are most impactful.
9	tariff threats are largest single constraint.

Q39 Has your business grown in the past 5 years?

Answered: 13 Skipped: 2



ANSWER CHOICES	RESPONSES	
A great deal	53.85%	7
A lot	15.38%	2
A moderate amount	7.69%	1
A little	7.69%	1
None at all	15.38%	2
TOTAL		13

Q40 If you feel comfortable sharing, what is your current annual revenue, approximately?

Answered: 5 Skipped: 10

#	RESPONSES
1	Not comfortable sharing
2	$22M
3	$110,000,000
4	$70m
5	$140 million

Q41 What types of financing instruments do you currently utilize to support mass timber-related efforts or projects?

Answered: 7 Skipped: 8

#	RESPONSES
1	Primarily grants and internal funding from operations.
2	Institutional debt and owner equity.
3	none.
4	Parent entity provides direct support; no bank financing
5	Pre-paid deposit structure - Projects
6	None
7	Internal financing

Q42 What granting agencies have you been most successful in obtaining funding from?

Answered: 8 Skipped: 7

#	RESPONSES
1	EDA, DoD
2	USDA
3	Nothing of substance to note ~$10 of electrical
4	USFS
5	Washington State, BC Gov
6	WIG
7	USDA Wood Innovations
8	n/a

Q43 What types of financing instruments are most needed?

Answered: 8 Skipped: 7

#	RESPONSES
1	N/A
2	We have been in need of operating capital to allow us to function in between mass timber projects and commodity glulam orders. So, operating lines of credit, or equity into the business
3	Unsure
4	Low interest loans
5	Client grant support for projects - US / CA sourced fiber
6	We always love grants to help ease capital investment.
7	Canada passes out free money to its manufacturers. We just want access to cheaper fiber.
8	n/a

Q44 Where would you like to see investments be made to grow the mass timber industry and market?

Answered: 8 Skipped: 7

#	RESPONSES
1	Code understanding and approvals in smaller, regional, rural markets.
2	Focus on growth of demand based on policies/incentives so that developers /owners receive tangible benefits for building with mass timber.
3	US needs to develop the technology vs purchasing from Europe.
4	Marketing Federal grants
5	R&D / species certification support Build systems R&D support
6	Domestic sourced timber at a cheaper cost.
7	infrastructure
8	grow the market share for mass timber overall to create a more stable environment to build manufacturing infrastructure.

10.5 Fabricator Survey

In summer 2025, a survey of value-add (fabrication, prefabrication, integration) companies was conducted to gather information about product availability and purchasing, production capacity, employment, target market, capital access, material constraints, personnel constraints, production constraints, and business constraints.

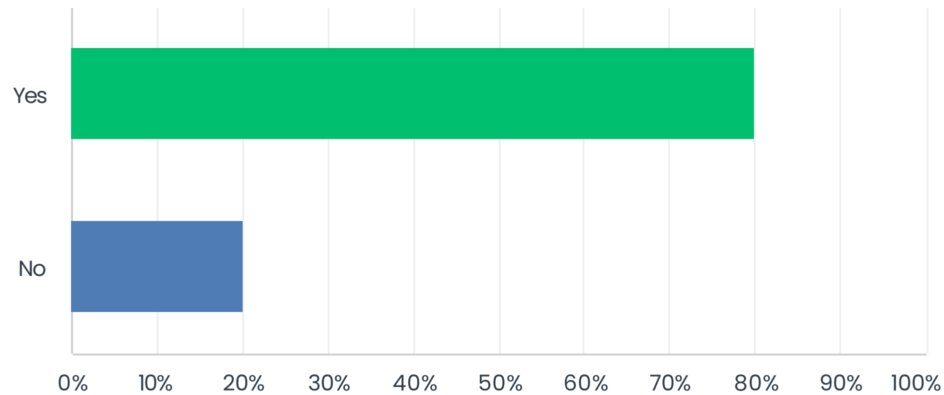
Recipients :

- PNW
    - Carpentry Plus Inc.
    - Cascade Joinery
    - Cascadia Structural Solutions
    - CedarStone Design & Build
    - CutMyTimber
    - Green Canopy NODE
    - New Energy Works
    - Sauter Timber
    - Tieton Cabin Company
    - Western Wood Structures
- North America
    - BC Passive House
    - Intelligent City
    - Notch SB

Responses to the survey are anonymous and not in a consistent or particular order.

Q1 Is your fabrication facility located in Oregon or Washington?

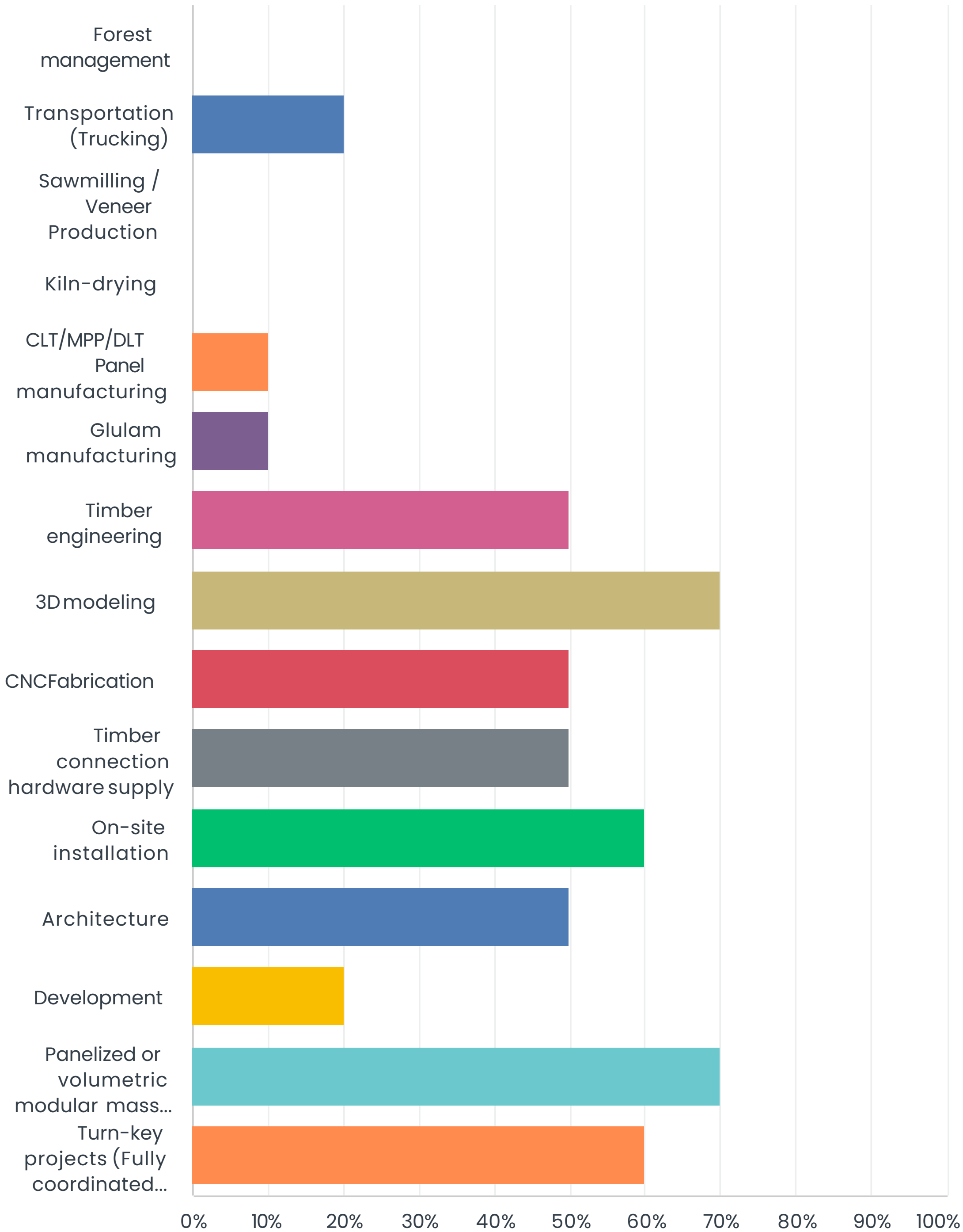
Answered: 10 Skipped: 0



ANSWER CHOICES	RESPONSES	
Yes	80.00%	8
No	20.00%	2
TOTAL		10

Q2 What products and services do your company provide in-house? Please check all that apply.

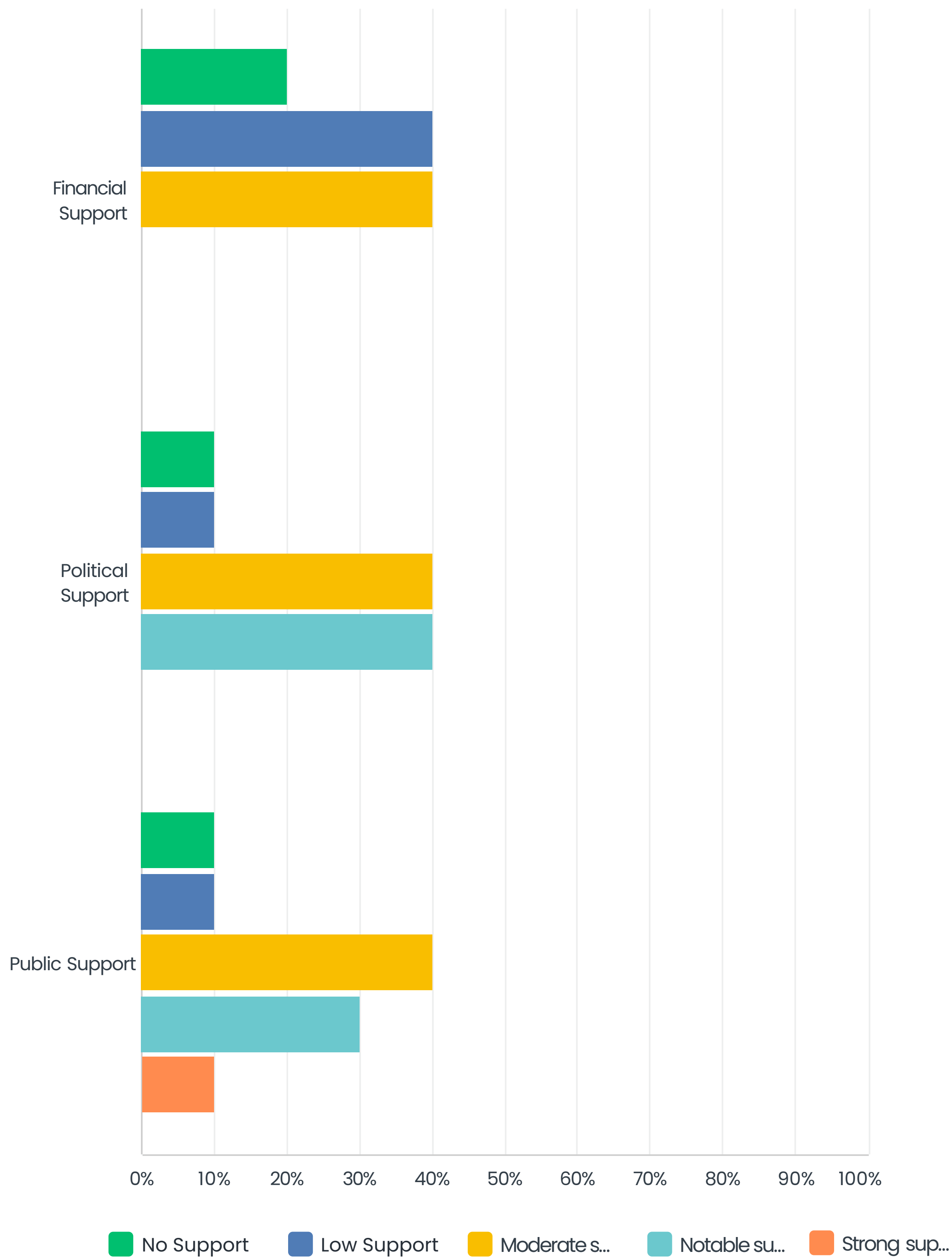
Answered: 10 Skipped: 0



ANSWER CHOICES	RESPONSES	
Forest management	0.00%	0
Transportation (Trucking)	20.00%	2
Sawmilling / Veneer Production	0.00%	0
Kiln-drying	0.00%	0
CLT/MPP/DLT Panel manufacturing	10.00%	1
Glulam manufacturing	10.00%	1
Timber engineering	50.00%	5
3D modeling	70.00%	7
CNC Fabrication	50.00%	5
Timber connection hardware supply	50.00%	5
On-site installation	60.00%	6
Architecture	50.00%	5
Development	20.00%	2
Panelized or volumetric modular mass timber	70.00%	7
Turn-key projects (Fully coordinated kit-of-parts material supply)	60.00%	6
Total Respondents: 10		

Q3 How would you rate the support for your operation in the area (city, county, state, province) in which you are located?

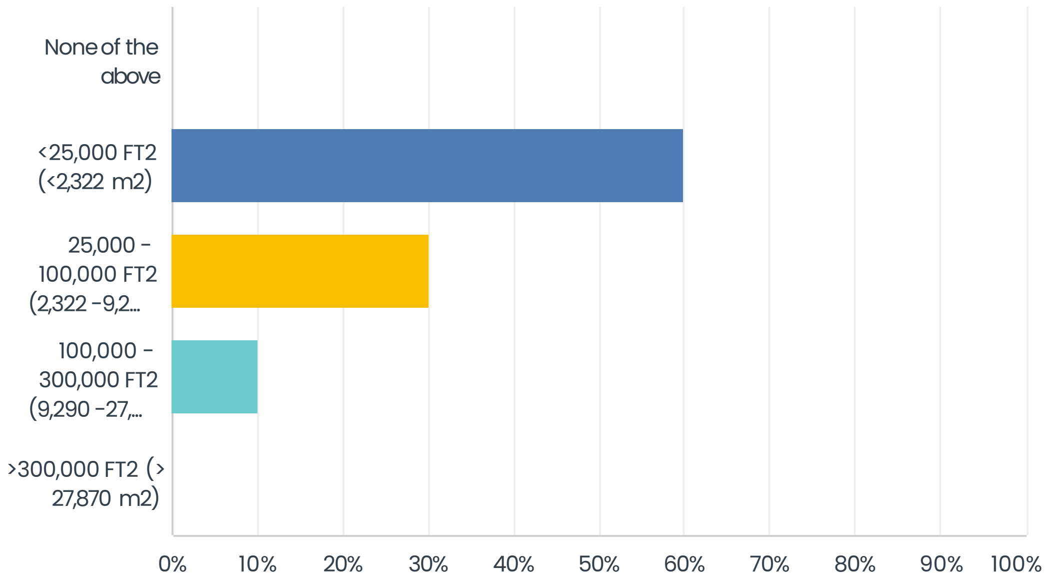
Answered: 10 Skipped: 0



	NO SUPPORT	LOW SUPPORT	MODERATE SUPPORT	NOTABLE SUPPORT	STRONG SUPPORT	TOTAL
Financial Support	20.00% 2	40.00% 4	40.00% 4	0.00% 0	0.00% 0	10
Political Support	10.00% 1	10.00% 1	40.00% 4	40.00% 4	0.00% 0	10
Public Support	10.00% 1	10.00% 1	40.00% 4	30.00% 3	10.00% 1	10

Q4 What is your ideal project size?

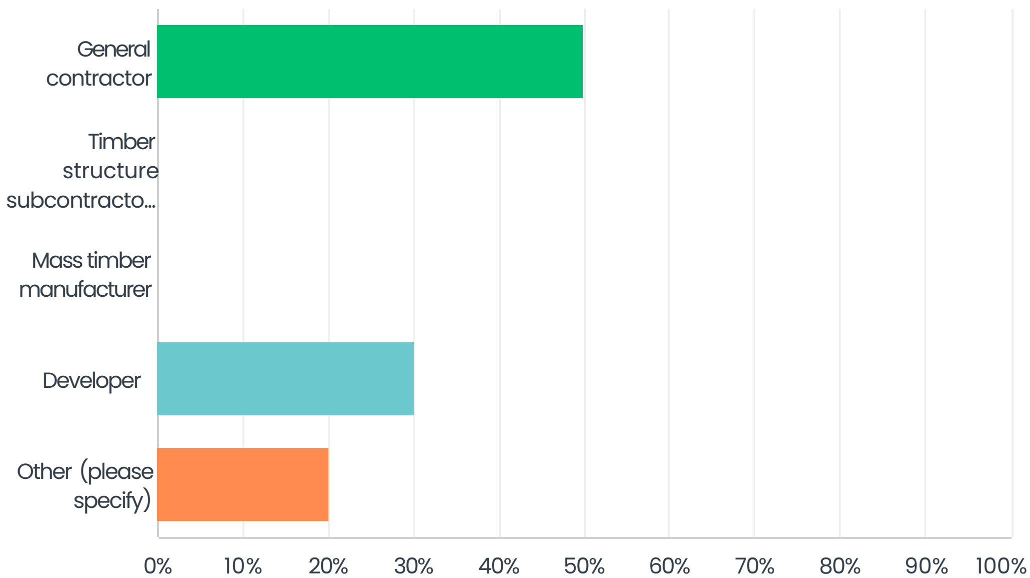
Answered: 10 Skipped: 0



ANSWER CHOICES	RESPONSES	
None of the above	0.00%	0
<25,000 FT2 (<2,322 m2)	60.00%	6
25,000 -100,000 FT2 (2,322 -9,290 m2)	30.00%	3
100,000 -300,000 FT2 (9,290 -27,870 m2)	10.00%	1
>300,000 FT2 (> 27,870 m2)	0.00%	0
TOTAL		10

Q5 Who is your ideal customer?

Answered: 10 Skipped: 0

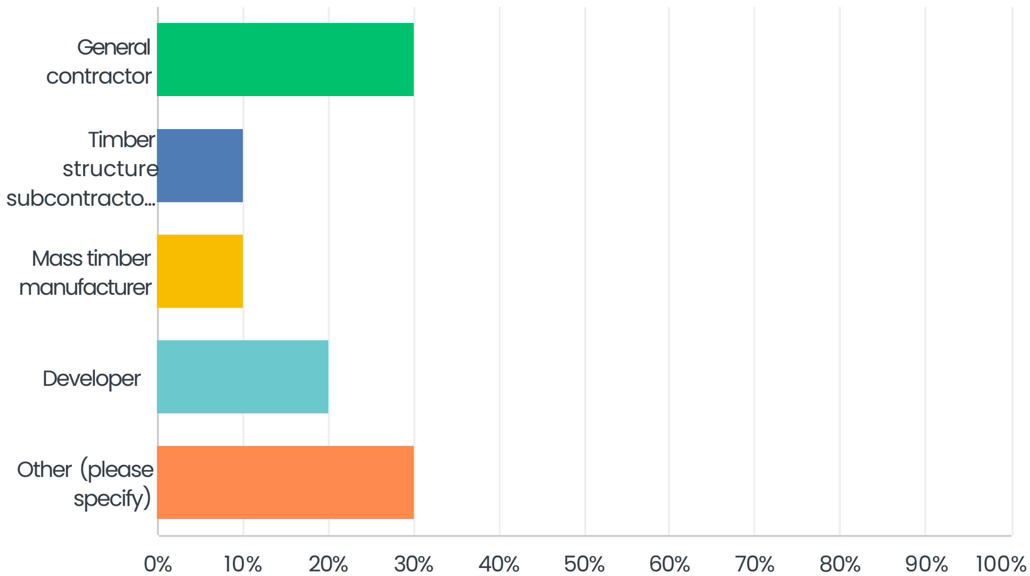


ANSWER CHOICES	RESPONSES	
General contractor	50.00%	5
Timber structure subcontractor / installer	0.00%	0
Mass timber manufacturer	0.00%	0
Developer	30.00%	3
Other (please specify)	20.00%	2
TOTAL		10

Other (please specify)	
Response 1	Mass Timber Fabricator
Response 2	We like both architects and timber subcontractors

Q6 Who is most commonly your customer?

Answered: 10 Skipped: 0

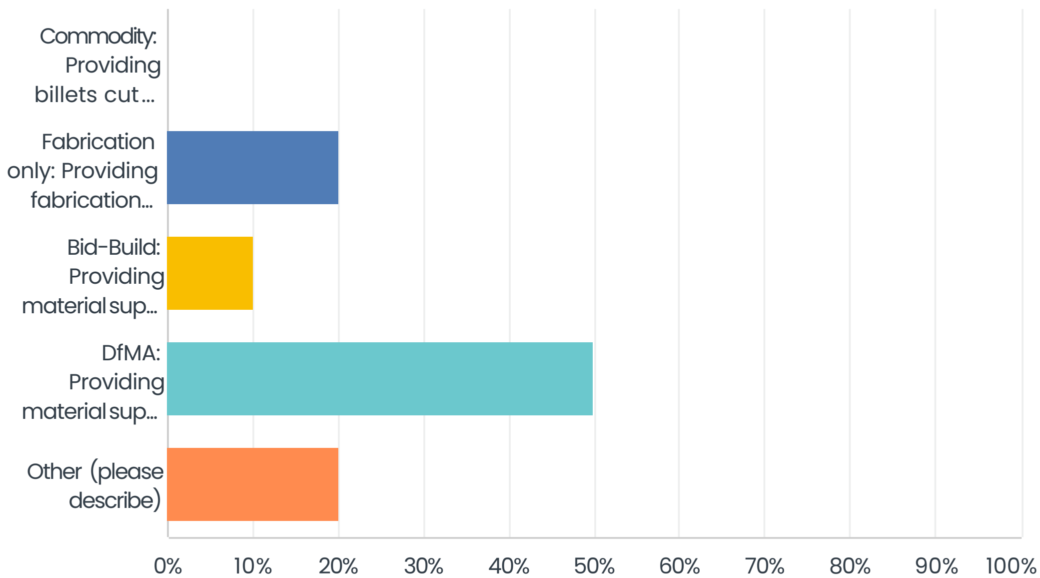


ANSWER CHOICES	RESPONSES	
General contractor	30.00%	3
Timber structure subcontractor / installer	10.00%	1
Mass timber manufacturer	10.00%	1
Developer	20.00%	2
Other (please specify)	30.00%	3
TOTAL		10

Other (please specify)	
Response 1	non-profit developer, or single family homeowners
Response 2	Retail customer
Response 3	Homeowners

Q7 What is your preferred project delivery method?

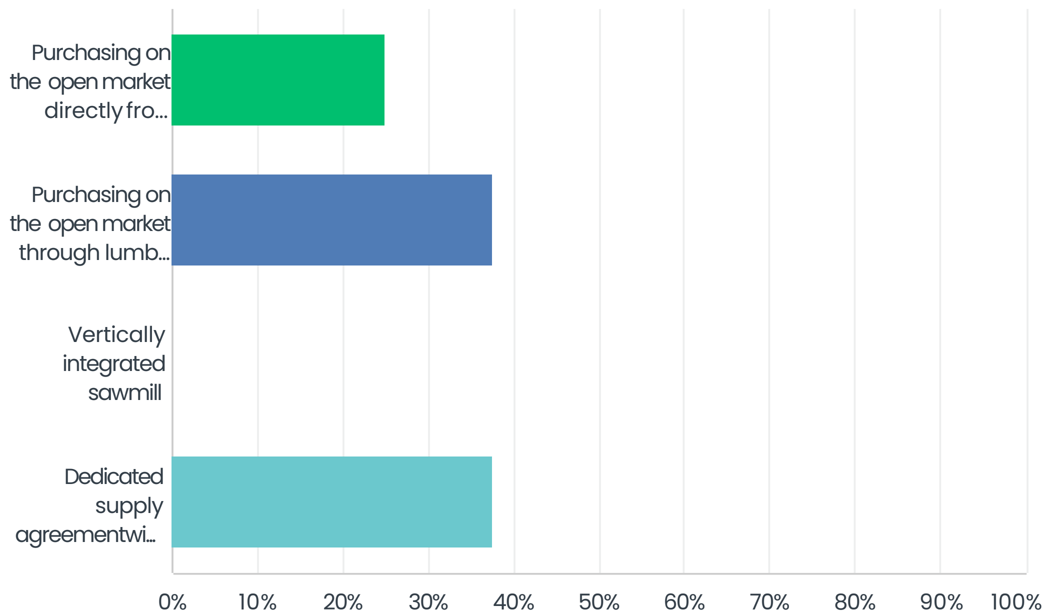
Answered: 10 Skipped: 0



ANSWER CHOICES	RESPONSES	
Commodity: Providing billets cut to length to a secondary manufacturing facility or client	0.00%	0
Fabrication only: Providing fabrication services (CNC fabrication) utilizing 3D models by others	20.00%	2
Bid-Build: Providing material supply package based on architectural and structural construction documents. The manufacturer is required to interpret these drawings to produce the 3D fabrication level model for CNC machines.	10.00%	1
DfMA: Providing material supply package for design assist projects, in which manufacturers are involved from an early stage to refine and optimize design.	50.00%	5
Other (please describe)	20.00%	2
TOTAL		10

Q8 What is your primary strategy for purchasing lumber?

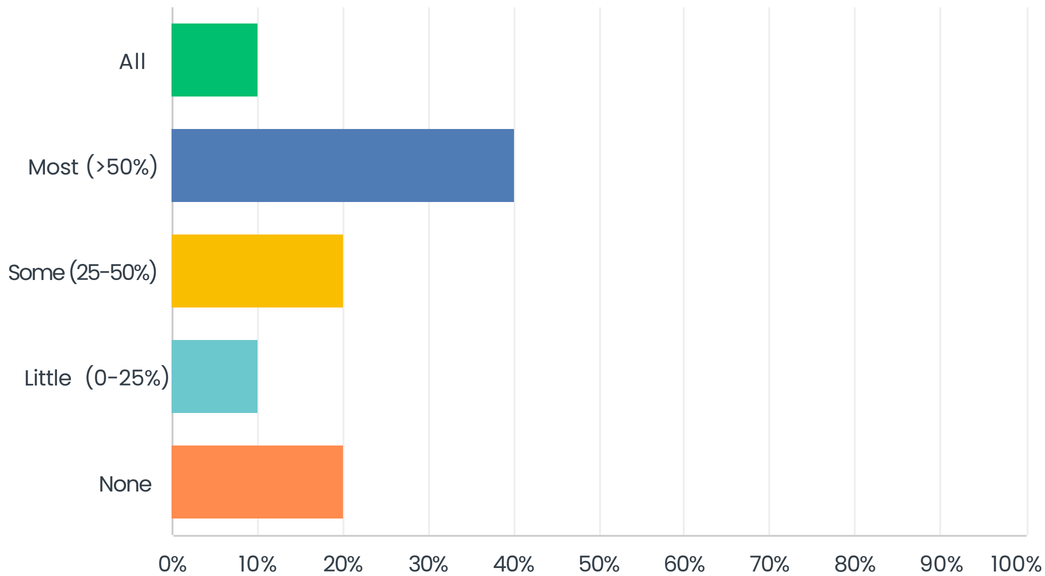
Answered: 8 Skipped: 2



ANSWER CHOICES	RESPONSES	
Purchasing on the open market directly from sawmills	25.00%	2
Purchasing on the open market through lumber broker	37.50%	3
Vertically integrated sawmill	0.00%	0
Dedicated supply agreement with sawmill partner(s) or distributor(s)	37.50%	3
TOTAL		8

Q9 What percentage of the mass timber your fabricate (use in your projects) comes from OR and WA manufacturers?

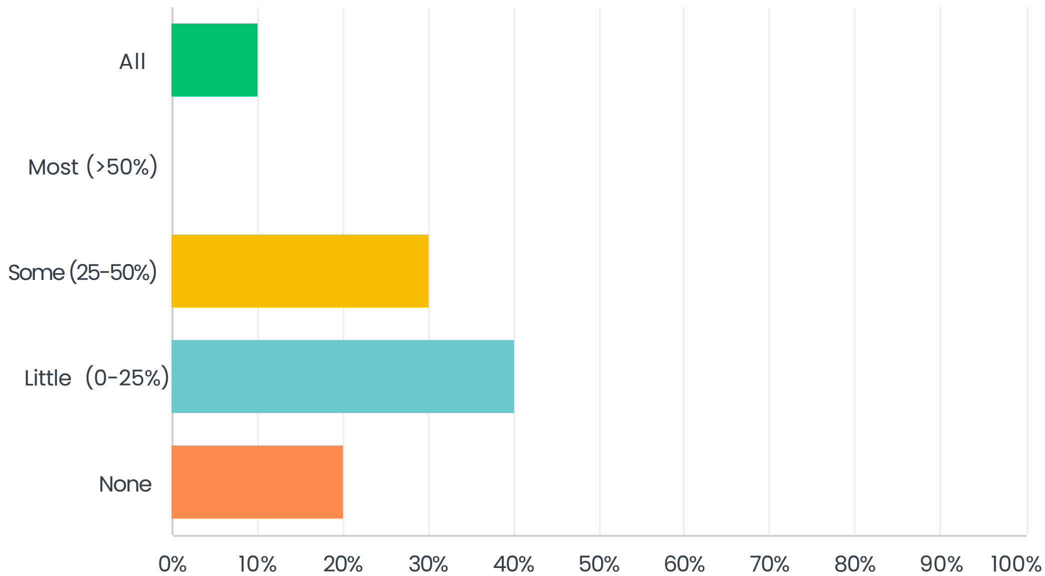
Answered: 10 Skipped: 0



ANSWER CHOICES	RESPONSES	
All	10.00%	1
Most (>50%)	40.00%	4
Some (25-50%)	20.00%	2
Little (0-25%)	10.00%	1
None	20.00%	2
TOTAL		10

Q10 What percentage of the mass timber your fabricate (use in your projects) comes from Canadian manufacturers?

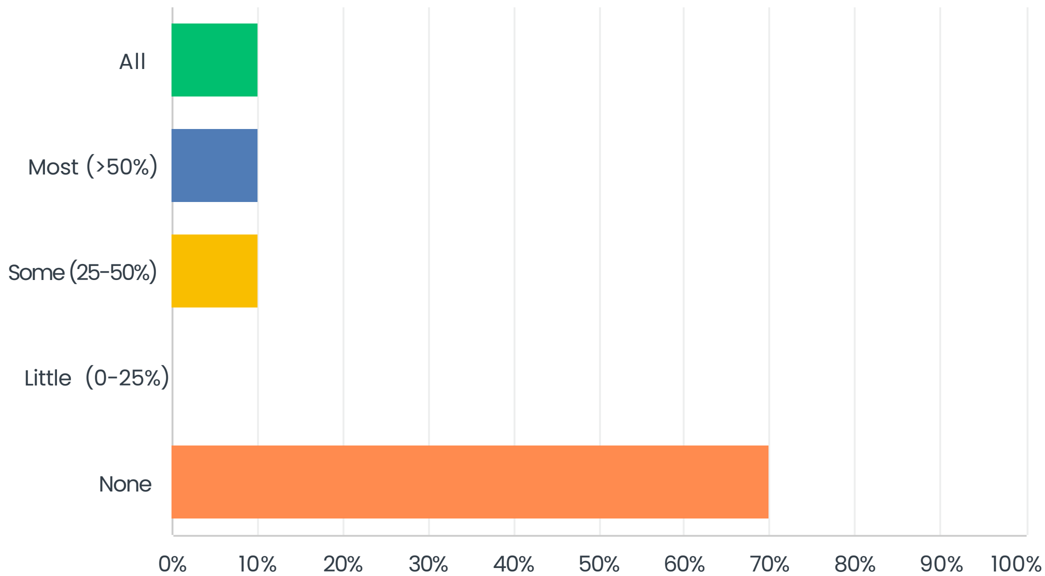
Answered: 10   Skipped: 0



ANSWER CHOICES	RESPONSES	
All	10.00%	1
Most (>50%)	0.00%	0
Some (25-50%)	30.00%	3
Little (0-25%)	40.00%	4
None	20.00%	2
TOTAL		10

Q11 What percentageof the mass timber your fabricate (use in your projects) comes from European manufacturers?

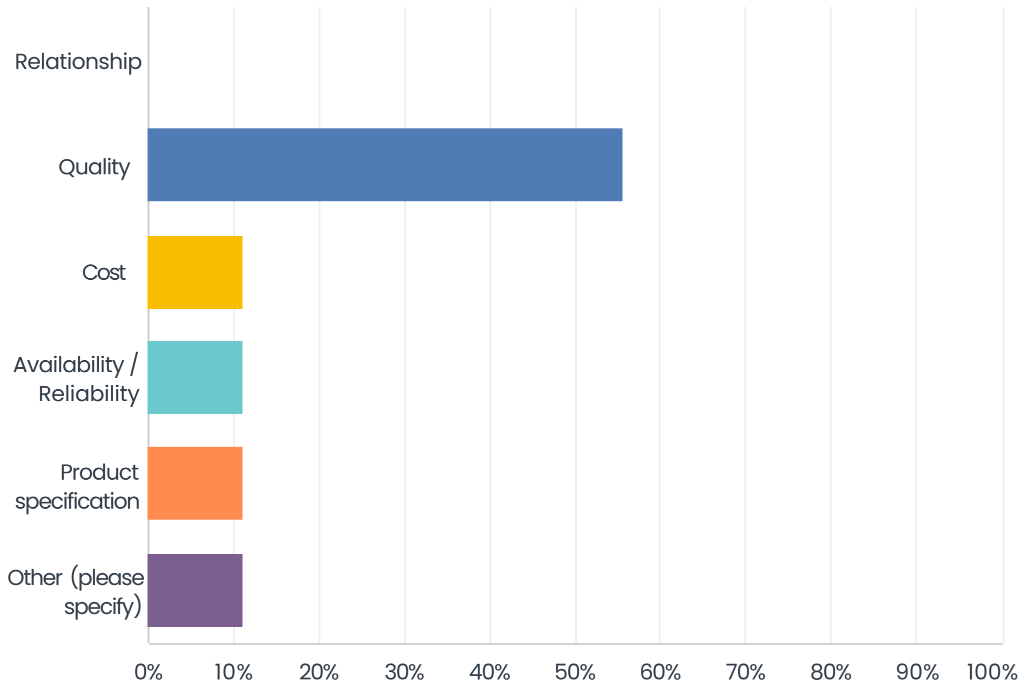
Answered: 10 Skipped: 0



ANSWER CHOICES	RESPONSES	
All	10.00%	1
Most (>50%)	10.00%	1
Some (25-50%)	10.00%	1
Little (0-25%)	0.00%	0
None	70.00%	7
TOTAL		10

Q12 If/when you process material from Canada and Europe, what is the primary reason for this procurement strategy?

Answered: 9 Skipped: 1

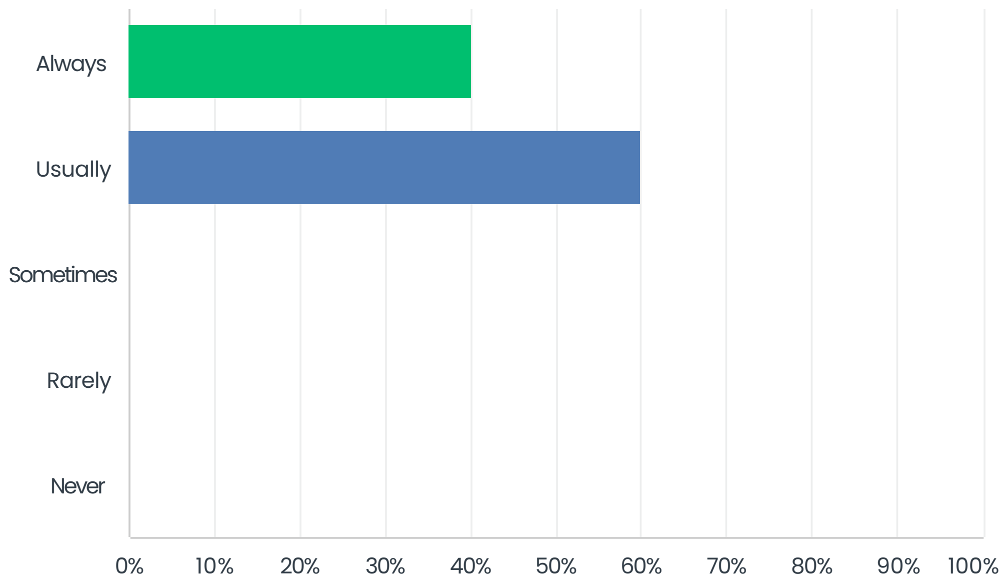


ANSWER CHOICES	RESPONSES	
Relationship	0.00%	0
Quality	55.56%	5
Cost	11.11%	1
Availability / Reliability	11.11%	1
Product specification	11.11%	1
Other (please specify)	11.11%	1
TOTAL		9

Other (please specify)	
Response 1	Customer specified

Q13 Are you including steel connectors with your supply package?

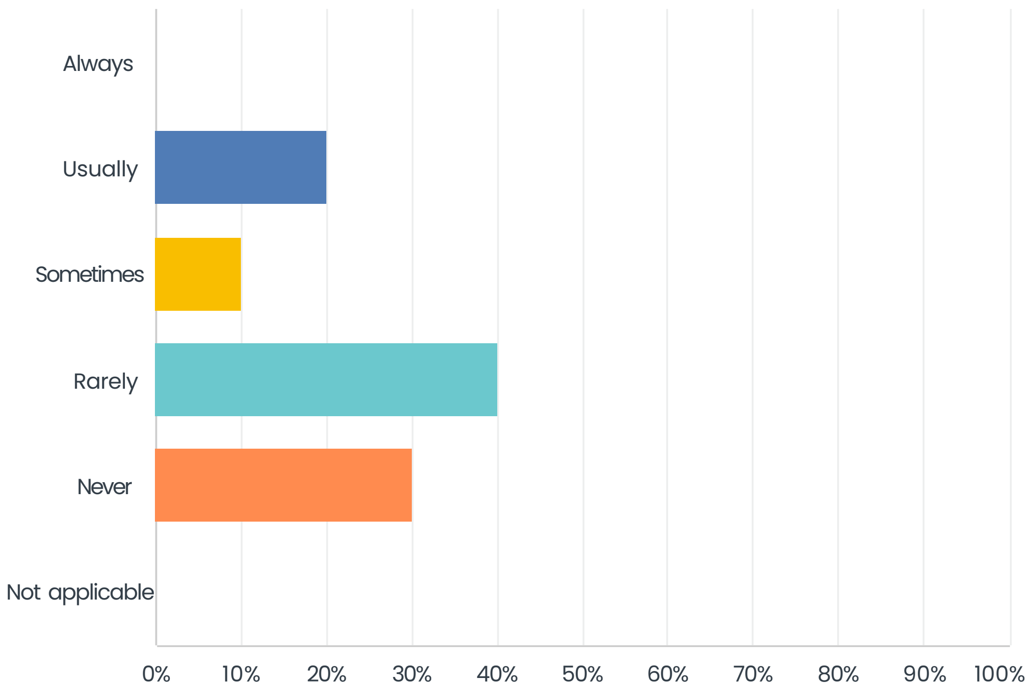
Answered: 10 Skipped: 0



ANSWER CHOICES	RESPONSES	
Always	40.00%	4
Usually	60.00%	6
Sometimes	0.00%	0
Rarely	0.00%	0
Never	0.00%	0
TOTAL		10

Q14 Do you struggle to procure custom steel assemblies for your projects?

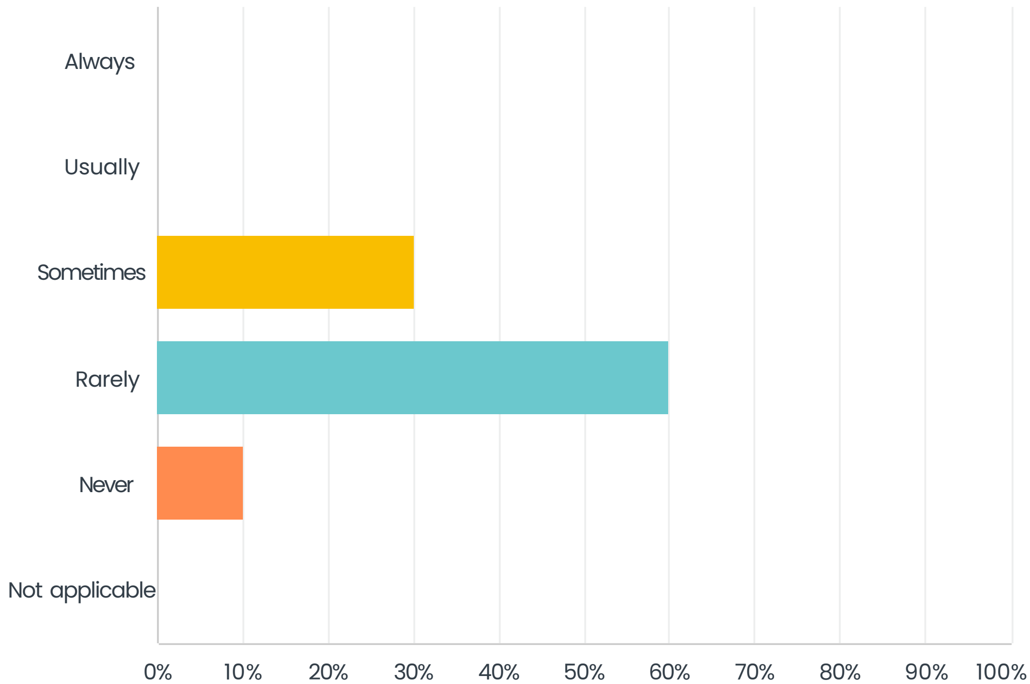
Answered: 10 Skipped: 0



ANSWER CHOICES	RESPONSES	
Always	0.00%	0
Usually	20.00%	2
Sometimes	10.00%	1
Rarely	40.00%	4
Never	30.00%	3
Not applicable	0.00%	0
TOTAL		10

Q15 Do you struggle to procure pre-engineered off-the-shelf connectors and fasteners for your projects, due to availability or lead time?

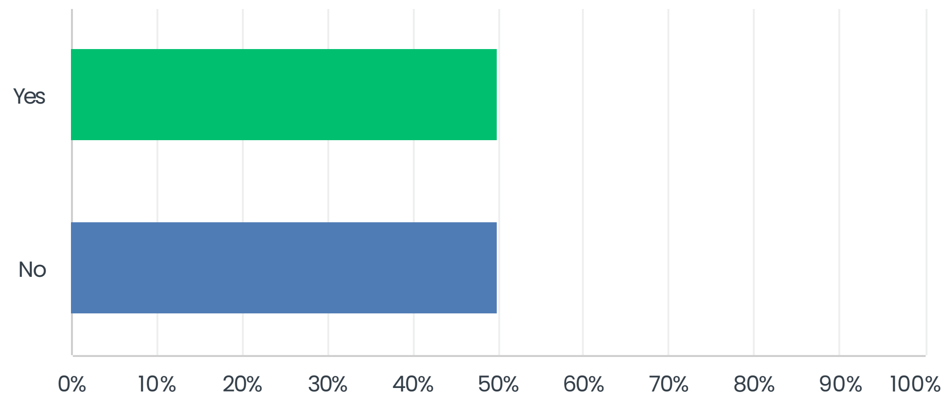
Answered: 10   Skipped: 0



ANSWER CHOICES	RESPONSES	
Always	0.00%	0
Usually	0.00%	0
Sometimes	30.00%	3
Rarely	60.00%	6
Never	10.00%	1
Not applicable	0.00%	0
TOTAL		10

Q16 Are steel tariffs affecting how you procure fasteners and connectors?

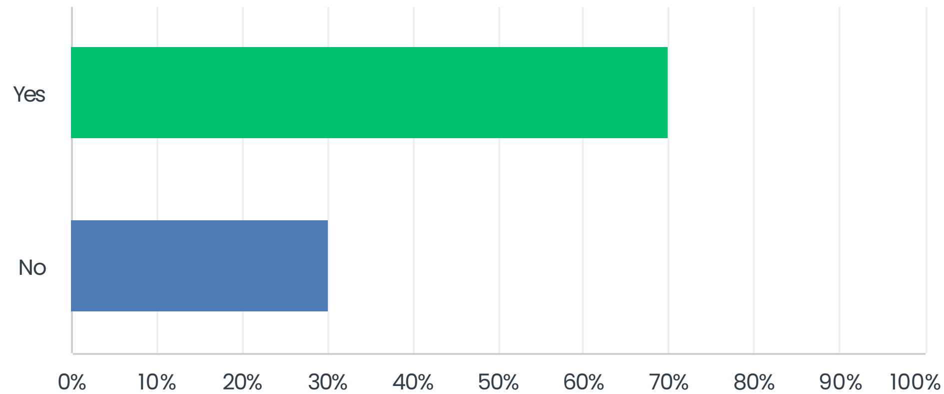
Answered: 10 Skipped: 0



ANSWER CHOICES	RESPONSES	
Yes	50.00%	5
No	50.00%	5
TOTAL		10

Q17 Are wood tariffs or duties affecting how you procure lumber for your projects?

Answered: 10 Skipped: 0



ANSWER CHOICES	RESPONSES	
Yes	70.00%	7
No	30.00%	3
TOTAL		10

Q18 How manyoffice workers do you have on staff?

Answered: 9 Skipped: 1

Responses	
Response 1	6
Response 2	8
Response 3	12
Response 4	25
Response 5	5
Response 6	4
Response 7	5
Response 8	3
Response 9	9

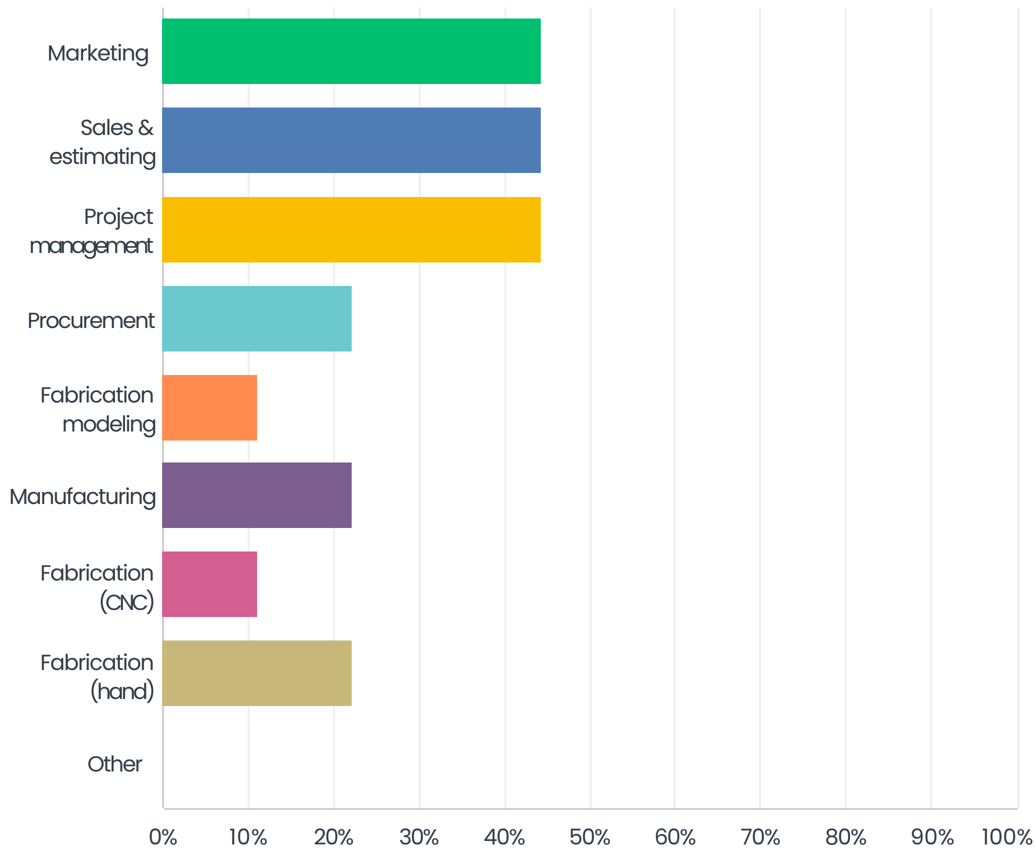
Q19 How many production workers do you have working each shift at each of your facilities? Please name facility and the number of employees.

Answered: 9 Skipped: 1

Responses	
Response 1	20
Response 2	6
Response 3	8
Response 4	25
Response 5	4
Response 6	3
Response 7	3
Response 8	3
Response 9	9

Q20 In what areas of your business do personnel constraints impact your team's ability to delivery mass timber projects? Please check all that apply.

Answered: 9 Skipped: 1



ANSWER CHOICES	RESPONSES	
Marketing	44.44%	4
Sales & estimating	44.44%	4
Project management	44.44%	4
Procurement	22.22%	2
Fabrication modeling	11.11%	1
Manufacturing	22.22%	2
Fabrication (CNC)	11.11%	1
Fabrication (hand)	22.22%	2
Other	0.00%	0
Total Respondents: 9		

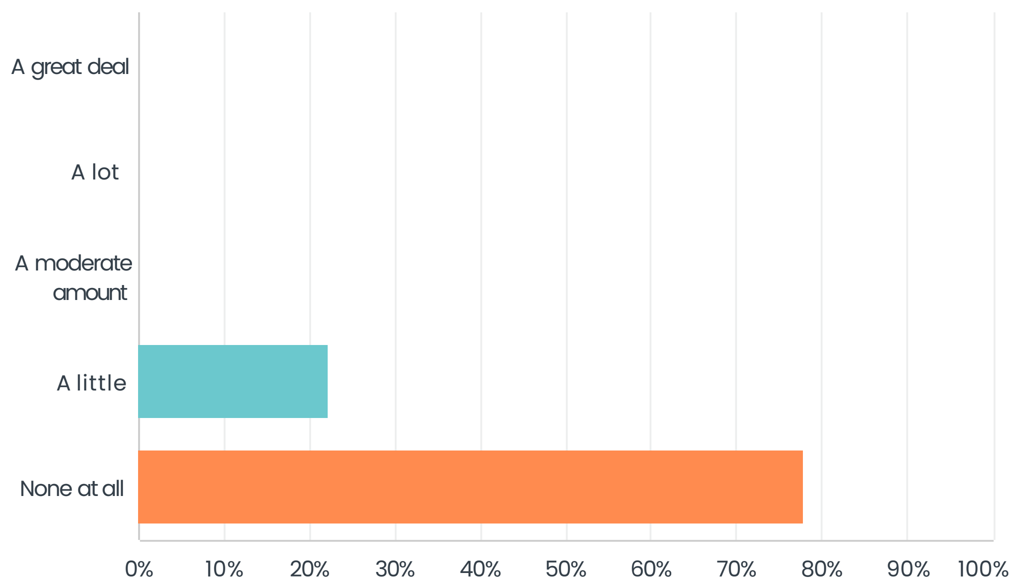
Q21 How many people do you have on staff doing digital design / 3D modeling? State 0 if none.

Answered: 9 Skipped: 1

Responses	
Response 1	2
Response 2	4
Response 3	5
Response 4	5
Response 5	3
Response 6	1
Response 7	2
Response 8	2
Response 9	1

Q22 Do you outsource 3D digital modeling services for manufacturing and / or clash detection?

Answered: 9 Skipped: 1



ANSWER CHOICES	RESPONSES	
A great deal	0.00%	0
A lot	0.00%	0
A moderate amount	0.00%	0
A little	22.22%	2
None at all	77.78%	7
TOTAL		9

Q23 If you are comfortable sharing, which companies have you partnered with (past & present) for fabrication modeling? This will help us define the extent of the mass timber ecosystem in North America.

Answered: 6 Skipped: 4

Responses	
Response 1	Mitek (Vietnam)
Response 2	Western Wood Structures, Cut My Timber
Response 3	none
Response 4	none
Response 5	1
Response 6	Freres, Nordic, Smartlam, Kalesnikoff, Spearhead, Zip-O-Laminators, Timberlab, Smartlam, etc.

Q24 How many people do you have on staff doing timber engineering? State 0 if none.

Answered: 9 Skipped: 1

Responses	
Response 1	1
Response 2	4
Response 3	1
Response 4	1
Response 5	0
Response 6	0
Response 7	1
Response 8	1
Response 9	0

Q25 How many people do you have on staff doing sales/marketing and estimating?

Answered: 9   Skipped: 1

Responses	
Response 1	2
Response 2	3
Response 3	3
Response 4	2
Response 5	1
Response 6	1
Response 7	2
Response 8	2
Response 9	3

Q26 How many people do you have on staff managing projects?

Answered: 9 Skipped: 1

Responses	
Response 1	3
Response 2	2
Response 3	2
Response 4	3
Response 5	3
Response 6	1
Response 7	2
Response 8	1
Response 9	2

Q27 How many people do you have working in your production facilities?

Answered: 9 Skipped: 1

Responses	
Response 1	20
Response 2	4
Response 3	8
Response 4	25
Response 5	4
Response 6	3
Response 7	3
Response 8	2
Response 9	9

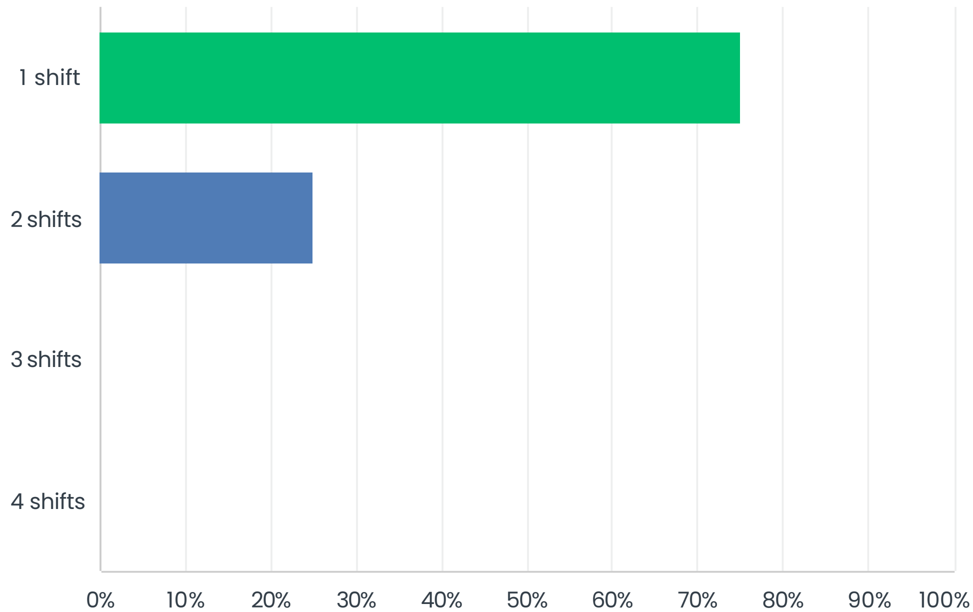
Q28 Please name the installation companies you have partnered with in Oregon and Washington (past & present)?

Answered: 6 Skipped: 4

Responses	
Response 1	CPI and many smaller ones
Response 2	Western Wood Structures
Response 3	none
Response 4	N/A
Response 5	Dozens
Response 6	Mainly GC's self performing installation

Q29 What shift configuration per week have you run, on average, over the past year?

Answered: 8 Skipped: 2



ANSWER CHOICES	RESPONSES	
1 shift	75.00%	6
2 shifts	25.00%	2
3 shifts	0.00%	0
4 shifts	0.00%	0
TOTAL		8

Q30 What is your actual production capacity in a single shift of production? Please include the unit of measure in your response.

Answered: 8 Skipped: 2

Responses	
Response 1	300 m^2
Response 2	10,000 board feet
Response 3	125 units (apartment equivalent)
Response 4	Processing at least 2 billets of CLT, Hand fabrication.
Response 5	2 cabins per month
Response 6	20,000 cubic feet CLT
Response 7	One timber frame home per day
Response 8	9 people, 10 hours (4, 10-hr shifts per week), 80% utilization = 72 man hours

Q31 What is your theoretical (upper bound / maximum) capacity for a single 8-hour shift?

Answered: 8 Skipped: 2

Responses	
Response 1	900 m^2
Response 2	16,000 board feet
Response 3	150
Response 4	8 Billets of CLT processed by hand and turned into structural elements, walls, roof, etc..
Response 5	4 cabins per month
Response 6	40,000 cubic feet CLT
Response 7	two timber frame homes per day
Response 8	Approximately 40 Board Feet/ fabrication hour

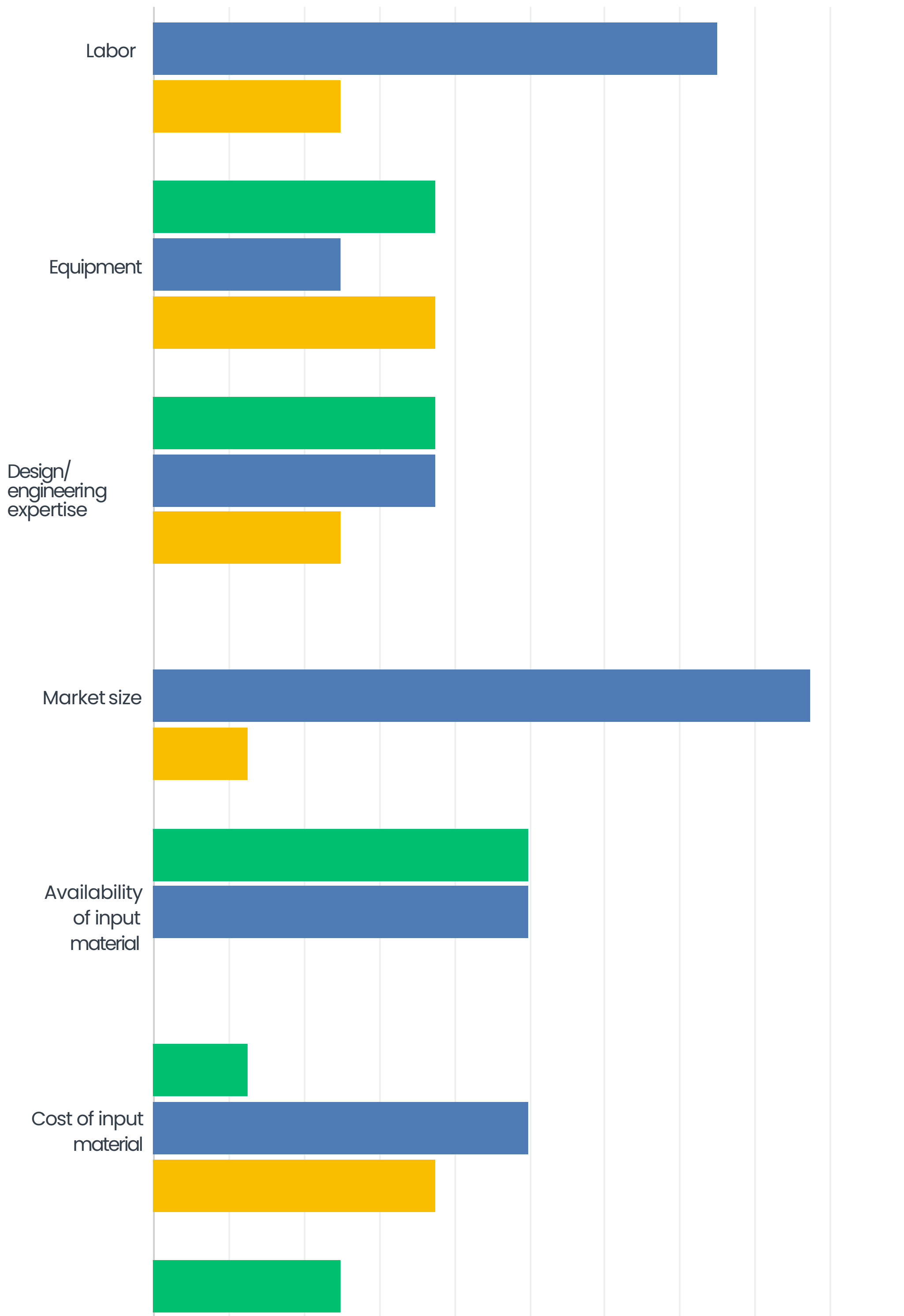
Q32 How do you calculate theoretical (upper bound / maximum) capacity for a single 8-hour shift?

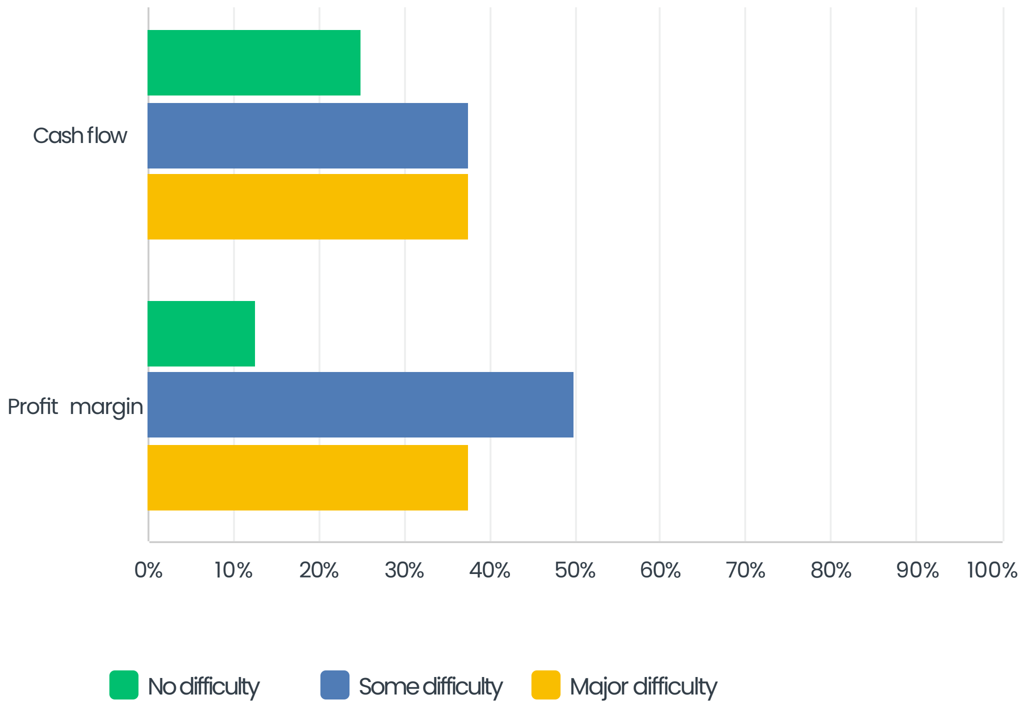
Answered: 8 Skipped: 2

Responses	
Response 1	depends a lot on the projects and fabrication details
Response 2	We use value stream mapping to understand our main bottleneck and calculate from there
Response 3	Measured takt time including time waste
Response 4	production worker productivity on average, estimating based on how much work can be done by our team in one shift.
Response 5	Space in the shop for cabins under construction at a single point in time.
Response 6	Throughput calculated through process flow/cycle time KPIs
Response 7	Depends on the projects, mass timber is not a commodity product for secondary manufacturers.
Response 8	This is based on past performance on Mass Timber projects. Note that this number varies greatly based on project details.

Q33 In which areas is your business challenged?

Answered: 8 Skipped: 2



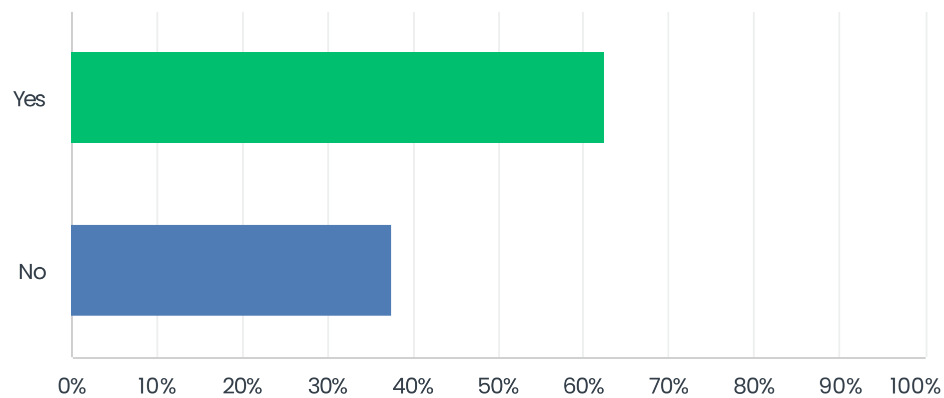


	NO DIFFICULTY	SOME DIFFICULTY	MAJOR DIFFICULTY	TOTAL
Labor	0.00% 0	75.00% 6	25.00% 2	8
Equipment	37.50% 3	25.00% 2	37.50% 3	8
Design/engineering expertise	37.50% 3	37.50% 3	25.00% 2	8
Market size	0.00% 0	87.50% 7	12.50% 1	8
Availability of input material	50.00% 4	50.00% 4	0.00% 0	8
Cost of input material	12.50% 1	50.00% 4	37.50% 3	8
Cash flow	25.00% 2	37.50% 3	37.50% 3	8
Profit margin	12.50% 1	50.00% 4	37.50% 3	8

Other (please specify)	
Response 1	Length of sales cycle and tariff uncertainty
Response 2	Insignificant public and government support for the PNW supply chain
Response 3	The Mass Timber manufacturing and fabrication space has become very competitive over the last few years. As a small shop that hand fabricates, it is challenging to meet the price point necessary to win jobs while also making a profit.

Q34 Are you currently considering expanding your capacity in your current location?

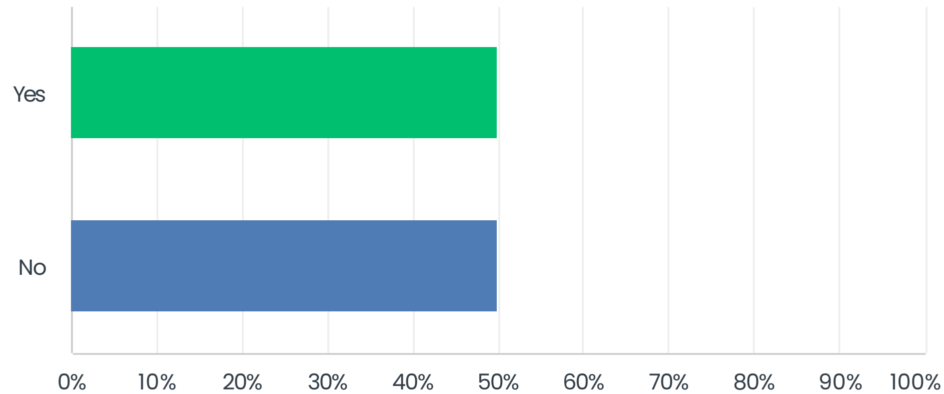
Answered: 8 Skipped: 2



ANSWE R CHOICES	RE SPONSE S	
Yes	62.50%	5
No	37.50%	3
TOTAL		8

Q35 Are you currently considering expanding your capacity in a new location?

Answered: 8 Skipped: 2



ANSWER CHOICES	RESPONSES	
Yes	50.00%	4
No	50.00%	4
TOTAL		8

Q36 What would help you make the decision to expand?

Answered: 8 Skipped: 2

Responses	
Response 1	just opened this new location
Response 2	Reducing the pricing of incoming material would make us more competitive against steel. Increasing our margins and output through new products we are developing and how quickly they are adopted will also drive this decision.
Response 3	Clearer demand from developers
Response 4	The financial support that comes from grants, investors, and or large projects where we would need to scale.
Response 5	Strong demand for a larger scale project.
Response 6	Stronger market demand indicators
Response 7	Regional support for the companies in the supply chain doing ALL the risky heavy lifting to develop the supply chain
Response 8	Believe that additional fabrication capacity would allow us a more competitive place in the Mass Timber market.

Q37 What is the average project size you are delivering, in dollars revenue?

Answered: 8 Skipped: 2

Responses	
Response 1	$150,000
Response 2	$80,000
Response 3	$5,000,000
Response 4	$250,000
Response 5	$300,000
Response 6	$750,000
Response 7	$350,000
Response 8	$250,000

Q38 What is the average project size you are delivering, in total area of mass timber structure?

Answered: 7 Skipped: 3

Responses	
Response 1	120 m^3
Response 2	50000
Response 3	1100 Square feet of Mass timber structure.
Response 4	400 FT2
Response 5	1035 cubic feet CLT
Response 6	25,000
Response 7	Approx. 10,000 to 25,000 square feet

Q39 What is the average project size you are delivering, in area of product (such as floor cassettes or facade panels), if applicable?

Answered: 4 Skipped: 6

Responses	
Response 1	6 glulam trusses
Response 2	75,000
Response 3	1 fully prefabricated cabin
Response 4	15,000 to 30,000 Board Feet

Q40 What is the average project size you are delivering, in number of modules, if applicable?

Answered: 4   Skipped: 6

Responses	
Response 1	0
Response 2	1
Response 3	1
Response 4	250 to 500 pieces

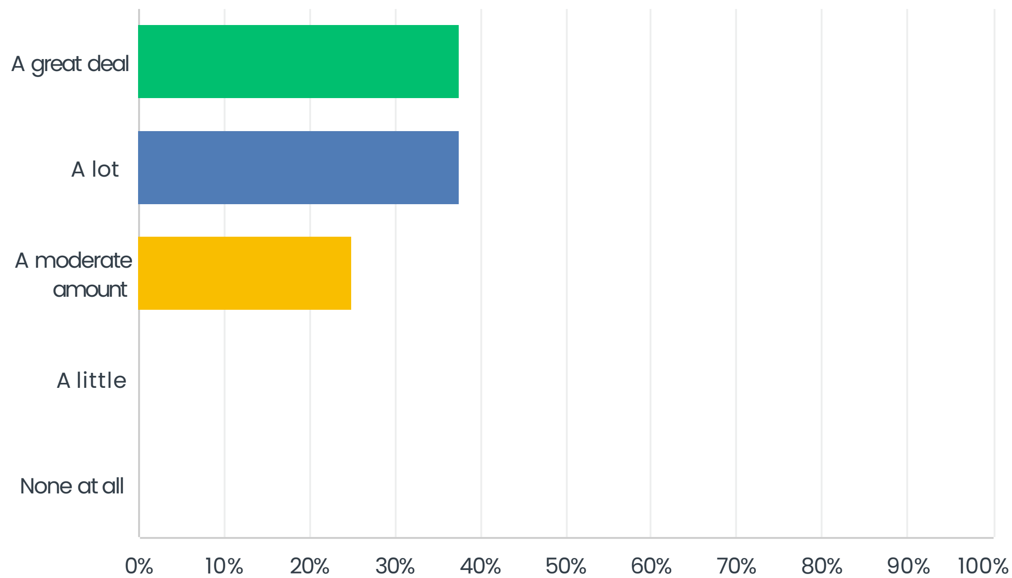
Q41 What current regulations or policies (ex: forest management, building codes, procurement policies, etc.) do you perceive to constrain your mass timber business?

Answered: 7 Skipped: 3

Responses	
Response 1	Codes does not targeting our production but hurt innovation. It explodes the cost in comparison to Europe
Response 2	The constraint on timber harvesting seem to be keeping lumber prices high
Response 3	requiring concrete topping
Response 4	mixed use of ORSC and OSSC, ORSC permits engineered wood, but defers mass timber to OSSC. Our work is Just, but to win federal support today, we have to speak bureaucracy in translation. its a bleak landscape for mission driven work.
Response 5	Energy code complexity
Response 6	Building codes, extremely long permitting times, extremely expensive land and housing costs in the PNW plus minimal governmental support for the regional mass timber industry.
Response 7	Building codes, life cycle analysis understanding, and a need for more commitment to higher cost up front to mitigate carbon emissions over the life of the building.

Q42 To what extent has your business grown in the past 5 years?

Answered: 8 Skipped: 2



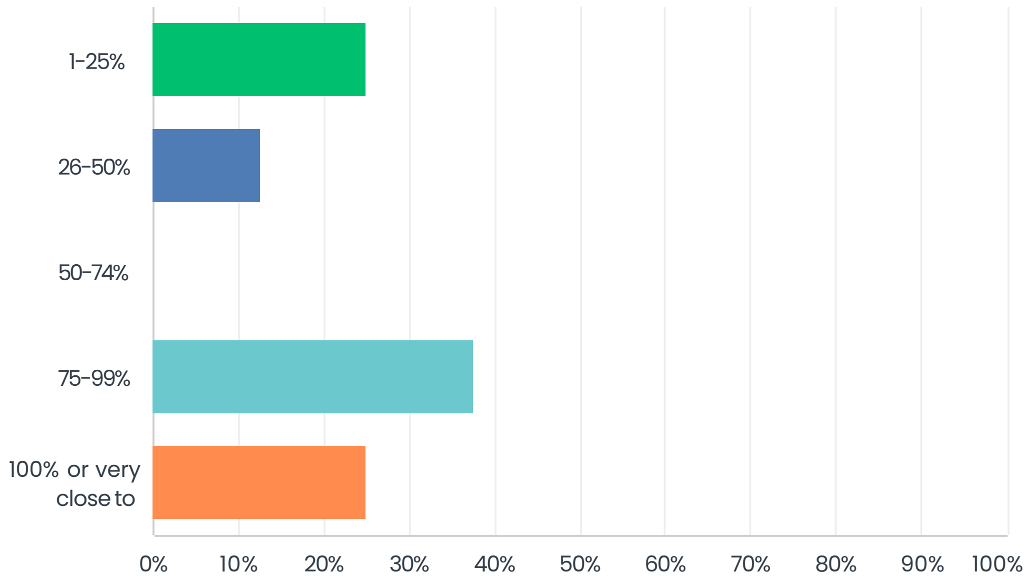
ANSWER CHOICES	RESPONSES	
A great deal	37.50%	3
A lot	37.50%	3
A moderate amount	25.00%	2
A little	0.00%	0
None at all	0.00%	0
TOTAL		8

Q43 If you feel comfortablesharing, what is your current annual revenue, approximately?

Answered: 6 Skipped: 4

Q44 What percentage of your revenue is tied to mass timber?

Answered: 8 Skipped: 2



ANSWER CHOICES	RESPONSES	
1-25%	25.00%	2
26-50%	12.50%	1
50-74%	0.00%	0
75-99%	37.50%	3
100% or very close to	25.00%	2
TOTAL		8

Q45 Are tariffs affecting which markets you can competitively sell into? If yes, please describe how.

Answered: 6 Skipped: 4

Responses	
Response 1	yes
Response 2	No we are currently just selling in America and Canada
Response 3	It doesn't allow us to procure from countries with tariffs
Response 4	Yes - to meet energy code, very high performance windows are required and the manufacturing is in Europe. The custom glulam beams for some of our designs come from FraserWood in BC, Canada.
Response 5	Yes; affordable and workforce housing difficult to make work right now because margins get too tight.
Response 6	Not currently

Q46 What types of financing instruments do you currently utilize to support mass timber-related efforts or projects?

Answered: 8 Skipped: 2

Responses	
Response 1	private
Response 2	None
Response 3	government financing
Response 4	Grants, Loans, private investors, Family loans.
Response 5	Bootstrap from ownership group.
Response 6	line of credit
Response 7	Bank loans
Response 8	We have not utilized financing for Mass Timber related activities

Q47 What granting agencies have you been most successful in obtaining funding from?

Answered: 8 Skipped: 2

Responses	
Response 1	USDA, county
Response 2	We have yet to have a successful grant
Response 3	many - federal and local
Response 4	Northwest native chamber, USDA,
Response 5	NA
Response 6	state programs
Response 7	US Forest Service Innovation Grants
Response 8	NA

Q48 What types of financing instruments are most needed?

Answered: 6 Skipped: 4

Responses	
Response 1	Grants for marketing and new equipment
Response 2	prefab financing - upfront down payments
Response 3	Grants, private investors,
Response 4	Banking line of credit for materials ordering.
Response 5	Low interest government loans and loan guarantees for capital expenses.
Response 6	NA

Q49 Where would you like to see investments be made to grow the mass timber industry and market?

Answered: 8 Skipped: 2

Responses	
Response 1	panels with mass timber and ready to install (windows, insulation, elect.) Prefab walls , floors and roofs
Response 2	Education in how architects and engineers need to modify designs to make the fabrication easier and increase supply
Response 3	both supply and demand
Response 4	Tribes.
Response 5	Capital access for small (and growing!) manufacturers.
Response 6	Subsidies for projects. More projects mean more companies will invest in personnel and infrastructure. Direct subsidies or grants to companies are of course helpful, but don't create market demand and are - in my opinion - a more risky way of investing int he growth of the mass timber industry.
Response 7	Support and promotion of the private sector companies assuming ALL the risk and expenses to create and expand the regional mass timber supply chain. Promotion and marketing of the PNW mass timber private sector companies like Canada promotes and subsidizes its mass timber companies.
Response 8	Access to capital for smaller businesses looking to expand in the Mass Timber market

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12. About the Authors

12.1 The Beck Group

Beck is a forest products planning and consulting firm based in Portland, Oregon. For nearly 45 years, our firm has been assisting forestry- and forest products-related organizations. For well over a decade, we have been consulting on mass timber with private businesses, government agencies, and universities.

ROY ANDERSON
Vice President, Senior Consultant, and Project Manager

Since joining The Beck Group in 2006, Roy Anderson has led a variety of planning and consulting projects. For one of Roy's specialty areas, utilizing small-diameter trees, he has completed dozens of technology screening studies and associated supply, market, and feasibility studies. Roy has also been heavily involved in BECK's mass timber work including analysis of mass timber markets, mass timber usage factors in buildings, fiber yield factors in glulam and CLT manufacturing, manufacturing capacity estimates, CLT and glulam feasibility, and more.

Roy has also performed many feasibility studies aimed at utilizing various forms of small diameter timber and biomass including mass timber, cogeneration, wood pellets/briquettes, bagged shavings, post and pole manufacturing, and firewood production. From that work, Roy has developed expertise covering all these technologies, as well as knowledge of raw material supply, matching plant size to available supply, capital costs, operating costs, product sales values, and financial analysis.

More recently, Roy has been involved in The Beck Group's various benchmarking/competitive assessment studies, which allow participants to understand their firm's performance relative to peers and to identify improvement opportunity areas. Roy's various roles in the studies have included recruiting participants, mill visits to assure the accuracy of the data collected, and delivering the study results to the participating firms' management teams.

Roy has more than 25 years of experience in the field of forestry and forest products. Before joining The Beck Group, he was a forest products specialist with the Montana State University Extension Service, where his responsibilities included developing and delivering forest products utilization and marketing outreach programs to Montana's forest products industry and private forest landowners. Roy has a Ph.D in Forest Products Marketing from Oregon State University, a Master's in Wood Science from the University of Minnesota, and a BS in Forest Management from the University of Wisconsin-Stevens Point. His research has been published in the Journal of Forestry and the Forest Products Journal. Roy started his forestry career in Wisconsin's hardwood timber industry where he worked as a procurement forester, hardwood lumber salesperson, and logger.

12.2 Erica Spiritos LLC

Erica Spiritos has a decade of experience growing the mass timber industry in the Pacific Northwest and nationally. Her consulting practice focuses on strategic planning and business development for existing manufacturers and start-up enterprises, as well as industry research on a national scale. She also serves as the founding Director of MASSTAC, the Washington State Mass Timber Accelerator.

ERICA SPIRITOS
Founder, Owner

Erica has long been interested in the design of urban environments in ways that honor the natural resources on which our lives depend. For nearly a decade, Erica has dedicated her professional energy to advancing the use of mass timber. In her consultancy practice, Erica is sustainably growing regional mass timber ecosystems across the United States, working with public and private clients to develop new products, policies, and business models that promote social equity and climate resilience.

Erica began her journey in mass timber as a sales representative for Structurlam, and later went on to co-found Swinerton's mass timber division—a mission-driven group that became Timberlab, a world-renowned provider of holistic mass timber systems with a reputation for collaboration and innovation. As Vice President and Director of Preconstruction for Timberlab, Erica led a team that brought mass timber dreams to life, helping to deliver precedent-setting projects and driving innovation into the mass timber supply chain.

12.3 Whirlwind Consultants

Led by Nicholas Sills, Whirlwind has significant experience in building and executing mass timber and other value-added wood product business plans. Nicholas brings in-depth financial and business modeling skillsets coupled with unique insights into market challenges. Whirlwind is currently managing $600 million in planned business investments across North America.

NICHOLAS SILLS
Principal

Nick is the Principal and Founder of Whirlwind Consultants, a firm he re-established three years ago to champion value-added forestry opportunities across North America. Leveraging a Master's in Timber Engineering from Bern University of Applied Sciences, Nicholas has emerged as a trusted advisor on sustainable construction, product innovation, and advanced manufacturing in the wood products sector.

Under his leadership, Whirlwind Consultants is currently engaged in over $600 million worth of capital business developments spanning mass timber manufacturing, wood fiber insulation projects, and prefabricated building components. Nicholas and his team also collaborate on governmental studies aimed at broadening the economic potential of forestry resources and championing carbon-neutral approaches. His deep understanding of feasibility analysis, project management, and market development enables clients to navigate complex regulatory environments while optimizing cost and performance.

Before founding Whirlwind Consultants, Nicholas served in various leadership roles at prominent mass timber companies where he introduced Industry 4.0 technologies, orchestrated structural design innovations, and streamlined supply chain processes. Known for his hands-on approach, he aligns cross functional teams—ranging from engineers and project managers to architects and investors—to accelerate time to market and achieve sustainable growth.

Nicholas's commitment to innovative, results-driven solutions is reflected in his active participation in industry events such as the International Mass Timber Conference, Holzbau Forum, and IWBC. He remains closely connected to emerging trends in both North American and European wood construction, advocating for advanced building materials that reduce environmental impact while enhancing design flexibility and market competitiveness.

12.4 Conifer Advising LLC

Conifer Advising is a mass timber consultancy dedicated to driving systemic change in the real estate, design, and construction industries by making mass timber the default choice for developers and architects. The firm is led by Kristin Slavin, a seasoned expert with over a decade of experience across the entire mass timber lifecycle, including development, architecture, construction, and prefabricated manufacturing. Conifer Advising is founded on the principle that sharing experience, knowledge, and collaborative processes to enable mass timber will increase the feasibility for developers to build innovative, low-carbon buildings.

Conifer Advising partners with a diverse clientele, including government agencies, institutions, developers, design teams, and manufacturers to overcome the critical barriers to mass timber adoption. The firm's services are rooted in deep industry knowledge and critical thinking, providing expert guidance to streamline projects, reduce risk, and eliminate costly re-work. This advisory work encompasses providing strategic design and pre-construction feedback, facilitating key industry connections, conducting in-depth market analysis, mass timber and prefab product development, and transforming traditional, bespoke project delivery models into productized, highly efficient building systems.

KRISTIN SLAVIN, AIA, LEED BD+C
Founder | Mass Timber Specialist

Kristin Slavin, AIA, LEED AP BD+C, NCARB, is a recognized leader, architect, and mass timber specialist dedicated to creating creative, efficient, and sustainable building solutions. As the Founder of Conifer Advising, she partners with developers, owners, and design teams to streamline mass timber and prefabricated projects, providing expert knowledge to reduce risk and enhance collaboration across disciplines.

Kristin's work has consistently focused on lowering the embodied and operational carbon of buildings by leading the shift to productized, systems-based delivery. At Sidewalk Labs/Google, she led product design and testing for breakthrough mass timber assemblies, developing sustainable procurement and timber policies, and standardizing product- and building-level carbon accounting. Before that, while an Associate at Kaiser + Path, she was instrumental in establishing the Type IV-C building code precedent in the 2021 IBC, culminating in the design, permitting, and construction of Carbon12, the tallest mass timber building in the US at its completion.

She is a dedicated community leader, formerly serving on the Board of the AIA Portland Chapter and as a member of the World Economic Forum Sustainable Mass Timber Action Community.

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2025 PNW Regional Mass Timber Market Study