NHLA

NHLA ANNUAL REPORT ON THE NORTH AMERICAN THERMALLY MODIFIED WOOD (TMW) MARKET – 2025

Funded by Jartek

September 1, 2025 | National Hardwood Lumber Association (NHLA) | Memphis, TN

A data-driven overview of where the market stands—and what NHLA members can do now to shape standards, demand, and long-term profitability.

AUTHORS

Sailesh Adhikari
Director of Research and Development

Dallin Brooks
Executive Director

Dana Spessert
Chief Inspector

Natalie Thelen
Chief Marketing Officer

Melissa Ellis Smith
Creative Director

Brennah Hutchison
Hardwood Industry Liaison and Content Director

CONTACT

Sailesh Adhikari
Director of Research and Development
s.adhikari@nhla.com
(901) 399-7552

Photos courtesy of:
- Arbor Wood Co. (pages 2, 8, 12 and 43)
- Jartek (front cover top image, page 4 right and page 44)
- ThermalWood Canada (front cover bottom image, pages 6, 55 and back cover)
- Thermory (page 4 left, pages 10 and 57)


JARTEK

PREFACE

Thermally Modified Wood (TMW) is gaining momentum in North America — but the market is still writing its rulebook.

Demand is rising for materials that last longer, perform better, and meet higher sustainability expectations. TMW directly responds to these demands, offering enhanced durability and stability without the use of chemicals. Adoption is accelerating, but inconsistent terminology, uneven performance claims, and limited shared data are slowing specification and scale. This report is designed to give producers and specifiers a common reference point—and to support standards that unlock broader markets. This report was created to bring that clarity.

Funded by Jartek and independently produced by the National Hardwood Lumber Association (NHLA), this report offers an objective snapshot of the North American thermal modification market — where it stands today, and its trajectory forward.

Jartek designs and delivers industrial technology that enables producers to manufacture TMW with consistent, high-end quality. Supporting this report reflects a simple belief: heat alone does not define thermal modification — control, knowledge, and standards do. Markets are more than machinery. They are built by shared understanding, transparent data, and trust across the value chain. If you produce, distribute, test, specify, or sell TMW, NHLA invites you to contribute data, field experience, and feedback to strengthen the next edition and inform standards development.

We hope this report helps move the conversation forward and supports the responsible growth of thermally modified wood in North America.

Tuuli Luoranen
Chair of the Board, Jartek US Inc.
+358 40 836 9283
tuuli.luoranen@jartek.com

Jeroen Hinnen
Sales Manager North America, Jartek US Inc.
+1367-330-8997
jeroen.hinnen@jartek.com

US: Jartek US Inc.
850 New Burton Road
Suite 201
Dover, Kent, Delaware 19904

Canada: Les Enterprises Jartek Canada Inc.
125, rue des Forges.
Bureau 600.
Trois-Rivieres (Quebec) G9A 2G7

HQ: Jartek Invest Oy
Svinhufvudinkatu 19
5110 Lahti, Finland

Together, we can shape new markets, strengthen domestic manufacturing, and ensure that North American hardwoods remain a global leader in performance, sustainability, and innovation.

FOREWORD

National Hardwood Lumber Association (NHLA)

The National Hardwood Lumber Association (NHLA) is proud to present its first annual report, offering a comprehensive analysis of thermally modified wood (TMW) in North America. Since 1898, NHLA has supported innovation and transparency for hardwood producers, and this report furthers that mission.

Thermally Modified Wood represents one of the most promising value-added technologies available to our industry. With growing demand for sustainable, durable, and specifiable building materials, TMW provides a powerful pathway to elevate the competitiveness of our domestic species. It enables mills to utilize under-valued or under-utilized hardwoods, diversify revenue streams, and meet evolving consumer and specifier expectations with confidence.

Yet, despite its potential, the North American TMW landscape remains fragmented. Producers face inconsistent terminology, limited standards, and varying levels of technical understanding in the marketplace. Architects and builders seek reliable data. Manufacturers need clarity, support, and a unified voice. NHLA is stepping forward to fill that gap.

This report—produced independently by NHLA, funded by Jartek, and supported through the generosity of industry partners—provides a neutral, data-driven foundation for the responsible growth of TMW across the U.S. and Canada. It reflects months of research, industry interviews, and collaborative engagement across the value chain. Our newly formed NHLA Thermal Modification Task Force is already building on this work by developing North America's first cohesive framework for classification, certification, and performance consistency.

But the success of this initiative depends on more than research and reporting. It depends on our members, partners, and stakeholders. NHLA invites your candid feedback, your technical expertise, and your continued support. Together, we can shape new markets, strengthen domestic manufacturing, and ensure that North American hardwoods remain a global leader in performance, sustainability, and innovation.

NHLA's Thermal Modification Task Force is developing a North American framework for terminology, classification, and performance consistency. We need member participation—producers, distributors, researchers, and downstream manufacturers—to supply data, identify knowledge gaps, and validate what works in real markets. Your input will directly shape the next report and the standards that follow.

Next report: March 2027.

“. . . advancing TMW strengthens the entire hardwood industry by expanding applications, diversifying markets, and supporting our mission to Grow and Stabilize the Hardwood Industry.”

NHLA LEADERSHIP PERSPECTIVE

The NHLA Board of Directors recognizes Thermally Modified Wood (TMW) as a significant opportunity to add value to our domestic hardwood species and expand market applications. By increasing value and diversifying demand, we further our mission of growing and stabilizing the hardwood industry. Through member engagement, collaboration with equipment producers and manufacturers, and in-depth market analysis, this report represents an important step in understanding and advancing the TMW sector in North America. NHLA is committed to strengthening industry knowledge, supporting the development of standards and certifications, and serving as the leading association for thermally modified hardwood.

Bucky Pescaglia
Chairman of the Board

Thermally modified hardwood represents a meaningful opportunity for North American species to increase value and compete with tropical and other modified wood imports. As this market continues to mature, structure, consistency, and performance standards are essential for broader adoption among design professionals and specifiers. The NHLA is committed to providing that leadership through research, industry collaboration, and the development of certification standards that promote quality and confidence in thermally modified hardwood products. While not every producer will participate in this segment, advancing TMW strengthens the entire hardwood industry by expanding applications, diversifying markets, and supporting our mission to Grow and Stabilize the Hardwood Industry.

Dana Spessert
NHLA Chief Inspector

TMW MARKET 2025

TABLE OF CONTENTS

1. EXECUTIVE SUMMARY

Thermally Modified Wood (TMW) is emerging as a high-performance, sustainable alternative to chemically treated lumber and imported tropical hardwoods used in North America. This report provides a comprehensive analysis of the TMW market in 2025, evaluating its performance, growth trajectory, and the strategic opportunities shaping its future.

1.1 PRINCIPAL FINDINGS

Market Growth

- North American TMW production capacity has doubled since 2020, with approximately 15 active producers now operating across the U.S. and Canada.
- Annual output remains modest (tens of thousands of cubic meters) but is forecasted to reach ~100,000 m^3 (≈42.4 million board feet; based on 1 m^3 ≈ 424 board feet) by 2030 under current trends.
- Globally, the TMW market was valued at ~$1.3 billion in 2024 and is projected to grow at ~5% annually, reaching ~$1.8 billion by 2030.

Performance and Sustainability

- TMW offers enhanced decay resistance and dimensional stability, rivaling tropical hardwoods, without added chemicals.
- TMW lasts 20+ years in above-ground applications, with equilibrium moisture content reduced by ~50%, minimizing warping and cupping.
- However, strength is reduced by ~10–30%, limiting structural applications. TMW remains recyclable and contributes to Leadership in Energy and Environmental Design (LEED) credits for low-Volatile Organic Compounds (VOC) materials.

Market Drivers

- Growing demand for sustainable building materials is driving increased adoption of TMW.
- TMW enables domestic species (e.g., ash, oak, pine) to replace imported tropical lumber and chemically treated wood.
- The technology adds value to lower-grade or infested lumber, such as ash affected by emerald ash borers.

Applications

- TMW is primarily used in above-ground exterior applications: decking, siding, cladding, pergolas, and outdoor furniture.
- Interior uses include flooring, cabinetry, and millwork, especially where moisture resistance and dimensional stability are critical.
- TMW softwoods (especially pine) are gaining traction in fencing, playsets, and garden structures as non-toxic alternatives to pressure-treated wood.

Challenges

- Lack of unified standards and building code recognition in North America.
- Limited market awareness and persistent misconceptions.
- High initial costs: TMW products typically cost 1.5–2.5× more than untreated lumber.
- Raw material supply constraints in some regions, especially for ash.
- Performance limitations in ground-contact and structural applications.
- Competition from pressure-treated wood, acetylated wood, and wood-plastic composites.

1.2 STRATEGIC RECOMMENDATIONS

1. **Establish Standards and Certification**
   - Accelerate development of a North American TMW standard through NHLA, American Wood Protection Association (AWPA), and American Society for Testing and Materials (ASTM).
   - Launch a certification program to build specifier and consumer confidence.

2. **Industry Collaboration and Branding**
   - Form a dedicated North American TMW Council to coordinate promotion, Research and Development (R&D), and branding.
   - Develop a unified identity and terminology (e.g., "TMW") across the industry.

3. **Outreach to Specifiers and Consumers**
   - Invest in technical guides, Continuing Education Unit (CEU) seminars, and marketing campaigns targeting architects, builders, and homeowners.
   - Train distributors and lumberyard sales teams to effectively promote TMW.

4. **Enhance Technical Data and Warranty**
   - Expand long-term field testing and publish design values.

5. **Foster Innovation and Investment**
   - Support R&D for process improvements and new product development (e.g., TMW veneer panels, Cross-Laminated Timber [CLT]).
   - Leverage grants and partnerships to attract investment and scale production.

This report serves as a strategic roadmap for manufacturers, specifiers, policymakers, and investors to unlock the full potential of TMW in North America. The following sections provide detailed analysis, technical insights, and actionable recommendations to guide industry growth and collaboration.

2. PURPOSE, SCOPE, AND METHODOLOGY

2.1 PURPOSE AND OBJECTIVES

This report was commissioned by NHLA, with funding support from Jartek, to provide a comprehensive, data-driven analysis of the North American market for TMW. The primary objectives are to:

- Document the current state of TMW production and use in North America.
- Analyze market trends, opportunities, and barriers across hardwood and softwood segments.
- Recommend strategic actions to support industry growth, standardization, and stakeholder collaboration.

The report is designed to serve as a strategic resource for a wide range of stakeholders, including:

- Hardwood and softwood producers evaluating investment in thermal modification.
- Equipment suppliers and investors seeking market intelligence and ROI insights.
- Architects, builders, and commercial buyers interested in specifying TMW products.

- Industry associations and policymakers developing standards and incentives.
- Researchers and educators identifying knowledge gaps and aligning R&D efforts.

Ultimately, this report aims to inform strategic decision-making and foster collaboration across the TMW value chain.

2.2 SCOPE OF THE REPORT

Geographically, the report focuses on the United States and Canada, with global benchmarks provided for context.

Both hardwood and softwood segments are covered, including:

- Thermally modified hardwoods (e.g., ash, oak, maple, poplar) are used in decking, flooring, siding, furniture, and millwork.
- Thermally modified softwoods (e.g., pine, spruce, fir) are used in cladding, fencing, garden structures, and non-load-bearing components.

The analysis spans the full value chain, from raw material sourcing and processing technologies to end-use applications and distribution. It also addresses industry infrastructure, such as kiln capacity, certification efforts, etc.

The timeframe includes historical developments over the past two decades, the current state as of 2024–2025, and forward-looking projections through 2030.

2.3 METHODOLOGY

To ensure a rigorous and balanced analysis, the report employs a mixed-methods research approach, combining quantitative data with qualitative insights:

Table 1: Data Collection Methods

Data Source / Method	Purpose and Examples
Industry Survey	Structured questionnaire distributed to North American TMW producers
Expert Interviews	Conversations with plant managers, equipment suppliers, and researchers
Enterprise Data & Case Studies	Internal NHLA resources, Task Force minutes, member company case studies
Literature & Research Review	Academic papers, technical reports, and market studies
Secondary Market Data	Import/export statistics, distributor pricing, and trade show trends

Cross-validation was performed where possible. For example, survey results were compared against aggregate figures shared confidentially in one-on-one meetings. Expert interviews added qualitative depth to quantitative findings.

Forecasting techniques were applied to project market growth, informed by historical Compound Annual Growth Rate (CAGR), planned kiln installations, and demand trends. Where data were limited, assumptions are transparently stated.

2.4 LIMITATIONS

While every effort was made to ensure accuracy, the study faces several limitations:

- Many TMW producers are privately held and cautious about sharing detailed business data. Survey response rate was ~60%.
- The TMW sector is evolving rapidly; data represents a snapshot as of late 2024-early 2025.
- Reporting units vary (board feet, cubic meters, tons); all volume figures were converted to board feet for consistency.
- Comparative data definitions differ across regions (e.g., European statistics may exclude non-member companies).
- Some performance data (e.g., long-term durability of North American hardwoods) remains under-researched.

Despite these limitations, the multi-source approach provides a robust foundation for strategic insights. The findings reflect converging evidence and practical realities, offering a reliable roadmap for industry development.

3. MARKET CONTEXT & INDUSTRY OVERVIEW

Thermally Modified Wood (TMW) refers to wood that has been heat-treated in a controlled, low-oxygen environment to improve its durability, dimensional stability, and resistance to biological decay, without the use of chemical preservatives. This process transforms common domestic wood species into high-performance materials suitable for a wide range of exterior and interior applications.

Although the concept of enhancing wood through heat has been studied for over a century, its commercial development has varied globally. Europe pioneered the modern TMW industry in the late 20th century, driven by environmental regulations and the need for non-toxic alternatives to tropical hardwoods and chemically treated lumber. Finland's ThermoWood® process, commercialized in the 1990s, demonstrated that thermal treatment could produce wood with enhanced decay resistance and stability comparable to tropical species. Today, Europe remains the global leader in TMW production, with over 285,000 m^3 (1 $m^3 \approx 424$ board feet) produced annually by 2024.

In contrast, North America's engagement with TMW has been more recent and fragmented. Early trials in Canada and the U.S. during the 1990s and 2000s showed promise but did not scale commercially. By the 2010s, only a handful of companies were actively modifying wood, often using imported European equipment. Challenges with product consistency, market acceptance, and lack of standards led to limited adoption.

However, interest in TMW has surged in recent years due to several converging factors:

- Growing demand for sustainable building materials.
- Technological improvements in thermal modification systems.
- A strategic push to add value to domestic wood species, including those affected by pests (e.g., emerald ash borer).
- Increased awareness among architects, builders, and consumers of TMW's performance and environmental benefits.

As a result, North American TMW production capacity has roughly doubled from 2020 to 2025, with over 15 active producers now operating across the U.S. and Canada (see Appendix 1). These producers are modifying both hardwoods (e.g., ash, oak, maple, poplar) and softwoods (e.g., pine, spruce, fir), targeting high-value applications such as decking, siding, flooring, and architectural millwork.

TMW is strategically important for both the hardwood and softwood sectors:

- For hardwood producers, thermal modification enables underutilized species to compete with tropical hardwoods in outdoor and moisture-prone applications.
- For softwood producers, it offers a chemical-free alternative to pressure-treated lumber, allowing abundant species like Southern Yellow Pine to be used in premium exterior products.

Technology also aligns with broader sustainability goals, offering a circular-economy solution that extends wood's service life, avoids toxic preservatives, and remains recyclable at end-of-life.

Recognizing this potential, leading organizations, including NHLA, AWPA, and equipment suppliers like Jartek, have stepped up to support TMW development through research, standardization, and market promotion. These efforts are accelerating North America's progress and positioning TMW as a mainstream material in the wood products industry.

This report builds on that momentum, providing a detailed analysis of the TMW market, technology, applications, and strategic roadmap for stakeholders to capitalize on this growing opportunity.

4. THERMAL MODIFICATION PROCESS

4.1 SCIENTIFIC PRINCIPLES

Thermal modification is a chemical-free process that enhances wood's durability, dimensional stability, and resistance to biological decay. It involves heating wood to temperatures typically between 180°C and 230°C in a controlled, low-oxygen environment. This high-heat treatment alters the wood's internal chemistry, primarily by breaking down hemicellulose sugars and modifying lignin and cellulose structures.

Outcomes of the process include:

- Reduced equilibrium moisture content (EMC), typically by 50% or more.
- Improved resistance to fungi and insects due to lower nutrient availability.
- Enhanced dimensional stability, minimizing warping, cupping, and swelling.
- Darkened color throughout the wood, resembling tropical hardwood.
- Slight reduction in mechanical strength (~10–30%), limiting structural applications.

The process is conducted in oxygen-free conditions to prevent combustion. Common heat transfer mediums include steam, nitrogen gas, heated oil, or vacuum systems. Each method yields similar performance improvements but varies in energy efficiency, cycle time, and equipment complexity.

4.2 PROCESS VARIANTS

Several different industrial thermal modification systems are used in North America and globally. These include:

- **Steam-Based (Conventional Kiln):** Uses superheated steam at atmospheric pressure. Widely adopted due to simplicity and scalability. Cycle times range from 48 to 72 hours.
- **Nitrogen-Based (Inert Gas):** Heats wood in a closed reactor with nitrogen. Offers rapid treatment but requires precise control to avoid over-drying.
- **Oil Heat Treatment (OHT):** Submerges wood in heated vegetable oil. Provides uniform heating and water repellency but requires oil handling and disposal.

- **Vacuum-Based Systems:** Operate under reduced atmospheric pressure to accelerate heat transfer and moisture removal. Shorten cycle times and support gentler treatment profiles that may help limit strength loss.
- **Pressure-Based (Pressurized Steam / Autoclave) Systems:** Use controlled overpressure; typically, pressurized steam; in closed vessels to improve thermal uniformity and moisture control. Well suited for thicker or denser lumber processing.
- **Hybrid and Proprietary Methods:** Combine elements of the above (e.g., steam + oil, pressurized steam + dry curing) to optimize performance.

Each method is tailored to specific wood species, product goals, and operational constraints.

4.3 PROCESS PARAMETERS

- **Temperature:** Higher temperatures (~220°C) yield greater durability and darker color, but increase strength loss. Lower temperatures (~180°C) prioritize dimensional stability.
- **Duration:** Wood is held at peak temperature for 2–4 hours, with total cycle times ranging from 15 hours to 3 days.
- **Atmosphere and Moisture Control:** Oxygen is excluded using steam, nitrogen, or oil. Moisture content is reduced close to zero percent during treatment, then reconditioned to ~4–7% for usability.

4.4 SUSTAINABILITY IMPACTS

Thermal modification is considered an environmentally friendly wood treatment. Significant sustainability benefits include:

- **No added chemicals:** TMW contains no toxic preservatives, making it safe for use in gardens, playgrounds, and indoor environments.
- **Recyclability:** TMW can be disposed of like untreated wood; recycled, landfilled, or incinerated without special handling.
- **Energy Use:** The process is energy-intensive (~300–600 kWh/m³), but many facilities use biomass boilers or wood waste to reduce fossil fuel consumption.
- **Emissions:** VOCs released during treatment are managed through condensers or after-burners. Oil-based systems require proper disposal of used oil.
- **Carbon Footprint:** TMW extends wood's service life, reducing the need for replacement and lowering lifecycle emissions. It avoids the carbon cost of manufacturing chemical preservatives.

Table 2: Comparative Impacts Across Process Types

Process Type	Energy Efficiency	Strength Retention	Typical Use Cases
Steam-Based	Moderate	Moderate	Decking, siding
Nitrogen-Based	High	Lower	Interior panels
Oil Heat Treatment	High	High	Furniture, cladding
Vacuum Systems	Very High	Moderate	Flooring, millwork

*These are **general tendencies** and vary by equipment/provider.*

Thermal modification is a scientifically advanced yet natural process that transforms wood into a stable and environmentally responsible material. By tailoring temperature, duration, and atmosphere, producers can optimize performance for specific applications. The process enables domestic wood species to compete with tropical hardwoods and chemically treated lumber, supporting sustainability goals and expanding market opportunities.

5. CORE CRITERIA AND DEFINITIONS

5.1 DEFINITION OF THERMALLY MODIFIED WOOD (TMW): Thermally Modified Wood refers to wood that has been heat-treated in a controlled, oxygen-poor environment to enhance its durability, dimensional stability, and resistance to biological decay. The process involves heating wood to temperatures typically between 180°C and 230°C using steam, inert gas, or heated oil, without the addition of chemical preservatives.

Defining criteria include:

- Treatment temperature sufficient to reduce hygroscopicity[1] (typically >160°C).
- Oxygen content below ~4% during treatment to prevent combustion.
- Measurable mass loss in the wood (typically 5–10%) due to thermal degradation of hemicelluloses.

TMW remains 100% wood, but its properties are permanently altered through thermochemical changes. It is distinct from kiln-dried wood, which is only dried, not chemically transformed.

5.2 CLASSIFICATION BY TREATMENT INTENSITY

While there are various ways that manufacturing companies classify TMW at the individual level, currently, the only official classification by treatment intensity is defined by the International ThermoWood Association (ITWA). ITWA categorizes treatments according to their intended purpose.

- **Thermo-S (Stability Class):** Moderate treatment (~190°C) focused on improving dimensional stability.
- **Thermo-D (Durability Class):** Higher-intensity treatment (~212°C) aimed at maximizing biological durability.

These classifications are widely used in Europe (e.g., as established by the ITWA) and are progressively being adopted in North America to inform product specifications and performance standards. At present, two manufacturers have adopted these guidelines and are members of the ITWA, as membership is required for implementation.

5.3 PERFORMANCE CHARACTERISTICS

Thermally modified wood exhibits a distinct set of performance properties:

- **Biological Durability:** TMW achieves Durability Class 1–2 (EN 350) for above-ground use, comparable to cedar or teak. It resists fungal decay and insect infestations due to its reduced nutrient content and low moisture levels.
- **Dimensional Stability:** EMC drops from ~12% (untreated) to ~5–7% (TMW), reducing swelling and shrinkage by 50–70%. This minimizes warping, cupping, and seasonal movement.
- **Moisture Resistance:** TMW absorbs water more slowly and dries faster, improving performance in humid environments. However, it is not waterproof and should be protected from prolonged exposure to water.
- **Mechanical Properties:** Bending strength and impact resistance are reduced by ~10–30%. TMW is generally not recommended for structural or ground-contact applications.
- **Aesthetics:** TMW darkens uniformly throughout the wood, producing rich brown tones without stains. The grain is often enhanced, and the color is stable if protected from UV exposure.

[1]The property of wood to exchange moisture with the surrounding environment, absorbing or releasing water vapor until it reaches equilibrium with ambient humidity.

- Thermal and Acoustic Properties: Thermal conductivity is reduced (~10–30%), offering minor insulation benefits. Acoustic damping characteristics may change, making TMW suitable for musical instruments and acoustic panels.
- Chemical Stability: TMW has low leachability, minimal resin bleed, and reduced VOC emissions. It does not corrode fasteners and is safe for indoor and garden use.

5.4 STANDARDS AND CERTIFICATIONS

Efforts are underway to formalize standards for TMW in North America. These frameworks include:

- **International ThermoWood Association (ITWA):** Provides process and performance guidelines for Thermo-S and Thermo-D classifications. Members must meet defined treatment parameters and undergo audits.
- **European Standards:** CEN/TS 15679 defines thermally modified timber and test methods. EN 350 and EN 113 are used to assess durability.
- **North American Standards (In Progress):**
  - AWPA Guidance Document N outlines data requirements for TMW inclusion in standards.
  - ASTM test methods (e.g., D5664 for decay resistance) are used in research.
  - Some producers pursue **International Code Council Evaluation Services** (ICC-ES) Evaluation Reports for code recognition.

Until unified standards are finalized, specifiers rely on manufacturer's data and third-party testing. Certification programs (e.g., "Certified Thermally Modified Wood") are being developed to ensure quality and consistency.

Table 3: Comparison to Other Wood Treatments

Treatment Type	Medium Used	Durability (Above Ground)	Dimensional Stability	Strength Impact	Environmental Profile
Thermally Modified	Heat (steam, gas, oil)	High (Class 1–2)	Excellent	Reduced (~20%)	No chemicals, recyclable
Pressure-Treated	Chemical preservatives	High (all uses)	Poor	None	Toxic chemicals, disposal concerns
Acetylated (e.g., Accoya®)	Acetic anhydride	Very High (Class 1, ground contact)	Exceptional	Minimal	Non-toxic final product, chemical use in production
Furfurylated (e.g., Kebony®)	Furfuryl alcohol	Very High	Good	Slightly improved	Resin-based, non-toxic after curing

TMW occupies a middle ground: it offers strong durability and stability without chemicals but is limited in structural and ground-contact applications. It is ideal for visible, above-ground uses where aesthetics and sustainability matter.

6. BARRIERS TO ENTRY

Despite growing interest and market potential, several critical barriers continue to limit broader adoption and investment in thermally modified wood across North America.

- Capital
- Standards/codes
- Education
- Supply constraints
- Performance limits
- Competitive alternatives

These barriers are addressable—but only with shared standards, shared data, and coordinated outreach.

6.1 CAPITAL INVESTMENT AND TECHNOLOGY ACCESS

Thermal modification requires specialized equipment, including high-temperature kilns, oxygen-control systems, and energy-efficient heat transfer technologies. Initial capital costs for a commercial-scale system range from $600,000 to over $1 million, depending on capacity and process type.

- Smaller sawmills and regional producers may lack the financial resources or technical expertise to install and operate TMW systems.
- Equipment suppliers are concentrated in Europe, with limited North American manufacturing or support infrastructure.
- Financing options for TMW equipment are limited, and ROI timelines can be uncertain without strong market demand.

These factors create a high barrier for new entrants and slow expansion among existing producers.

6.2 REGULATORY AND CERTIFICATION HURDLES

TMW is not yet fully recognized in North American building codes or standards, limiting its use on regulated construction projects.

- ICC-ES Evaluation Reports are required for code approval, but few producers have pursued or obtained them.
- AWPA and ASTM standards for TMW are still under development, creating uncertainty for specifiers and inspectors.
- Lack of standardized performance data (e.g., design values, decay ratings) makes it difficult to compare products or specify them confidently.

Without clear certification pathways and code recognition, architects and builders may hesitate to adopt TMW, especially in commercial or public-sector projects.

6.3 MARKET AWARENESS AND EDUCATION

Many stakeholders, including architects, builders, distributors, and consumers, remain unfamiliar with TMW or misunderstand its properties.

- TMW is often confused with kiln-dried wood or pressure-treated lumber. Kiln-dried wood is only dried to reduce moisture content, and pressure-treated lumber is infused with chemical preservatives for decay and insect resistance, whereas TMW is heat-treated at high temperatures without chemicals to improve durability and stability.
- Misconceptions persist about TMW's durability, strength, and environmental profile.
- Distributors may not stock TMW due to low demand or lack of sales training.

This lack of awareness slows market growth and reduces the incentive for producers to invest in expansion.

6.4 SUPPLY CHAIN AND RAW MATERIAL CONSTRAINTS

TMW relies on consistent, high-quality raw material inputs. However:

- Species availability varies regionally, and some preferred hardwoods (e.g., ash) are declining due to pests like the emerald ash borer.
- Moisture content and grain uniformity affect treatment outcomes, requiring careful sourcing and pre-processing.
- Transportation and logistics costs can be high, especially for producers located far from major markets.

These supply chain challenges increase production costs and limit scalability.

6.5 PERFORMANCE LIMITATIONS AND APPLICATION CONSTRAINTS

While TMW performs well in many applications, it has limitations that restrict its use:

- Reduced mechanical strength (~10–30%) makes it unsuitable for structural or load-bearing components.
- Ground-contact applications are not recommended due to moisture exposure and decay risk.
- UV exposure can cause surface graying unless protective coatings are applied.

These constraints must be clearly communicated to avoid misuse and ensure customer satisfaction.

6.6 COMPETITIVE PRESSURE FROM ALTERNATIVE PRODUCTS

TMW competes with several established wood treatments and alternatives:

- Pressure-treated lumber is cheaper and widely available, with full code recognition.
- Acetylated and furfurylated[2] woods offer superior durability and stability, though at a higher cost.
- Wood-plastic composites dominate the decking market due to modest maintenance and consistent appearance.

To compete effectively, TMW must differentiate itself through sustainability, aesthetics, and performance in niche applications.

7. HARDWOOD MARKET ANALYSIS

Thermally modified hardwoods represent a growing segment of the North American wood products industry. They offer a sustainable, high-performance alternative to tropical hardwoods and chemically treated lumber, particularly in exterior and moisture-sensitive applications. This section analyzes the species used, production capacity, pricing trends, applications, and strategic opportunities within the hardwood TMW market.

7.1 SPECIES UTILIZED IN THERMAL MODIFICATION

The most thermally modified hardwood species in North America include:

- Ash (white and green)
- Oak (red and white)
- Poplar (yellow poplar/tulipwood)
- Maple (soft and hard)
- Beech and birch (regionally)

[2] **Acetylated wood:** wood chemically modified with acetic anhydride to reduce moisture uptake and improve dimensional stability and durability.
Furfurylated wood: wood impregnated with furfuryl alcohol and polymerized to increase hardness, stability, and decay resistance.

These species are selected for their availability, workability, and responsiveness to thermal treatment. Ash and poplar are favored for their consistent modification results and attractive post-treatment appearance.

Emerging species of interest include:

- Basswood and alder (for interior applications)
- Walnut and cherry (for premium architectural uses)
- Insect-affected species (e.g., emerald ash borer (EAB)-killed ash) for value recovery.

Species selection is influenced by regional supply, kiln performance, and end-use requirements. For example, ash is preferred for decking due to its strength and grain, while poplar is used in siding and cladding for its stability and affordability.

7.2 PRODUCTION CAPACITY AND LEADING PRODUCERS

As of 2025, there are approximately 10–12 active hardwood TMW producers in North America, with a combined estimated annual output of 20,000–30,000 m^3, where (1 m^3 ≈ 424 board feet). Most producers operate one or two kilns, with batch sizes ranging from 5 to 20 m^3.

Notable producers include:

- Companies in the Midwest and Northeast specializing in ash and oak.
- Southern producers modifying poplar and maple for siding and millwork.
- A few vertically integrated firms offering branded TMW product lines.

Production is expected to grow steadily as more sawmills and secondary manufacturers invest in thermal modification systems. Several producers have announced plans to expand capacity or add new species to their product lines.

7.3 MARKET PRICING AND VOLUME TRENDS

Thermally modified hardwoods command a premium over untreated lumber due to the added processing, improved performance, and aesthetic appeal.

- TMW ash decking: $4.00–$5.50 per board foot (vs. $2.50–$3.00 for untreated ash)
- TMW poplar siding: $3.00–$4.00 per board foot (vs. $1.50–$2.00 untreated)
- TMW oak flooring: $5.00–$7.00 per board foot (premium architectural grade)

Pricing varies by species, grade, finish, and distribution channel. While volumes remain modest, demand is growing in high-end residential, commercial, and institutional markets.

Forecasts suggest that North American hardwood TMW output could reach 50,000–60,000 m^3 (1 m^3 ≈ 424 board feet) annually by 2030, driven by:

- Increased kiln installations
- Expanded product offerings (e.g., TMW panels, engineered flooring)
- Greater market acceptance among architects and builders

7.4 APPLICATIONS AND USE CASES

Thermally modified hardwoods are used in a wide range of applications, particularly where durability, stability, and aesthetics are critical:

Table 4: Thermally Modified Hardwood Applications

Application Area	Common Species	Key Benefits
Decking	Ash, oak	Long service life, rich color, no chemicals
Siding & Cladding	Poplar, ash	Dimensional stability, weather resistance
Flooring	Oak, maple	Enhanced grain, reduced movement
Outdoor Furniture	Ash, beech	Durability, natural look
Millwork & Trim	Poplar, maple	Paint/stain compatibility, stability
Sauna & Spa Interiors	Aspen, alder	Low thermal conductivity, no off-gassing

TMW hardwoods are increasingly specified in green building projects, luxury homes, and public spaces where sustainability and performance are valued.

7.5 STRATEGIC OPPORTUNITIES

To accelerate growth in the hardwood TMW segment, stakeholders should consider:

- Promoting underutilized species (e.g., EAB-killed ash) as sustainable alternatives to tropical hardwoods.
- Developing branded product lines with warranties and performance data.
- Educating architects and designers through CEU courses and sample kits.
- Partnering with distributors to expand availability and reduce lead times.
- Investing in R&D to improve treatment consistency and expand the species range.

8. SOFTWOOD MARKET ANALYSIS

Thermally modified softwoods are gaining traction in North America as a sustainable, chemical-free alternative to pressure-treated lumber. While hardwoods have historically dominated the TMW landscape, softwoods, particularly pine and spruce, are increasingly being modified for exterior applications such as cladding, fencing, and garden structures. This section explores the species in use, production capacity, pricing, applications, and growth opportunities in the softwood TMW segment.

8.1 SPECIES IN USE

The most thermally modified softwood species in North America include:

- Southern Yellow Pine (SYP)
- Eastern White Pine
- Spruce (white and black)
- Douglas Fir
- Western Hemlock
- Larch

These species are selected for their abundance, affordability, and regional responsiveness to thermal treatment. Southern Yellow Pine is widely available and benefits significantly from thermal modification, which improves its dimensional stability and decay resistance.

Emerging species of interest include:

- Lodgepole pine and red pine (in northern regions)
- Western softwoods (e.g., Douglas fir) for architectural applications

Species selection is often driven by regional availability and the desire to add value to lower-grade or fast-growing timber.

8.2 PRODUCTION CAPACITY AND MAJOR PLAYERS

Softwood TMW production in North America is currently smaller than hardwood but is growing steadily. As of 2025:

- About 5 to 7 producers are modifying softwoods, with batch sizes of 5 to 20 m^3.
- Estimated annual output is 10,000–15,000 m^3 (1 m^3 ≈ 424 board feet), with capacity expected to double by 2030.
- Some hardwood TMW producers are adding softwood lines to diversify their offerings.

Softwood modification is often more cost-effective due to faster cycle times and lower raw material costs. This makes it attractive for high-volume applications like fencing and siding.

8.3 MARKET PRICING AND VOLUME TRENDS

Thermally modified softwoods are priced competitively with premium pressure-treated lumber and composite alternatives:

- TMW pine cladding: $2.50–$3.50 per board foot
- TMW spruce fencing: $2.00–$3.00 per board foot
- TMW fir paneling: $3.00–$4.00 per board foot

Prices vary based on species, finish, and distribution channel. While volumes remain modest, demand is growing in residential and light commercial markets, particularly among environmentally conscious consumers.

Forecasts suggest that softwood TMW output could reach 30,000–40,000 m^3 (1 m^3 ≈ 424 board feet) annually by 2030, driven by:

- Increased awareness of chemical-free alternatives
- Expansion into big-box retail and DIY channels
- Adoption in green building and LEED-certified projects

8.4 APPLICATIONS AND USE CASES

Thermally modified softwoods are well-suited for non-structural, above-ground applications where durability and aesthetics are important:

Table 5: Thermally Modified Softwood Applications

Application Area	Common Species	Key Benefits
Cladding & Siding	Pine, spruce	Weather resistance, natural look
Fencing & Screens	Pine, fir	Decay resistance, no chemical leaching
Garden Structures	Hemlock, larch	Suitable for above-ground garden structures; avoids chemical leaching, child-safe
Pergolas & Trellises	Douglas fir, pine	Dimensional stability, rich color
Interior Paneling	Spruce, fir	Warm tones, low VOCs
Sauna & Spa Interiors	Hemlock, aspen	Low thermal conductivity, no off-gassing

Softwood TMW is especially attractive for applications where pressure-treated wood is undesirable due to chemical content, or where aesthetics and sustainability are priorities.

8.5 STRATEGIC OPPORTUNITIES

To accelerate growth in the softwood TMW segment, stakeholders should consider:

- Promoting TMW as a premium, chemical-free alternative to pressure-treated lumber.
- Developing pre-finished product lines for cladding, fencing, and garden centers.
- Partnering with retailers and distributors to expand market reach.
- Educating consumers and contractors on the benefits of TMW softwoods.
- Investing in process optimization to reduce cycle times and improve consistency.

9. STANDARDS & CERTIFICATION DEVELOPMENT

Establishing clear standards and certification frameworks is essential for the growth, credibility, and market acceptance of TMW in North America. Without recognized benchmarks, specifiers, builders, and consumers face uncertainty about product performance, safety, and suitability for regulated applications. This section outlines current efforts, gaps, and strategic pathways for advancing TMW standards and certification.

9.1 CURRENT STATUS OF STANDARDS

At present, North America lacks a unified, process-based, or performance-based standard for TMW. However, several organizations are actively working to fill this gap:

- **NHLA TMW Task Force:** Formed to lead the development of a North American standard for thermally modified hardwoods and softwoods. The Task Force includes producers, researchers, and technical advisors. Its goals include:
  - Defining process parameters (temperature, duration, atmosphere).
  - Establishing durability and stability benchmarks.

    - Launching a certification program aligned with real-world production practices.
    - NHLA is collecting performance data to draft the first North American standard in collaboration with various manufacturers and the United States Department of Agriculture (USDA) Forest Products Laboratory (FPL).
- **AWPA:** AWPA's Technical Committees are reviewing TMW data for potential inclusion in its "Use Category System." A guidance document (AWPA GD-N) outlines the data requirements for new wood protection technologies, including:
    - Laboratory and field test results for decay resistance.
    - Moisture absorption and dimensional stability metrics.
    - Compatibility with coatings and fasteners.
- **ASTM International:** ASTM provides standardized test methods (e.g., D5664 for decay resistance, D1037 for dimensional stability) that are used in TMW research and product evaluation. These methods form the basis for future performance standards.
- **ICC-ES:** Some producers are pursuing ICC-ES reports to gain building code recognition. These reports require rigorous testing and documentation, but enable TMW products to be specified in regulated construction projects.

9.2 INTERNATIONAL BENCHMARKS

North American efforts are informed by established European standards:

- **European Committee for Standardization / Technical Specification No. 15679:** Defines thermally modified timber and outlines process parameters and performance expectations.
- **European Norms 350 and 113:** Used to classify biological durability and assess resistance to decay fungi.
- **ThermoWood® Classification (ITWA):** Differentiates products into Thermo-S (stability-focused) and Thermo-D (durability-focused) categories based on treatment intensity.

These frameworks provide valuable reference points but must be adapted to North American species, climate conditions, and market needs.

9.3 CERTIFICATION FRAMEWORKS IN DEVELOPMENT

The NHLA TMW Task Force is developing a voluntary certification program for TMW producers. Priority elements include:

- **Certification:** Verifies that wood is treated under defined temperature, duration, and atmosphere conditions to achieve a certain minimum performance. Validates product durability, stability, and safety through standardized testing.
- **Labeling and Traceability:** Certified products will carry a label indicating treatment class, species, and producer ID.
- **Auditing and Compliance:** Third-party audits will ensure consistency and credibility.

The certification program aims to build trust among specifiers, distributors, and consumers, while enabling producers to differentiate their products in the marketplace.

9.4 STRATEGIC OPPORTUNITIES

To accelerate standards and certification development:

- Encourage producers to participate in AWPA and ASTM data submission processes.
- Fund long-term field testing and publish results in peer-reviewed journals.
- Align certification efforts with sustainability frameworks (e.g., LEED, WELL[3]).
- Develop educational materials for architects, builders, and inspectors.
- Collaborate with ICC-ES to streamline evaluation report pathways for TMW products.

By establishing robust standards and certification systems, the TMW industry can unlock broader market access, improve product consistency, and foster innovation across the value chain.

10. EQUIPMENT & TECHNOLOGY SUPPLIERS

Thermal modification technology is central to the success and scalability of the TMW industry. The choice of equipment and process design directly affects product quality, energy efficiency, throughput, and operational costs. This section outlines the major equipment suppliers active in North America, the types of systems available, and fundamental considerations for producers evaluating technology investments.

10.1 MAJOR EQUIPMENT SUPPLIERS

Several international and domestic companies supply thermal modification systems to North American producers, including:

- **Jartek (Finland)**
- **Maspell (Italy)**
- **Valutec (Sweden):** Not present in the market, but some manufacturers still use its technology.
- **Moldrup (Denmark)**
- **WTT (Germany)**
- **AWT/IWT (North America)**
- **Self-Installed Systems:** Some producers have developed proprietary or retrofitted systems using modified kilns and control units.

[3] WELL focuses on **10 core areas (concepts)** that support human health and well-being in buildings:
Air – indoor air quality and ventilation
Water – water quality and accessibility
Nourishment – healthy food choices
Light – lighting quality and circadian support
Movement – physical activity and active design
Thermal Comfort – temperature and humidity comfort
Sound – acoustic comfort and noise control
Materials – reduction of harmful material exposures
Mind – mental health, stress reduction, and well-being
Community – social equity, inclusion, and occupant engagement

10.2 SYSTEM TYPES AND FEATURES

Thermal modification systems vary by heat transfer medium, control method, and design complexity. Common system types include:

Table 6: Thermal Modification Systems Features

System Type	Heat Medium	Key Features	Typical Use Cases
Steam-Based	Superheated steam	Simple design, scalable, moderate cycle time	Hardwood and softwood decking
Oil Heat Treatment	Vegetable oil	Uniform heating, water repellency, low VOCs	Cladding, furniture
Vacuum Systems	Air/steam under vacuum	Fast cycle, moderate strength retention	Flooring, millwork
Nitrogen-Based	Inert gas	Rapid treatment, low oxygen, high control	Interior panels, specialty wood
Hybrid Systems	Steam + oil or vacuum	Customizable, optimized performance	Multi-species operations

Primary performance metrics include:

- Cycle time (15–72 hours depending on system and species)
- Energy consumption (300–600 kWh/m³)
- Temperature control accuracy (±3°C)
- Moisture reconditioning capability.
- Automation and remote monitoring features offered by some providers

10.3 INSTALLATION AND OPERATIONAL CONSIDERATIONS

When selecting a thermal modification system, producers must consider:

- Species compatibility: Some systems perform better with hardwoods, others with softwoods.
- Batch vs. continuous operation: Batch systems offer flexibility; continuous systems maximize throughput.
- Footprint and infrastructure: Systems require space, ventilation, and energy supply (often biomass or electric).
- Training and support: Supplier-provided training and maintenance support are critical for consistent output.
- Regulatory compliance: Systems must meet local safety, emissions, and building code requirements.

Producers are encouraged to conduct pilot runs, visit reference installations, and consult with suppliers to match technology to business goals.

10.4 STRATEGIC OPPORTUNITIES

To strengthen the equipment and technology landscape in North America:

- Encourage domestic manufacturing and customization of TMW systems.
- Develop shared testing and demonstration facilities for small producers.

- Promote supplier partnerships with industry associations (e.g., NHLA, AWPA).
- Support R&D into energy-efficient and species-specific treatment protocols.
- Create financing programs or grants to reduce capital barriers for new entrants.

11. ECOSYSTEM & RESEARCH INFRASTRUCTURE

The growth of thermally modified wood in North America depends on more than production capacity. It requires coordinated engagement across associations, standards bodies, research institutions, and industry events that shape education, validation, and market access.

A strong ecosystem ensures that performance claims are credible, standards are informed by real data, and new applications are supported by research.

11.1 STANDARDS & INDUSTRY ORGANIZATIONS

Several organizations are central to the continued development and credibility of TMW:

- **NHLA –** Through its TMW Task Force, NHLA is coordinating terminology alignment, data collection, and standard development across hardwood and softwood stakeholders.
- **AWPA –** Evaluating durability data and potential inclusion within its Use Category System framework.
- **ASTM International –** Providing test methods that underpin performance validation.
- **ITWA –** Offering established European classification models (Thermo-S, Thermo-D) that inform North American discussions.
- **Green Building Frameworks (LEED, WELL, Living Building Challenge) –** Recognizing chemical-free materials and lifecycle performance.

Active participation in these bodies is essential to accelerate specification confidence and code recognition.

11.2 INDUSTRY EVENTS AS MARKET CATALYSTS

Trade shows, technical meetings, and association conferences serve as accelerators for visibility and adoption.

Platforms include:

- NHLA Annual Convention
- AWPA Annual Meeting
- International Woodworking Fair (IWF)
- Greenbuild
- NAWLA Traders Market and regional building expos

These venues provide opportunities to:

- Present durability data
- Educate specifiers through CEU programming
- Showcase finished applications
- Align messaging across producers

Events should be viewed not only as marketing platforms, but as strategic touchpoints for education and standards advancement.

11.3 RESEARCH & TECHNICAL VALIDATION

Long-term market acceptance depends on credible data.

Current research contributors include:

- USDA Forest Service – Forest Products Laboratory (FPL)
- University research programs across North America
- NHLA Task Force technical working groups
- AWPA and ASTM committees

Priority research areas include:

- Long-term durability performance in North American climates
- Mechanical property retention and design values
- Energy efficiency and process optimization
- Species expansion and pest-affected resource utilization
- Coating and adhesive compatibility
- Lifecycle assessment (LCA) and carbon analysis

Expanded collaboration is needed to move from isolated studies to shared, accessible data that supports specification and standardization.

11.4 PARTNERSHIP & FUNDING MODELS

To scale research and validation, the industry should pursue:

- Industry–academic collaborations
- Public–private research initiatives
- Consortium-based data pooling
- Supplier-supported applied research
- Federal and state sustainability grants

Cost-sharing models reduce individual producer risk while accelerating collective credibility.

Strategic Implication

- A coordinated ecosystem reduces fragmentation, strengthens data credibility, and shortens the path to specification.
- For North American TMW to scale responsibly, producers, researchers, and associations must operate less as isolated actors and more as a structured network.
- NHLA's role is to serve as a neutral convening platform — organizing participation, aligning terminology, and converting research into actionable standards.

12. MANUFACTURING LANDSCAPE

The manufacturing landscape for TMW in North America is evolving rapidly, driven by increased demand, technological advancements, and strategic investments. While still emerging compared to Europe's mature TMW sector, North American producers are expanding capacity, diversifying product lines, and integrating thermal modification into broader wood processing operations. This section provides an overview of current manufacturing practices, facility types, regional distribution, and operational trends.

12.1 FACILITY TYPES AND SCALE

TMW manufacturing facilities in North America range from small batch operations to mid-sized integrated plants. Common facility types include:

- Sawmill-Integrated Kilns: Many hardwood producers have added thermal modification kilns adjacent to existing sawmill operations. This allows for direct processing of rough lumber and efficient use of byproducts (e.g., biomass for heating).
- Dedicated TMW Plants: Some companies operate standalone facilities focused exclusively on thermal modification. These plants often serve multiple species and offer branded product lines.
- Secondary Manufacturers: A growing number of flooring, siding, and millwork producers are incorporating TMW into their product offerings by outsourcing modification or installing in-house kilns.

Batch sizes typically range from 5 to 20 m^3 (1 m^3 ≈ 424 board feet), with cycle times of 24–72 hours depending on species and system type. Most facilities operate on a batch basis, though continuous kilns are being explored for high-volume softwood production.

12.2 REGIONAL DISTRIBUTION

TMW manufacturing is concentrated in regions with strong hardwood and softwood supply chains:

- Midwest (e.g., Ohio, Indiana, Michigan): Focus on ash, oak, and maple. Several producers are modifying EAB-killed ash to recover value.
- Northeast (e.g., Pennsylvania, New York): Poplar and beech are common. Facilities often serve architectural and millwork markets.
- Southeast (e.g., North Carolina, Georgia): Southern Yellow Pine modification is growing, targeting cladding and fencing applications.
- Pacific Northwest: Limited activity, but potential for Douglas fir and western softwoods.

Proximity to raw material sources and distribution hubs influences facility location. Transportation costs and regional species availability are priority areas.

12.3 OPERATIONAL TRENDS

Several trends are shaping the manufacturing landscape:

- **Species Diversification:** Producers are expanding beyond ash and poplar to include oak, maple, pine, and specialty woods.
- **Pre-Finishing Integration:** Many facilities now offer staining, sealing, and profiling services to deliver ready-to-install products.
- **Energy Optimization:** Biomass boilers and heat recovery systems are being adopted to reduce energy costs and carbon footprint.
- **Automation and Monitoring:** Advanced control systems enable precise temperature and moisture management, improving consistency and throughput.
- **Quality Assurance:** Producers are investing in testing equipment (e.g., moisture meters, strength testers) to validate product performance and support certification efforts.

12.4 STRATEGIC OPPORTUNITIES

To strengthen the manufacturing base and support industry growth:

- Promote regional manufacturing clusters to share infrastructure and logistics.
- Support workforce development and training in thermal modification operations.
- Encourage investment in scalable, energy-efficient kiln technologies.
- Facilitate partnerships between producers and secondary manufacturers.
- Develop shared testing labs and pilot facilities for small and emerging producers.

By enhancing manufacturing capabilities and fostering collaboration, the TMW industry can scale efficiently, improve product quality, and meet growing market demand across North America.

13. COMPETITIVE COMPARISON

Thermally modified wood competes in a dynamic landscape of wood and alternative wood products. While TMW offers a compelling combination of sustainability, performance, and aesthetics, it faces competition from chemically treated lumber, engineered wood products, and non-wood alternatives. This section compares TMW to its primary competitors across key dimensions to help stakeholders understand its positioning and strategic advantages.

13.1 COMPARISON OVERVIEW

Table 7: Comparing TMW with major competitors across essential aspects.

Product Type	Durability (Above Ground)	Dimensional Stability	Chemical Use	Structural Use	Aesthetic Appeal	Sustainability Profile
Thermally Modified Wood	High (Class 1–2)	Excellent	None	Limited	Rich, natural	Excellent
Pressure-Treated Lumber	High (all uses)	Poor	Yes	Yes	Industrial look	Moderate (toxins)
Acetylated Wood (e.g., Accoya®)	Very High (Class 1)	Exceptional	Yes (modified)	Yes	Uniform, premium	Excellent
Furfurylated Wood (e.g., Kebony®)	Very High	Good	Yes (resin)	Yes	Dark, glossy	Good (non-toxic resin)
Wood-Plastic Composites	High	Excellent	Synthetic	Yes	Consistent, artificial	Poor (non-renewable)
Tropical Hardwoods (e.g., Ipe)	Very High	Good	None	Yes	Premium, exotic	Poor (deforestation)

13.2 PERFORMANCE COMPARISON

- **Durability:** TMW offers excellent resistance to decay and insects in above-ground applications, comparable to cedar and some tropical hardwoods. However, it is not recommended for ground contact or structural use due to reduced mechanical strength.

- Dimensional Stability: TMW significantly reduces swelling, shrinking, and warping; outperforming untreated and pressure-treated lumber, and rivaling acetylated wood.
- Strength Retention: TMW loses ~10–30% of its original strength, limiting its use in load-bearing applications. Acetylated and furfurylated woods retain more strength and are suitable for structural components.
- Thermal and Acoustic Properties: TMW has lower thermal conductivity and improved acoustic damping, making it suitable for saunas, musical instruments, and interior panels.

13.3 ENVIRONMENTAL AND HEALTH CONSIDERATIONS

- Chemical-Free Treatment: TMW is treated using only heat and water (or inert gas/oil), with no added toxins. It is safe for children, pets, and gardens, and does not leach harmful substances.
- Recyclability: TMW can be disposed of like untreated wood; recycled, incinerated, or landfilled without special handling.
- Carbon Footprint: TMW extends wood's service life, reducing replacement frequency and lifecycle emissions. It supports circular economic principles and contributes to LEED credits.

In contrast, pressure-treated lumber contains preservatives that may leach into soil and water, while composites and tropical hardwoods raise concerns about non-renewable inputs and deforestation.

13.4 MARKET POSITIONING

Table 8: TMW Market Positioning

Attribute	TMW Strengths	TMW Limitations
Sustainability	Non-toxic, recyclable, low VOC	Energy-intensive process
Aesthetics	Rich color, enhanced grain	UV fading without coating
Performance	Durable, stable, moisture-resistant	Reduced strength, not for ground contact
Cost	Competitive with premium wood options	Higher than untreated lumber
Availability	Growing but limited regional access	Not yet mainstream in big-box retail
Certification	In development (NHLA, AWPA, ASTM)	Not yet code-recognized nationwide

13.5 STRATEGIC IMPLICATIONS

To strengthen TMW's competitive position:

- Emphasize its chemical-free nature and sustainability in marketing and education.
- Target niche applications where aesthetics and environmental performance are valued (e.g., decking, cladding, saunas).
- Develop warranties and performance data to build specifier confidence.
- Expand distribution through partnerships with retailers and green building suppliers.
- Continue investment in certification and code recognition to unlock regulated markets.

14. GLOBAL MARKET OUTLOOK

Thermally modified wood has established a strong global presence, particularly in Europe, and is now gaining momentum in North America and other regions. As sustainability, performance, and chemical-free treatment become increasingly important in construction and design, the global TMW market is poised for continued growth. This section provides an overview of international production trends, market drivers, and strategic opportunities for North American stakeholders.

14.1 GLOBAL PRODUCTION AND MARKET SIZE

- As of 2024, the global TMW market was valued at approximately $1.3 billion.
- Forecasts project annual growth of ~5%, reaching ~$1.8 billion by 2030.
- Europe accounts for most of the global production, with over 285,000 m^3 (1 m^3 ≈ 424 board feet) produced annually by ITWA member companies alone.
- North America's output remains modest (~30,000–40,000 m^3) but is expected to grow significantly as infrastructure and market awareness improve.
- Asia and the Middle East are emerging markets, with increasing interest in sustainable building materials and non-toxic wood treatments.

14.2 EUROPEAN LEADERSHIP AND INNOVATION

Europe pioneered the commercial development of TMW in the 1990s, driven by:

- Strict environmental regulations limit chemical preservatives.
- Demand for durable alternatives to tropical hardwoods.
- Strong research and development support from universities and institutes.

Foundational European developments include:

- The ThermoWood® classification system (Thermo-S and Thermo-D).
- Advanced kiln technologies and continuous production systems.
- Integration of TMW into building codes and sustainability frameworks.

European producers have successfully positioned TMW as a premium product for decking, cladding, flooring, and architectural applications. Their experience offers valuable lessons for North American stakeholders.

14.3 EMERGING MARKETS AND EXPORT POTENTIAL

- Asia (especially Japan, South Korea, and China) is showing increased interest in TMW for residential and commercial construction.
- The Middle East is exploring TMW for exterior applications due to its heat resistance and modest maintenance.
- Latin America and Oceania are beginning to adopt TMW in niche markets.

North American producers have an opportunity to expand into these regions by:

- Forming export consortia to pool resources and market collectively.
- Leveraging trade promotion programs and sustainability certifications.
- Offering species and profiles tailored to regional preferences and climate conditions.

14.4 STRATEGIC IMPLICATIONS FOR NORTH AMERICA

To compete globally and capture export opportunities, North American stakeholders should:

- Align with international standards (e.g., ITWA, EN 350) to ensure compatibility and credibility.
- Invest in R&D to improve process efficiency and expand species offerings.
- Develop branded product lines with multilingual marketing and technical documentation.
- Participate in international trade shows and sustainability forums to raise visibility.
- Collaborate with global partners on joint ventures, technology transfer, and market development.

14.5 RISKS AND CONSIDERATIONS

- Currency fluctuations and shipping costs may affect export competitiveness.
- Regulatory differences (e.g., building codes, labeling requirements) require careful navigation.
- Intellectual property protection for proprietary processes and branding must be considered.

Despite these challenges, the global outlook for TMW remains highly favorable. With strategic investment and collaboration, North American producers can establish a strong presence in international markets and contribute to the global shift toward sustainable wood products.

15. PRICING ANALYSIS AND FORECASTING

Understanding the pricing dynamics of TMW is essential for producers, distributors, and specifiers seeking to position products competitively and plan for future growth. This section analyzes current pricing trends across species and product types, identifies cost drivers, and provides a forecast of market pricing through 2030 based on production capacity, demand growth, and competitive pressures.

15.1 CURRENT PRICING OVERVIEW

TMW products command a premium over untreated lumber due to added processing, enhanced performance, and sustainability value. Pricing varies by species, application, finish, and distribution channel.

Table 9: TMW Pricing by Usage Category

Product Type	Common Species	Price Range (USD/ Board Foot)	Notes
Decking	Ash, oak	$4.00 – $5.50	Premium outdoor use, high durability
Siding & Cladding	Poplar, pine	$2.50 – $4.00	Pre-finished options priced higher
Flooring	Oak, maple	$5.00 – $7.00	Architectural grade, interior use
Fencing & Garden Structures	Pine, spruce	$2.00 – $3.50	Competes with pressure-treated lumber
Interior Paneling	Fir, spruce	$3.00 – $4.50	Low-VOC, warm tones

Prices are influenced by regional availability, kiln efficiency, finish level, and brand positioning. Products sold through specialty retailers or direct-to-consumer channels often carry higher margins.

15.2 COST DRIVERS

Influential factors affecting TMW pricing include:

- **Raw Material Costs:** Species availability, grade, and moisture content affect input pricing. Ash and oak are more expensive than poplar or pine.
- **Energy Consumption:** Thermal modification is energy-intensive (~300–600 kWh/m³). Facilities using biomass or waste heat can reduce costs.
- **Cycle Time and Throughput:** Longer treatment cycles reduce output and increase per-unit cost. Vacuum and hybrid systems offer efficiency gains.
- **Labor and Overhead:** Skilled operators, quality control, and facility maintenance contribute to operational costs.
- **Finishing and Packaging:** Pre-staining, sealing, and profiling add value but increase production costs.
- **Distribution and Logistics:** Transportation, warehousing, and retail markup vary by region and channel.

15.3 COMPETITIVE PRICING BENCHMARKS

TMW competes with several alternatives:

Table 10: TMW Competitive Pricing Comparison

Material Type	Typical Price Range	Notes
Pressure-Treated Lumber	$1.50 – $2.50/BF	Lower cost, chemically treated
Tropical Hardwoods (e.g., Ipe)	$5.00 – $8.00/BF	Premium, imported, sustainability concerns
Wood-Plastic Composites	$3.50 – $5.50/BF	Consistent appearance, synthetic materials
Acetylated Wood (Accoya®)	$6.00 – $9.00/BF	High performance, chemically modified

TMW is competitively priced against tropical hardwoods and composites, especially when sustainability and aesthetics are prioritized.

15.4 FORECASTING THROUGH 2030

Based on current trends and projected market growth, TMW pricing is expected to evolve as follows:

- **Short-Term (2025–2027):** Prices will remain stable or rise slightly due to increased demand and limited supply. New kiln installations may offset cost pressures.
- **Mid-Term (2027–2029):** As production scales and certification improves, prices may moderate. Pre-finished and branded products will command premiums.
- **Long-Term (2030):** Greater market maturity, expanded distribution, and process optimization may lead to price stabilization or slight reductions in cost per board foot.

Table 11: Projected TMW Average Pricing

Year	Estimated Avg. Price (USD/BF)	Notes
2025	$3.50 – $5.50	Premium positioning, limited supply
2027	$3.25 – $5.25	Increased capacity, certification gains
2030	$3.00 – $5.00	Market maturity, broader adoption

15.5 STRATEGIC RECOMMENDATIONS

To optimize pricing and profitability:

- Invest in energy-efficient systems and process automation.
- Diversify product offerings to include high-margin applications.
- Develop branded lines with value-added features (e.g., warranties, finishes).
- Monitor competitor pricing and adjust positioning accordingly.
- Educate customers on lifecycle value and sustainability benefits to justify premiums.

16. FUTURE GROWTH PROJECTIONS AND INVESTMENT OUTLOOK

The thermally modified wood industry in North America is entering a phase of accelerated growth, driven by rising demand for sustainable building materials, expanding production capacity, and increasing market awareness. This section outlines projected industry growth through 2030, identifies significant investment opportunities, and highlights strategic considerations for stakeholders evaluating entry or expansion in the TMW sector.

16.1 MARKET GROWTH PROJECTIONS

Based on current trends, industry surveys, and global benchmarks, the North American TMW market is expected to grow significantly over the next five years.

Table 12: Estimated TMW Production Over the Next Five Years

Year	Estimated Annual Output (North America)	Growth Drivers
2025	~30,000–40,000 m^3	Existing producers, rising demand
2027	~60,000–70,000 m^3	New kiln installations, expanded applications
2030	~100,000 m^3+ (1m^3 = 424 board feet)	Standardization, certification, export growth

This represents a CAGR of approximately (1 m^3 ≈ 424 board feet), outpacing traditional lumber segments and aligning with global sustainability trends.

16.2 DEMAND EXPANSION

Driving factors contributing to demand growth include:

- Increased adoption in residential and commercial construction.
- Specification in green building projects (LEED, WELL, Living Building Challenge).

- Replacement of pressure-treated lumber and tropical hardwoods in exterior applications.
- Growth in DIY and retail channels for decking, siding, and garden products.
- Rising interest from architects, designers, and public-sector buyers.

As awareness and certification improve, TMW is expected to move from niche to mainstream in several product categories.

16.3 INVESTMENT OPPORTUNITIES

Strategic investment areas include:

- **Kiln Infrastructure:** Installing new thermal modification systems to meet rising demand. Modular and scalable systems offer flexibility for small and mid-sized producers.
- **Species Diversification:** Developing TMW products from underutilized or pest-affected species (e.g., EAB-killed ash, poplar, pine).
- **Product Innovation:** Launching pre-finished, branded product lines for decking, cladding, flooring, and millwork.
- **Certification and Testing:** Funding performance testing and certification to unlock regulated markets and build specifier confidence.
- **Distribution Expansion:** Partnering with retailers, distributors, and e-commerce platforms to increase market access.
- **Export Development:** Targeting emerging markets in Asia, the Middle East, and Latin America through trade promotion and consortium models.

16.4 RISK FACTORS AND MITIGATION

While the outlook is strong, investors should consider:

- **Market Education Lag:** Continued investment in outreach and training is needed to overcome misconceptions and build demand.
- **Raw Material Supply:** Regional species availability and pest impacts may affect input costs and consistency.
- **Energy Costs:** Thermal modification is energy-intensive; facilities should explore biomass and efficiency upgrades.
- **Regulatory Uncertainty:** Building code recognition and standardization are still in progress; early adopters may face approval delays.

Mitigation strategies include diversifying species, investing in energy-efficient systems, and participating in standards development.

16.5 STRATEGIC OUTLOOK

The TMW industry is well-positioned for long-term growth. Success factors for investors and producers include:

- Aligning with sustainability and wellness trends in construction.
- Building strong brands and product differentiation.
- Collaborating across the value chain to share infrastructure and market intelligence.
- Leveraging public and private funding to support innovation and expansion.

With coordinated effort and strategic investment, North America can become a global leader in thermally modified wood production, innovation, and export.

17. CONCLUSION AND STRATEGIC RECOMMENDATIONS

Thermally modified wood is emerging as a transformative material in the North American wood products industry. It offers a compelling combination of durability, dimensional stability, aesthetic appeal, and environmental responsibility, without the use of chemical preservatives. As sustainability becomes a central priority in construction, design, and consumer preferences, TMW is uniquely positioned to meet the evolving demands of the market.

The industry has made significant strides in recent years, with production capacity doubling, market awareness growing, and top stakeholders, including NHLA, AWPA, and ASTM, actively working toward standardization and certification. Both hardwood and softwood segments are expanding, supported by technological innovation, strategic partnerships, and increasing interest from architects, builders, and retailers.

However, challenges remain. Barriers to entry, limited code recognition, and fragmented market education continue to slow adoption. To fully realize the potential of TMW, coordinated action is needed across the value chain, from producers and equipment suppliers to specifiers, policymakers, and investors.

With the right investments, outreach, and collaboration, North America can become a global leader in thermally modified wood, driving innovation, sustainability, and economic growth across the forestry and construction sectors.

Strategic Recommendations
To accelerate industry growth and ensure long-term success, stakeholders should focus on the following strategic priorities:

1. Standardization and Certification
- Finalize a unified North American standard for TMW, aligned with AWPA, ASTM, and ICC-ES frameworks.
- Launch a voluntary certification program to validate process integrity and product performance.
- Promote certified products to architects, builders, and retailers to build trust and drive specification.

2. Industry Collaboration and Branding
- Form a North American TMW Council to coordinate marketing, research, and advocacy.
- Develop a unified brand identity and terminology to promote TMW across channels.
- Share data, best practices, and market intelligence to strengthen the industry ecosystem.

3. Education and Outreach
- Create CEU-accredited courses, technical guides, and sample kits for specifiers.
- Train distributors and retail sales teams to communicate TMW's benefits effectively.
- Launch consumer-facing campaigns highlighting safety, sustainability, and beauty.

4. Product Innovation and Diversification
- Expand product lines to include flooring, panels, furniture components, and engineered wood.
- Explore new species and treatment profiles to meet diverse market needs.
- Invest in R&D to improve process efficiency, reduce energy use, and enhance performance.

5. Strategic Investment and Infrastructure

- Support kiln installations and facility upgrades through public and private funding.
- Develop regional manufacturing clusters to share logistics and infrastructure.
- Create shared testing labs and pilot facilities for small and emerging producers.

6. Market Expansion and Export Development

- Partner with retailers, green building programs, and e-commerce platforms to increase access.
- Target emerging international markets through trade promotion and consortium models.
- Aligning with global standards to facilitate exports and build international credibility.

7. Sustainability Leadership

- Position TMW as a cornerstone of sustainable forestry and green construction.
- Highlight lifecycle benefits, recyclability, and contribution to LEED and wellness certifications.
- Collaborate with environmental organizations to promote responsible resource use.

18. PATH TO SCALE: STRATEGIC PRIORITIES FOR NORTH AMERICA

The North American TMW market is at a pivotal moment. Production capacity is expanding, awareness is increasing, and demand for sustainable, high-performance materials continues to grow. However, long-term success will depend on coordinated action across the value chain.

To move TMW from emerging segment to mainstream material, the industry must focus on five strategic priorities:

1. Establish Clear Standards and Certification

Market confidence begins with clarity. A unified North American framework—aligned with AWPA, ASTM, and ICC-ES—will:

- Enable broader specification in regulated construction markets
- Provide consistent terminology and performance expectations
- Reduce confusion among architects, builders, and distributors

A voluntary certification program, supported by testing and third-party validation, will further strengthen credibility and unlock specification-driven growth.

2. Align the Industry Around a Unified Identity

Fragmentation slows adoption. Coordinated messaging and collaboration can accelerate it.

- Develop consistent terminology (e.g., “TMW”) across producers
- Share non-confidential performance data and case studies
- Consider formalizing collaboration through a North American TMW Council or coordinated working group

Clear, unified communication will increase trust and reduce market friction.

3. Educate Specifiers, Distributors, and End Users
Awareness remains uneven. Education must match production growth.
Initiatives include:

- CEU-accredited programs for architects and designers
- Technical guides and specification resources
- Sales training for distributors and retailers
- Consumer-facing materials explaining performance and maintenance

Education should clearly communicate both strengths and limitations, positioning TMW for appropriate above-ground applications.

4. Expand Product Innovation and Market Access
Growth will depend on diversification and accessibility.

- Broaden product lines beyond decking and cladding into flooring, panels, millwork, and engineered applications
- Explore new species and treatment profiles
- Develop pre-finished and value-added offerings
- Expand distribution through specialty retailers, green building suppliers, and select retail partnerships

Innovation strengthens differentiation and improves margin potential.

5. Lead with Sustainability and Lifecycle Value
TMW's competitive advantage is not just performance—it is positioning.
The industry should consistently emphasize:

- Chemical-free treatment
- Recyclability and responsible end-of-life handling
- Lifecycle durability and reduced replacement frequency
- Alignment with green building frameworks

Clear sustainability messaging differentiates TMW from pressure-treated lumber, tropical hardwood imports, and synthetic alternatives.

Strategic Outlook
North America has the resources, species diversity, and manufacturing infrastructure to become a global leader in thermally modified wood. Realizing that opportunity will require:

- Participation in standards development
- Investment in testing and documentation
- Shared data and coordinated outreach
- Long-term commitment to market education

NHLA's role is to provide structure, transparency, and a neutral platform for collaboration. The pace of adoption will ultimately depend on member engagement across production, distribution, research, and specification.


Northglenn City Hall
11701#B

STAKEHOLDER PROFILES

STAKEHOLDER PROFILE INDEX

Producer

Technology Provider

The following section features a selection of industry stakeholder profiles representing key segments of the thermally modified wood supply chain. Each profile was submitted directly by participating companies and is presented with minimal edits to preserve the original voice and perspective of each contributor.

Bingaman & Son Lumber

Bingaman & Son Lumber is a third-generation hardwood production company based in Pennsylvania. The company began thermal modification in 2008 and now considers TMW an integral part of its value-added product portfolio.

Thermal modification has opened new markets for hardwood species such as ash, red oak, and poplar. With enhanced durability and dimensional stability, hardwoods can now be used in exterior applications such as decking, siding, ceilings, and furniture.

Market awareness remains a key challenge for the industry, although outreach to the architectural community has improved significantly in recent years.

The industry is also working toward consensus performance standards to ensure that thermally modified products deliver consistent results across different species and modification technologies.

ThermalWood Canada

Company Overview
ThermalWood Canada occupies a unique position within the thermally modified wood (TMW) supply chain as a specialized producer of thermally modified hardwoods.

Based in Bathurst, New Brunswick since 2008, the company connects North American hardwood resources with global demand for durable and environmentally responsible wood products.

Origins and Mission
ThermalWood Canada began with the premise that wood enhanced through science rather than chemicals could unlock new opportunities for builders, designers, and manufacturers.

Role in the Supply Chain
The company operates as a processor, product developer, collaborator with architects and manufacturers, and educator for clients exploring the potential of thermally modified hardwoods.

Industry Collaboration
As a member of the International ThermoWood Association (ITWA), the company supports the development of industry standards and collaborative knowledge sharing.

Looking Ahead
ThermalWood Canada sees thermally modified wood becoming a mainstream building material as the industry continues to grow and evolve.

Thermory

Thermory is the world's largest manufacturer of thermally modified wood (TMW), supplying premium decking, cladding, and interior wood products for architectural and residential applications for more than twenty-seven years.

In the United States, Thermory has helped build market awareness and specification confidence for TMW, with products now sold in approximately 60 countries worldwide.

Demand for TMW continues to grow as architects and builders seek natural materials that meet both performance and sustainability requirements. Thermory works closely with the design community to support proper specification and use of thermally modified wood.

Thermal modification extends the service life of wood, reduces maintenance cycles, and lowers environmental impact. It also enables a wider range of hardwood species to replace tropical hardwoods and high-carbon building materials.

As the TMW sector expands, Thermory emphasizes rigorous testing, quality control, and long-term performance to maintain confidence in the category.

Westwood Millworks

Founded in 2007 as the first thermal modification company in the Americas, Westwood Millworks has nearly two decades of experience producing high-quality thermally modified wood products. All production processes are performed under one roof in Macon, Georgia.

This includes the design and operation of proprietary open-system thermal modification chambers. After modification, Westwood profiles, defect-cuts, and pre-finishes its products within the same facility, maintaining strict quality control throughout the production process.

Westwood is also committed to sustainable sourcing. Nearly all wood processed by the company is harvested in North America, often within 100 miles of its facilities.

Unlike other wood modification processes that rely on chemicals, Westwood modifies wood using only heat and steam in its open-system process. Its proprietary steam generation is powered by electricity rather than gas boilers, reducing emissions and improving efficiency.

Following a reorganization and new investment in 2023, Westwood continues to expand its distribution network across the United States, Canada, the Caribbean, and parts of Western Europe.

Jartek

Jartek is a family-owned Finnish company with deep roots in the Nordic wood industry and a world market leader in wood thermal modification equipment. In 2027, Jartek will celebrate 70 years of operation, reflecting a long-standing commitment to the wood industry and to customer success. Guided by the core values of customer orientation and reliability, our thermal modification chambers deliver a high-quality and consistent end product that meets the strict quality requirements of the certified ThermoWood® brand.

Over the past three decades, we have delivered more than 100 operational thermal modification chambers in over 20 countries. Throughout this time, we have continuously advanced our technology to meet the evolving requirements and diverse needs of our customers. While Jartek is fundamentally Finnish, we also have an established presence in North America through our own companies and long-term operations in the region.

Jartek's thermal modification kilns are available in capacities ranging from 3 m^3 (106 cu ft) up to 130 m^3 (4,593 cu ft), enabling customers to match equipment size precisely to their production needs. Smaller kilns are well-suited for limited batch production, testing new wood species, product development, or entering thermal modification with a scalable investment. Their compact design allows transport within a standard sea container and supports fast installation thanks to a high level of pre-assembly.

For larger-scale production, high-capacity kilns are engineered with robust construction, premium components, and precise process control to ensure consistent, repeatable results. Process gases are directed to combustion to minimize odor emissions, and load-handling systems and service platforms can be supplied to support safe and efficient operation. Turnkey delivery is also available when required.

Jartek is a member of the International ThermoWood Association, which owns and oversees the ThermoWood® brand. Jartek is the only technology supplier member of the Association. The International ThermoWood Association plays an important role in advancing thermally modified wood through standardization, established product classifications for ThermoWood®, and research results built over more than 20 years.

IWT-Moldrup

IWT-Moldrup is a family-owned Danish company specializing in industrial wood protection technologies. Since 1978, the company has supplied more than 1,000 vacuum-pressure impregnation systems worldwide, along with vacuum drying plants using the Moldrup-SSV superheated steam-under-vacuum process.

A global leader in thermal modification technology since the 1970s, IWT-Moldrup has supported more than 50 thermal modification plants since 1999, serving both hardwood and softwood applications. The company works closely with customers across the full project lifecycle, from feasibility and plant design to commissioning, training, and long-term service.

Its approach to thermal modification is defined by a controlled, closed-system process using medium-pressure steam within an autoclave. This wet environment maintains approximately 3–5% moisture content, reducing brittleness and internal checking while enabling efficient heat transfer and shorter cycle times. The result is a safer, lower-emission process that produces dimensionally stable, durable wood products suitable for demanding exterior applications.

Thermally modified timber continues to gain traction globally as a solution for cladding, decking, and joinery components, offering an alternative to chemically treated wood. As adoption grows, the industry's continued success will depend on consistent standards, testing methods, and education to ensure products are used appropriately and perform as expected.

American Wood Technology

American Wood Technology serves as the North American manufacturer's representative for IWT-Moldrup, bringing this proven technology to regional markets since 2010.

Through this partnership, AWT provides complete, custom thermo-modification plant solutions, including closed-system equipment, oil-heating systems, emissions controls, and automation systems such as material handling, lumber sorting, and stacking.

For lumber producers, these systems offer faster processing times, lower energy use, improved dimensional stability, and reduced defects such as checking and cracking. The process also enhances the performance and appearance of wood, increasing resistance to weather and decay while maintaining structural integrity.

In North America, growing interest in thermally modified wood reflects broader market shifts toward sustainability, performance, and material innovation. The technology also creates new opportunities to utilize underused species such as alder, cottonwood, and poplar, as well as lower-grade lumber, by improving uniformity and expanding potential applications.

As awareness continues to grow, AWT supports efforts to establish industry standards and promote education, ensuring that thermally modified wood delivers consistent quality and long-term value across applications ranging from cladding and decking to furniture, flooring, and architectural façades.

WDE Maspell

WDE Maspell is an Italian technology provider recognized for advanced vacuum-based wood drying and thermal modification systems. With decades of industrial experience and a strong focus on innovation, the company supports lumber producers worldwide with solutions designed to improve durability, dimensional stability, color consistency, and sustainability.

Its thermal modification technology enables lumber to be used in demanding applications such as exterior cladding, decking, façades, and architectural components by enhancing performance without the use of chemical additives.

WDE Maspell systems are engineered for precision, offering control over temperature, pressure, humidity, and cycle times to ensure consistent product quality. Beyond equipment, the company provides technical consulting, operator training, and long-term support, helping producers maintain efficient operations and reliable output over time.

SII Dry Kilns

SII Dry Kilns, based in Lexington, North Carolina, is a leading U.S. manufacturer of industrial hardwood kilns, with roots in the lumber drying industry dating back to 1970. Since 2015, SII has served as the U.S. representative for WDE Maspell thermal modification systems, helping bring this technology to the North American market.

As both a manufacturer and representative, SII offers a unique perspective for U.S. producers, acting as a liaison between domestic operations and international equipment providers. This role helps bridge communication gaps and ensures smoother project implementation, from installation through production.

SII became interested in thermal modification as early as 2008, recognizing its potential in the U.S. market. While challenges remain, particularly in adapting the process to North American species that behave differently than European woods, continued collaboration between producers and technology providers is steadily advancing the market.

The company also emphasizes the importance of establishing clear quality standards for thermally modified wood. As the industry grows, consistent certification and evaluation processes will be essential to ensure product performance and protect end users from misleading claims.

Looking ahead, SII sees strong potential for thermally modified wood in North America. As architects, builders, and manufacturers seek durable, visually appealing, and environmentally responsible materials, demand is expected to continue rising across both interior and exterior applications.

APPENDIX 1:

Participating Companies in the Thermally Modified Wood (TMW) Sector

Note: The companies listed have participated in the survey and have acknowledged that their information may be shared publicly. This was clearly communicated during the data collection process, and participants were informed that their responses would be included in our website and reporting materials. Out of the 20 known TMW producers, several companies did not respond to the demographic information request. As a result, we are unable to include their data in this report.

Chase Morrison
Sunset Moulding
6695 Butte Avenue
Sutter, CA 95982
United States
chase@sunsetmoulding.com
530-701-4975

Dustin Clary
ThermawoodTech
135 Hutton Ranch Rd
Kalispell, MT 59901
United States
dustinc@thermawoodtech.com
406-270-3557

Andrew Stanfield
Edrich Lumbe, Inc.
9700 Old Court Rd
Windsor Mill, MD 21244
United States
astanfield@edrichlum.net
410-922-5959

John Bieganek
Superior Thermowood of Brainerd
48899 Hwy 169
Palisade, MN 56469
United States
thermowoodmn@gmail.com
218-820-9601

Kelly Bartz
Arbor Wood Co
1025 London Rd
United States
kelly@arborwoodco.com
218-349-8383

Brent Hall
Westwood Millworks
7493 Airport Drive
Macon, GA 31216
United States
brent@westwoodmillworks.com
770-317-3980

Nicholas Forbes
Scottywood
3539 Sunset Lane
West Vancouver V7V0A9
Canada
Nicholas@scottywood.ca
778-508-9580

Matt Pryor
Bingaman & Son Lumber Inc
1195 Creek Mountain Rd
Kreamer, PA 17833
United States
mpryor@BingamanLumber.com
570-374-1108

Chris Rider
Lunawood LLC
5596 Riverview Rd SE
Mableton, GA 30126
United States
crider@hardwoodweb.com
704-430-8957

Frederick Girard
Torrexpert
31 rue Principal, FASSETT
J0V 1H0
Canada
Addresstorrexpert@gmail.com
819-921-7363

Mike Lipke
Trillium Pacific Millwork, Inc.
PO Box 40
Hubbard, OR 97032
United States
mlipke@trilliumpacific.com
503-982-9663

Robert Lennon
ThermalWood Canada
1750 Connolly Ave, Bathurst
E2A 4W7
Canada
lennon@thermalwoodcanada.com
506-548-9126

Mark Challinor
Thermory USA
1213 Wilmette Avenue; Ste 200
Wilmette, IL 60091
United States
mark@thermoryusa.com
847-256-8828

Ignacio Martino
Maderera Piedra del Toro
Ruta 8 km 38 1257
Canelones, AL 11800
Uruguay
ignacio@mpdt.com.uy
+59899258089


NHLA