
Forisk Strategy Note, Q1 2019

Risk and Context in the Forest Industry: Lessons from Wood Pellets and Bioenergy

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Summary Messages

- Wood bioenergy comprises a set of forest products that turn forest-derived raw materials into value-added products. Research of the sector, with a special emphasis on wood pellets, provides context for how wood-using industries in North America evolve generally.
- This Note highlights four lessons relevant to evaluating risk, understanding drivers of capital investment, and providing context for investment decisions.
 - 1) **Have a simple screening and ranking process** to separate speculative projects from viable investments. This approach applies to assessing “at-risk” mills, acquisition targets, and the suitability of wood baskets for timber investment and capacity expansions.
 - 2) **Connect wood markets to end markets** to assess strategic advantage. The simple math of “distance to mill” or “distance to customer” along with gross margins and the ability-to-pay for wood provide a framework for strategic analysis.
 - 3) **Understand what drives capacity changes and consolidation** to leverage and track the compounding benefits of technology and scale in the forest products industry across regions in North America.
 - 4) **Communicate with context** to provide the best possible guidance to your teams and clients, while also role-modeling what we expect from others. We must be “on guard” and disciplined as consumers and disseminators of analysis.

Introduction

In the forest industry, where capital investments and forest management plans span decades, we benefit by understanding wood markets and technologies as they actually function. This clarifies risks and provides context for emerging wood demand from new applications and end markets. Over the past decade, we developed a point of view and set of insights for understanding emerging markets based on tracking the wood bioenergy sector.

In 2008, Forisk initiated a research program to track every wood-using bioenergy project in the United States. Why? We wanted to quantify the progress of local and regional bioenergy markets. This bottom-up analysis provided context to decision-makers who might otherwise assume all bioenergy projects could succeed. Misreading the markets along these lines could overstate risk and lead policy-makers, environmental groups, and forest products firms to “over react” or pursue counterproductive efforts.

Our previous Forisk Strategy Note shared specific learnings and observations from spending months visiting wood-using mills and operations in the pallet industry.¹ This Note shares insights from a decade of research related to North America’s wood bioenergy sector. We focus on the

¹ “Reinvention and Competition in the Forest Industry: Lessons from Wood Pallets,” *Forisk Strategy Note*, Q4 2018. Available at: <http://forisk.com/resources/white-papers-and-articles/#forisk-strategy>

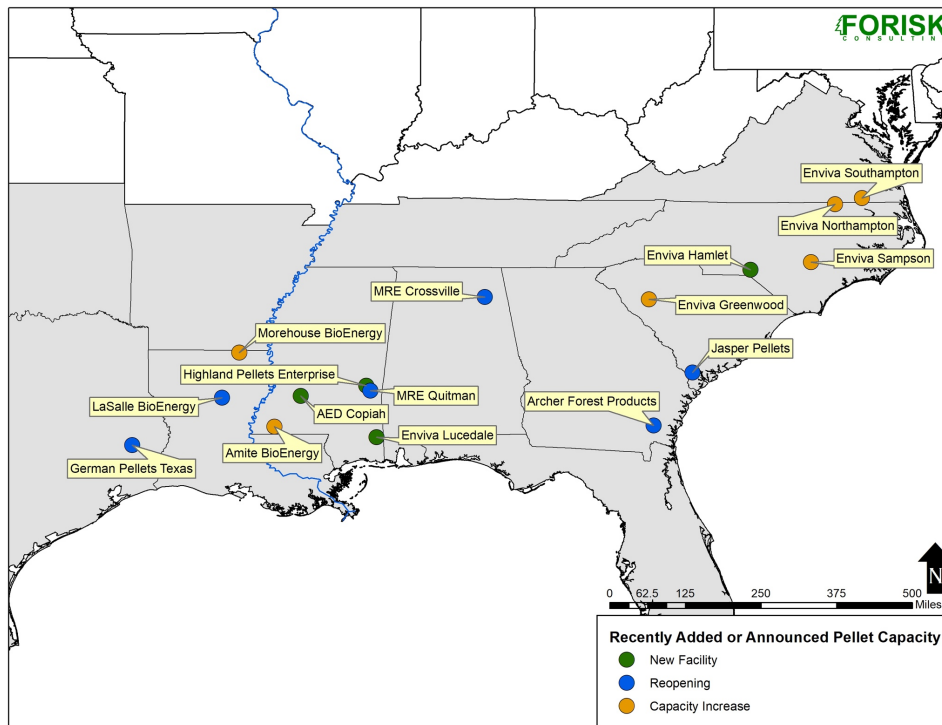
wood pellet sector, with notes on cellulosic ethanol and wood electricity, to highlight ways we can better evaluate and communicate risk in the forest industry.

U.S. Wood Bioenergy Sector

North America’s forest industry has over 770 million tons of wood using capacity.² Of this, approximately 39 million tons (5.1%) are associated with wood pellet plants. In the United States alone, the wood bioenergy sector – which includes pellets, combined heat and power (CHP), wood electricity, and liquid fuels – accounted for over 70 million tons of wood use in 2018, much of it in the form of manufacturing residuals and hog fuel.³

In 2017, wood biomass accounted for 1.0% of total U.S. electricity generation.⁴ It is a stable, though small, component of U.S. power. Meanwhile, **wood pellet markets continue to grow and attract capital.**⁵ Wood pellet production capacity in North America increased 170% over the past decade. Growing to meet European demand for renewable energy – and more recently demand from Asia – wood pellet manufacturers consolidated and shifted across regions. While the North has the largest share of viable wood bioenergy plants in the U.S., larger projects continue to locate in the South, which hosts the largest wood pellet producing region in North America (Figure 1).

Figure 1. Recently Added or Announced Viable Pellet Capacity in the U.S. South



Source: Forisk

² “2018 North American Forest Industry Capacity,” Forisk Consulting Multi-Client Study. Available at: <http://forisk.com/product/north-american-forest-industry-capacity/>

³ “Wood Bioenergy Chapter,” Q1 2019 Forisk Research Quarterly (FRQ).

⁴ Energy Information Administration (EIA); Q1 2019 FRQ

⁵ From “Wood Pellet Capacity Continues to Increase in the South,” Forisk Blog posted February 26, 2019. Available at <http://forisk.com/blog/2019/02/26/wood-pellet-capacity-continues-increase-u-s-south/>

Four Lessons from Wood Pellets on Risk and Context

The forestry profession consists of local entrepreneurs with a long tradition of adapting incrementally to market shifts as investors and manufacturers deploy capital to new projects. Each participant must look at their spreadsheets, and in the mirror, to weigh risks and opportunities. Our research into wood bioenergy highlights insights relevant to strategy development and risk management in the forest industry and for timberland investing.

One: Have a Simple Screening and Ranking Process

Without a structured approach to ordering the world, the world will impose its views on us. The fact is some things are more important than others, some things are easily verifiable, and some things depend on others. We have “nice to have” and “need to have.” There are “necessary” conditions and “sufficient” conditions. Simple processes help us sort the mess and prioritize.

We all apply screens. Does he tell the truth? Does this house have three bathrooms? Does this car have a big enough trunk for my flux capacitor? The key is to apply these screens consistently, systematically and then revise based on back-testing performance over time. That’s how we learn and improve.

For example, we apply simple screens each quarter to the wood bioenergy sector to sift out speculative projects. As of January 2019, Forisk tracked 437 operating and announced bioenergy projects. These represent potential wood use of 114.8 million tons per year. Our analysis suggests 156 of these projects (35.7%) will fail, implying wood use from bioenergy in the U.S. of 80.8 million tons by 2028.

Our screens pose two answerable questions. First, does the project rely on a proven technology? “Proven” is one that operates at full commercial scale, preferably for a year or longer, anywhere in the world. For wood bioenergy, proven technologies include pelletizing and boilers. Second, has this project secured at least two of the necessary resources or agreements such as financing; air quality permits; engineering (EPC) contracts; power purchase agreements; or raw material supply agreements?

While there are other considerations – such as technical details related to raw materials and wood-to-energy conversions, and the economics of subsidies – **this approach has proved useful in systematically distinguishing probable from speculative projects.**

More generally in the forest industry, we apply simple screens to “at-risk” mills⁶ and newly announced mills⁷, to evaluate wood baskets⁸ and operable forest supplies⁹, just as we scan the posted health scores at any restaurant we enter. They don’t tell us everything, but they tell us something that focuses the mind and reorders follow-up questions. Have humility and understand that screens, while not perfect, clarify thinking and prioritize effort.

⁶ “Evaluating Mill Risk and Investments,” Forisk Blog posted April 5, 2018. Available at: <http://forisk.com/blog/2018/04/05/evaluating-mill-risk-investments-analyzing-timber-markets-wood-baskets/>

⁷ “3 Questions for Forest Industry Capital Allocation,” Forisk Blog posted September 19, 2016. Available at: <http://forisk.com/blog/2016/09/19/3-questions-forest-industry-capital-allocation/>

⁸ “Three Questions for Screening and Ranking Wood Baskets for New Mills,” Forisk Blog posted April 12, 2018. Available at: <http://forisk.com/blog/2018/04/12/three-questions-screening-ranking-wood-baskets-new-mills/>

⁹ “What is Forest Supply? The ‘Big 3’ Considerations,” Forisk Blog posted July 21, 2015. Available at: <http://forisk.com/blog/2015/07/21/what-is-forest-supply-the-big-three-considerations/>

Two: Connect Wood Markets to End Markets

In bioenergy, manufacturers buy wood locally and sell pellets globally. This distinguishes wood pellets from other forest products, where most production gets consumed domestically or in neighboring countries. For North America, over 90% of solid forest products and over 80% of paper and paperboard production get consumed in the U.S. and Canada, while over three out of four pellets (76%) get shipped out by ocean-crossing exporters (Figure 2).

Figure 2. North American Forest Products Exports as Share of Production

	Softwood Lumber* (BBFT)	OSB** (MMSF)	Plywood** (MMSF)	Paper & Paperboard** (tons)	Wood Pellets** (tonnes)
Production (U.S. and Canada)	62.2	22.7	13.4	81.9	9.6
Exports to Rest of World	5.2	0.7	0.8	16.1	7.3
% Consumed in North America	91.6%	96.9%	94.0%	80.3%	24.0%

Sources: FRQ; Forisk 2018 N.A. Forest Industry Capacity; WWPA; FAO

Notes: *2018; **2017

Globally, most forest products move regionally; on a volume basis, intercontinental exports represent the exception. The reasons are simple: forest products are heavy, bulky and expensive to ship. The math of freight costs and law of gravity, buffeted by exchange rate volatility, enforce a quasi-limit on forest industry trade relative to domestic demand for most developed economies (outside of New Zealand).

This emphasizes the core “timber markets are uniquely local” tenet of forest industry analysis. Once we get past the localized fundamentals of supply (is the wood there?) and demand (are the mills there?), we assess risk and manufacturers through the economics of (1) distance and (2) margin by asking:

- 1) How much does it cost to deliver product and serve customers?
- 2) What is their ability-to-pay for wood?¹⁰

Distance and margin provide quantitative measures of risk and opportunity. If I can cut the distance between links in my supply chain – from the woods to the mill, or from the mill to my customers, or between logs on the sharp chain – then I save time, gain volume and reduce costs. And the extent to which any of these get improved relative to competitors will grow gross margins and strengthen raw material security.

Three: Understand What Drives Capacity Changes and Consolidation

Wood bioenergy reminds us that the forest industry does not consolidate until things are figured out. Consider liquid biofuels. In 2011, we published research that detailed 12 technologies across 36 projects attempting to convert wood to liquid fuels.¹¹ The study concluded:

“...wood-based biofuels will fail to contribute substantively to EPA’s Renewable Fuel Standard targets in 2011 or 2022.”

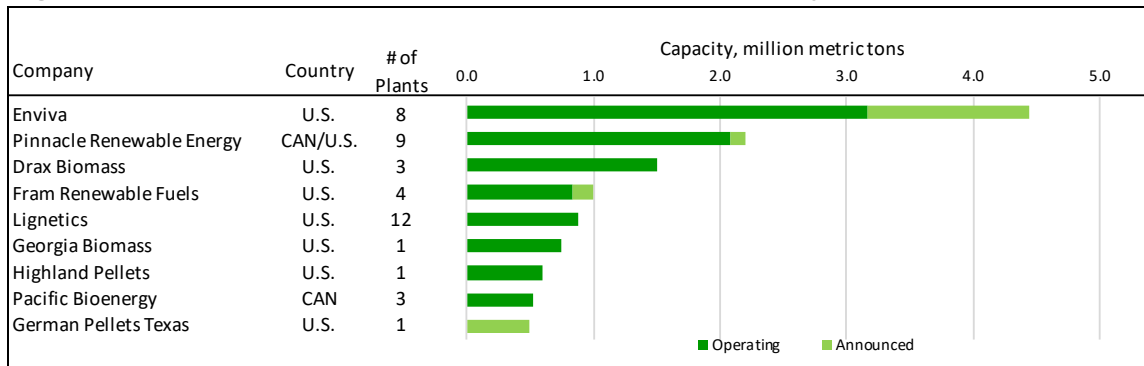
¹⁰ The importance of knowing one’s “economic place in the forest industry universe” arises consistently and persistently in our research. Clarity in gross margins and the ability-to-pay for wood frames strategic analysis. See Part II on “Pallets and the Forest Industry,” Forisk Blog posted December 6, 2018. Available at: <http://forisk.com/blog/2018/12/06/reinvention-competition-wood-pallets-forest-industry-part-ii/>

¹¹ “Impacts on Timberland Investors from Biofuels Projects,” Forisk Blog posted May 24, 2011. Available at: <http://forisk.com/blog/2011/05/24/wood-bioenergy-impacts-on-timberland-investors-from-biofuels-projects/>

In 2018, we revisited the study and confirmed how wood-based biofuels failed to develop commercially. Of the original 36 projects, 19 were canceled, 9 were shut down, and 8 remained operational. Of the operational facilities, all were pilot or demonstration plants.¹² Cancellations and technology failures do not drive capital investment or investment bankers.

Rather, **firms consolidate to leverage technologies, gain scale, and lock down market share**. Consider North America’s largest wood pellet manufacturers (Figure 3). These firms have been consolidating for several years. In the U.S. alone, Enviva now accounts for over 25% of total capacity.¹³

Figure 3. North American Wood Pellet Production Capacity



Source: Forisk Consulting

Beyond bioenergy, capacity changes and consolidation point to how technological shifts support margin capture and market share growth for wood-using firms scaling their operations. For example, between 2008 and 2018, while the number of sawmills decreased by 15% in North America, the average softwood sawmill size increased 16% (from 96 to 112 MMBF). Forisk’s research matches the growth of sawmill size with strategic decisions by individual firms.

In the forest products industry, scale leverages technological advances and operational excellence as larger firms (1) acquire and recapitalize older facilities or (2) build cutting edge plants. And industry consolidation further leverages those benefits. We see this in lumber, plywood, pulp, OSB and wood pellets.

Four: Communicate with Context

We have an obligation to communicate accurate information with clarity and context. This builds trust and the ability to influence decisions over time.

Years ago, I interviewed a graduate student for a job opening. The bottom of the applicant’s resume said, “*fluent in Spanish.*” So, I asked, in Spanish, “where did you learn Spanish?”

The applicant, eyes wide open, hesitated before saying, “well, it’s been a while. I’m a little rusty.”

Then I asked, “What else on your resume is not accurate?”

¹² “Wood-Based Biofuels: A Drop in the Bucket,” Forisk Blog posted May 30, 2018. Available at: <http://forisk.com/blog/2018/03/30/wood-based-biofuels-drop-bucket/>

¹³ “Consolidation of Wood Pellet Producers Continues,” Forisk Blog Posted January 5, 2018. Available at: <http://forisk.com/blog/2018/01/05/consolidation-wood-pellet-producers-continues/>

I read research and reporting related to forest sustainability and timber markets with the expectation that, at a minimum, facts get checked and context gets provided. Once you start pulling at loose threads, buttons fall to the ground and sweaters unravel. When reviewing analysis and coverage, I look for three specific common errors:

- 1) Failure to provide context.
- 2) Improperly assigning “causal” relationships.
- 3) Errors of fact.

Media accounts often missed the forest and the trees when reporting on wood pellets and bioenergy.¹⁴ For example, a 2013 BBC report¹⁵ on the use of wood pellets in the UK said planned power plant conversions would “burn more wood than the entire output from the UK’s timber industry.” And how much wood would that be?

At the time, it took four minutes on the United Nations online database of forest products statistics to figure out that the UK produced one-half of one percent of the world’s industrial timber in 2011. The U.S. timber industry was 32 times bigger. This failure to provide context for UK’s timber industry was like reporting on hamburger sales in India or breweries built by BYU graduates. While they could prove interesting, the numbers may prove trivial.

Failing to provide fact-based information with proper context injects risk and uncertainty into any decision-making process. We all have opportunities to improve the quality and clarity of our communications. If we are the ones “in the chair,” we must further understand bias and discern for ourselves, in many situations, the kernel of truth or insight that can help us navigate risks, make decisions and move forward.

Conclusion: Strategic Implications

For timber and forest industry executives and investors, the lessons in this Note specify:

- 1) The value of simple, systematic screens to prioritize risks;
- 2) Answerable questions for comparing end market risks across sectors;
- 3) The strategic relevance of specifying which factors drive capital investment and consolidation across sectors and any point in time; and
- 4) The need to be “on guard” and disciplined as communicators and consumers of analysis within a broader context.

Wood bioenergy markets provide context for how wood-using sectors in North America evolve generally. Bioenergy projects run the gauntlet of traditional forest industry activities, from finding a site and securing financing and permits to constructing the plant and procuring raw material. Progress in these activities provides a way to assess the viability of investments at the local level and allows decision-makers to evaluate the effects on wood use and timber markets.

¹⁴ “Nibbling on a Chicken or Nibbling on an Elephant?” Forisk Blog posted October 23, 2015. Available at: <http://forisk.com/blog/2015/10/23/nibbling-on-a-chicken-or-nibbling-on-an-elephant-another-example-of-incomplete-and-misleading-analysis-of-us-forest-sustainability-and-wood-bioenergy-markets/> and “How Reporters Miss the Forests and the Trees,” posted June 3, 2013: <http://forisk.com/blog/2013/06/03/how-reporters-miss-the-forest-and-the-trees-when-covering-wood-bioenergy-markets/>

¹⁵ “Biofuels: MPs to Consider Subsidies for Power Stations,” BBC post by Roger Harrabin, March 6, 2013. Available at: <https://www.bbc.com/news/science-environment-21672840>

Appendix A: About Forisk

Our team conducts research to understand how things in the forest industry work. We use this to help clients make better decisions with timber-related investments and wood-using industries. All Forisk researchers have direct forest industry and market analysis experience. This includes work in wood procurement, forest finance, forest operations, and timber market forecasting.

Forisk publishes the *Forisk Research Quarterly (FRQ)*, which includes timber forecasts, forest industry analysis, forest operations research and wood market rankings for North America. In total, Forisk subscribers own or manage over 100 million acres of timberland and use over 200 million tons of wood per year in the U.S. and Canada. This includes firms and organizations based in the U.S., Canada, Europe, Asia and South America.

Our consulting focuses on analyzing the supply and demand characteristics of local wood and timber markets and, from this analysis, developing forecasts and strategic guidance related to investment decisions and the management of assets. To support this research, Forisk maintains the most complete databases of mill level capacity for solid wood-using mills in North America.

Forisk Product and Services

■ Products

- *Forisk Research Quarterly (FRQ)*
- 2019 North American Forest Market & Industry Rankings
- 2018 North American Forest Industry Capacity, 2008-2020
- North American Timberland Owners & Managers database
- Silviculture Surveys
 - Forest management benchmarking for the US South and Pacific Northwest
- Wood Bioenergy US database

■ Services

- Timber market and wood basket screening, ranking and feasibility analysis
- Property and mill-specific timber price forecasts
 - Stumpage and delivered
- Forest operations analysis and benchmarking
 - Wood procurement, market infrastructure and logging/hauling capacity
- Executive education and professional development

■ 2019 Events

- “Applied Forest Finance” short course, February 19, 2019
- “Timber Market Analysis” short course, June 25, 2019
- **3rd Annual “Wood Flows & Cash Flows” Conference**
 - **Save the date: December 5th, 2019 in Atlanta**

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