



## *FutureMetrics™ LLC*

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# **Where do you think lumber, furniture, flooring, paper, cardboard boxes, tissue, and toilet paper come from?**

## **A quantitative review of the North American forest products industry (with a new interactive dashboard)**

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June 19, 2023

This brief white paper and a new interactive dashboard provides a quantitative view of the US and Canadian forest products sector.

There are about 1850 operating mills in north America (US and Canada) that use wood as their primary input. North America's managed forests<sup>1</sup> supply over a half a billion metric tonnes per year<sup>2</sup> to produce products that many of us take for granted.

These products produced from trees are commonplace in the forms of packaging and shipping boxes, lumber and other wood-based construction materials, flooring, furniture, tissue, and many other less obvious uses.

Unlike products based on refined petroleum products, these materials are from a perpetually renewing resource.

As noted in an earlier FutureMetrics white paper<sup>3</sup>, the forest products industry in the US and Canada has every motive to make sure that the working forests that provide the raw material for mills are managed sustainably. In other words, the mills, which cost hundreds of millions of dollars to build, are sized such that the intake rate of the mill does not exceed the surrounding working forest's growth rate. If the mill needs 200,000 tonnes per year of wood, the forests around the mill have to add at least 200,000 tonnes per year of new growth. Otherwise, the resources would become scarce, more costly over time, quickly deplete, and cause the mill to prematurely close. Unlike drilling rigs extracting oil, a sawmill, pulp mill, or pellet mill cannot be moved when the raw material is depleted. Sustainability is baked into the business model. The white paper referenced in footnote 3 explains this in detail.

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<sup>1</sup> A managed forest is essentially a tree farm with many plots in many stages of the growth cycle. If sustainably managed, each plot regrows after every harvest. At the landscape level, across many plots, the new growth equals or exceeds the removals of mature trees and thus the net stock of wood is not depleted.

<sup>2</sup> FutureMetrics uses the Forisk North American Forest Industry Capacity Database. <https://forisk.com/>

<sup>3</sup> See the white paper "Do we really want to exclude all roundwood from being used to make pellet fuel?" from June 25, 2022, at the [FutureMetrics website](https://www.futuremetrics.com/).



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Many who do not live in areas in which there are mills that convert wood into goods do not grasp the breadth and size of the industries that provide those goods.

Table 1 below shows the potential maximum annual demand (in short green tons) across the major sectors of the forest products industry.

## 2023 North American Annual Wood Demand at Operating Mills

	Short Tons if at Nameplate Capacity	Percent of Total
Lumber, Furniture, Flooring	324,120,000	43.4%
Paper, Packaging, and Tissue	259,926,000	34.8%
Oriented Strand Board (OSB)	41,263,000	5.5%
Chips (many uses including paper, OSB, and pellets)	37,824,000	5.1%
Export Pellets	36,008,000	4.8%
Plywood and Veneer	35,304,000	4.7%
Domestic Pellets for Heating	12,268,000	1.6%
	<b>746,713,000</b>	<b>100.0%</b>

source: Forisk North American Forest Industry Capacity Database, July 2023; Analysis by FutureMetrics

*Table 1 - North American Mill Capacities in Short Tons per Year*

Nameplate capacity is defined in this analysis as the output of the mill if it were to run at its nominal output rate every hour of the year. Mills never operate 100% of the time due to scheduled and unscheduled maintenance. Actual capacity factors vary by mill and, in aggregate, by sector.

Estimating actual annual wood demand requires several assumptions, including the capacity factors mentioned in the paragraph above. To quantify and visualize wood demand, FutureMetrics has produced a dashboard that allows many of those assumptions to be set by the user.

Figure 1 on the next page is an image of the dashboard. The dashboard can be opened directly in a web browser from [HERE](#).

There are several insights illustrated in the dashboard that are important in gaining a fuller understanding of the forest products industry.

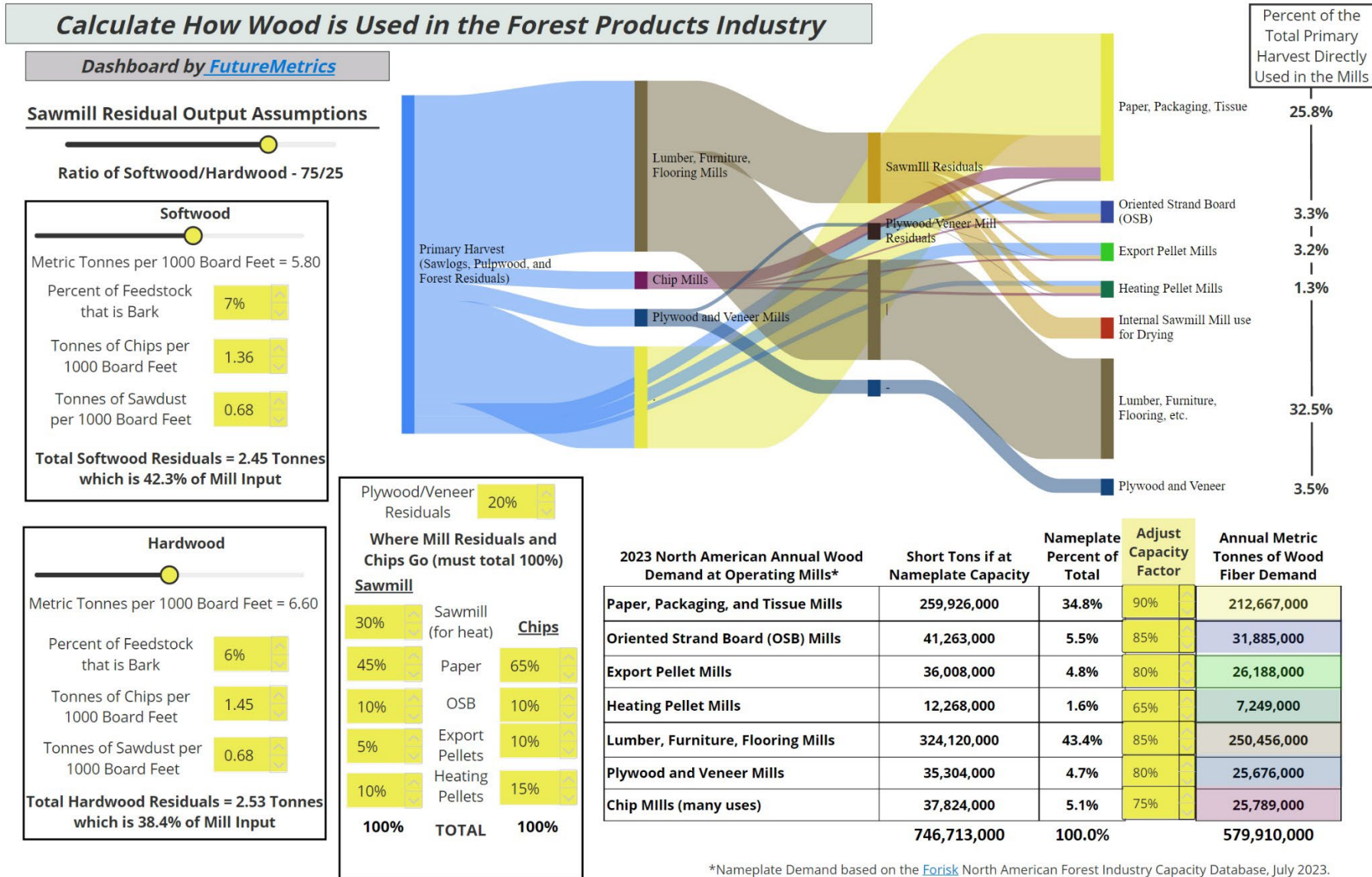
Note that the majority of the primary harvests (that is material from the forest) are used in the paper, packaging, and tissue sectors, and in the sawmilling sectors.

Note also that residuals from the sawmilling and certain engineered wood products sectors are used in other sectors. So-called forest residuals (parts of the tree not suitable for sawmills and other higher value uses) are chipped and used in several manufacturing applications.



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2023 North American Annual Wood Demand at Operating Mills*	Short Tons if at Nameplate Capacity	Nameplate Percent of Total	Adjust Capacity Factor	Annual Metric Tonnes of Wood Fiber Demand
Paper, Packaging, and Tissue Mills	259,926,000	34.8%	90%	212,667,000
Oriented Strand Board (OSB) Mills	41,263,000	5.5%	85%	31,885,000
Export Pellet Mills	36,008,000	4.8%	80%	26,188,000
Heating Pellet Mills	12,268,000	1.6%	65%	7,249,000
Lumber, Furniture, Flooring Mills	324,120,000	43.4%	85%	250,456,000
Plywood and Veneer Mills	35,304,000	4.7%	80%	25,676,000
Chip Mills (many uses)	37,824,000	5.1%	75%	25,789,000
	<b>746,713,000</b>	<b>100.0%</b>		<b>579,910,000</b>

\*Nameplate Demand based on the [Forisk](#) North American Forest Industry Capacity Database, July 2023.

Figure 1 - Wood Flow Dashboard- Direct Link [HERE](#)



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The Sankey chart<sup>4</sup> shows how the primary harvest is divided up and how residuals from some of the manufacturing is used in other sectors.

Given the baseline capacities, the assumed capacity factors, and the other input assumptions with yellow shading, a total of about 580 million metric tonnes of wood<sup>5</sup> will be used in 2023.

The largest demander of raw material from the forest is the lumber, flooring, furniture, and cabinetry sawmills. However, as the dashboard shows, a significant portion of the sawlogs that enter a sawmill do not become end products. The default settings in the dashboard show that about 42% of softwood roundwood (typically used to produce lumber for construction like the well-known 2x4) and about 38% of hardwood roundwood (used, for example, for flooring and furniture) are by-products.

Some years ago, much of that residual material was simply burned (often in those infamous “beehive” burners<sup>6</sup>). For environmental and business reasons, those days are long gone.

Some of the residuals are used in sawmills to fuel the energy plants that provide drying heat for curing the lumber. The rest of the sawdust, chips, and bark are products that sawmills sell into other sectors (as illustrated in the Sankey diagram).

One of the beneficiaries of both sawmill and forest residuals is the wood pellet sector (shown in the dashboard as “export” and “heating” mills).

As FutureMetrics has discussed in many white papers and is seen in some press reporting, the pellet export sector is sometimes portrayed as a poor steward of the forest resources. Implications of continuous and permanent deforestation to satisfy the millions of tonnes per year of pellets produced in north America are not uncommon.

These accusations are illogical. It makes no sense to deplete the resources around a mill. And it makes the export (or “industrial) pellet sector out to be far more influential in how forest resources are allocated than it is.

Note in Figure 1 that, given the input assumptions, the export pellet sector only receives about 3.2% of the total primary harvest directly from the forest. Most of that 3.2% is roundwood that is unsuitable for higher value use. Those are typically crooked stems, rotten center stems, or species interspersed in the harvest that are not suitable for the primary uses for the harvest. Some are thinnings from managed plantations. Those intermediate harvests may have no other merchantable markets other than pellet mills<sup>7</sup>. Occasionally stands that were “high graded<sup>8</sup>” are clear cut, the otherwise nonmerchantable timber sent to a pellet factory, and the stand is remediated to correct the negative effects of high grading.

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<sup>4</sup> [https://en.wikipedia.org/wiki/Sankey\\_diagram](https://en.wikipedia.org/wiki/Sankey_diagram)

<sup>5</sup> The capacities are in “green tonnes”. That is, wood as it is delivered from the forest. Typical moisture content of “green” wood is between 40% and 55% depending on species, location, season, etc.

<sup>6</sup> [https://en.wikipedia.org/wiki/Beehive\\_burner](https://en.wikipedia.org/wiki/Beehive_burner)

<sup>7</sup> See [HERE](#) for a brief description.

<sup>8</sup> [https://en.wikipedia.org/wiki/High\\_grading](https://en.wikipedia.org/wiki/High_grading)



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So what is the reason for the opposition to the tiny export pellet production sector in the much larger forest products industry (all of whom depend on trees being grown and harvested on a more or less continuous basis)?

Perhaps it is because the product is used as fuel. But as numerous FutureMetrics white papers, and other highly credible scientific analysis has shown, if fundamental sustainability criteria are followed (and proven with independent third-party auditing), the use of pellet fuel to replace coal in power generation is highly carbon emissions beneficial. With the addition of carbon capture and storage, those power stations can simultaneously produce baseload and/or on-demand power while subtracting CO<sub>2</sub> from the atmosphere<sup>9</sup>.

Perhaps it is because currently almost 100% of the industrial pellets produced in the US and Canada are exported. In the last year, US exports of lumber and pulp (and scrap paper) averaged about \$1.4 billion per month<sup>10</sup>. Pellet exports were about 1/10 as much at about \$110 million per month.

Perhaps it is because many do not know better. Perhaps they are clueless as to the size and scope of the forest products industry. Perhaps they don't connect the dots between the source and their Amazon delivery boxes, their toilet paper, their books, the structural lumber underlying many of their homes, the doors, windows, their hardwood flooring and the cabinets in those homes. Perhaps they believe that one small sector in a large industry can be responsible for the destruction of the forest lands around those pellet factories; but the other 96.8% of primary harvest going to the rest of the mills is okay. A factual perspective does not support a vision of forests being permanently removed to support pellet production. As the dashboard illustrates, the north American sawmilling sector uses 10 times more wood directly from the forest per year than the pellet export sector.

This researcher cannot provide a reason that is based on facts and logic for much of the opposition to the production of industrial wood pellets. Fortunately, we all agree that forests are good for many reasons and should be nurtured so that in aggregate they never shrink in size and are growing trees forever.

**Hopefully, this white paper and the dashboard provide information and analysis in an easy-to-understand format that can help everyone gain a reality-based perspective.**

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FutureMetrics is highly committed to the principles behind renewable energy and to the need for mitigating climate change. The statement on our "About Us" document makes that clear:

*Mitigating climate change is the foundation of our mission.*

*FutureMetrics believes that the foundation for all biomass-based energy projects, from both environmental and economic points of view, must be sustainability. **Preservation of the landscape's carbon stocks are essential for the low carbon characteristics of the refined fuel.***

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<sup>9</sup> See the FutureMetrics white paper "Carbon Negative! An analysis by Dr. Strauss that shows a pathway that the US can follow to join the offramp to a decarbonized future." March 24, 2023. At the [FutureMetrics website](#).

<sup>10</sup> Bureau of Labor Statistics and US Census Bureau.