



TIG White Paper: Global Wood Pulp Market Structure and Dynamics

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Timberland Investment Group



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Executive Summary

The Global Pulp Market

- The global wood pulp market consumes 213 million metric tons (MT) of wood annually, with 38% of this consumption as “market pulp” sold to non-integrated mills and 62% used internally by companies producing both pulp and paper products.
- Market pulp demand has grown steadily over the past two decades, driven primarily by China’s rapid industrial growth and increasing paper consumption, leading to a CAGR of 2.2% and reaching 71 MT in 2023.
- Hardwood pulp, from broad-leaved trees, is used for smooth and bright products like printing papers and tissues, while softwood pulp, from coniferous trees, is used for strong and durable packaging materials.

Pulp Industry Structure

- Major products that the pulp industry produces include Bleached Hardwood Kraft Pulp (BHKP, used for sanitary products and printing papers), Unbleached Kraft Pulp (UKP, used for packaging paper), Bleached Softwood Kraft Pulp (BSKP, used for packaging materials such as containerboard and paperboard), Mechanical Pulp (used for printing and writing papers), and Dissolving Wood Pulp (DWP, used for textiles, pharmaceuticals, and chemicals).
- Chemical pulping, particularly the kraft process, dominates due to its superior brightness, strength, and longevity, while mechanical pulping offers higher yields and lower costs but produces lower quality paper.

- The global supply of market pulp has grown significantly, with Latin America, especially Brazil, emerging as a major producer due to low production costs and extensive eucalyptus plantations.

Pulp Market Structure

- The pulp market is categorized into hardwood and softwood pulp, each with distinct uses and regional production focuses, with hardwood pulp gaining market share due to lower costs and fast-growing plantations in Latin America.
- Global fiber consumption consists of 58% recovered paper and 42% virgin pulp, of which 16% is market pulp.
- The market has seen significant consolidation, with major mergers and acquisitions increasing the market share of top producers, and ongoing investments in new pulp capacity by large producers further consolidating the industry.

US Pulp Dynamics

- The US pulp and paper industry faces challenges such as high production costs, underinvestment in infrastructure, and declining demand for printing and writing papers, exacerbated by global competition.
- Despite these challenges, there are growth opportunities in the fluff pulp and packaging sectors, driven by sustained global demand, particularly for absorbent products and packaging materials.

The Global Pulp Market

The Global Pulp Market

Overview

The global wood pulp market is a primary driver of global timber demand. In aggregate, this market accounts for 213 million metric tons (“MT”) of wood consumption.¹ Of this consumption, 38% is comprised of “market pulp”, or pulp sold into the open market to meet the needs of mills that do not have integrated pulping operations or are unable to satisfy all their pulp demand internally.² The remaining 62% is internal consumption within integrated companies that both produce pulp and manufacture paper products such as packaging, paper and hygiene products, among others.

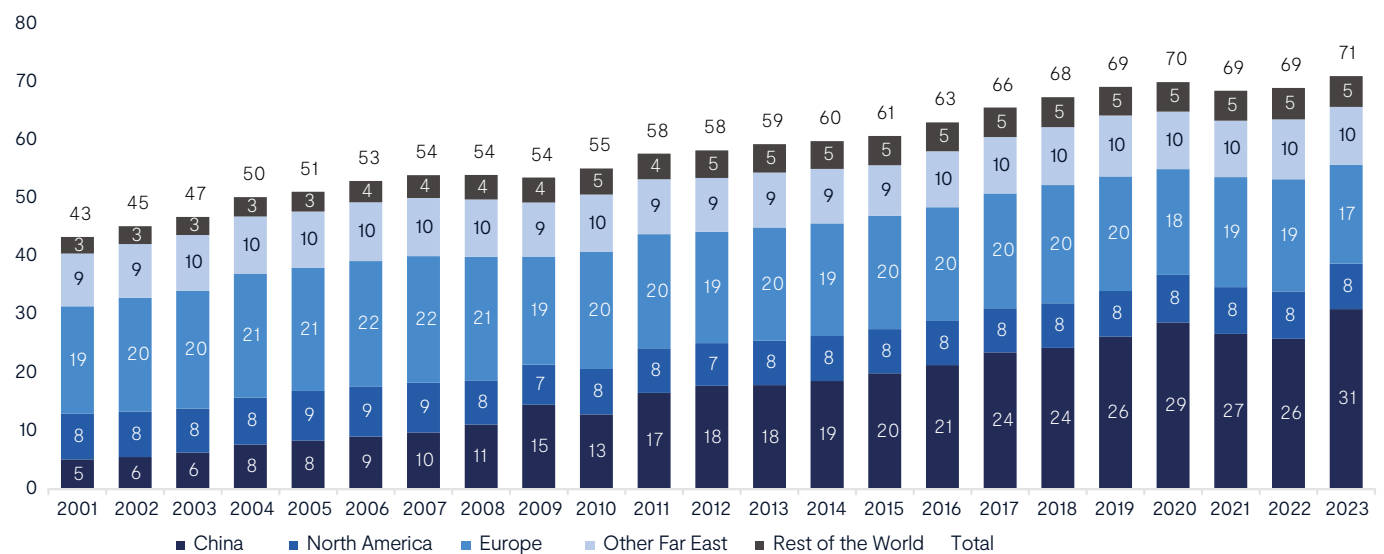
Over the last two decades, demand growth has been highest in the market pulp segment of the market. This growth is largely a result of China’s appetite for market pulp, given that the paper industry in China has developed more rapidly than its capacity to supply its own raw material. Growth in population and urbanization rates have led to increasing paper consumption in the country. Since 2000, growth in global market pulp consumption has been relatively stable, at ap-

proximately 1.0–1.5 MT per year, at a CAGR of 2.2%. As of 2023, annual consumption stood at 71 MT.³

Categories of Market Pulp

There are two primary categories of market pulp: hardwood and softwood. Hardwood pulp is derived from broad-leaved trees such as eucalyptus, oak, maple, and birch while softwood pulp is derived from coniferous trees such as pine and spruce. Given its shorter fibers, particularly well-suited for products that require smoothness and brightness, hardwood pulp is typically used to produce printing and writing papers (“P&W”), textiles, toilet paper, tissue, paperboard, and other products. Softwood pulp, which has longer fibers providing strength and durability, is used to produce packaging materials such as containerboard and paperboard. When blended with hardwood pulp, softwood pulp can be used in a wide variety of applications. Hardwood pulp has gained market share versus softwood pulp given emerging market growth, particularly in China, and as timberland owners have increasingly planted lower cost, fast-growing and high-yielding eucalyptus plantations, mainly in Latin America, and primarily in Brazil.

FIGURE 1: MARKET PULP CONSUMPTION (MT)



Source: RISI, TIG Analysis

^{1,2,3} RISI



Eucalyptus nursery. Source: TIG

Pulp Industry Products

Pulp Industry Products

Main Pulp Products

Bleached Hardwood Kraft Pulp (BHKP): This short-fiber pulp is manufactured through a chemical process. Primary uses include sanitary products, P&W papers, and specialty papers. Latin America stands as a significant global producer for this form of pulp. BHKP in Brazil is primarily derived from eucalyptus and is referred to as Bleached Eucalyptus Kraft Pulp (BEKP) in the market. Other sub-products include Bleached Acacia Kraft Pulp (BAKP), Northern Bleached Hardwood Kraft (NBHK), among others.

Unbleached Kraft Pulp (UKP): Generally derived from softwood or long fibers, this type of pulp is predominantly used in the manufacture of packaging products.

Bleached Softwood Kraft Pulp (BSKP): This long-fiber pulp is manufactured through a chemical process and is typically used to produce packaging materials such as containerboard and paperboard. Containerboard is mainly used for making corrugated board boxes and focuses on

strength and cushioning for shipping and packing, whereas paperboard encompasses a variety of heavier paper materials used for packaging and other applications. BSKP enhances paper strength more than BHKP and has historically sold at higher prices. Sub-products include Northern Bleached Softwood Kraft (NBSK), Southern bleached softwood kraft (SBSK), among others.

Mechanical Pulp: This form of pulp is characterized by high yield, high bulk, high stiffness, and low cost. It is primarily used in P&W papers while having some application to paperboard.

Dissolving Wood Pulp (DWP): This form of pulp is a high-purity cellulose, making it easily soluble in specific solvents. DWP serves as a raw material for producing cellulose derivatives, such as acetate, rayon and other specialty fibers that are predominantly used in the textile, pharmaceutical, food and chemical industries.

Pulp Industrial Processes

The **Mechanical pulping** process involves the separation of fibers from one another through the application of mechanical energy to the wood matrix by gradually breaking the bonds between fibers, releasing fiber bundles, single fibers, and fiber fragments. It is the combination of these fibers and fiber fragments that imparts favorable printing properties to mechanical pulp.

During **chemical pulping** processes, fibers are released from the wood matrix by dissolving lignin into a chemical solution at elevated temperatures. There are two main chemical pulping methods: the sodium **sulfate (kraft)** process and the sodium **sulfite** process. The kraft process is the predominant chemical pulping method globally. This is due to its superior pulp strength properties when compared to the sulfite process, its applicability to a wide range of wood species, and the efficient chemical recovery systems that have been developed.



Forklift transporting roll of paper in warehouse. Source: Getty Images

Chemical pulping has some advantages over mechanical pulping, such as:

- **Brighter papers:** the light color of chemical pulp results from the removal of lignin and impurities, making it preferred for the production of white or bright papers
- **Higher strength papers:** chemical pulp contains minimal lignin, enhancing the flexibility and resilience of the fibers. This characteristic contributes to the heightened strength and durability of paper manufactured from chemical pulp;
- **Greater longevity:** the removal of lignin and impurities from chemical pulp results in its resistance to yellowing and degradation over time. This property renders it well-suited for producing archival or long-lasting papers.

However, chemical pulp also has certain disadvantages when compared to mechanical pulp, including:

- **Lower yield:** chemical pulping uses a fraction of the wood material, leading to a relatively low pulp yield, ranging from about 40% to 55%. Consequently, this process generates more waste and incurs higher raw material costs;
- **Higher production cost:** chemical pulping requires more energy and chemicals than mechanical pulping, which consequently increases operational expenses;
- **Environmental concerns:** chemical pulping generates a significant amount of pollutants, including organic compounds, sulfur compounds, among others, all of which require proper treatment or disposal. Also, the higher energy demand and water usage can add to chemical pulp's environmental impacts.



The Union Camp Paper Mill on the Savannah River Savannah, Georgia. Source: Getty Images

Pulp Market Structure

Pulp Market Structure

Pulp Demand

Market pulp constitutes only a fraction – 17% – of global paper and fiber consumption. Annually, the world consumes 434MT of paper:

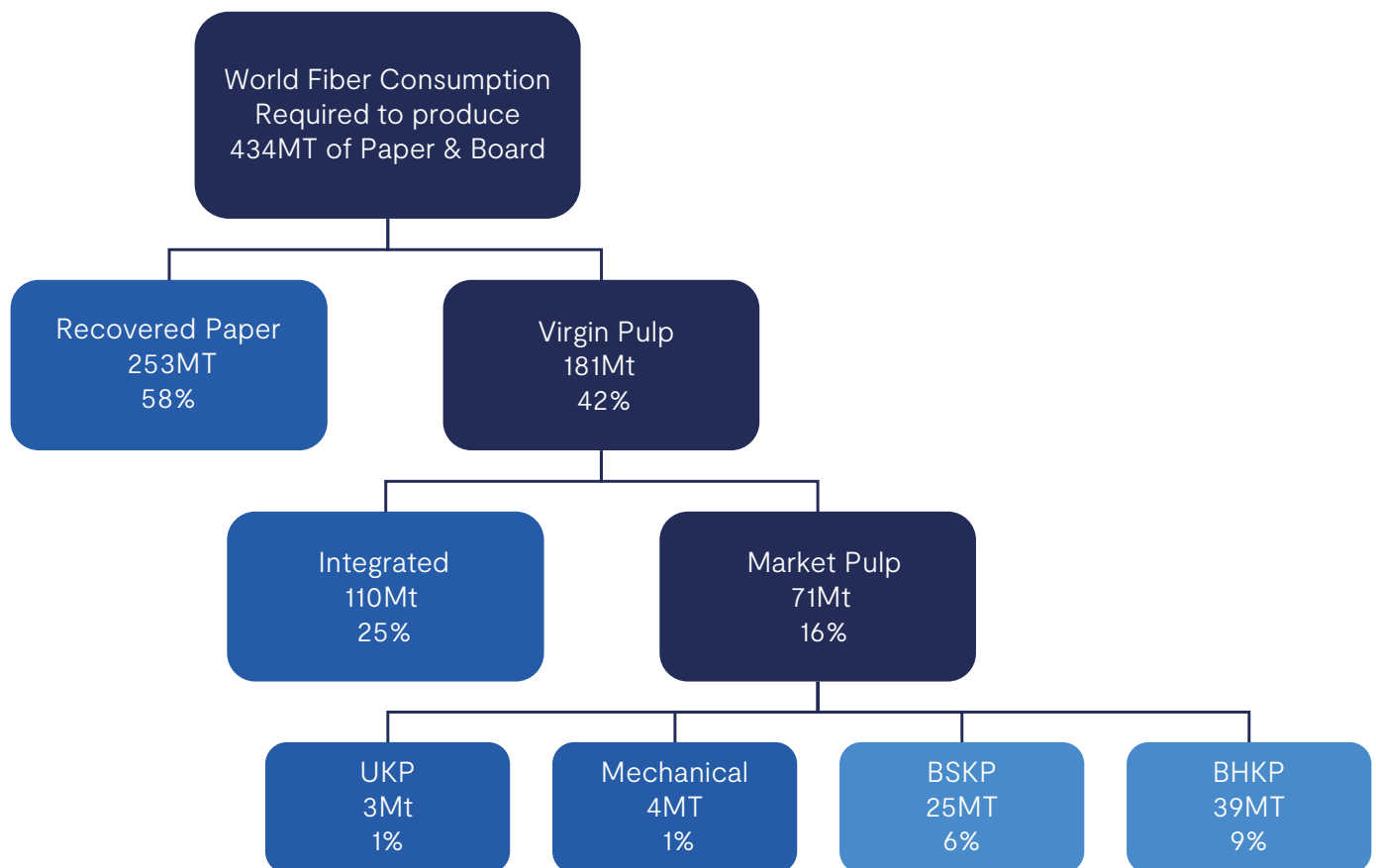
- 253MT (or 58%) of this is sourced from recovered paper (paper waste generated after the completion of a papermaking process or recycling paper).
- 181MT (42%) is sourced from virgin pulp (pulp not previously used in a manufacturing process) (Figure 3).

Within the virgin pulp production market, there is a split between integrated production (61%) and market pulp (39%).

In integrated production, pulp is produced by vertically integrated companies, who produce pulp to make a desired end-product. Market pulp is produced by entities that sell these volumes to third parties and is divided by BHKP (39MT or 55%), BSKP (25MT or 35%), Mechanical (4MT or 6%) and UKP (3MT or 4%) (Figure 3).

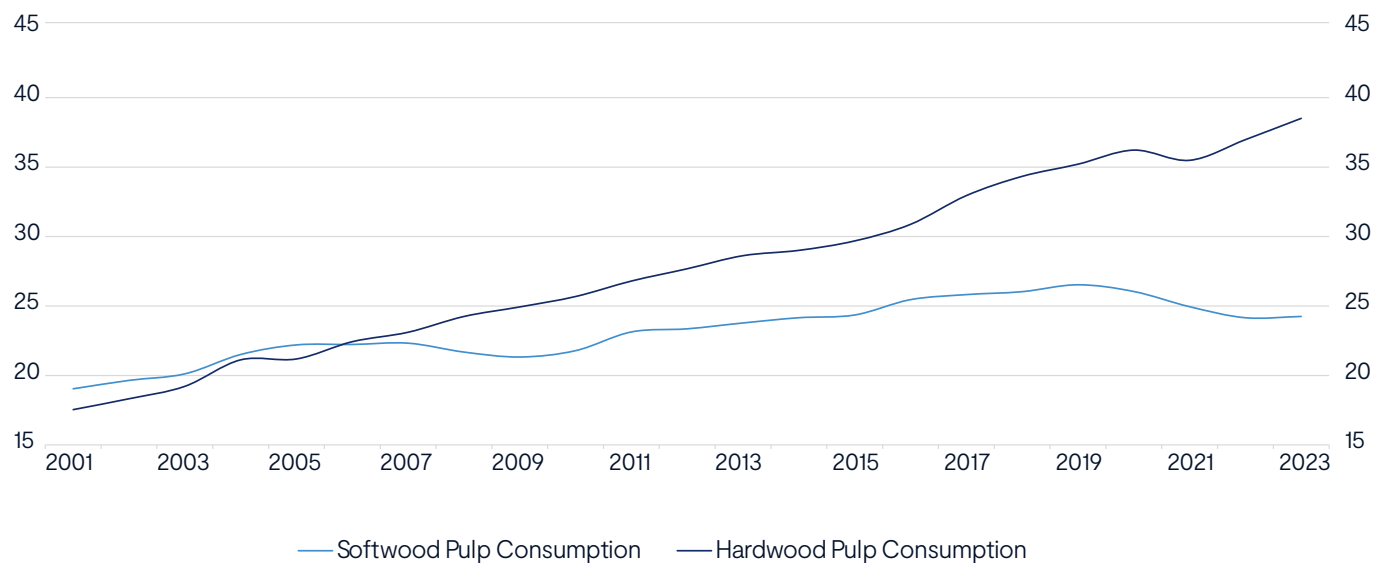
Since 2001, aggregate consumption for market pulp has been growing at a 2.2% CAGR with hardwood growing at 3.6% and softwood growing at 1.1% (Figure 4).

FIGURE 3: PULP AND PAPER MARKET CONSUMPTION STRUCTURE



Source: UNECE, RISI, TIG Analysis – 2023

FIGURE 4: HARDWOOD AND SOFTWOOD MARKET PULP CONSUMPTION (MT)

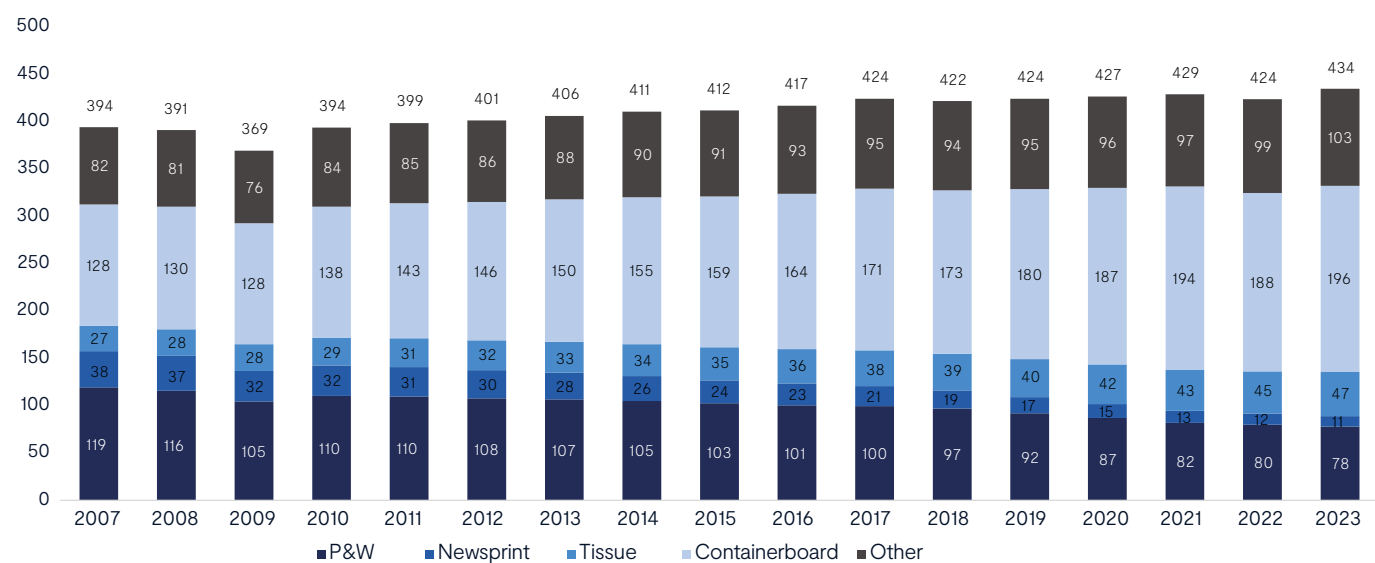


Source: RISI, TIG Analysis

Market pulp demand is driven by end-product consumption including paper, containerboard, and tissue (Figure 5). Of total paper production (the 434MT presented in Figure 3), containerboard is the largest end-use (44% of total consumption). However, as it is mostly produced with recycled paper, it has limited representation for

wood pulp markets (Figure 5). P&W and newsprint markets have been decreasing over the last decades, reducing from the most relevant end-products with ~30% to only ~20% of total demand. Tissue represents 11% of total paper consumption, and has been a consistently growing market, with a relevant impact on pulp demand (Figure 5).

FIGURE 5: GLOBAL PAPER CONSUMPTION BY END-MARKET (MT)



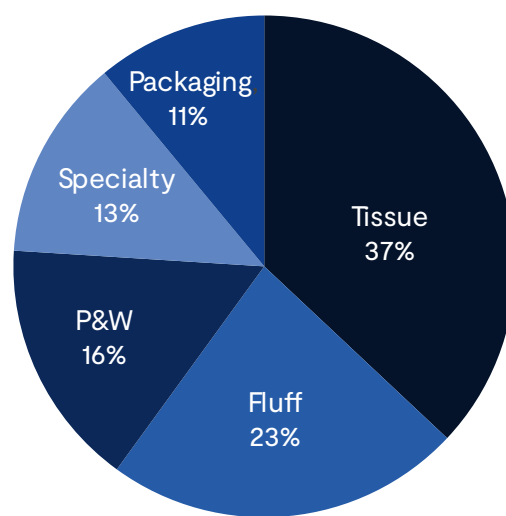
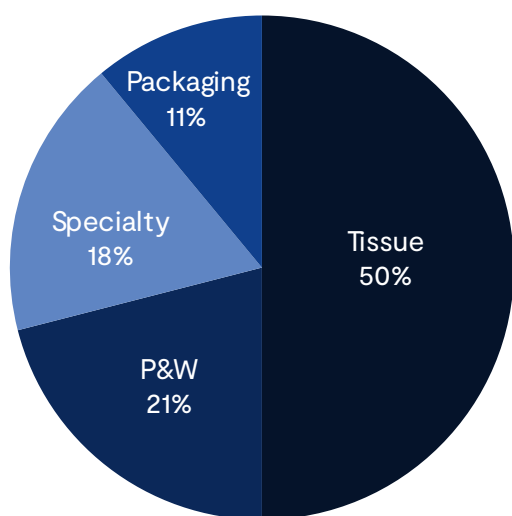
Source: RISI, TIG Analysis

Hardwood market pulp end-product consumption (Figure 6) is driven by tissue (~50%), P&W (21%), Specialty (18%) and Packaging (11%). For softwood

(Figure 7), consumption is driven by tissue (~37%), Fluff (23%), P&W (16%), Specialty (13%) and Packaging (11%).

FIGURE 6: HARDWOOD MARKET PULP CONSUMPTION

FIGURE 7: SOFTWOOD MARKET PULP CONSUMPTION



Source: Hawkins Wright - 2023

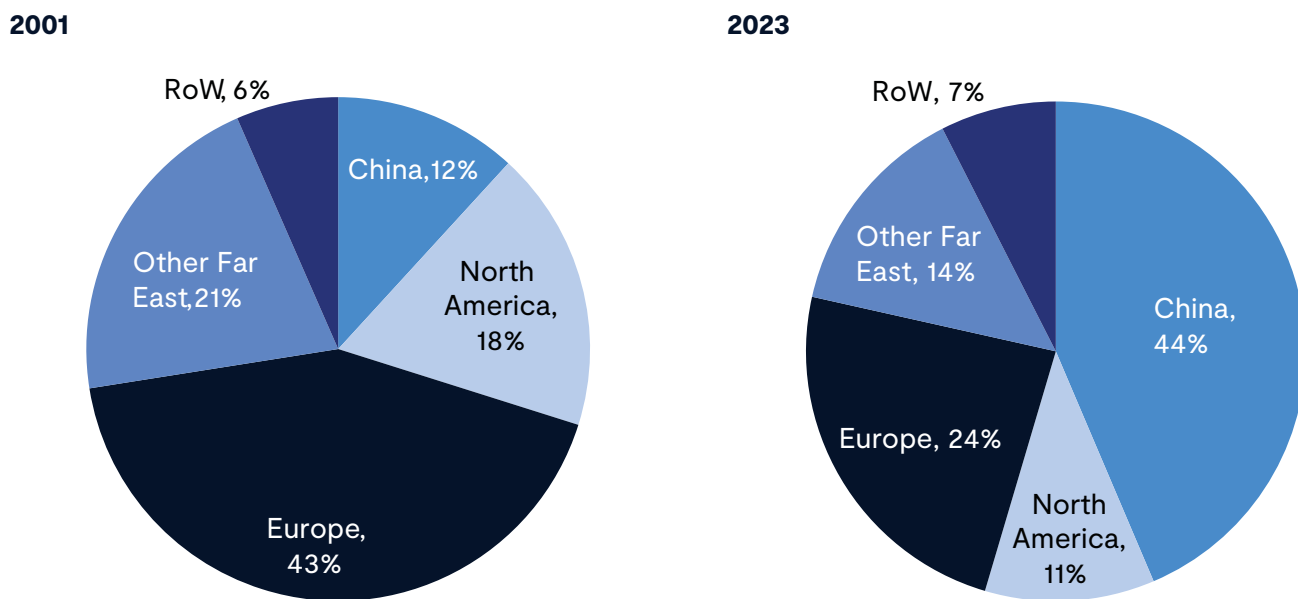
Source: Hawkins Wright - 2023

While paper demand has been declining in developed regions such as North America and Western Europe, negatively impacting the pulp consumption in these regions, it continues to grow in Asia (a larger pulp consuming region than either North America or Western Europe), Latin America and Eastern Europe. Moreover, containerboard and tissue continue to grow globally due to rising GDP, improving industrial production, increased use of packaging in support of remote product delivery, growing populations and urbanization. Until the early 2000s, Western Europe and North America

had been the largest pulp consuming regions. While they remain sizeable pulp consuming markets, they have experienced declines in demand driven by declining P&W demand. As referenced previously, other regions including Asia, Eastern Europe, and Latin America, have experienced market pulp growth. China has been responsible for more than 90% of market pulp growth over the last 20 years (Figure 8) and now accounts for 44% of the total market pulp demand considering both local consumption and exports. Europe/North America represent ~35% combined.⁴

⁴ RISI, TIG Analysis

FIGURE 8: MARKET PULP CONSUMPTION BY GEOGRAPHY (%)



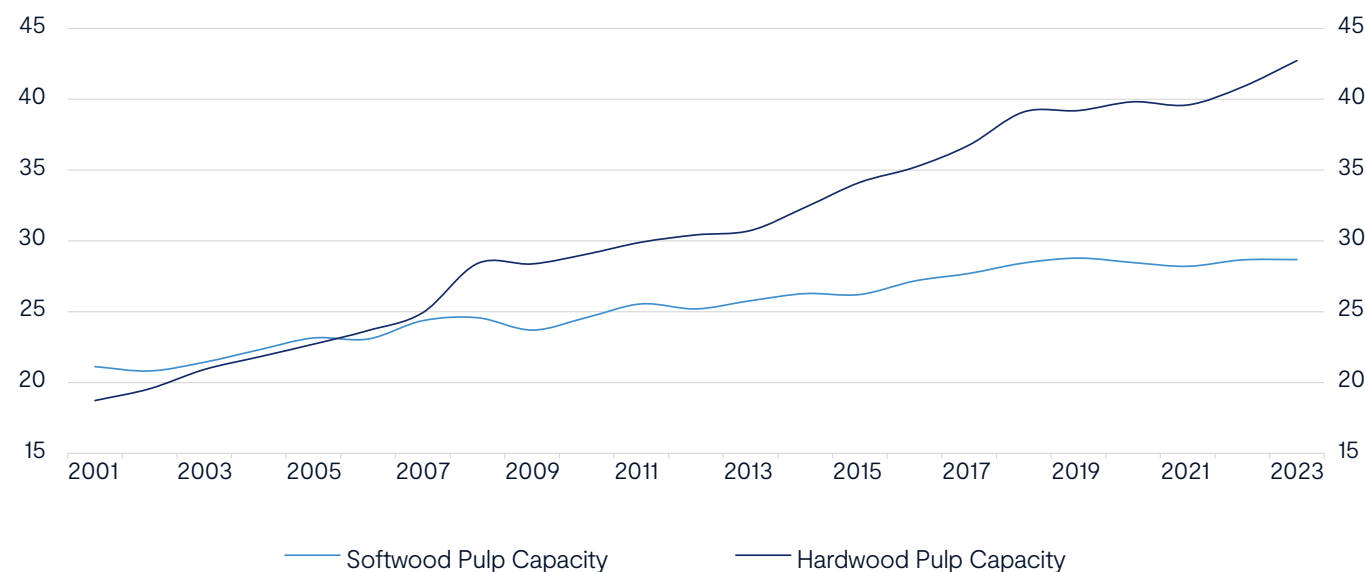
Source: RISI, TIG Analysis

Market Pulp Capacity

Global capacity of market pulp has grown from 48MT in 2001 to 81MT in 2023 with softwood accounting for 28.7MT and hardwood accounting for 42.7MT. The remaining 9.6MT is comprised of sulfite, unbleached

kraft, and mechanical pulp. While softwood had historically been the dominant pulp category, growth of hardwood has been notable, overtaking softwood pulp production capacity in 2006 (Figure 9).

FIGURE 9: HARDWOOD AND SOFTWOOD MARKET PULP CAPACITY (MT)

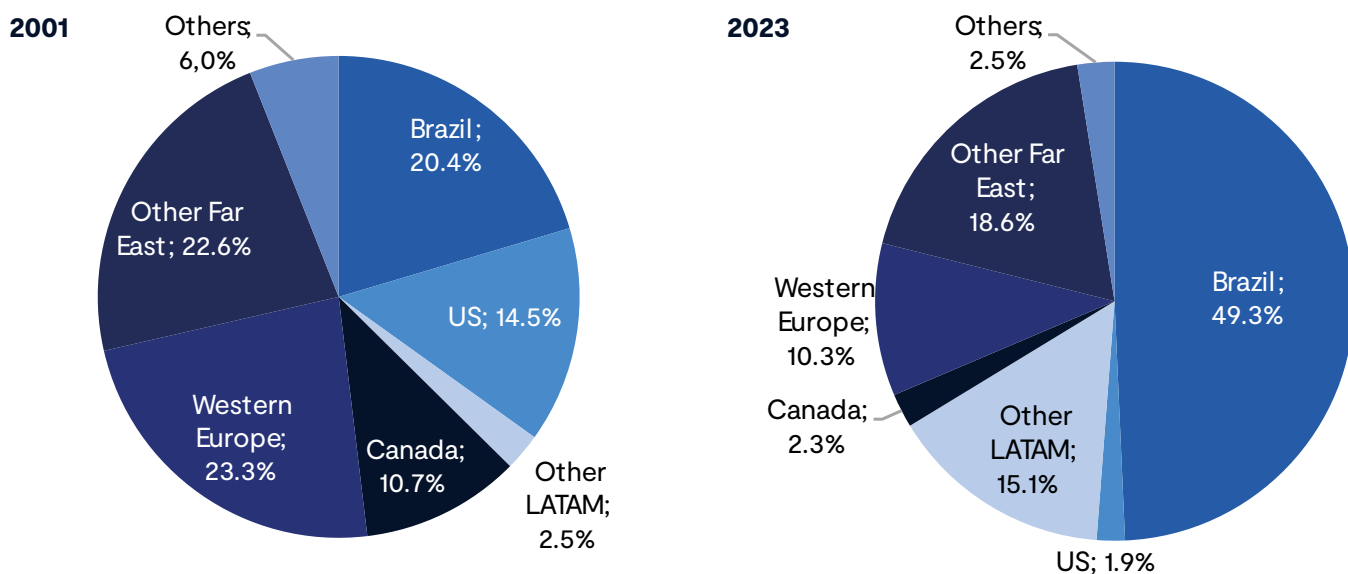


Source: RISI, TIG Analysis

Since 2001, aggregate market pulp capacity has been growing at a 2.4% CAGR. Hardwood market pulp has been growing at a rate of 3.8% due to increasing demand in China while softwood market pulp has been growing at a rate of 1.4% (Figure 9). On a regional basis, 49.3% of hardwood market pulp supply originates in Brazil, 15.1%

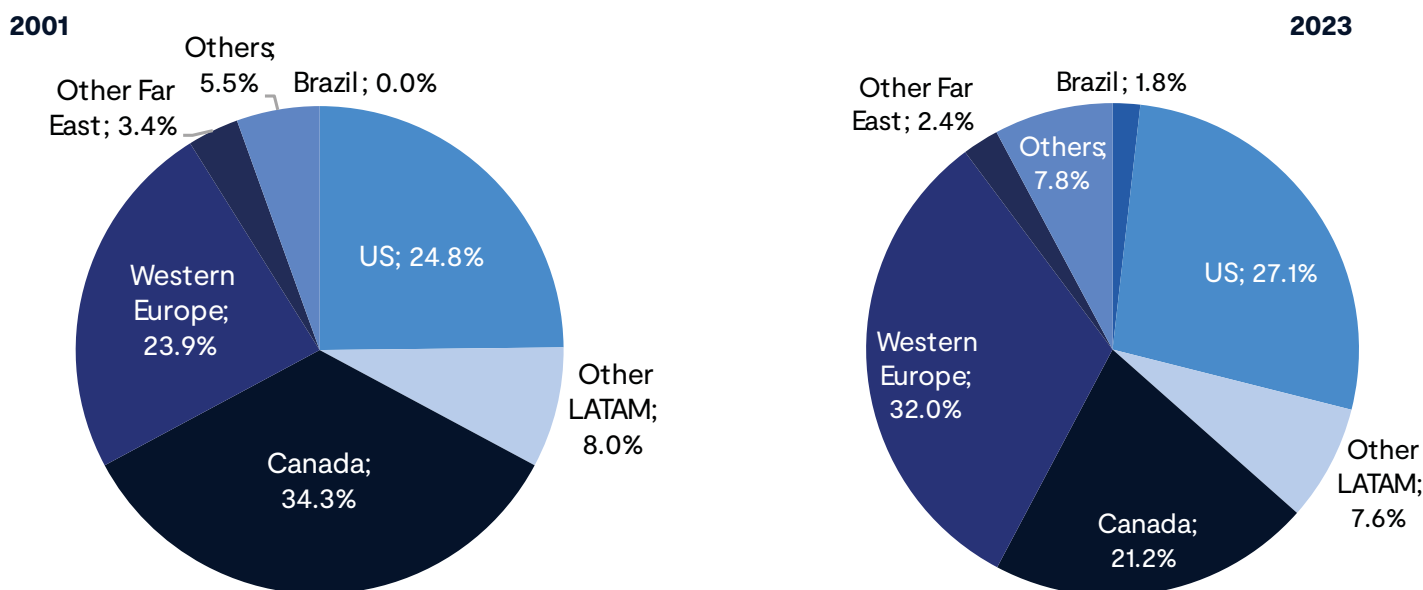
in Other Latin America (e.g., Chile, Uruguay, etc.), and 10.3% in Western Europe. Brazil has emerged as the largest producing region of hardwood (eucalyptus) market pulp (Figure 10) while Western Europe is the largest producing region of softwood market pulp (Figure 11).

FIGURE 10: HARDWOOD MARKET PULP CAPACITY BY GEOGRAPHY



Source: RISI, TIG Analysis

FIGURE 11: SOFTWOOD MARKET PULP CAPACITY BY GEOGRAPHY

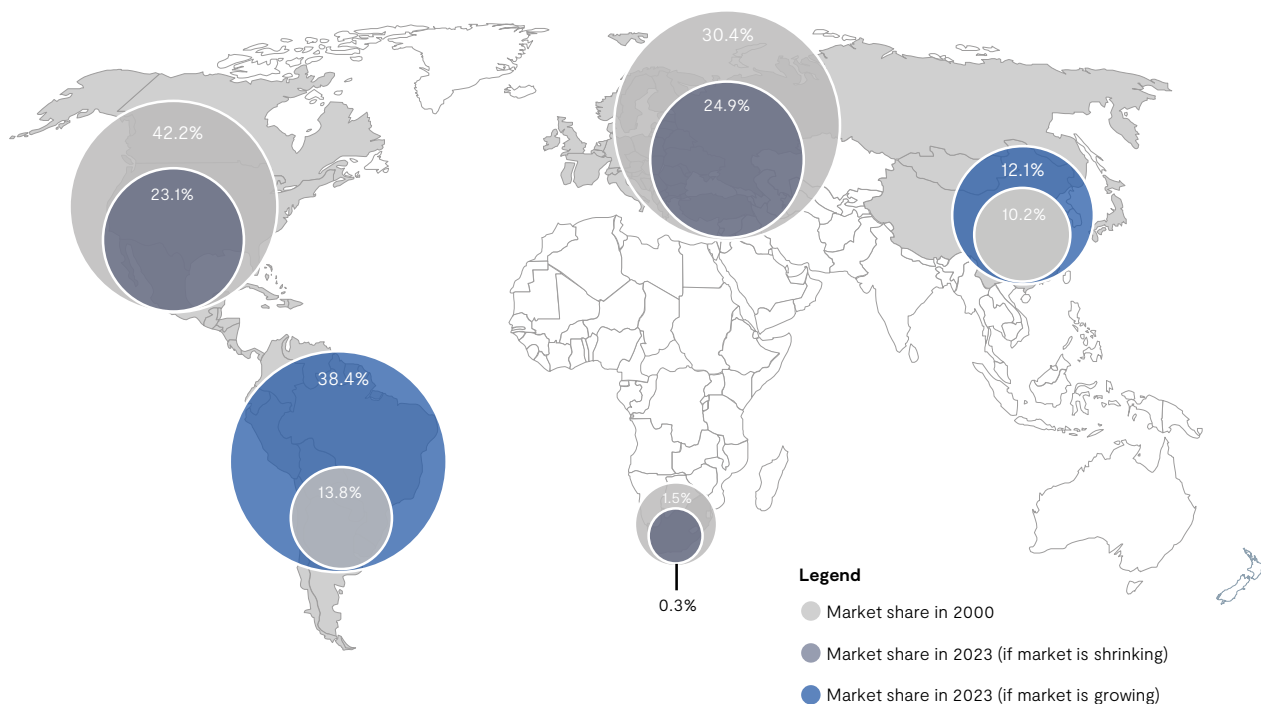


Source: RISI, TIG Analysis

China's supply of market pulp increased from 10.2% in 2000 to 12.1% in 2023 (Figure 12). Latin America has emerged as the most competitive hub globally for pulp manufacturing, where the majority of expansion projects

have been concentrated, and increasing its participation from 13.8% in 2000 to 38.4% in 2023 (Figure 12). Latin America has become the largest hardwood pulp production region in the world.⁵

FIGURE 12: GLOBAL PRODUCTION OF MARKET PULP BY MARKET SHARE



Source: RISI, TIG Analysis

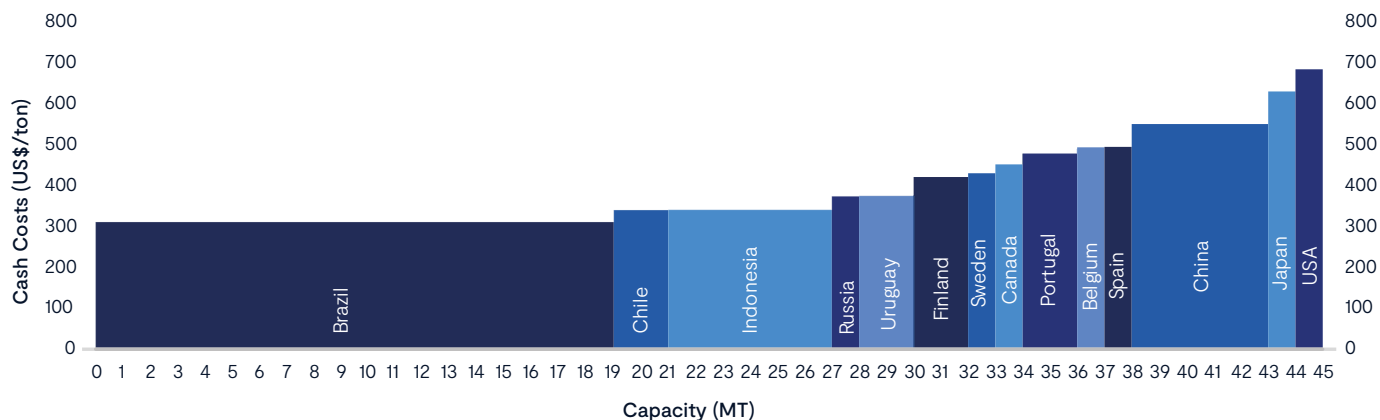
Cash Costs

Cash costs, which refers to the direct costs associated with the production of pulp are a major factor influencing pulp supply, incentivizing or disincentivizing producers to continue production and/or proceed with new investments. Due to its low wood and

energy cost, Latin America has the lowest cash cost for production of market pulp at US\$ 321/ton (Figure 13). This is followed by Europe at US\$ 455/ton and Asia at US\$ 463/ton (Figure 13).

⁵ RISI, TIG Analysis

FIGURE 13: HARDWOOD CASH COSTS/CAPACITY BY REGION, CIF (COST, INSURANCE AND FREIGHT) SHANGHAI



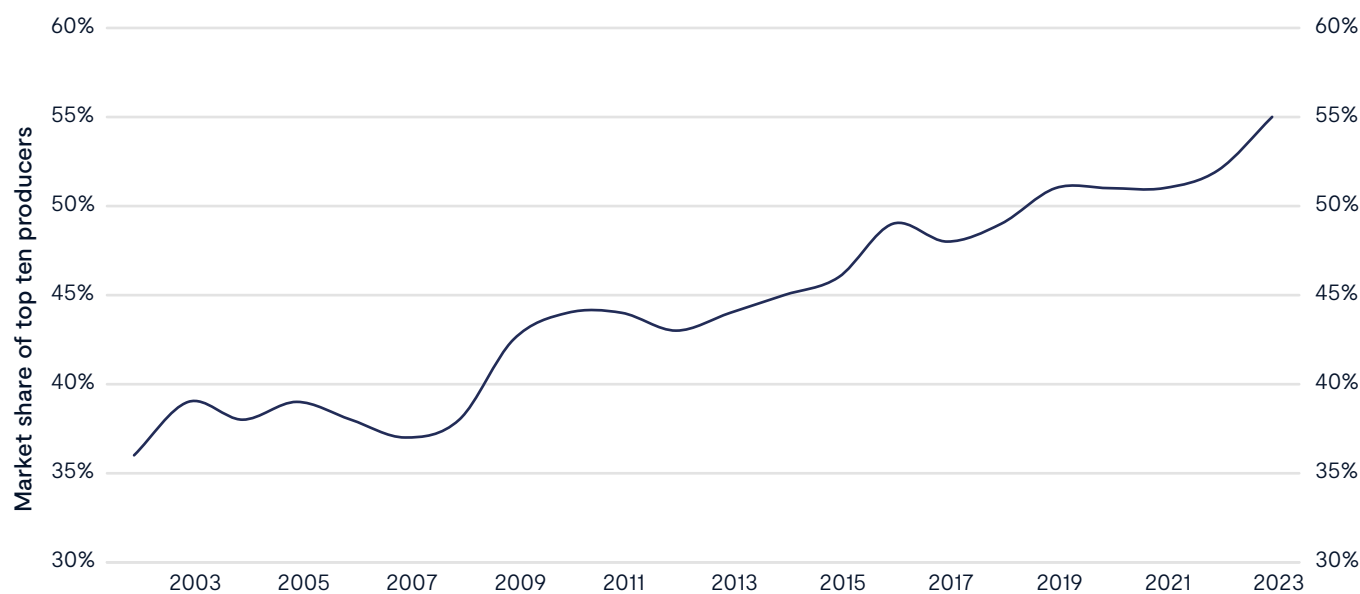
Source: RISI, TIG Analysis - 2023

Market Consolidation

The market pulp industry has experienced consolidation over the last decade. The merger in 2018 of Suzano (the then #5 global producer of paper grade market pulp and #2 global producer of hardwood market pulp) and Fibria (the then #1 global producer of paper grade market pulp and #1 global producer of hardwood market pulp) created a global market pulp producer with a leading global market share in hardwood market pulp (around 11 MT).

In addition to mergers and acquisitions, ongoing investment in new pulp capacity from existing leading market pulp producers has increased consolidation within the industry. The market share of the top ten market pulp producers increased from 36% in 2002 to 55% of the global supply in 2023 (Figure 14).

FIGURE 14: MARKET SHARE OF TOP 10 MARKET PULP PRODUCERS



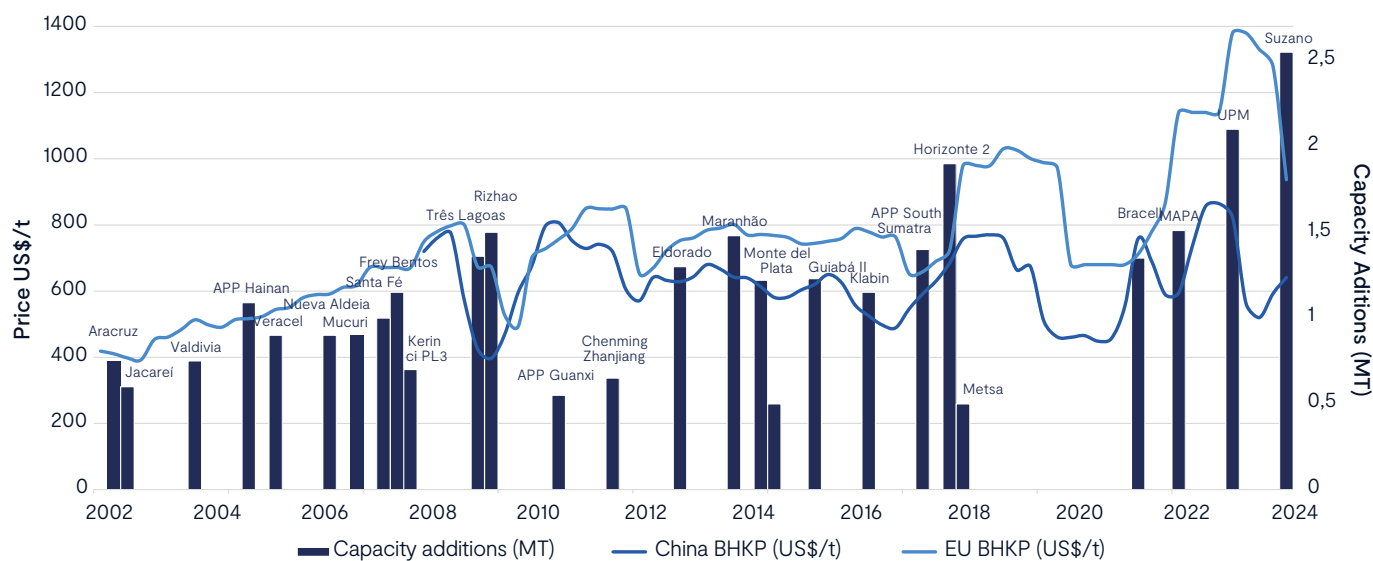
Source: Hawkins Wright, TIG Analysis

Latin American Capacity Additions

Considering all new mills and expansions, the hardwood pulp market increased capacity by approximately 9MT from 2021-2024, from 72MT to nearly 84MT an increase of 16% in the last three years. With Suzano's Cerrado project in Brazil, commencing operations in July 2024 (2.55 MT), the current expansion

cycle has perhaps reached its conclusion. Projects such as Bracell's Star (2.8MT, Brazil), Arauco's MAPA (1.25 MT, Chile), UPM's Paso de los Toros (2.1 MT, Uruguay), and CMPC's Bio (0.35 MT, Brazil) have all contributed to the momentum for pulp markets in recent years (Figure 15).

FIGURE 15: CAPACITY ADDITIONS (MT) VS. BHKP PRICES (US\$/TON) - PRICES TEND TO REACT IN ADVANCE



Source: Suzano, RISI, Companies' information, TIG Analysis

Few additional expansion announcements are expected between 2025-2028. Many new projects have been announced, including Paracel (1.8MT, Paraguay, projected opening 2027), Arauco's Sucuriú (2.5MT; Matto Grosso do Sul, Brazil; projected 2028), APP's OKI II (3MT, Indo-

nesia, projected 2025), Eldorado's Vanguarda 2.0 (2.5MT; Mato Grosso do Sul, Brazil; no announced date) but only Paracel in Paraguay and Arauco's Sucuriú in Mato Grosso do Sul, have been confirmed at this stage.

US Pulp Dynamics

US Pulp Dynamics

Overview

Many of the trends affecting US pulp and paper before the 2020 COVID-19 pandemic have continued or accelerated in subsequent years.

One such trend is China's rise as the largest producer of finished paper products. This has resulted in China becoming the largest demand factor for global market pulp. This shift in production has had a major impact on the US pulp and paper industry due to China's preference for Latin American produced Southern Bleached Hardwood Kraft (SBHK) and its impact on traditional US pulp end markets.

US pulp and paper manufacturers face several significant challenges. Higher input costs make domestic mills less cost competitive. Additionally, decades of underinvestment in infrastructure have led to reduced efficiency and increased maintenance expenses.

Another continuing trend has been the decline in P&W production. This decline began in 2008 and has accelerated since 2020 due to declining demand and supply chain issues. In addition, there has been a significant re-

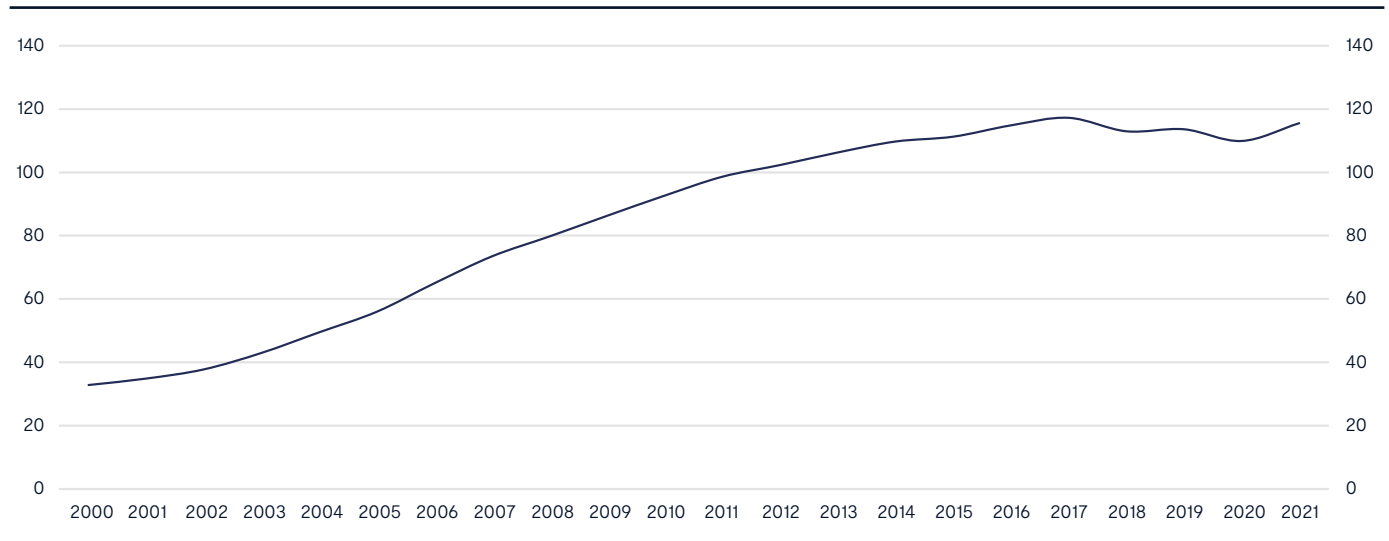
duction in US South capacity due to closures and curtailments since 2020.

Though US pulp and paper has faced significant headwinds in recent years there are several potentially positive areas for US end markets. Fluff pulp, used in products such as diapers and hygiene products and one of the major end products of US South pulp producers, has experienced sustained demand growth. Additionally, packaging production should continue to experience tailwinds driven by demand growth.

China: Production Emergence

As China's production of pulp and paper products has grown over the past two decades, the country has become the dominant consumer of market pulp globally – increasing from just 8% of total market pulp consumption in 2000 to roughly 40% today. This increased demand represents 90% of total global market pulp demand growth since 2010 (Figure 1). However, China's pulp and paper production capacity is not matched by the domestic availability of wood fiber as a feedstock. Latin America's cost competitiveness has positioned it as the primary supplier of market pulp to meet China's demand

FIGURE 16: GROWTH OF CHINESE PRODUCTION OF PAPER AND BOARD PRODUCTS (MT)



Source: TIG Analysis

US Production Costs

The U.S. is less cost-competitive compared to other pulp-producing regions, with the highest cash production costs for hardwood pulp globally (Figure 13). Input costs for many items needed in the pulp manufacturing process are more expensive for US manufacturers. For example, labor costs are ~141% higher in the US than Brazil.⁶ Other examples of US cost disadvantages include raw material (wood fiber), chemicals (pulping, bleaching, etc.), and some energy sources (coal and biofuels). There has also been less infrastructure investment in recent decades – increasing the technical age of many mills. There has been no greenfield pulp development in the US since 1989. The lag in technology for US mills makes them less efficient and more expensive to maintain.

US P&W Demand Decline

One trend in the US Pulp and Paper industry that continued through and was exacerbated by COVID-19 was the global decrease in demand for P&W. P&W was a significant component of U.S. pulp production, accounting for ~28% of paper and board production in 2000, but it now constitutes only ~10% of the production.⁷

The decline in global demand began in 2008 and continued at an annual rate of ~4% from 2008 to 2020.⁸ This

decline accelerated after 2020 due to economic conditions arising from the pandemic, including increased digitalization, absence from traditional office settings, and corresponding supply chain issues. In the first half of 2023, North American demand for P&W was ~4.4 MT, a decrease of 24.1% compared to the first half of 2022.⁹ This further fall in demand was the final blow for many North American producers of these products, leading to a significant number of capacity closures in the US North and West along with Canada East and West.

US Capacity Closures

Since 2020, there have been 10 major closures and three mills indefinitely idled in US pulp and paper production. Six of these closures have occurred in the US South, the region with the most pulp and paper capacity in the US, with five of these closures having occurred since 2022. Closures since 2019 represent a 7% decrease in total US pulp capacity (Figure 16).

Many of these mill closures were in response to decline in consumption coupled with high energy and raw material costs. The cost of production continues to be a challenge for US pulp mills as the average cost to produce their staple commodity of Southern Bleached Softwood Kraft (SBSK) is \$715 per ton compared to Southern Bleached Hardwood Kraft (SBHK)

^{6,7,8,9} RISI

of \$529 per ton in Brazil.¹⁰ With the high production costs of SBSK, prohibitive costs of building a new pulp facility in the US, and expanding market share of

SBHK, further adjustments to US pulp capacity could be needed.

FIGURE 17: US PULP AND PAPER CAPACITY CLOSURES SINCE 2020

Mill Name	Region	End Use	Closure Date	Capacity (M Tons)
IP Orange	US South	US Paper (lineboard, medium)	Oct-23	923
GP Foley Cellulose	US South	US Pulp (fluff pulp, speciality)	Sep-23	582
WestRock Tacoma	US West	US Pulp (kraft pulp), paper (lineboard)	Sep-23	510
WestRock Charleston	US South	US Paper (kraft paper, lineboard, medium)	Aug-23	665
Evergreen Packaging Canton	US South	US Pulp (kraft pulp), Paper (freesheet, paperboard)	Jun-23	584
Androscoggin Mill	US North	US Paper (groundwood, freesheet, specialty)	Mar-23	550
Roaring Spring Park. LLC	US North	US Paper (freesheet)	Mar-23	126
WestRock Panama City	US South	US Paper (lineboard), pulp (fluff pulp)	Jun-22	646
Resolute FP Calhoun	US South	US Pulp (kraft pulp), paper (tissue, freesheet)	Dec-21	445
Billerud Wisconsin Rapids	US North	US Pulp (kraft pulp) Paper (freesheet)	Jul-20	512
Total				5,543

Source: Forisk; TIG Analysis

US Market Tailwinds

There are areas, where future market developments appear more positive for US producers.

The market for primary end-products of US pulp production, fluff pulp (major component of absorbent products such as diapers and sanitary products), has remained resilient. Over 85% of global fluff pulp supply comes from the US South.¹¹ Global fluff pulp

demand has historically grown at a rate of 3-4%, with potential for future gains.

Longer term projections for packaging also predict at least a partial rebound from the decline of recent years. This is important for the US South as 76% of packaging mill capacity is in this region.¹²

¹¹ ERA Forest Products Research

¹² Forisk



Eucalyptus plantations. Source: TIG.

Conclusions

Conclusions

The global pulp market is one of the largest drivers of global timber demand, especially for smaller diameter logs. Since 2000, global market pulp consumption has increased at a CAGR of 2.2% and has now reached 71MT.

China has accounted for over 90% of the growth in market pulp demand over the past two decades, driven by manufacturing capacity expansions that have out-paced domestic pulp supply.

In addition, the development of end-markets, including packaging and tissue, has been an important driver of growth. Looking ahead, Latin America is well-positioned to capitalize from long-term market dynamics in the hardwood pulp market, combined with expected pulp capacity expansions.

Other traditional pulp producing regions face challenging conditions to meet current and forecasted demand trends.



Eucalyptus nursery. Source: TIG

Glossary

Glossary

- 1. BHKP:** Bleached Hardwood Kraft Pulp (“BHKP”) is a short-fiber pulp produced from chemical process, primarily used for tissue papers, coated papers and other specialty papers due to its smoothness.
- 2. BSKP:** Bleached Softwood Kraft Pulp (“BSKP”) is a long-fiber pulp produced from a chemical process mainly to of high-quality printing and writing papers.
- 3. CAGR:** Compound Annual Growth Rate.
- 4. Cash Costs:** Direct costs associated with the production of the pulp.
- 5. Chemical Pulp:** Extracted via chemical processes, providing strong fibers for high-end paper products, tissues, and specialty papers.
- 6. Containerboard:** Paperboard for corrugated fiberboard, essential in manufacturing shipping and packaging boxes.
- 7. Corrugated Board:** The composite material consisting of a fluted corrugating medium sandwiched between two layers of linerboard, essential in manufacturing shipping and packaging boxes.
- 8. DWP:** Dissolving Wood Pulp (“DWP”) is a high purity cellulose pulp with the suitable for specialty fibers, such as acetate, rayon due to its characteristics of being easily soluble in specific solvents.
- 9. EUDR:** European Union Regulation on Deforestation-Free Products (EUDR) is a legislation that aims to minimize the impact of EU market on global deforestation.
- 10. Fiber Separation:** Critical in producing quality pulp, affecting the texture and quality of finished paper products used in various industries.
- 11. Fluff Pulp:** Highly absorbent, soft pulp used in personal care products like diapers, adult incontinence products, and feminine hygiene items.
- 12. Hardwood:** Wood from dicot trees (typically broad-leaved), such as oak and birch. Used to produce pulp with shorter fibers, which offers a smoother finish ideal for high-quality printing and writing papers.
- 13. Integrated Pulp:** The pulp produced by vertically integrated companies, who produce pulp to directly make a desired end-product.
- 14. Kraft Pulp:** Versatile and durable pulp used in everything from paper bags and packaging materials to specialty products.
- 15. Lignin:** A binder in wood, removed to enhance pulp quality; lignin byproducts are used in making adhesives, binders, and energy sources.
- 16. Market Pulp:** Pulp sold into the open market to meet the needs of those mills that do not have integrated pulping operations.
- 17. Mechanical Pulp:** Less processed pulp with high yield, used primarily in newsprint and low-grade papers like phone books and manuals.
- 18. MT:** Million metric tons.
- 19. Newsprint:** Category of paper grade typically used for newspaper due to its low cost and good ink absorption capacity.
- 20. Printing & Writing (“P&W”):** Broad category of paper grades used for a variety of purposes, such as catalogs, books, commercial printing, among others.
- 21. Pulp Yield:** Measures efficiency in converting wood to pulp, critical for cost management in paper production.
- 22. UKP:** Unbleached Kraft Pulp (“UKP”) is long-fiber pulp typically produced from softwood trees suitable for packaging materials that do not require brightness.
- 23. Virgin Pulp:** From fresh wood fibers, providing high-quality pulp for premium papers, including art papers and certain medical-grade products.
- 24. Wood Chips:** Primary raw material for pulp, sourced from forestry operations focused on sustainable wood harvesting.
- 25. Sulfite Process:** An acidic method creating pulp for fine paper and cellophane, also used in chemical derivatives from lignin.
- 26. Softwood:** Wood from gymnosperm trees (typically conifers), such as pine and spruce. Provides long fibers that contribute to strength and durability, making it suitable for products like fluff pulp and corrugated board.

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