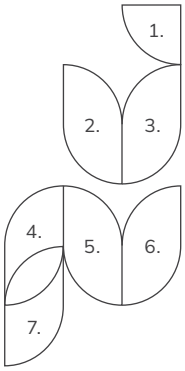
brazilian tree industry

Ibá

2023

Annual Report



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brazilian tree industry

Ibá

2023

Annual Report

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Opening message

The Brazilian planted tree sector does not stop growing.

The numbers are impressive: in 2022, the sector generated 2.6 million direct and indirect job posts, attained gross revenues of R$ 260 billion, and shattered production records with 25 million tons of cellulose pulp, 11 million tons of paper, and 8.5 million m³ of wood panels. Additionally, it has a portfolio of investments worth almost R$ 62 billion, with a new factory opening every year and a half, on average. This is a sector that is on the right side of the climate equation, and a source of pride for all Brazilians.

It is currently one of the drivers of the country's economy. Just to provide an idea, its products were the fourth leading item among Brazil's thriving agricultural exports in 2022, further establishing its strength in this industry. The sector generated US$ 14.29 billion from exports on the order of 19.1 million tons of cellulose pulp, 2.5 million tons of paper, and 1.5 million m³ of wood panels. Brazil is the world's largest pulp exporter.

Forest-based industry has been firmly establishing itself for decades as a model of the bioeconomy on a large scale, and has voluntarily obtained rigorous international certifications for years. It works alongside society to create shared value and mutual growth, proving every day that production and conservation are compatible. In Brazil, 100% of paper comes from trees grown specifically for this purpose.

Bracell | Gleison Rezende

The sector plants, harvests, and replants in an area spanning 9.94 million hectares. These farms have expanded into areas that were previously converted for human use, replacing low-productivity pastures with modern management and plantations of mainly pine and eucalyptus. This process of remediating degraded areas further expands the relevance of this segment in the important planet-wide challenge as we face the effects of climate change, since trees are the most efficient naturally-based solution to mitigate these alterations. They sequester and store carbon dioxide, the main gas responsible for pushing the planet into global warming.

Besides productive areas, this sector simultaneously preserves another 6 million hectares of native forest, an area equivalent to the state of Rio de Janeiro.

This globally competitive sector sees enormous opportunities in the low-carbon economy by offering recyclable and biodegradable products from renewable sources. Using trees as biorefineries, this segment separates two main raw materials: the fiber in the tree, which is used to produce over 5,000 bio-based products like books, paper packaging, clothing, and tissues, and lignin, part of the tree's structure which is used to produce energy. Nearly all the energy consumed by the planted tree sector is clean, produced from forest biomass.

One segment which has grown continuously is sanitary paper, which encompasses paper for hygiene uses, paper towels, cleaning wipes, diapers, and other products. Significant potential for growth in Brazil can be seen when per capita consumption here is compared with other markets; while annual per capita consumption of tissue in the United States is 27 kg, in Brazil it is only 6 kg per person.

2.6 million

direct and indirect job posts generated in 2022.

The pandemic caused us to adopt new habits that persist even today, such as online purchases and food delivery, which have highlighted the role of paper packaging in the everyday routines of consumers. Within this scenario, green solutions like paper packaging have gained even more ground. Today, they account for 34% of the market, and have a high rate of recycling: 75.8% of all packaging paper consumed in Brazil was recycled.

Cellulose has been widely studied and is known for its versatility, and the microparticulates it contains are already the source of numerous items from renewable sources that are an essential part of everyday life. On the nanometric scale, nanocellulose is considered a “supermaterial” because it is strong, light, and impermeable. The automotive and aeronautics industries have already seen benefits from the development of this type of innovative material. Cellulose nanofibers are known for various characteristics including reduced capacity to absorb water, making them ideal for applications such as barriers, food packaging, biomedicine, gas containment, and even cosmetics. Along these lines, Klabin invested in the Israeli startup Melodea to develop new barrier solutions.

Nanocellulose crystals are transparent and highly resistant, and can be used in conducting electricity. One application for this product is foldable mobile phone screens. Bio-oils come from renewable and more sustainable sources, and are already used to generate electricity, as additives to improve fuel efficiency, or as fuel themselves, after refining. Similarly, companies in the sector are already using biogases and

Adobestock

bio-oils derived from burning biomass as a substitute for fuel oil to fire lime kiln boilers, an important step in the process of recovering co-products from cellulose manufacturing, and are important to decarbonization of industrial operations.

Meanwhile in the textile industry, growth in viscose derived from soluble cellulose is another notable phenomenon, as part of the global movement toward sustainability and decarbonization, and already accounts for approximately 6% of the global textile market. In Brazil, this specific demand is met by Bracell (with two factories, in São Paulo and Bahia) and LD Celulose in Minas Gerais, a joint venture between Dexco and the Austrian company Lenzing. Viscose has been used as an option for clothing, including delicate fabrics, to provide texture, as in ties, undergarments, dresses, and even jeans, as well as towels and bedding. Microfibrillated cellulose is another form of this product which has also been developed to expand the supply of textile fibers, with investments by companies like Suzano in the Finnish startup Spinnova.

With constant investments in science, technology, and innovation, the forest-based industry continues to develop inexhaustible and sustainable solutions to help build a better world. This industry uses land intelligently, cares for people, and respects nature. We are pleased to present, in the pages of what has become our traditional annual report, some of the sector's principal environmental, social, and economic conquests for the year 2022.

Antonio Joaquim de Oliveira,
Chairman of the Ibá Deliberative Council and President of Dexco

Paulo Hartung,
Executive President of Ibá

1.

The Brazilian planted tree industry and its products

Eucatex
Freepik
Pexels | Cottonbro

The Brazilian planted tree sector in your game of life

The planted tree sector is an example of sustainability, offering renewable and mostly recyclable products that are part of our everyday lives. As you advance through your game of life, products from forest-based industry are present at various times, even if you don't notice them. Discover more below.

START

Diapers
Sanitary paper

Birth

Cell phone
Nanocellulose

College graduation

Facial tissue
Sanitary paper

First job

Cardboard box
Corrugated cardboard

Online purchases

Stage
Green steel

First music festival

Christmas with your family

Electricity
Biomass

Got sick

Medication capsules
Soluble cellulose

Hospital gowns and surgical masks
Soluble cellulose

Your child is born

Cake and ice cream
Cellulose thickener

Wedding

Bought your first house

Laminate flooring and wood furniture
Wood floors and panels

School books
Paper

Childhood

Paint
Resin

Adolescence

Box of chocolates
Paperboard packaging

Acetate eyeglasses
Soluble cellulose

Job interview

Clothing made of viscose
Soluble cellulose

First trip abroad

Passport
Special papers

Chance Cards
Draw one card

Chance Cards

A sustainable future can be constructed when private society, government, and business work together.

Decarbonization

You start working at a cellulose manufacturing company that generates its own renewable energy from forest biomass.

Lucky you!
Everyone moves forward two spaces.

Replacing fossil-origin materials

You start thinking about the life cycle of the products you consume. Now you choose renewable materials and avoid products from fossil sources. Paper is your preferred packaging.

Lucky you!
Move forward two spaces.

Recycling

You made a habit of recycling your packaging, looking out for the environment and considering the circular economy.

Lucky you and future generations!

The Brazilian planted tree sector and its products

With a large-scale model of the bioeconomy, the Brazilian planted tree industry offers biodegradable, renewable, and recyclable products, always with an eye to the environment, soils, water, and biodiversity. Its products are in the hands of all Brazilians and millions of people around the world.

As a modern, sustainable, and renewable biorefinery, these planted trees with management and knowledge developed in Brazil are the source of over 5,000 biologically based products spanning from the widely-known items in our homes like notebooks, pencils, diapers, paper, surgical masks, cardboard boxes, wooden furniture, laminate flooring, and toilet paper to new products that are just arriving in the market or are still in development. They have numerous uses in the textile, pharmaceutical, electronics, food and beverage, and even automobile industries.

These products are in high demand, driven by consumers who are increasingly more conscientious and look for items from renewable sources that store carbon and have lower environmental and social impacts, including after use. One example is paper packaging, which gained visibility during the pandemic with the growth in delivery and online purchasing. During this traumatic global event that transformed paradigms and profoundly impacted human life, consumers stopped to think about the packages they brought home and the entire chain of disposal and post-use.

During this process, paper and cardboard solutions stood out. According to data from the Brazilian Packaging Association (Associação Brasileira de Embalagem, ABRE) produced by FGV, the gross value of physical production of packaging totaled R$ 123.2 billion in 2022, growth of 3.9% over 2021. While plastic packaging fell by 1%, cardboard packaging expanded 2.4%. Paper, paperboard, and corrugated cardboard accounted for 34% of the market. They also have high recycling rates: 75.8% of all packaging paper consumed in the country was recycled, according to data from Ibá and FGV IBRE.

Migration toward products from renewable sources has resulted from consumer interest as well as government decisions in various locations around the world. According to a survey by Fastmarkets with data from Smithers and Reuters that consider the breadth of plastic consumption, more than half of countries have announced or are expected to announce some type of restriction on single-use plastic objects.

Freepik | Senivpetro

Along these lines, the planted tree sector has been making strong investments in new solutions to improve resistance to moisture, fats, or to provide barriers against oxygen, moisture, or mineral oils and protect food against flavor loss in paper packages. These new barriers promise to revolutionize this market.

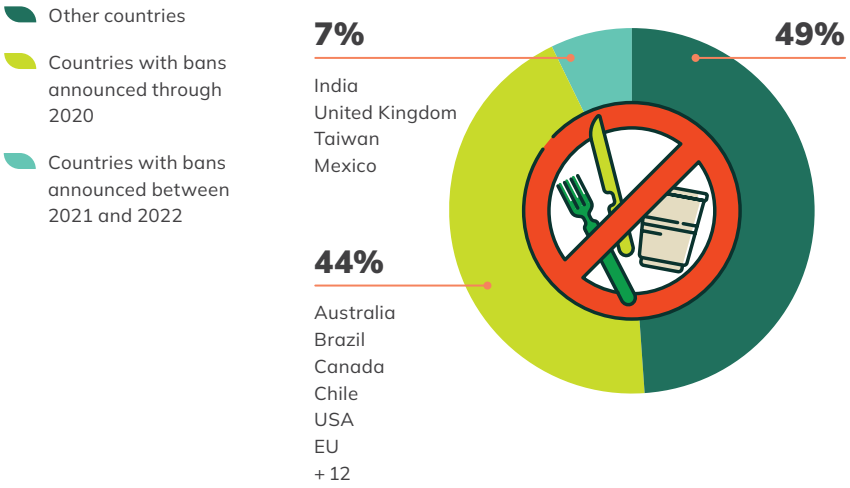
75.8%

of all packaging paper consumed in the country was recycled.

figure 1

Bans on single-use plastic items

Source: Smithers, Fastmarkets, public sources, Reuters



Freepik | Drazen Zigic

Sanitary paper

Another segment with constant growth and major potential in Brazil is sanitary paper. According to data from Ibá and Comex Stat, consumption of tissue products has grown 56.3% in 15 years. In 2022 alone, domestic sales grew 5% to reach 1.4 million tons.

The Fastmarkets analysis indicated that despite economic challenges, Latin America is expected to exhibit growth in this segment in 2024 and 2025. Brazil has major growth potential when we compare consumption of these papers with other markets; while annual per capita consumption of tissue reaches 27 kg in the United States, in Brazil it is only 6 kg, for example. Even compared to other Latin American countries, Brazil has space to expand to reach the levels in Chile and Mexico, where annual per capita consumption reaches 14 kg and 9 kg, respectively. In homes around the world, the main product in the sanitary paper segment is toilet paper, with a share of 55%, but there are also significant shares for paper towels (22%) and facial tissue (16%). Meanwhile, in Brazil 89% of the market for sanitary paper is concentrated in toilet paper. These data come from Fastmarkets with Euromonitor and Nielsen Retail, and show the significant potential for growth in Brazil for new types of paper, such as triple-ply toilet tissue and makeup removing wipes.

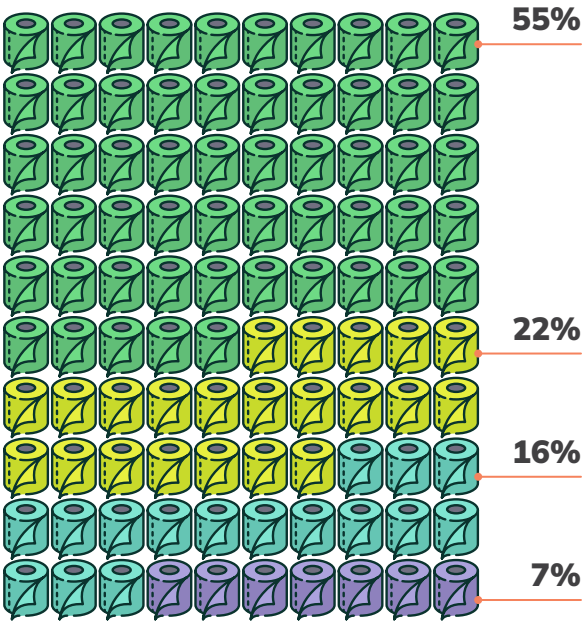
figure 2

Household use of sanitary paper

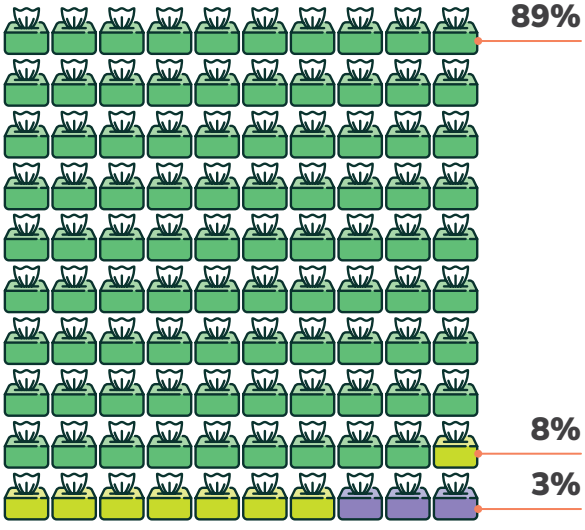
Source: Fastmarkets, Euromonitor, NielsenRetail INA

Toilet paper
Paper towels
Facial tissue
Paper napkins

World



Brazil



Pexels | Vie Studio

Clothing

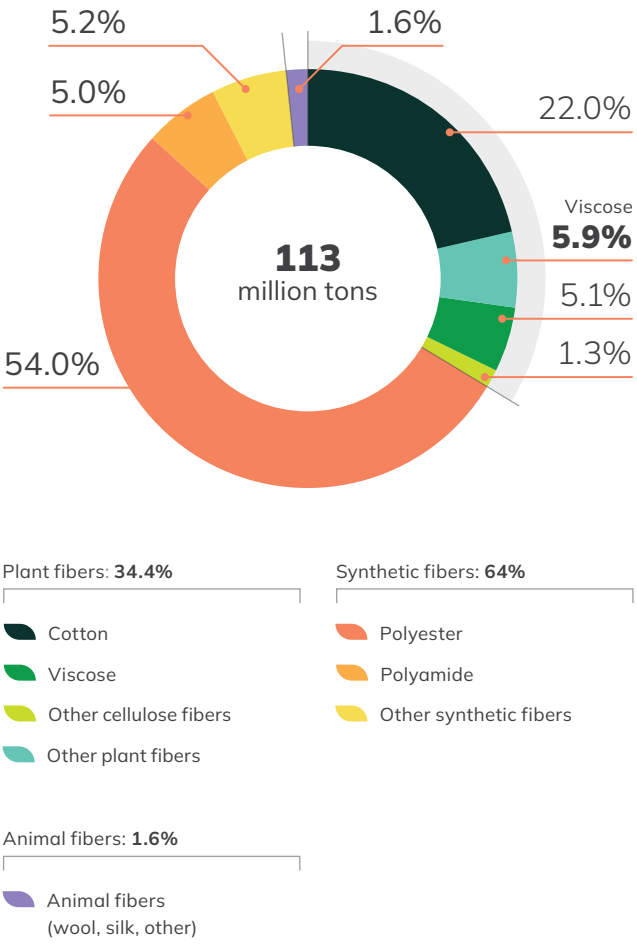
With reports of open-air dumps in Chile's Atacama Desert and studies showing the presence of microplastics in the human bloodstream, in the oceans, and even in glaciers, the textile industry has also accelerated its sustainability agenda. Global textile production totals around 113 million tons per year, and over 60% comes from fossil sources, in materials such as polyester and polyamide. One growing alternative to products from fossil sources is fabric made from fibers from planted trees, especially those made from viscose, which comes from soluble cellulose.

Viscose accounts for roughly 6% of the global textile market and is driven by growing demand for clothing made from comfortable fabrics and greater awareness about ecological and sustainable materials. According to data from Textile Exchange, 65% of this segment has FSC or PEFC certification, and 0.5% of these products are already made with recycled fibers.

figure 3

Global market for textile fibers

Source: Textile Exchange



Paying close attention to these trends in the new green economy, Ibá's member companies Bracell (in Lençóis Paulista, with Project Star) and LD Celulose (a joint venture between Dexco and the Austrian company Lenzing in the Triângulo Mineiro region of Minas Gerais state) have two newly-inaugurated factories that produce soluble cellulose. The former focuses on kraft pulp but can be converted to soluble cellulose, depending on demand, while the latter is completely focused on production of soluble cellulose to manufacture viscose.

Klabin | Zig Koch

Freepik

Other uses

Another innovation from planted trees is nanocellulose: cellulose pulp on a millimetric scale. This material has excellent properties such as strength, impermeability, and low weight, making it an option for various industrial segments.

The sector invests heavily in technology and innovation to make processes more sustainable and also to develop new uses for wood. As a result, it has been able to offer innovative solutions for consumers who are concerned with global sustainability. These alternatives use sustainably-produced raw materials from renewable sources that store carbon, and many are biodegradable and recyclable.

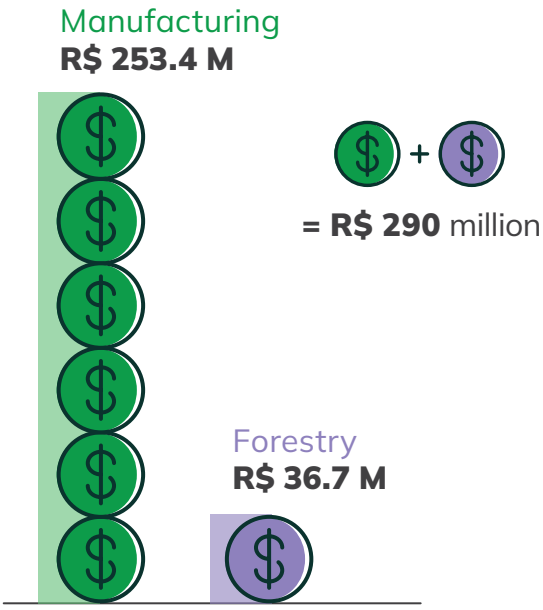
R&D&I

To develop these new solutions, in 2022 alone Ibá's member companies invested R$ 290 million in research, development, and innovation (R&D&I), driving the sector and helping to bring innovation and sustainability into the everyday lives of the population.

figure 4

Investment in innovation and R&D in 2022 (million R$)

Source: Ibá (2022) | Developed by: ESG Tech



This investment shows the sector's commitment to excellence and continuous improvements of its products and processes, and encompasses various areas: 34% in manufacturing (totaling R$ 253.4 million), 31% in new products, 19% in the forest base (totaling R$ 36.7 million), 13% in industry 4.0 technologies, and 3% in other initiatives.

Behind the numbers, the industry is not just constructing a strong sector but also a sustainable future for everyone based on renewable raw material, which drives universities, young researchers, and startups. For this to occur, strategic partnerships are essential: 31% of member companies have products involving startups and 23% with universities. Furthermore, 100% of member companies have internal teams that focus on innovation.

Joint work with startups is another route toward innovation within the sector. Klabin, for instance, invested in the Israeli startup Melodea. The goal of this partnership is to use nanocellulose to replace plastic or aluminum moisture barriers in milk and juice packaging, making it more recyclable and biodegradable. And Suzano is constructing a commercial plant in partnership with the Finnish company Spinnova to develop textile fibers from microfibrillated cellulose, which could reduce use of water and chemicals by up to 90%.

The global economy will need to decarbonize on various fronts, and this sector is a fantastic example of how sustainability and productivity can be allies in a world that desperately needs to reduce carbon emissions and prioritize respect for nature.

figure 5

Investment in innovation and R&D in 2022 by solution type

Source: ESG Tech | Projeto Arvoredo

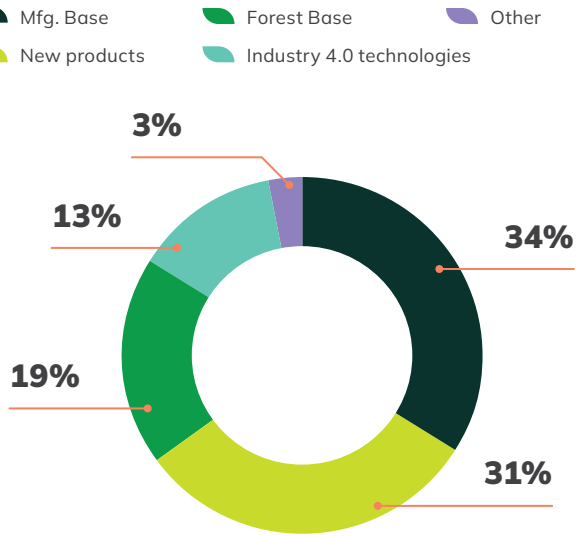


figure 6

Percentage of companies with partnerships, by partnership type (%)

Source: Ibá (2022), Member questionnaire | Developed by: ESG Tech

Type of partnership	%
Internal development	100
Startup	31
Universities	23

All member companies that responded have some sort of partnership related to research.

2.
Economic aspects of the sector

Klabin
Pexels | Polina Tankilovich
Pexels | Karolina Grabowska
Unsplash | Venti Views

Economic aspects of the sector

Gross domestic product

In 2022, Brazil's economy felt the positive effects as restrictions related to the Covid-19 pandemic loosened, bringing new impetus to the country's economy. This resulted in increased demand for products and services. But during the year, the rate of expansion in Brazilian gross domestic product (GDP) slowed and was even negative during the last quarter, closing the year with growth of 2.9%, lower than the 5% observed in 2021. This reduced growth was partially expected in 2022, considering that the 5% seen in 2021 reflected the accelerated recovery that took place in the post-pandemic period.

The forest production chain again demonstrated its resilience and relevance for Brazil, maintaining its historic trend of growth above Brazilian GDP. In 2022, the value added to Brazilian GDP by the planted tree production chain grew 6.3%, driven by the increase in generation of gross revenue, which rose from R$ 244.6 billion in 2021 to R$ 260.0 billion in 2022. In current values, the forest sector reached another landmark in value added to the GDP, totaling R$ 107.2 billion.

figure 7

Value of production by the sector in current prices, 2019–2022 (billion R$)

Source: IBGE (2022) | Developed by: ESG Tech

In terms of share, after the increase in value added that exceeded Brazilian GDP growth, the forest sector accounted for 1.3% of Brazilian GDP, its highest point since 2012.

Suzano

figure 8

Value added by the production chain, in current values (billion R$)

Source: IBGE (2021) | Analysis by: ESG Tech

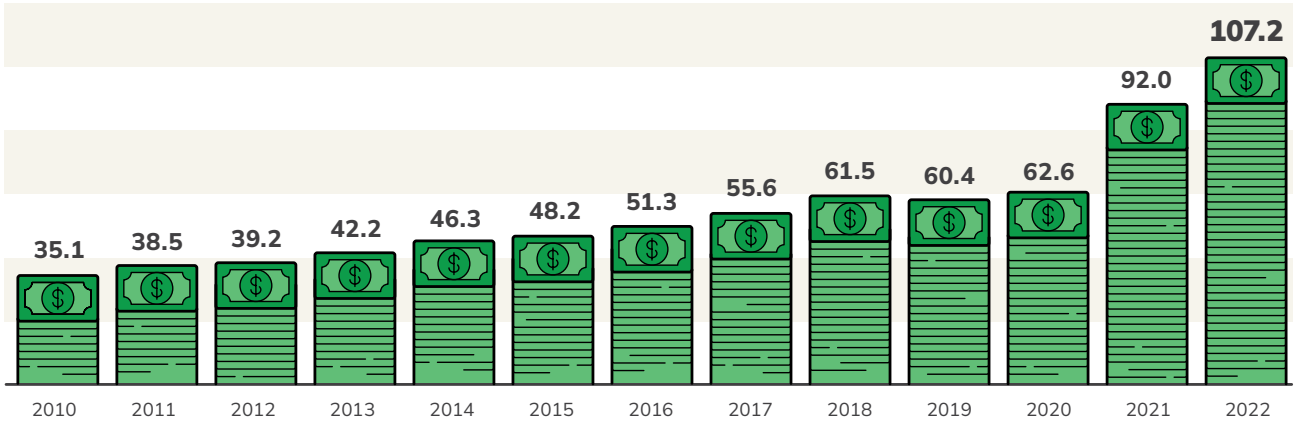


figure 9

Real annual variation in the Brazilian economy (%)

Source: Quarterly National Accounting (Contas Nacionais Trimestrais, CNT) | IBGE (2023) | Developed by: ESG Tech

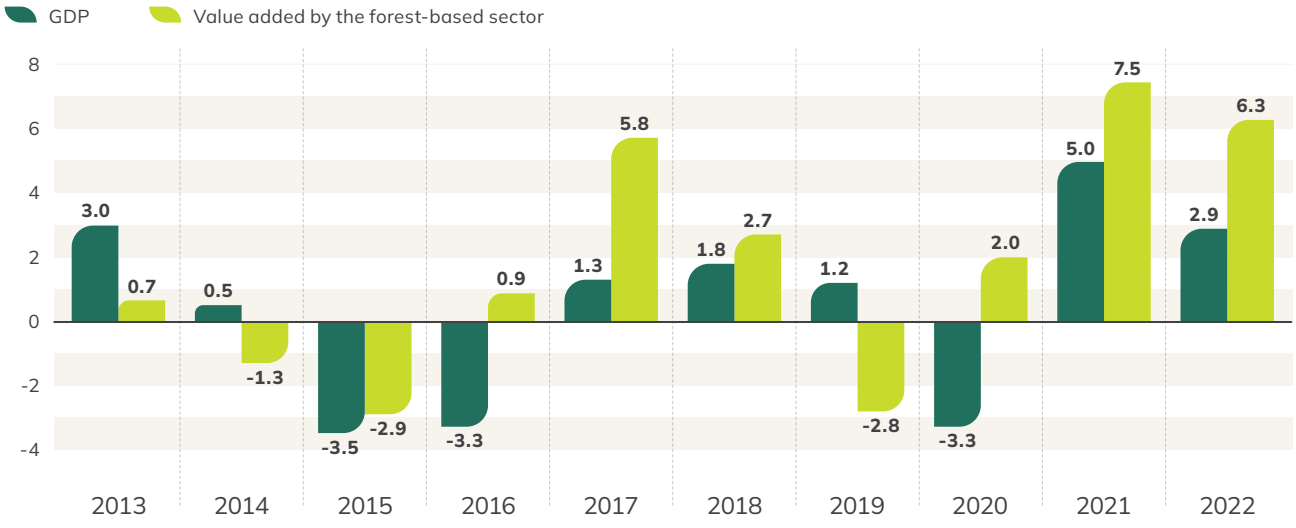
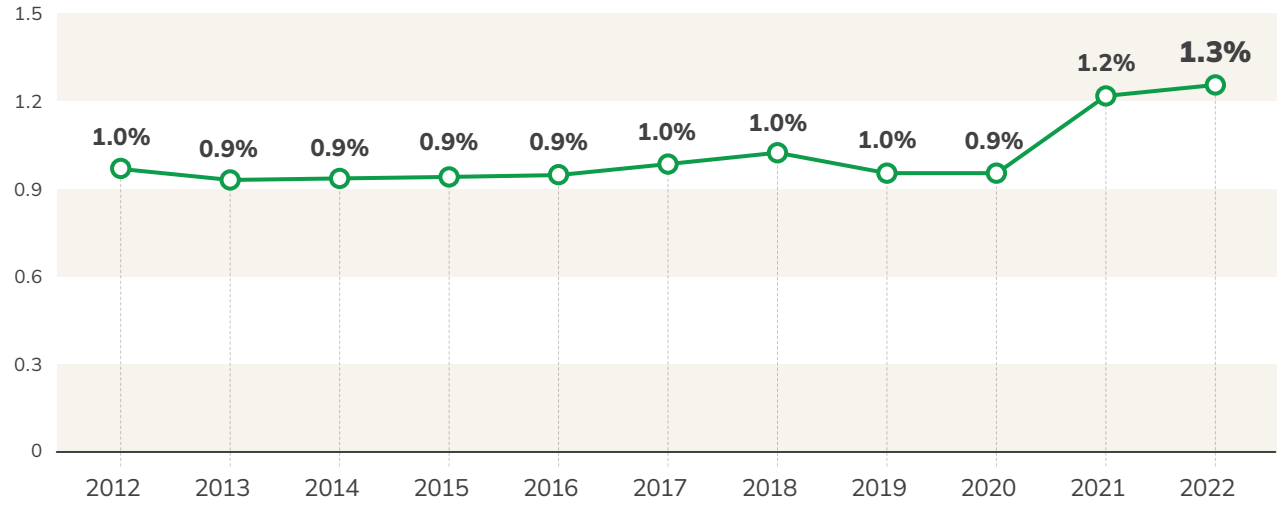


figure 10

Share of value added to the Brazilian economy by the forest production chain (%)

Source: IBGE (2021) | Analysis by: ESG Tech



International Paper | Gerardo Lazzari

To provide context for the economic importance of planted trees in Brazil, the forest-based production sector ranked 22nd among the 50 activities that most impact the country's economy, with data estimated for the average for the 2010–2022 period. Note that the activities that contributed the most to the economy are generally in the service sector.

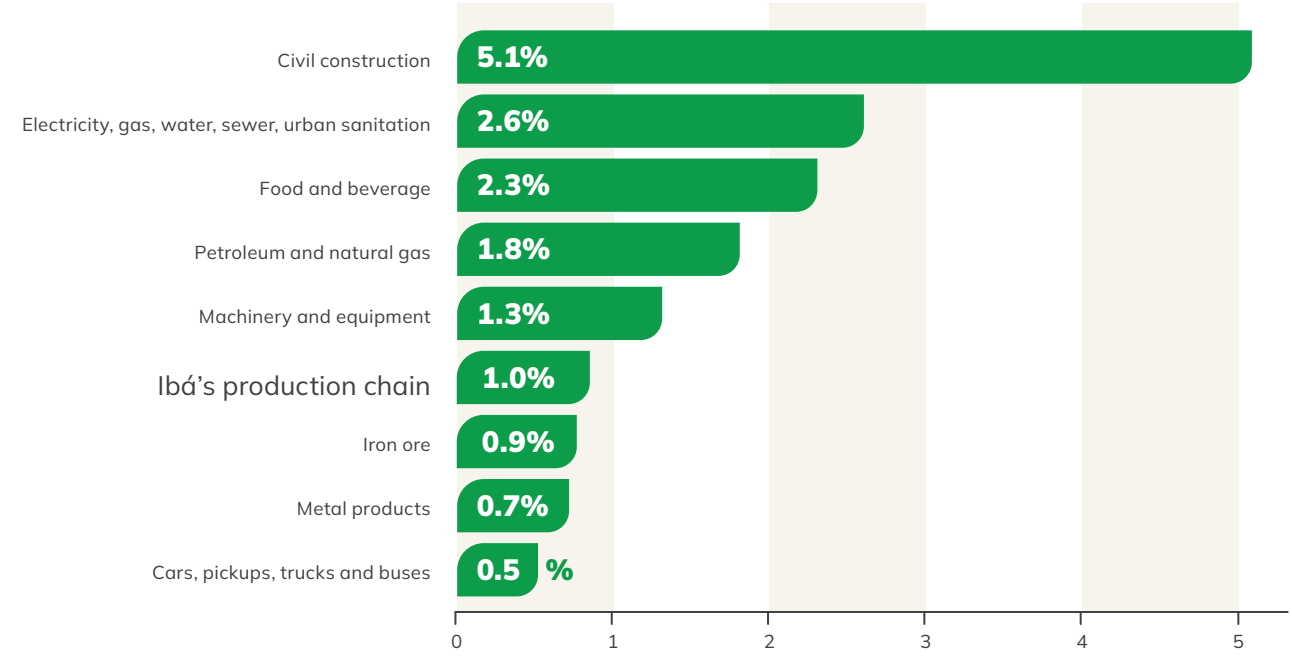
In the traditional analysis that contains 12 economic activities, the planted tree production chain is included in two different areas: agriculture/ranching (forest production) and manufacturing (of wood products and of pulp, paper, and paper products).

In the analysis of a total of 34 different manufacturing activities, the planted tree production chain rose to 6th place after only the construction sector (5.1%), electricity/gas/water/sewer/urban sanitation (2.6%), food and beverages (2.3%), oil and gas (1.8%), and machinery and equipment (1.3%).

figure 11

Share of value added by forest-based production to agriculture/ranching activity, mean for the past 10 years (%)

Source: ESG Tech

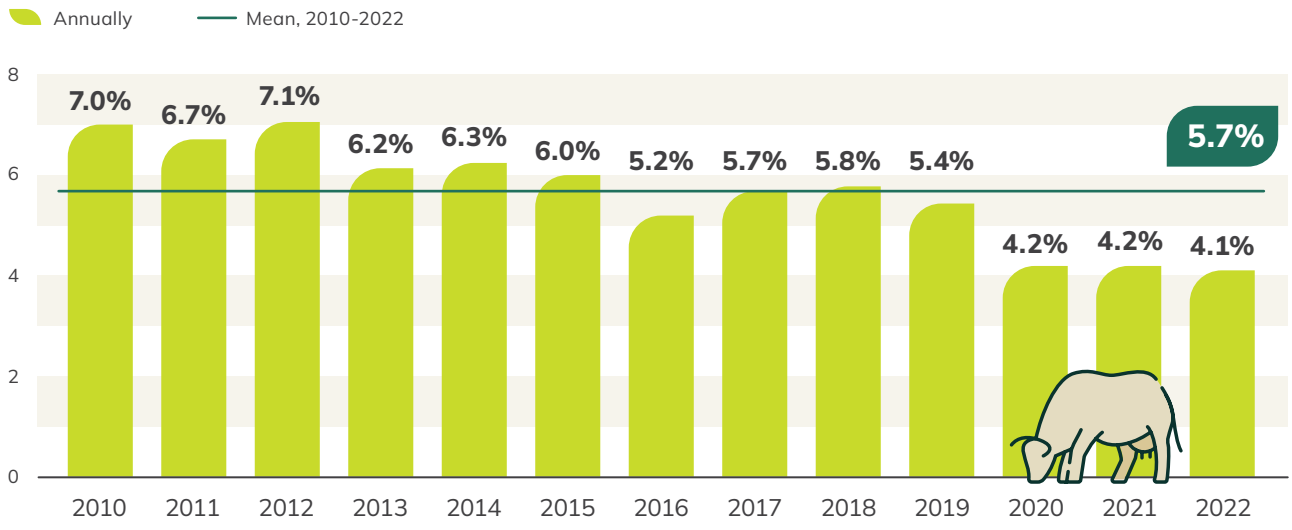


The planted tree production chain accounted for 4.1% of the agriculture/ranching sector in 2022 (Figure 12).

figure 12

Share of value added by forest-based production to agriculture/ranching activity (%)

Source: ESG Tech



7.2%

the sector's share of Brazilian industrial production.

Suzano

Against the current of deindustrialization that Brazil has been experiencing, the forest-based sector has been growing. Cellulose production and paper production rose by 10.2% and 3.5%, respectively. The planted tree production chain accounted for 7.2% of the value added to manufacturing activity in 2022, setting a record for the third time in a row, as shown in Figure 13. This expansion has been observed over the past decade and is the result of several factors including export performance and increased global demand for renewable products.

Seen in terms of demand, Figure 14 shows that the planted tree sector's share of exports grew 4.7% in 2022. Intermediate consumption of products from the forest sector accounted for 2.6% of total intermediate consumption for the country in 2022. Finally, household demand for these products and gross capital formation accounted for 0.8% of all these components combined.

figure 13

Share of the forest-based sector in manufacturing (%)

Source: ESG Tech

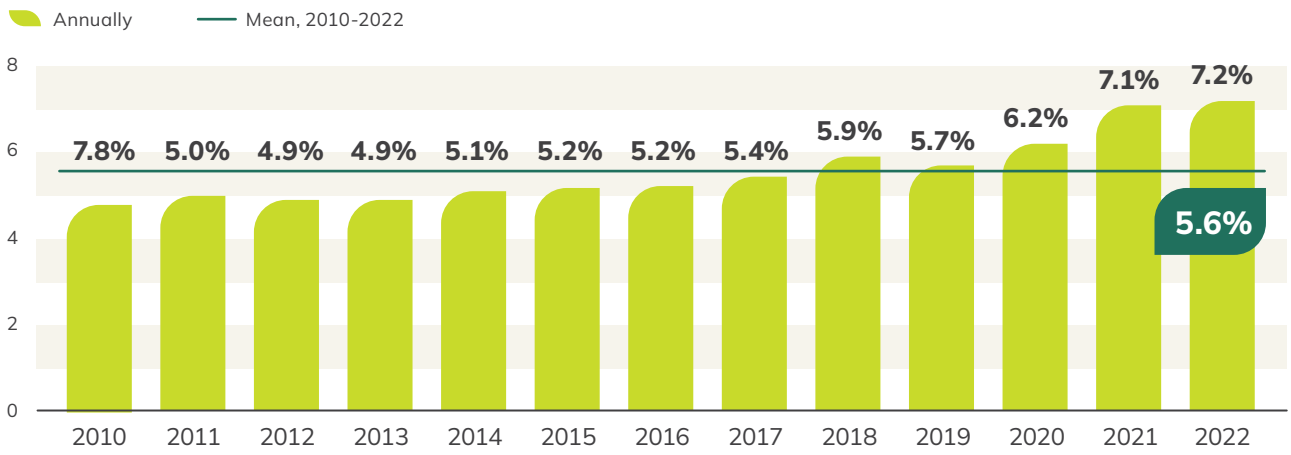
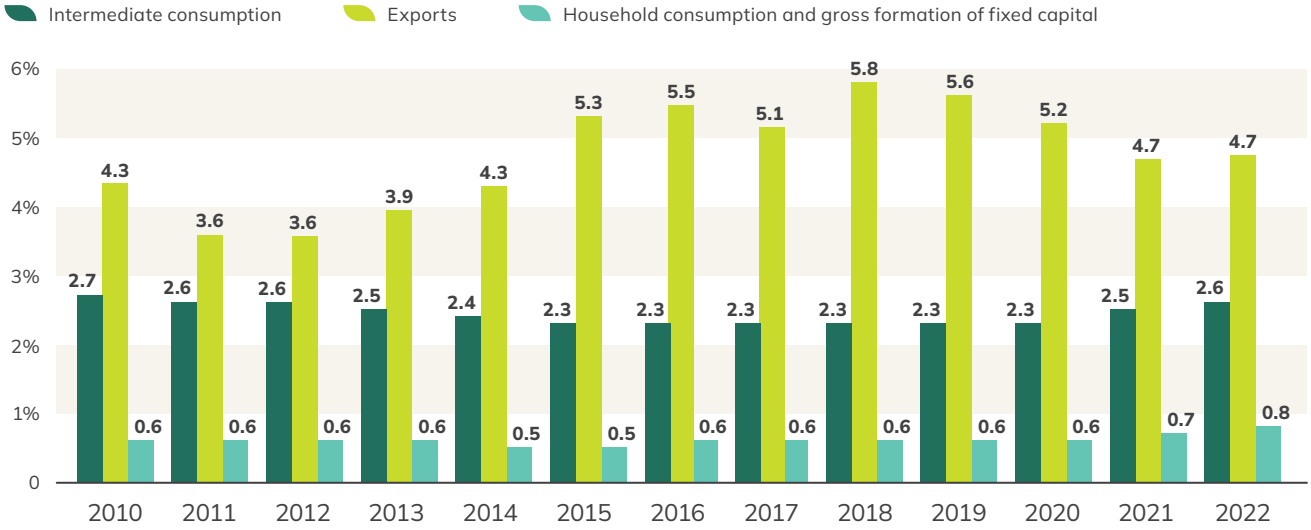


figure 14

Share of products from the planted tree production chain in the components of Brazilian demand (%)

Source: COMEX (2023) and IBGE (2023) | Developed by: ESG Tech and Ibá



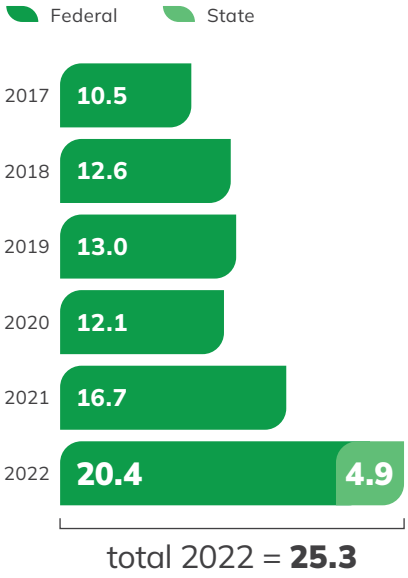
Tax generation

The Brazilian planted tree sector generated approximately R$ 25 billion in federal and state taxes in 2022 (Figure 30). This value includes the new survey on the state level, using the total highlighted value of ICMS taxes in order to better represent the wealth generated by this segment. For federal taxes, we used data from the Federal Revenue Service, which amounted to R$ 20 billion, an increase of 22% over 2021. Additionally, the Ibá Annual Report now includes data on all the tax credits accumulated by member companies. In 2022, they totaled R$ 3.5 billion, distributed among ICMS, IPI, PIS, and Cofins.

figure 15

Federal and state taxes levied (billion R$)

Developed by: ESG Tech | Source: Brazilian Revenue Service & Ibá (2022)



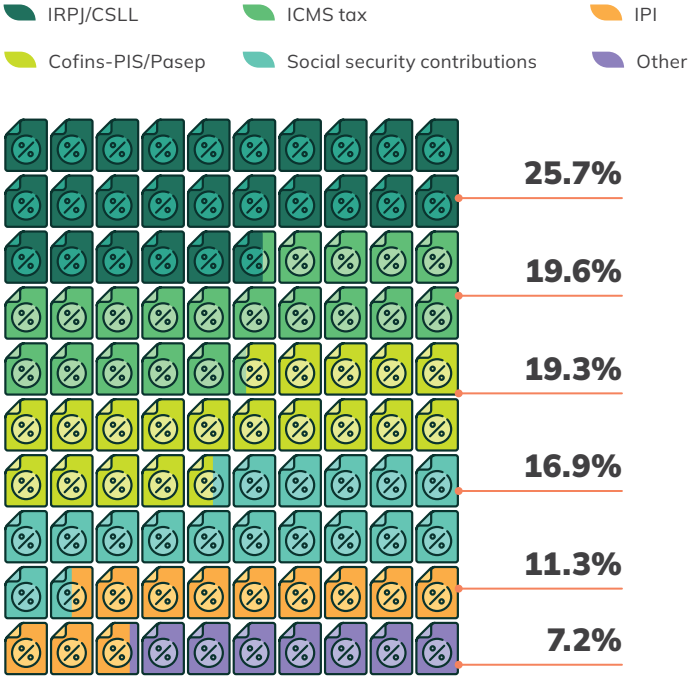
R$ 25
billion

generated in federal and state taxes by the Brazilian planted tree sector in 2022.

figure 16

Taxes levied (%)

Source: Brazilian Revenue Service & Ibá (2022)
Developed by: ESG Tech State Taxes Levied, via questionnaire



Job creation

2.6
million

direct and indirect jobs generated by the planted tree sector in 2022, resulting in total salaries of nearly R$ 2 billion reais.

According to the Brazilian Ministry of Labor's Annual Social Data Report (RAIS, 2021), the planted tree sector generated a total of 2.6 million jobs, both direct and indirect. In 2022, the sector accounted for 663,000 direct jobs, an increase of 8% over the result for the previous year according to this same source* (614,000), resulting in total salaries of nearly R$ 2 billion reais (Figure 17).

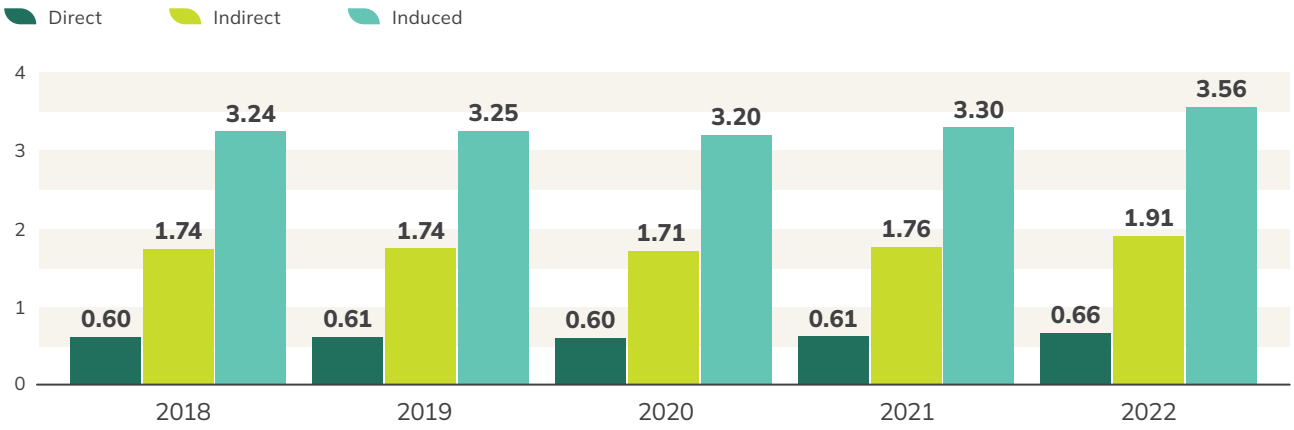
Indirect job posts are estimated at 1.91 million, and induced jobs maintained the ratio of 5.3 jobs generated throughout the production chain for each person directly employed by the forest-based sector with products that originate in or raw materials utilized by the Brazilian planted tree industry. This results in a total of 3.56 million induced jobs, which when combined with the 2.6 million direct and indirect posts yields a total of over 6.1 million people.

* Historical data were recalculated according to the official RAIS data on direct jobs.

figure 17

Jobs generated by the sector based on official RAIS data (million staff)

Source: RAIS (2021) & ESG Tech | Developed by: ESG Tech



Investments

The forest-based sector continues to invest in new units and expansions, with an estimated R$ 62 billion in investments planned for the coming years, which will generate direct jobs as well as significant opportunities from the income effect.

Considering only investments in CAPEX (in manufacturing and forests), R&D&I, voluntary socioenvironmental efforts, and others, the sector applied R$ 16.3 billion in 2022, growth of 4% over the previous year. Note that this value does not consider the expansion projects which are currently underway.

Exports and trade balance

The Brazilian planted tree industry has been consolidating itself for decades as a model of the bioeconomy on a large scale. This globally competitive sector registered record exports of US$ 14.3 billion, an increase of 21.3% over the previous year. The main export product in 2022 was cellulose pulp, with values reaching US$ 8.4 billion and accounting for 59% of the value exported by the sector, while the other products combined to total US$ 5.9 billion (Figure 18).

figure 18

Exports (billion US$)

Source: COMEX (2023)
Developed by: ESG Tech and Ibá

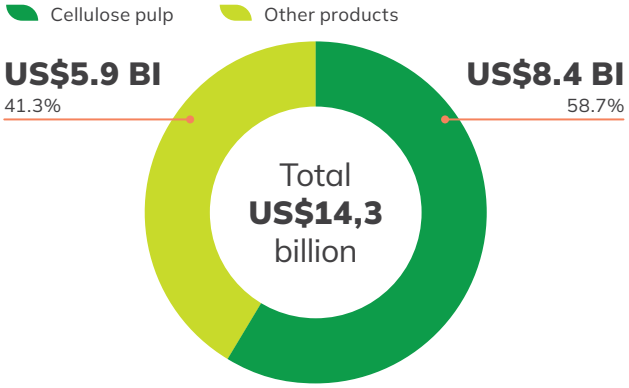


figure 19

Exports from the sector (billion US$)

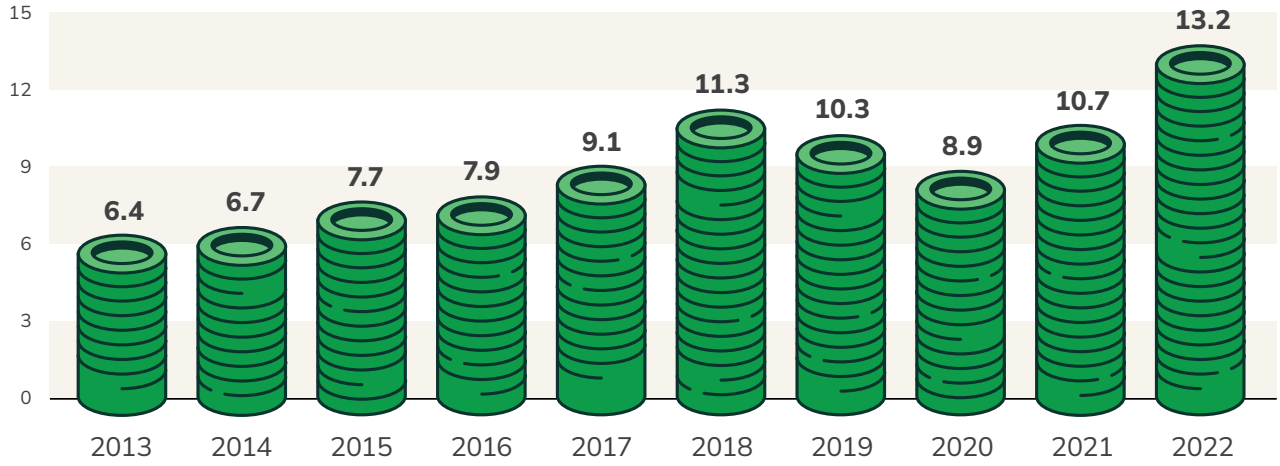
Source: COMEX (2023)

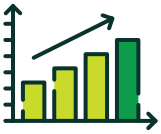
In 2022, the trade balance for the sector was US$ 13.2 billion, growth of 23% compared to 2021 (Figure 20). This sector accounted for 4.3% of all Brazilian exports in 2022.

figure 20

Historical trade balance for the forest-based sector (billion US$)

Source: COMEX (2023) | Elaboração: ESG Tech e Ibá





23%

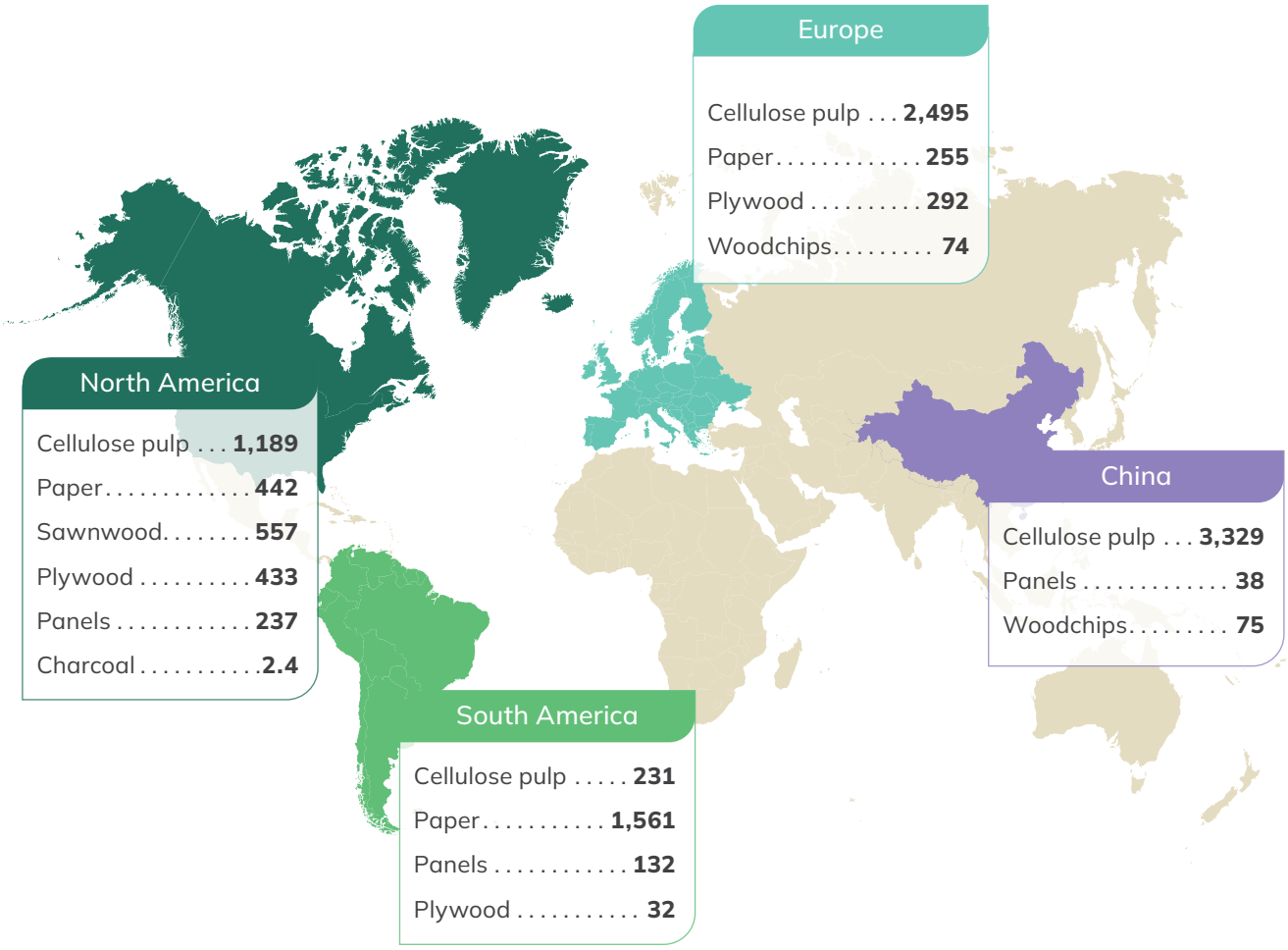
growth in the trade balance for the sector compared to 2021.

China and the United States continued as the two leading destinations for exports from the Brazilian planted tree industry in 2022 (Figure 21), accounting for a total of US$ 3.6 billion in exports, growth of US$ 0.4 billion over the previous year. By region, over 78% of exports from the planted tree sector went to Asia, North America, and Europe.

figure 21

Leading export destinations for the planted tree sector (million US$)

Source: COMEX (2023) | Developed by: ESG Tech and Ibá



Industry inflation rate

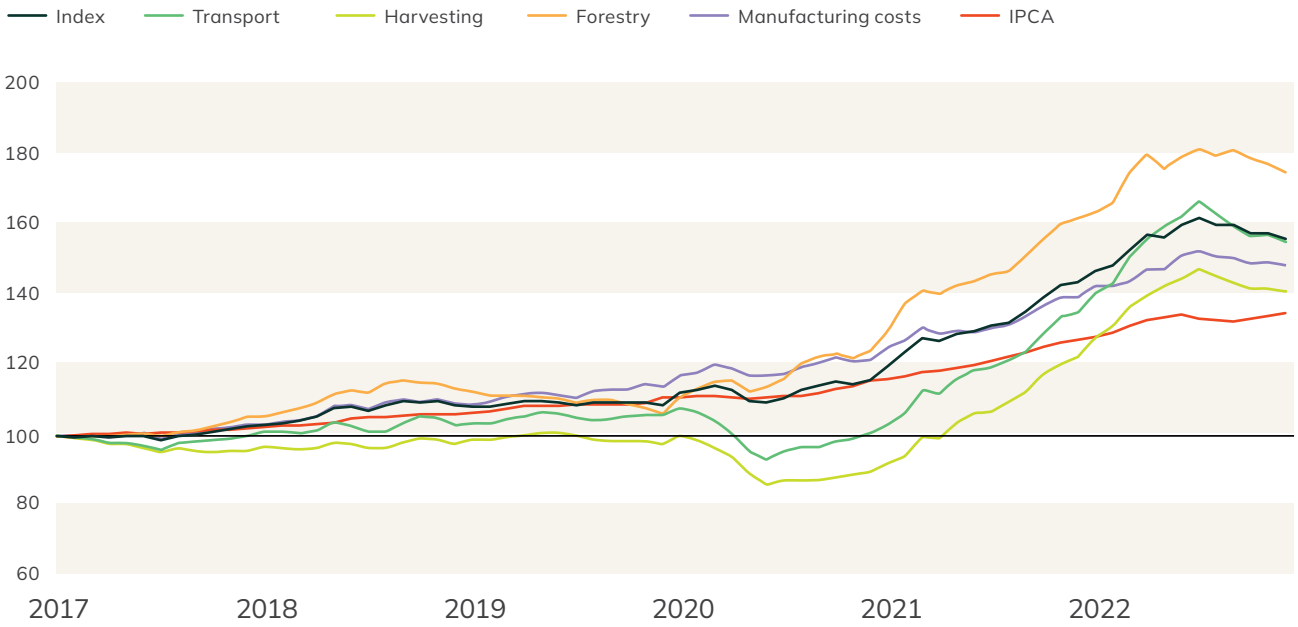
During the first semester of 2022, the market continued to experience difficulty obtaining raw materials, which in turn resulted in higher production costs in some chains. This global scenario has led to production bottlenecks in various segments. In the planted tree sector, input costs rose during the first half. But during the second half, overall costs for the forest-based sector diminished, mainly due to the drop in prices for diesel and fertilizers.

The cost index for wood production accumulated a gain of 9% in 2022, significantly less compared to 2021, growth of 24%. This index was much lower than the average inflation of 5.8% measured by the Expanded Consumer Price Index (IPCA) in 2022.

figure 22

Cost index for the forest sector (January 2017 = 100)

Source: ESG Tech and Ibá



Ricardo Teles

3.
Industrial production

Berneck
Unsplash | This is Engineering
Freepik
Freepik

Sylvamo

Industrial production

Cellulose pulp

In 2022, pulp production in Brazil reached a landmark 25 million tons (22 million tons of short-fiber pulp, 2.5 million tons of long-fiber pulp, and 0.5 million tons of high-yield pulp), growth of 10.9% over the previous year (Figure 23).

In the global ranking of cellulose pulp producers, Brazil is in second place, behind only the United States (~50 million tons) (Figure 24).

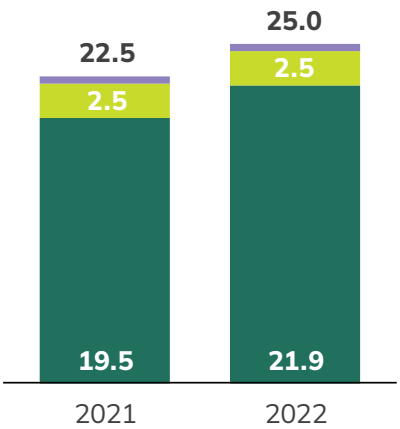
25
million tons
of cellulose were produced in Brazil in 2022.

landmark

figure 23

Brazilian cellulose pulp production (million tons)

Source: Ibá (2022) | Developed by: ESG Tech



Destination for pulp production (million tons)

Source: Ibá (2022) | Developed by: ESG Tech

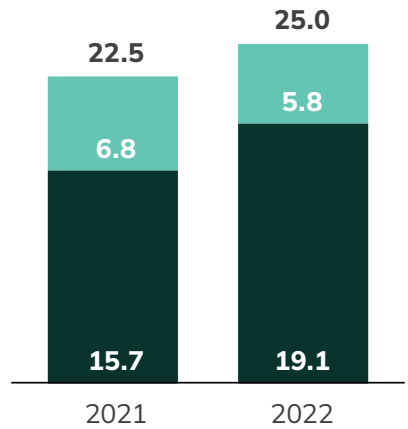


figure 24

Leading pulp-producing countries in 2021 (million tons)

Source: Brazil: Ibá (2022); other countries: FAO (2021) | Developed by: ESG Tech

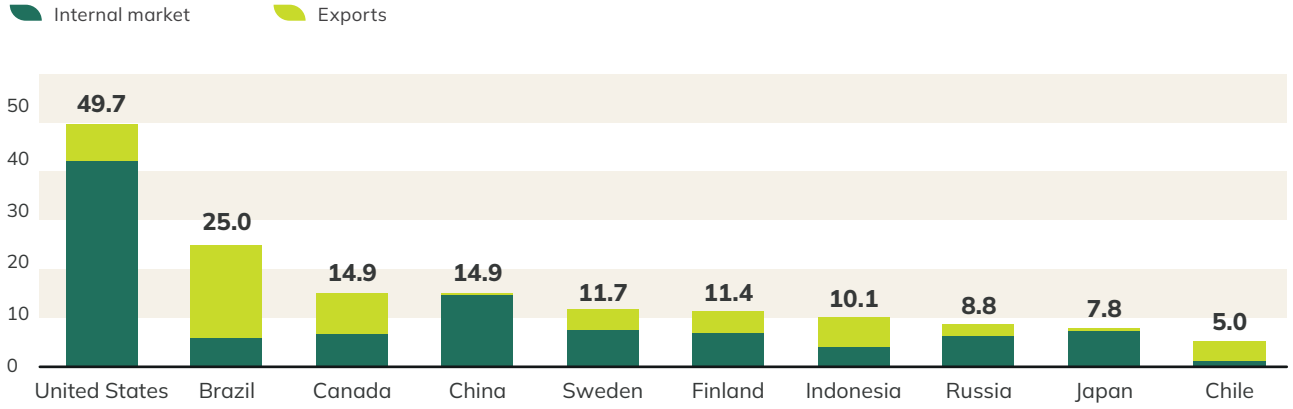
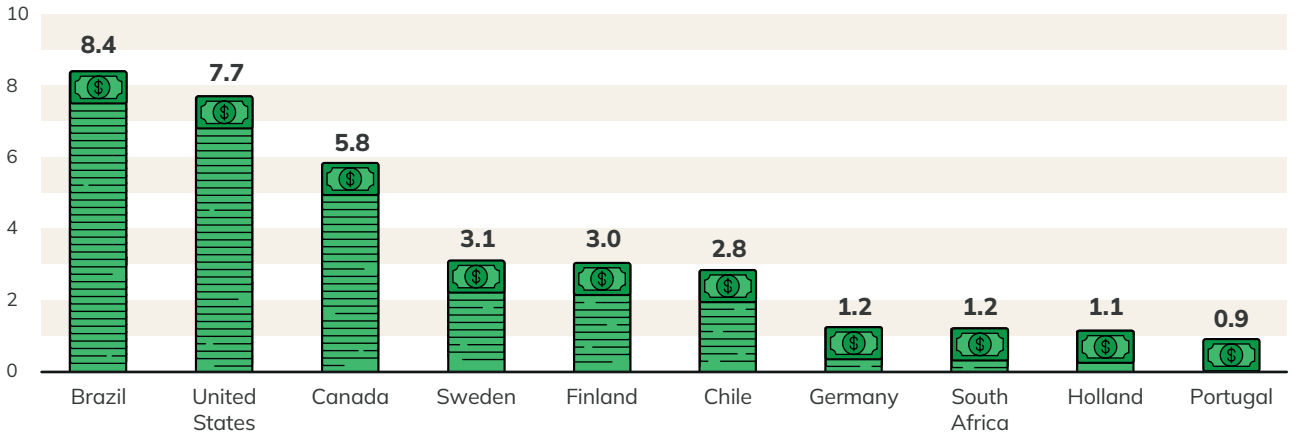


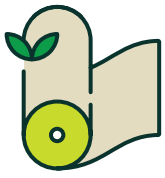
figure 25

Leading pulp-producing countries, 2022 (billion US$)

Source: Comtrade (2022) | Developed by: ESG Tech



In 2022 Brazil maintained its position as the leading exporter of cellulose pulp in the global market, exporting US$ 0.7 billion more than the United States, in second place (Figure 25). The leading destinations for pulp exports in 2022 remained China and Europe, with 40% and 30%, respectively. In the planted tree sector, pulp accounted for 59% of exports by value, with its share of exports from the sector continuing to expand compared to 2021.

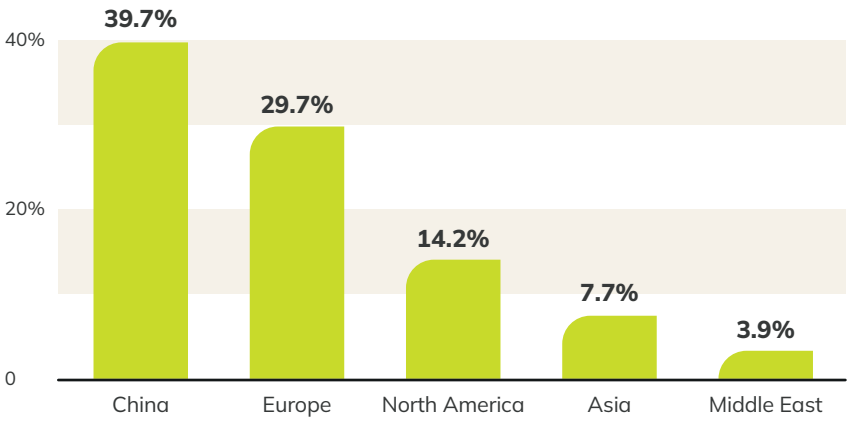


Brazil is the largest exporter of cellulose pulp in the global market.

figure 26

Leading destinations for exports from the planted tree sector in 2022 (%)

Source: COMEX (2023) | Developed by: ESG Tech and Ibá



Export volume for Brazilian cellulose pulp reached 19.1 million tons in 2022, an increase of 22.1% compared to 2021. Meanwhile, 5.8 million tons remained in the domestic market.

Paper

11
million tons
of paper were produced in Brazil in 2022.

landmark

In 2022 Brazil produced 11.0 million tons of paper, an increase of 3.5% over the previous year (Figure 27). The domestic market was still the main destination for this product, absorbing 77.2% of this volume (8.5 million tons), while the remaining 2.5 million tons were exported, reflecting an increase of 21% over 2021.

Of the different types of paper produced in Brazil, paper for packaging accounted for 56% of total production, an increase of 7% in 2022 (Figure 28). Printing and writing paper and card stock went in the opposite direction, with lower production (by 3.6% and 7.1%, respectively).

In 2022, China remained the leading global producer of paper, with 143.6 million tons manufactured, 6.1% more than in 2021 (Figure 29). Brazil continued in 9th place among global paper producers, with 11.0 million tons, and an increase of 5% over the past 5 years.

figure 27

Destinations for paper production (million tons)

Source: Ibá (2022) | Developed by: ESG Tech

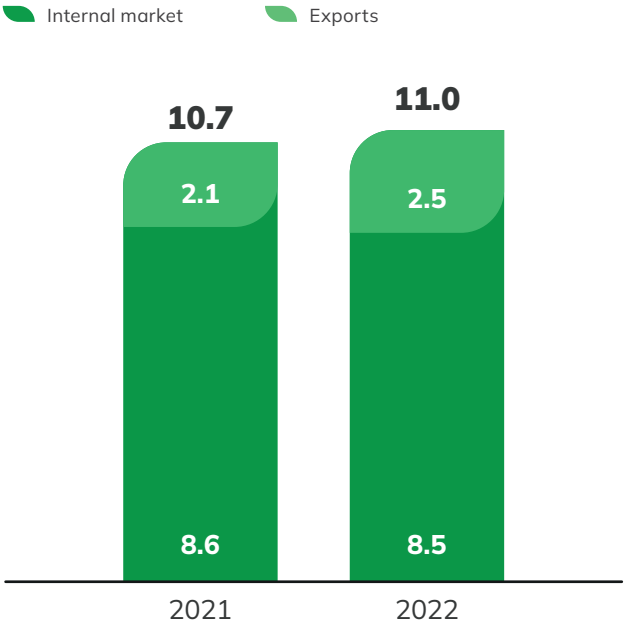


figure 28

Paper production in Brazil, by type (million tons)

Source: Ibá (2022) | Developed by: ESG Tech

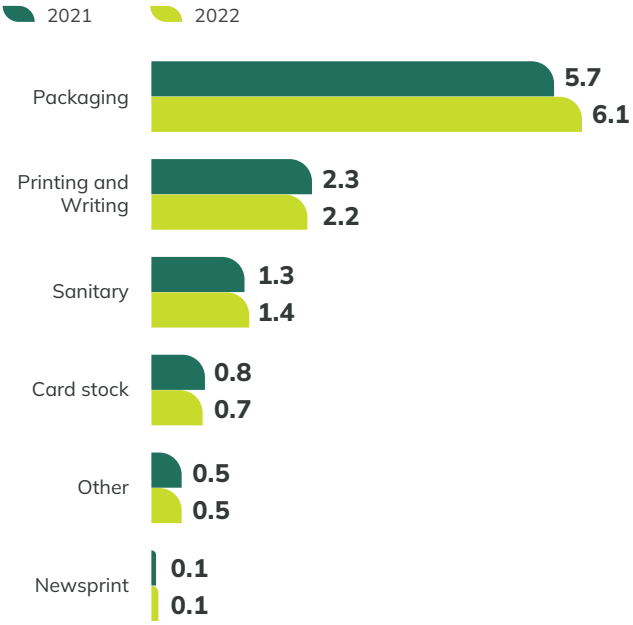
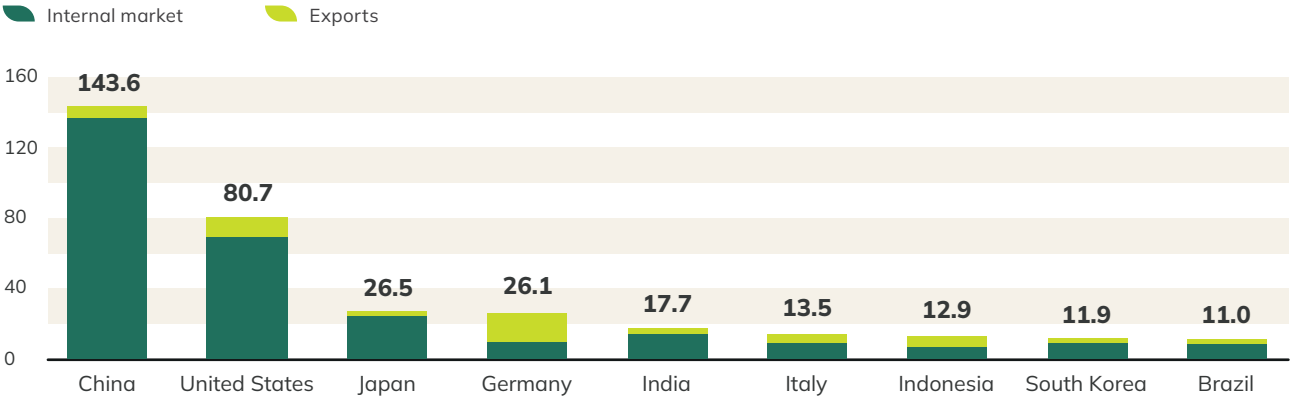


figure 29

Leading paper-producing countries in 2021 (million tons)

Source: FAO (2021) | Ibá & ESG Tech (2022)



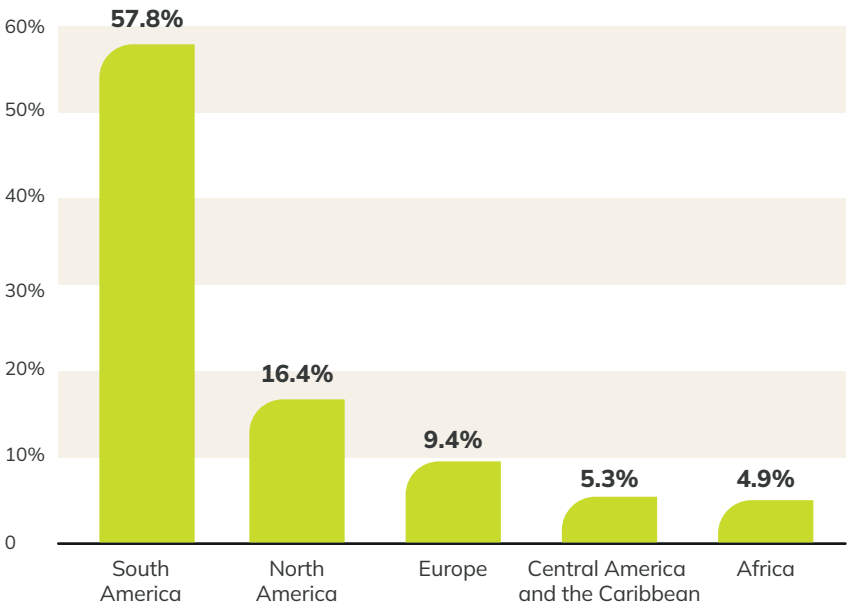
Three of the five leading destinations for paper exports are in South America: Argentina, Chile, and Peru. Combined, this region accounts for 58% of paper exports.

Freepik | Zinkevych

figure 30

Leading destinations for exports from the planted tree sector in 2022 (%)

Source: COMEX (2023) | Developed by: ESG Tech and Ibá



Wood panels

Domestic sales of reconstituted wood panels reached 7.0 million m³, a reduction of 14.8% in relation to 2021 (Figure 31). Among these products, MDF panels were responsible for 61% of sales, with a total of 4.2 million m³. As MDP, in 2022 sales declined 16.5%.

China has been more firmly establishing itself as the largest global producer of reconstituted wood panels, registering production of 102.3 million m³, the equivalent of 38% of global production (Figure 32). Brazil remains in 8th place in the global ranking, with 8.5 million m³ produced.

Meanwhile, the leading destination for Brazilian exports of wood panels, sawnwood, and plywood in 2022 was North America.

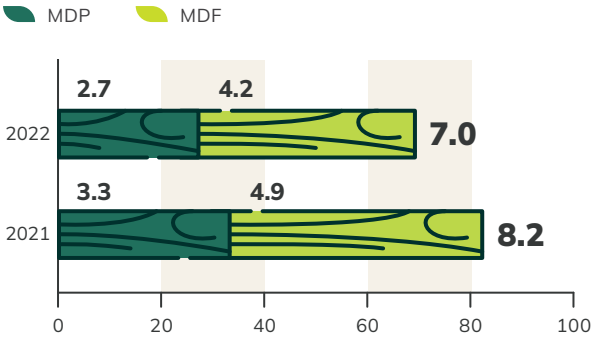
8.5
million m³

of wood panels produced in Brazil in 2022.

figure 31

Domestic sales of wood panels (million m³)

Source: Ibá (2022) | Developed by: ESG Tech



Sales of wood panels by destination (million m³)

Source: Ibá (2022) | Developed by: ESG Tech

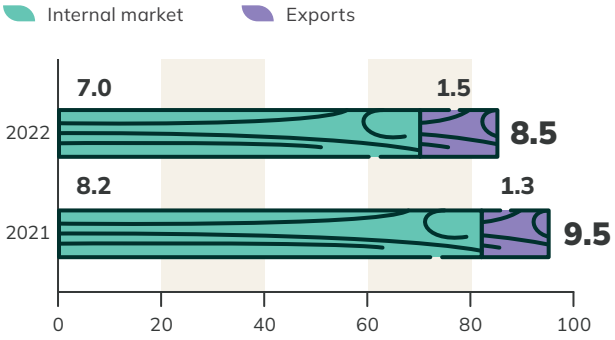


figure 32

Leading destinations for exports from the planted tree sector in 2022 (%)

Source: COMEX (2023) | Developed by: ESG Tech and Ibá

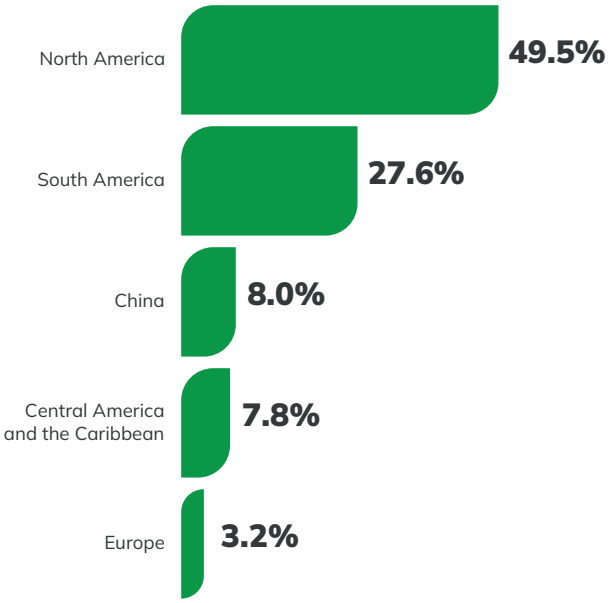
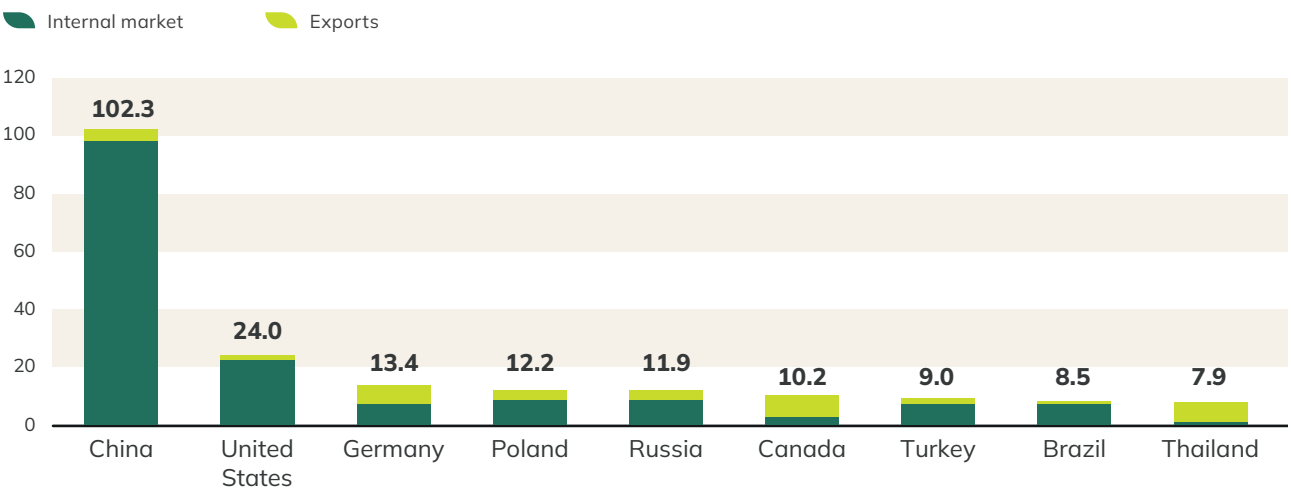


figure 33

Leading wood-producing countries in 2021 panels (million m³)

Source: Brazil: Ibá (2022); other countries: FAO (2021) | Developed by: ESG Tech



10.5
million m²
of laminate flooring
sold in 2022.

Pexels | Irina Kraskova

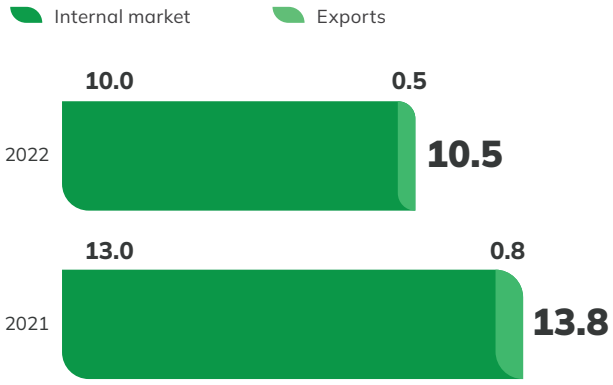
Laminate flooring

Sales of laminate flooring in 2022 reached 10.5 million m², a reduction of 23.7% in relation to 2021 (Figure 34). The internal market is the destination for 95% of Brazilian production.

figure 34

Destination of laminate flooring produced (million m²)

Source: Ibá (2022) | Developed by: ESG Tech



Charcoal

Brazil leads the global ranking of charcoal producers and reached the 7.0 million ton mark for production in 2022, with nearly all of this production going to the internal market (Figure 35). Of this total, 6.9 million tons of charcoal came from wood derived from planted forests, an increase of 15% over the last 5 years (Figure 36). According to data from SINDIFER, the steelworks sector produced 7.8 million tons of pig iron from charcoal in 2022: this corresponded to 24.1% of its total production of 32.4 million tons.

figure 35

Leading charcoal-producing countries in 2021 (million tons)

Source: Brazil: SINDIFER and ESG Tech (2022); other countries: FAO (2021) | Developed by: ESG Tech

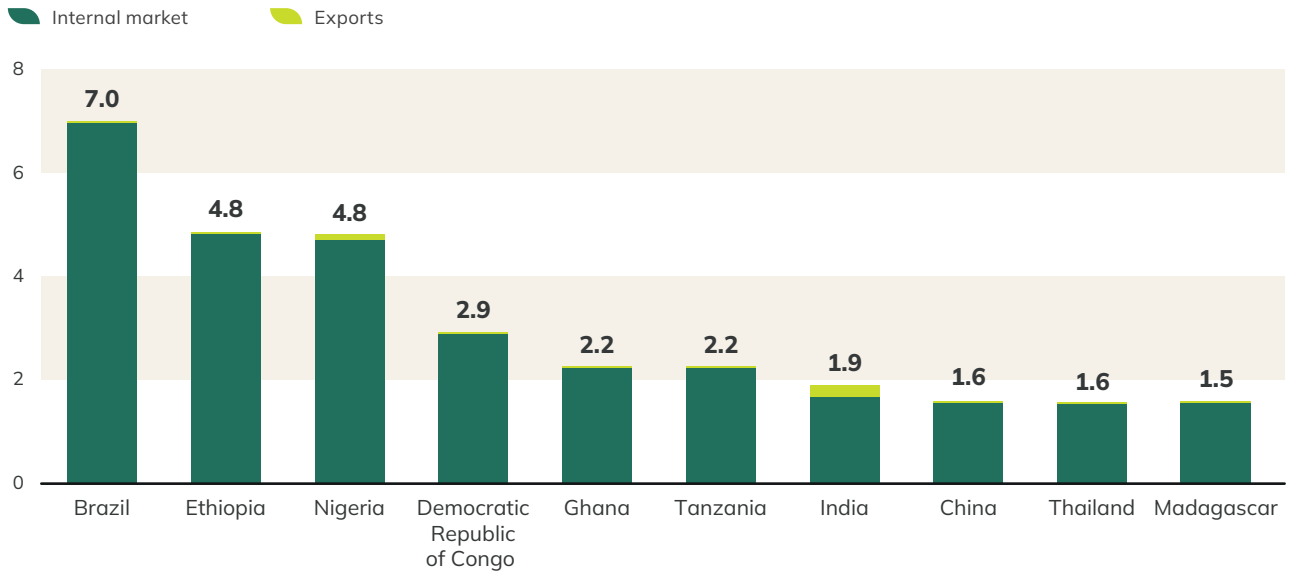
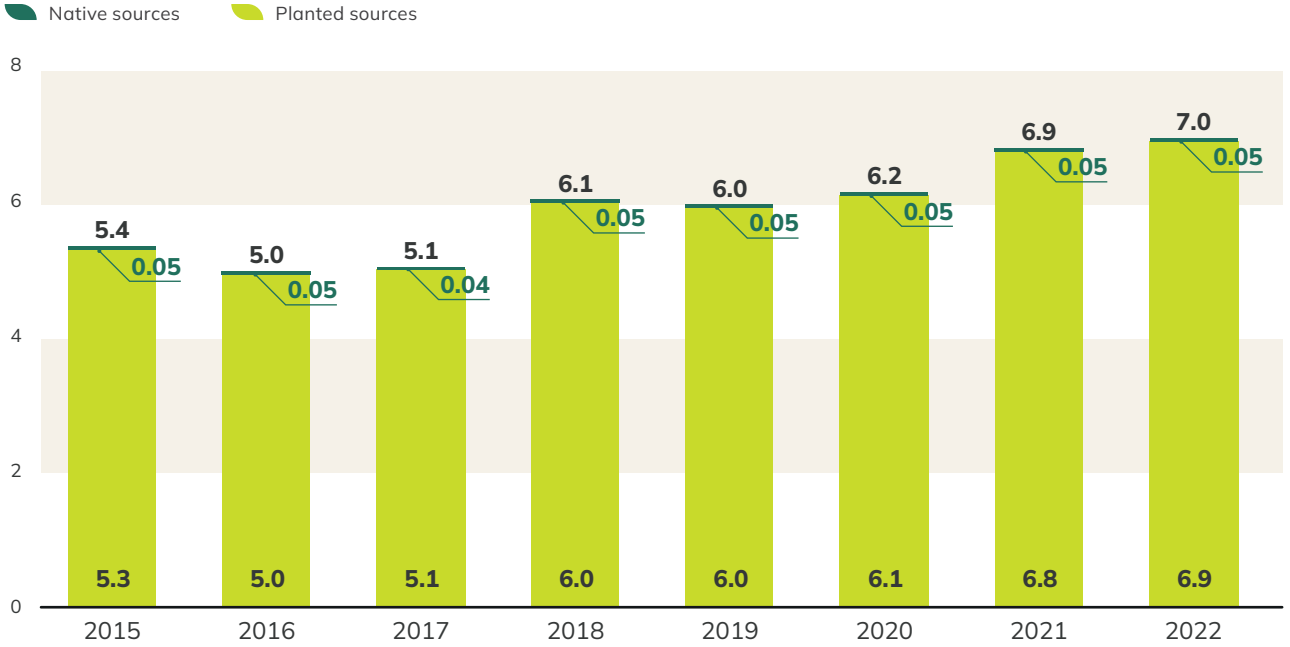


figure 36

Charcoal consumption in steel production (million tons)

Source: Ibá (2022) and SINDIFER (2022) | Developed by: ESG Tech



Sawnwood

Around **8.0** million m³

of sawnwood has been produced annually in recent years.

Sawnwood production has remained around 8.0 million m³ in recent years (Figure 37). Production of sawnwood from planted trees reached 3.2 million m³ in 2021, a 3.2% gain compared to 2020 (Figure 37).

Brazil occupied tenth place among the ten leading global producers of sawnwood; the leaders are China (84.0 million m³) and the United States (80.5 million m³) (Figure 38).

figure 37

Destination of sawnwood produced (million m³)

Source: FAO (2021) and ABIMCI (2021) | Developed by: ESG Tech

Freepik

figure 38

Leading sawnwood-producing countries in 2021 (million m³)

Source: Brazil: ABIMCI (2021); other countries: FAO (2021) | Developed by: ESG Tech

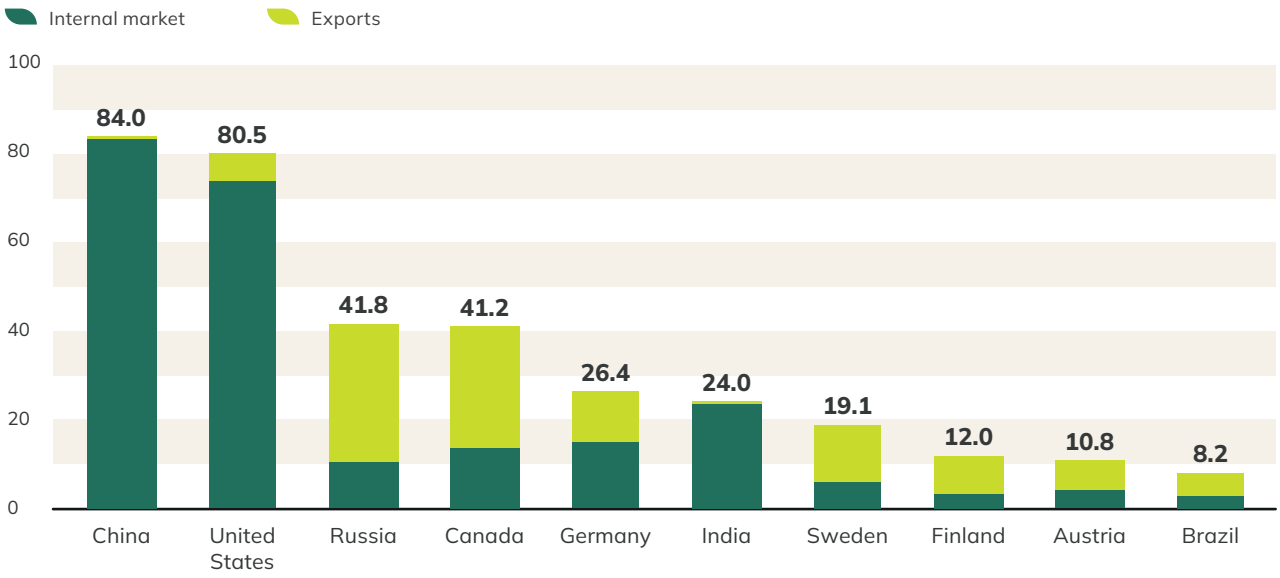
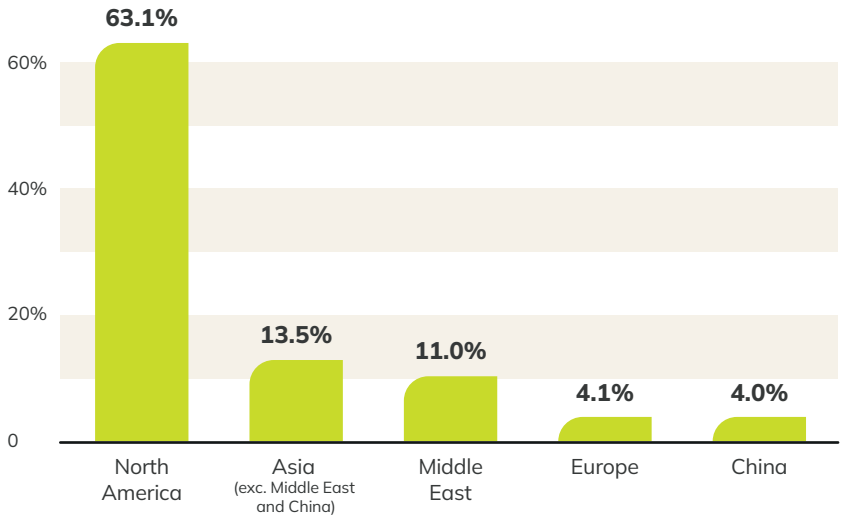
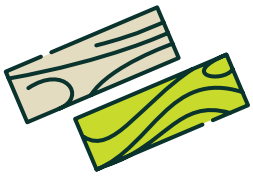


figure 39

Leading destinations for exports from the planted tree sector in 2022 (%)

Source: COMEX (2023) | Developed by: ESG Tech and Ibá





Brazil occupied tenth place among the ten leading global producers of sawnwood.

4.
Planted trees

Klabin
Freepik | DCStudio
Celuose Irani | Fabiano Panizzi
Adobestock

Planted trees

Cultivated area

The total area of planted trees was 9.94 million hectares in 2022, a gain of 0.3% over the previous year (Figure 40).

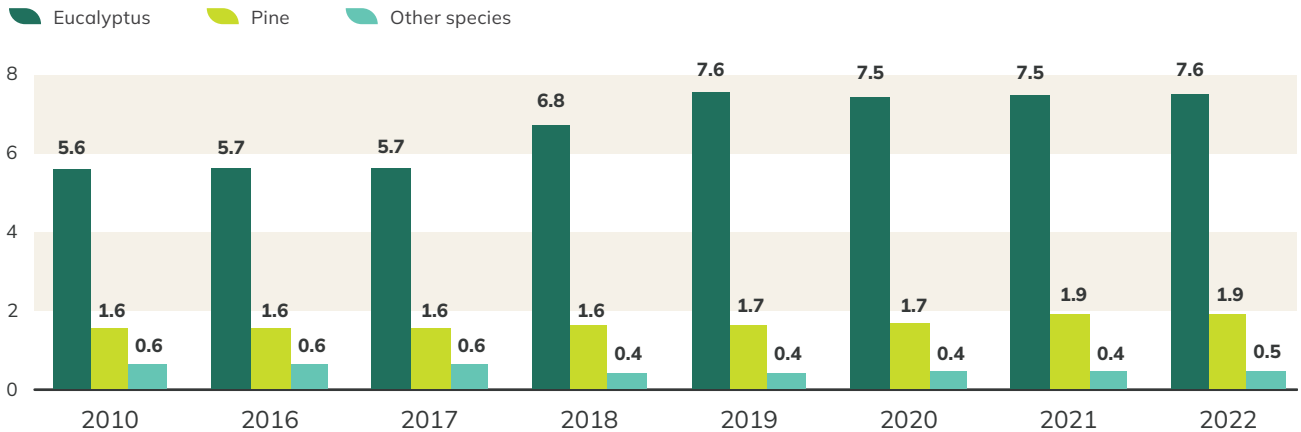
Eucalyptus, which accounts for 76% of planted area in Brazil and 7.6 million hectares, continues to be the most common species. Next is pine with 19%; this species remained essentially stable compared to 2021, with 1.9 million hectares. Other species, which account for 5% of planted area, include rubber with 230,000 hectares, teak with 76,000 hectares, and acacia with 54,000 hectares.

Eucalyptus plantations are mostly located in the Southeast and Midwest of the country, most notably in the states of Minas Gerais (29%), Mato Grosso Sul (15%), and São Paulo (13%) (Figure 42).

figure 40

Planted area in Brazil (million hectares)

Source: Ibá, Canopy | Developed by: ESG Tech



Duratex

figure 41

Share of planted area per region: eucalyptus, 2022 (%)

Source: Canopy (2022) | Developed by: ESG Tech

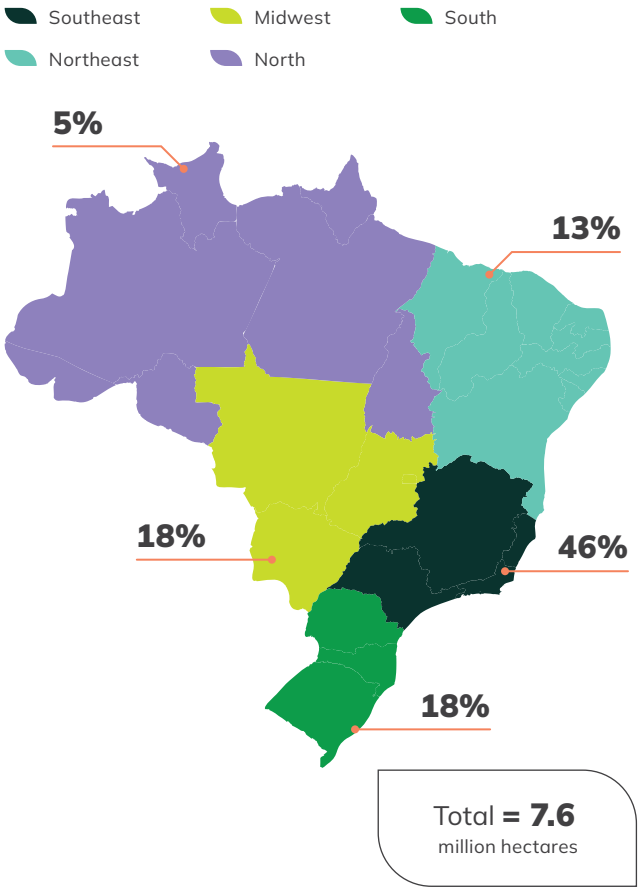
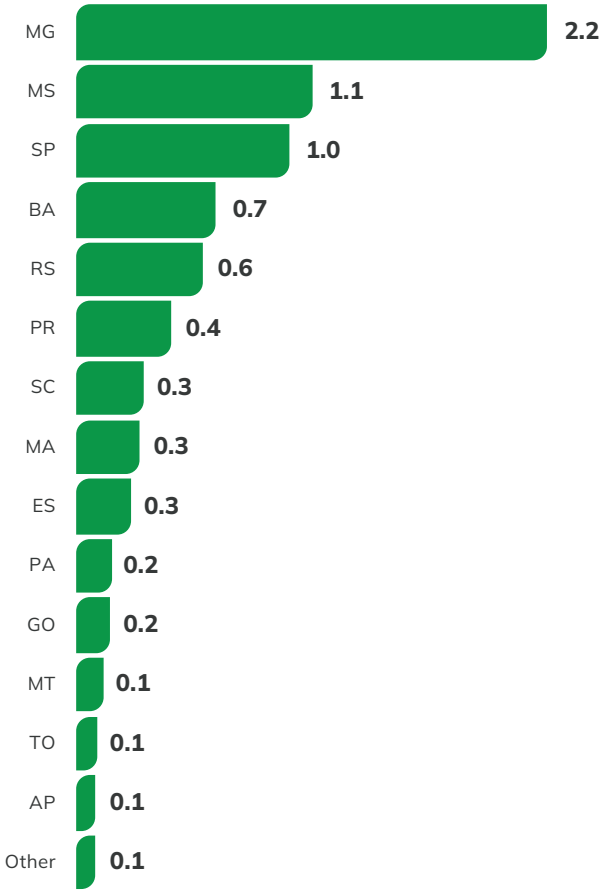


figure 42

Share of area planted with eucalyptus by state in 2022 (million hectares)

Source: Canopy (2022) | Developed by: ESG Tech

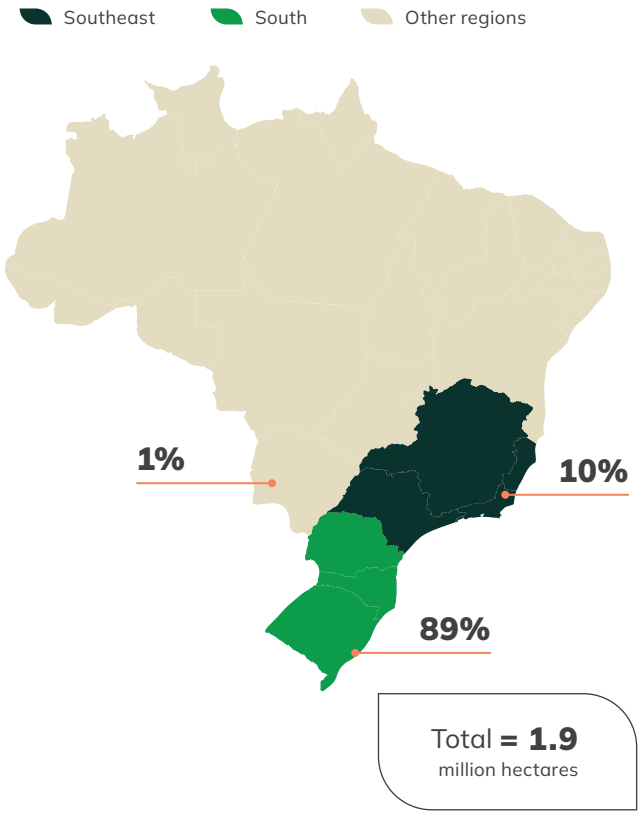


Brazil's Southern region continues to stand out as the main provider of pine wood, with 89% of the total (Figure 43). Paraná state leads with the largest planted area (713,000 hectares), followed by Santa Catarina with 701,000 hectares.

figure 43

Share of planted area per region: pine, 2022 (%)

Source: Canopy (2022) | Developed by: ESG Tech



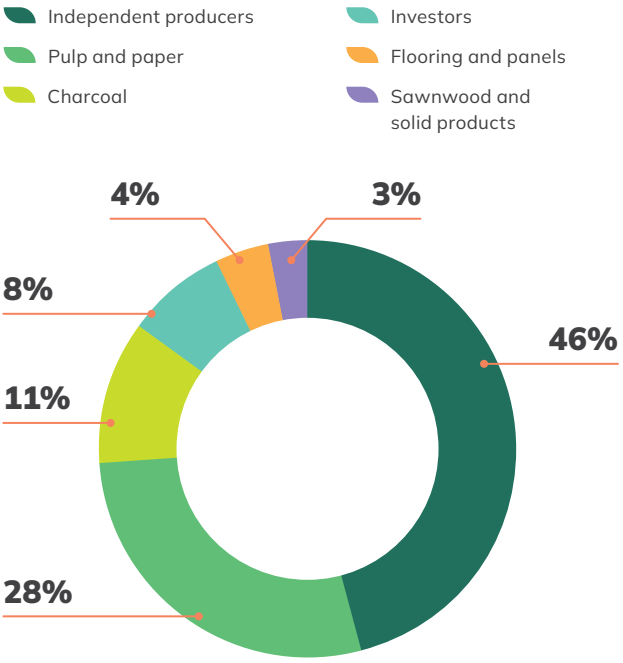
Total = **1.9** million hectares

Distribution of planted area by landowner type is presented in Figure 44. The largest planted area in Brazil belongs to independent producers, followed by pulp and paper companies.

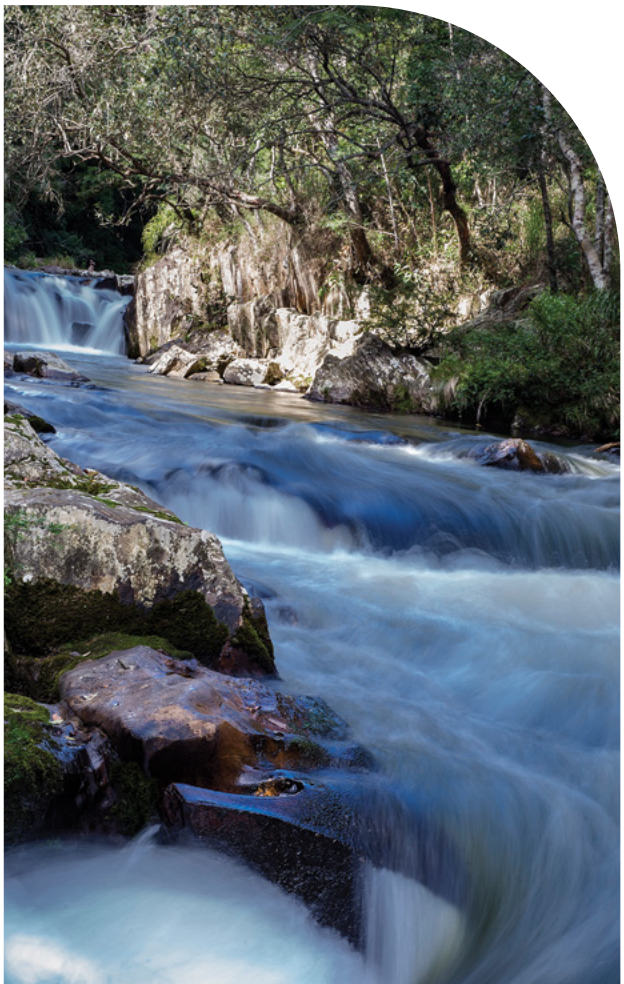
figure 44

Planted area by industrial segment (%)

Source: Ibá (2022) | Developed by: ESG Tech



Eucatex



Productivity

The productivity indicator considered the contribution of the planted area in each state, with weighting derived from data from sampling and the market. By including all the states with planted area in the productivity estimate, representativity can be extended to the national average.

Eucalyptus productivity in Brazil was estimated at 32.7 m³/ha/year (over bark), with an average cycle of 6.7 years. Data dispersion was 22%. The state with the lowest mean productivity registered 20 m³/ha/year, while the state with the greatest mean productivity reached 42.4 m³/ha/year (Figure 45).

Pine productivity in Brazil was estimated at 30.9 m³/ ha.year (over bark), with an average cycle of 16.3 years. Data dispersion was 9%. The state with lowest mean productivity presented 25.1 m³/ha/year, while the state with the greatest mean productivity registered 33.2 m³/ha/year (Figure 45).

The method for calculating forest productivity was refined, and is described in detail in the methodology notes.

figure 45

Maximum and minimum productivity by state, and mean productivity in Brazil (m³/ha/year over bark)

Source: Ibá & ESG Tech | Developed by: ESG Tech

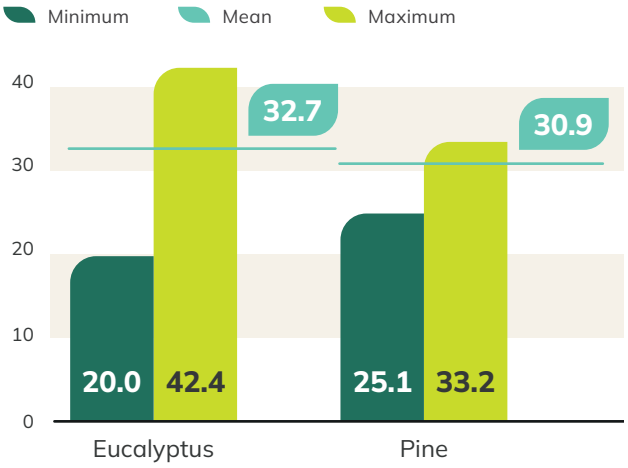


figure 46

Forest productivity [m³/ha.year over bark]

Source: Canopy (2022), ESG Tech, and Ibá | Developed by: ESG Tech

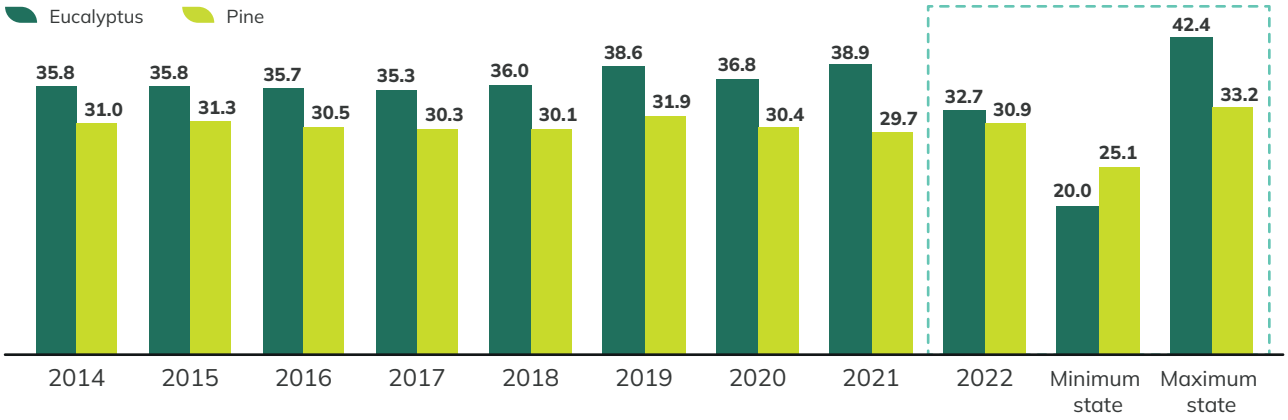
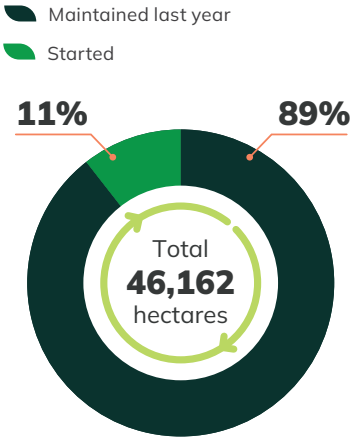


figure 47

Recovered areas

Developed by: ESG Tech



Preserved areas

Management at the landscape level is established practice in this sector; productive plantations of different ages and clones are interspersed with preserved areas of natural forests, which form ecological corridors. They promote landscape connectivity, provide shelter for fauna and flora, and offer many benefits for conservation of soil and water, such as regulating water flows.

In 2022, the area preserved by the planted tree chain reached 6.73 million hectares, including 4.75 million hectares of Legal Reserves (LR) and 1.89 million hectares of Permanent Preservation Areas (PPA) (Figure 46).

The sector is responsible for direct or indirect management of 100,000 hectares of Private Natural Heritage Reserves (PNHR) distributed among the Amazon Forest, Caatinga, Cerrado, Atlantic Forest, and Pantanal biomes. RPPNs are one modality for privately owned preservation units in perpetuity, showing the initiative of the sector in voluntarily maintaining areas that are important for preserving biodiversity.

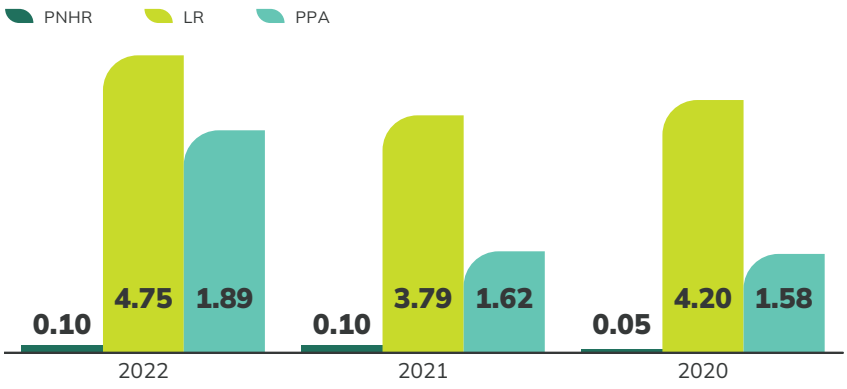
Further validating the concept of responsible management, in 2022 Ibá member companies had over 180,000 hectares of areas identified as high conservation value areas (HVCA). HVCAs are a designation used in certification schemes to refer to areas that are especially important to protect in order to maintain and/or expand significant and critical environmental and social values. Identifying these areas makes these decisions around forest management even more sustainable. Furthermore, the member companies maintained 46,000 hectares of forests in the process of recovery or restoration (Figure 47).

Klabin | Zig Koch

figure 48

Preserved area in Brazil (million hectares)

Source: Ibá (2022) | Developed by: ESG Tech



over
180,000
hectares

identified as high conservation value areas by Ibá member companies in 2022.

Integrated crop, livestock, and forest systems

Amid the dynamic scenario of the Brazilian planted tree industry, integrated crop, livestock, and forest systems have emerged as a notable and innovative model.

According to EMBRAPA, 17.4 million hectares are estimated for the 2020/2021 harvest, with 40% of these located in the Midwest region.

Integrated systems stand out as a solution that transcends the traditional frontiers of agriculture, ranching, and forestry. They are especially relevant when we consider that 46% of the planted area in Brazil is in the hands of independent producers.

This approach offers a true example of sustainability and maximizing resources by interspersing planted crops, pasture, and forested areas in the same space, helping to improve the soil, boost productivity, and diversify income for rural producers.

Integrated systems also provide significant economic gains for small rural producers, since diversified activities reduce risk, boost business resiliency, and optimize use of available resources. The sale of wood, meat, grain, and other agricultural products from the same area adds value to production, strengthening producers' competitiveness and financial stability. It also makes substantial contributions to environmental preservation. Planting trees together with agricultural crops and pastures helps with carbon fixation, mitigating the impacts of climate change.

Integrated systems offer a sophisticated example of how innovation and sustainability can go hand in hand. They not only reinforce the importance of planted trees, but also redefine the way agriculture and ranching take place. By promoting integrated systems, we are investing in a more promising future for industry, the environment, and society as a whole, especially for the independent producers that account for a significant portion of Brazil's planted area.

5.
Sustainability

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Sustainability

Sustainability is founded on the capacity to meet the demands of the current generation without compromising the well-being or resources of future generations. Aspects like socioenvironmental responsibility, generation of shared value, and respectable income make up sustainable development as a topic.

For years, the planted tree sector has made sustainability a strategic pillar of its business plan. There is no false dichotomy between production and conservation in this sector: both work hand in hand and are part of the essence of decision-making at the highest level.

The following chapter showcases the planted tree sector's contributions toward people and the environment. Most of the findings reflect responses on the questionnaire Ibá sent to its member companies.

Climate change

One of today's greatest challenges lies in the effects of climate change. According to the Intergovernmental Panel on Climate Change (IPCC 2018), human activities are estimated to be responsible for global warming ≈1°C higher than pre-industrial levels. Changes in land and ocean habitats and the services they provide are expected to result from projected global warming of 1.5°C, and could cause severe negative impacts on ecosystems, economic growth, and even human survival. In this way, in order to slow and mitigate the effects of these changes, international efforts such as the Paris Agreement (2015) have been developed to bring about changes that can only be attained with broad, sustained public support.

In tune with global concerns, and based on the search for sustainable development, the planted tree sector is conscious of its position on the right side of the climate equation, as an agent with a positive impact.

The sector's work focuses around the physiological ability of trees to remove and sequester carbon dioxide from the atmosphere in their biomass. This happens in planted trees as well as in areas of native forests and in the soil. The equivalent of 1.82 billion tons of carbon dioxide are stored in productive forests, and 2.98 billion tons of carbon dioxide equivalent is stored in natural forests set aside for conservation.

Another component of this positive impact on the climate equation is the sector's capacity to avoid emissions from the production process.

This is because the sector's power grid is mostly renewable, and also because of the circular nature of its manufacturing processes, particularly pulp production. In this case, black liquor, a by-product when chips are cooked, is a key player, since not only does it generate electricity but it is also a source for recovering a series of inputs which are reused throughout the manufacturing process. This circular approach helps reduce greenhouse gas emissions compared to the traditional linear approach.

The products from this sector are also important players for the climate, since they store carbon in their makeup and replace others that come from fossil sources, thus avoiding emissions.

In convergence with this reasoning and to monitor emissions, the number of member companies in the sector that have greenhouse gas inventories rose 8 percentage points over 2021 to reach 81% in 2022 (Figure 48). Among the companies that have inventories, 73% publish their results, reflecting an increase of 23 percentage points compared to 2021.

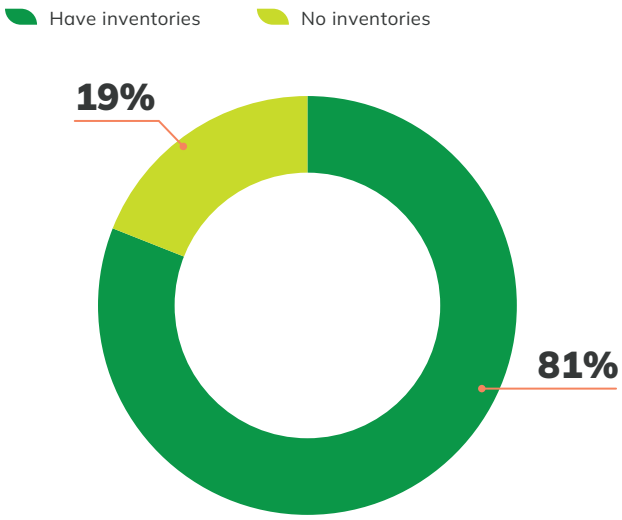
Additionally, 35% of the member companies stated that they also have goals to reduce greenhouse gas emissions in their operations: 12% with scope 1 and 2 goals (direct emissions related to production and energy generation, respectively) and 23% with additional scope 3 goals (indirect emissions from the company's supply chain).

All these elements combine to result in a highly decarbonized sector that has major potential to help decarbonize other industries in the Brazilian economy, providing low-carbon inputs and energy.

figure 49

Companies with greenhouse gas inventories (%)

Source: Ibá (2022) - Member questionnaire | Developed by: ESG Tech
Note: 27 respondents.



Klabin | Zig Koch

Biodiversity

Monitoring biodiversity involves long-term oversight, using well-established methods for each species group. By assessing these responses, assertive decisions can be made about management, always with an eye to relieving pressure on the ecosystem.

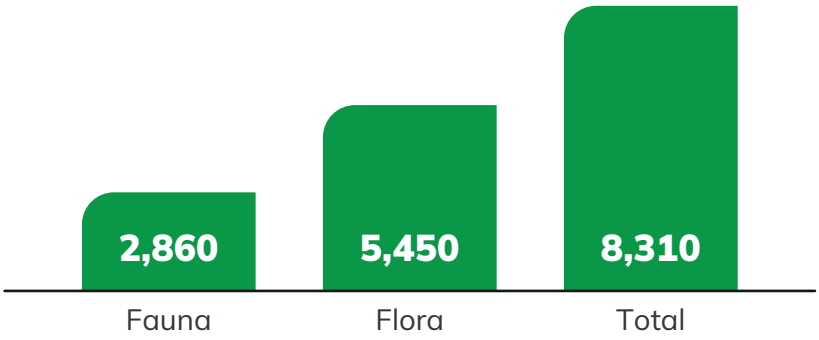
In this aspect, companies with forest resources are strongly engaged and have invested in this monitoring activity since the 1970s. Historical monitoring data on biodiversity obtained by Ibá (2022) indicate that over 8,300 species have been recorded in areas belonging to the planted tree sector (Figure 50). Of these species, 335 were considered threatened or endangered. This information is extremely important so that companies can continue to contribute to biodiversity conservation.

over
8,300
species
have been recorded in areas belonging to the planted tree sector.

figure 50

Biodiversity recorded in areas belonging to the planted tree industry (number of species)

Source: Caderno de Biodiversidade do Setor de Árvores Cultivadas [Biodiversity in the Planted Tree Sector Report] (2022)



Management of water resources

Preserving and protecting water resources is essential to ensure the continuation of ecosystems and the beings that depend on them.

Within the planted tree sector, good practices in water conservation were part of the sustainability strategy in approximately 90% of member companies in 2022. Practical conservation activities involve preventing and mitigating erosion in the companies' areas: sustainable harvesting, in which by-products like bark, leaves, and branches are left on the ground to protect the soil; mosaic planting, where productive areas are interspersed with productive areas at the landscape level; and restoration of springs and other Permanent Protection Areas.

Furthermore, of the member companies that responded to the Ibá questionnaire, roughly 79% stated that they carry out some type of qualitative and quantitative monitoring of their bodies of water. Monitoring is a central element in adaptive stewardship and good management of water resources, since it allows companies to understand, assess, and oversee the effects of their plantations, their management practices, and protection measures, in order to guide potential adjustments when necessary.

The effectiveness of these practices can be seen in the fact that in 2022, only approximately 1.3% of interactions received by the member companies were related to water.

Roughly 82% of the water captured for use in pulp and paper mills is returned to the same body of water after treatment. In the flooring and panel segment, this return rate is 63%, reflecting the fact that most of the production process in this segment involves dry pressing. While this sector does use a large quantity of water, the majority of this captured water is returned to its origin after treatment.

79%

of member companies stated that they carry out some type of qualitative and quantitative monitoring of their bodies of water.

Waste management

In the planted tree sector, the main waste consists of bark, branches, and leaves. After the trees are harvested, these by-products can be left in the field to protect the soil from erosion, improve stability, and boost nutrition, or can also be directed toward energy generation. Another significant byproduct from wood processing in the flooring and panel segment is sawdust (Figure 51).

This sector has been implementing various projects and developing new uses to avoid wasting materials and natural resources, focusing on circular practices, namely the 3R concept (reduce, reuse, recycle). In 2022, approximately 93% of the total quantity of waste generated went toward energy generation and recycling and/or reuse (Figure 52). For energy generation, this number rose roughly 24 percentage points over 2021.

figure 51

Type of waste and share of total quantity generated

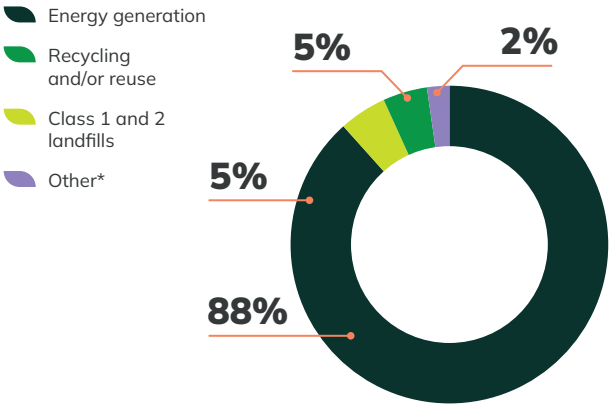
Source: Ibá (2022) - Member questionnaire | Developed by: ESG Tech
Note: 27 respondents.

Type of waste	Share of total (%)
Bark, branches, and leaves	57.8
Sawdust	21.7
Woodchips	6.6
Black liquor	5.7
Lime sludge and boiler ash	1.0
Oils, grease, and agrochemical packaging	0.2

figure 52

Destination of waste and share of total quantity generated

Source: Ibá (2022) | Developed by: ESG Tech
Note: the category "Other" also includes waste that is incinerated, composted, coprocessed, and used in the fields to protect, fertilize, and correct the soil, among other uses.



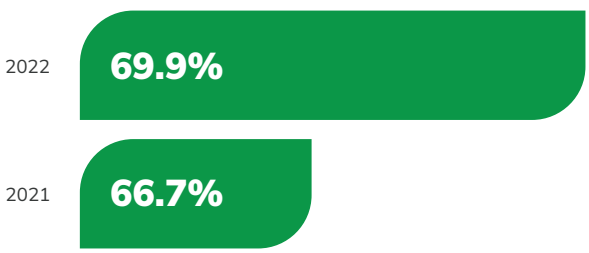
Recycling rate

The Brazilian paper sector has one of the highest recycling rates in the world. In 2022, 5.2 million tons of paper scraps were collected, reaching a recycling rate of 69.9% according to data from FGV IBRE, an increase over the previous year. When we consider only paper for packaging and paperboard, this rate rises to 75.8%.

figure 53

Paper recycling rate

Source: Ibá (2022)



Adobestock

86%

of the sector's energy is sustainably self-generated.

Energy

The planted tree industry has a historically sustainable and predominantly clean energy grid, and is a reference in the area of green energy, since most of the energy it consumes comes from renewable sources. With the biomass obtained from planted trees, the sector sustainably generates 86% of all the energy it consumes. In 2021 this number was 66%, showing an incrase of 20 percentage points.

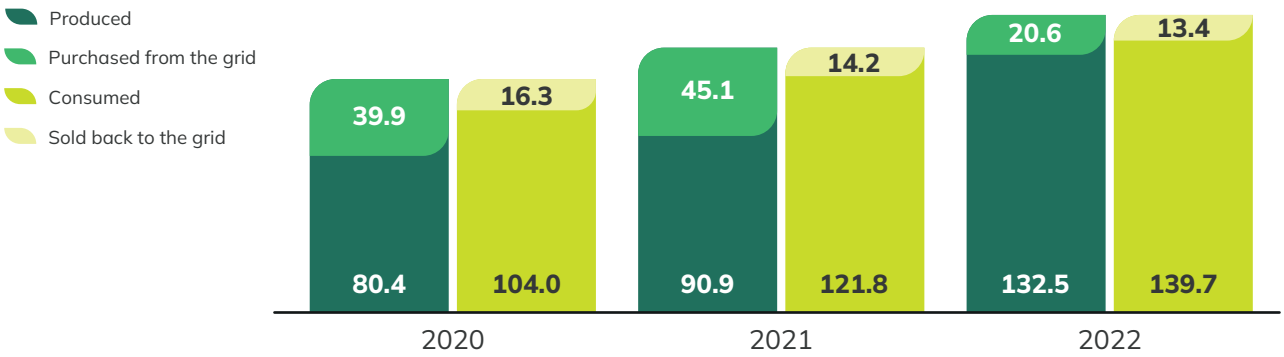
Self-generation is predominant in the pulp sector; most mills are self-sufficient and even export extra electricity back to the grid and to the surrounding municipalities.

Black liquor, a byproduct of pulp production, is the most significant source for self-generation of green energy, and has major energy potential (Figure 53).

figure 54

Electricity balance in the sector (million GJ)

Source: Ibá (2022) | Developed by: ESG Tech

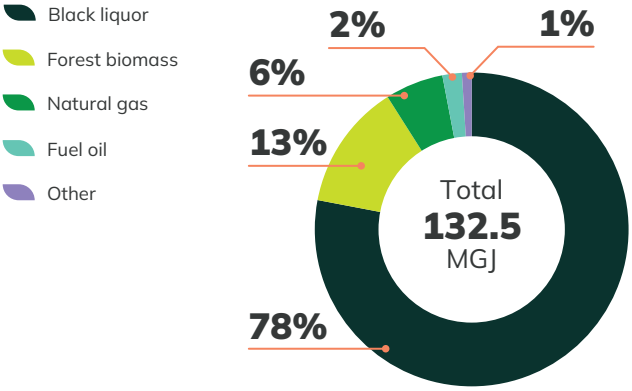


An important highlight of energy decarbonization in this sector is its investments in new technologies to replace boilers that burn fossil fuels with new ones powered by bioenergy. This shift is taking place in both the pulp and paper as well as the flooring and panel segments. The two newest pulp mills run entirely without fossil fuels.

figure 55

Sources used in self-generation (%)

Source: Ibá (2022) | Developed by: ESG Tech



Arauco do Brasil | Zig Koch

Forest certification

Expansion in the forest sector and growth in consumers who now consider sustainability in the decisions they make for their businesses have contributed to growing demand for ways to affirm that raw materials (in this case, wood) originated in areas where responsible forest management practices were utilized, respecting social, environmental, and economic aspects.

Within this scenario, forest certification programs can be considered important instruments for demonstrating the reputational value of an organization to the market, since they use third party verification to ensure that internationally recognized standards are being implemented. These certifications act as the eyes of the consumer in operations.

Two of these internationally recognized standards are broadly utilized in Brazil: Forest Stewardship Council (FSC), and the Programme for the Endorsement of Forest Certification (PEFC).

In both systems, certification is a voluntary process that can focus on forest management activity as well as chain of custody (CoC), thus permitting traceability and knowledge of product origins.

In 2022, the total certified area in Brazil exceeded 9 million hectares, and certified planted area expanded by approximately

29% compared to 2021 to total 5.2 million hectares. Additionally, planted areas with dual certifications (FSC+PEFC) exceeded 2 million hectares in 2022, growth of 35% over the previous year (Figure 56).

In the global ranking of certified area, Brazil held 5th place in 2022 for FSC and 11th place for PEFC seals, respectively. As for the number of CoC certificates, Brazil was in 11th place for FSC certifications and 35th for PEFC (the same ranking as 2021 for this system).

In addition to forest management and chain of custody certifications, the companies in the planted tree sector that responded to this survey also hold other certifications, such as the ISO family, certification for food packaging and add-ons (ISEGA, kosher, halal), and certification for panels, like CARB (California Air Resources Board). The ISO certifications for Quality Management, Environmental Management, Energy Management, and Workplace Health and Safety are the most widely adopted by the sector.

figure 56

Certified area in Brazil by certification system in 2022

Source: Ibá (2022)

Certification	Total area*	Planted area
		(million ha)
FSC alone	≈ 4.4	≈ 2.8
PEFC alone	≈ 0.9	≈ 0.3
Dual certification (FSC/PEFC)	≈ 3.8	≈ 2.1
Total (hectares)	≈ 9.1	≈ 5.2

*Total area includes both planted and preservation areas.

Suzano

over **9** million hectares

of certified area in Brazil in 2022.

Forest outgrower programs

The planted tree industry includes independent producers within its production chain via forest outgrower programs. Outgrower contracts generate jobs, diversify income, and contribute to socio-economic progress in the regions where the sector works.

Beyond the socio-economic impact, by establishing sustainable practices in the contracts, companies in this industry not only ensure continued production but also protect the environment and encourage well-being in surrounding communities. Many companies also include technical support for independent producers in their outgrower contracts, sharing knowledge about sustainable forest management.

Bracell | Gleison Resende

Community relations and development

Relations with society, which encompass staff and service providers as well as communities, consumers, academia and the government, are an important component for business resilience in this sector.

Dialog, listening, and mapping opportunities for improvement are recurrent practices that become more firmly established with engagement. One hundred percent of the companies surveyed have some type of formal mechanism for receiving complaints and suggestions, such as a phone line or email channel, workshops, meetings, suggestion boxes in work areas and communities, for example.

These tools are important, especially to analyze the effectiveness of activities to prevent or mitigate potential negative impacts and to optimize the positive effects that result from the companies' operations, considering the viewpoint of stakeholders and impacted parties.

Beyond relationships, the Brazilian planted tree sector plays a fundamental role in the sustainable development of local communities where they work; this can be seen in the Sustainable Cities Development Index (IDSC), which considers factors like health, education, infrastructure, and environmental preservation,

Approximately 29% of Brazilian cities overall have IDSC scores considered medium to high, while 40% of the cities in the areas influenced by this sector have medium to high scores on the IDSC classification. This indicates a vital interdependence between growth of this industry and prosperity in these communities.

Sustainable development in the communities that are part of Ibá's production chain spans job opportunities, income generation, and quality of life.

CMPC | Matheus Pinto

Social and environmental investments

Guided by socioenvironmental responsibility, the companies continued their projects in this area throughout 2022.

Socioenvironmental investments as a whole totaled R$ 475 million in 2022, which represents an increase of over 40% compared to the value invested in 2021 (R$ 331 million).

In 2022, the two main categories for projects that received investments were the environment, with projects involving recycling, recovery of degraded areas, and environmental education, and quality of life, which included projects involving promotion of culture, art, sports, and health.

Diversity and Inclusion

The percentage of Ibá member companies with goals related to the diversity and inclusion agenda rose from 60% in 2021 to 71% in 2022. To drive this agenda, 77% of the member companies utilized internal initiatives involving the director, management, and operational hierarchy levels. Furthermore, 58% of the companies also participate in external initiatives such as Movimento Mulher 360, Rede Mulher Florestal, and the Corporate Coalition for Racial and Gender Equity.

71%

of Ibá member companies have goals related to diversity and inclusion.

Sustainability strategy and reporting

72%

of Ibá member companies reported having some sustainability strategy for monitoring their corporate performance.

The existence of a sustainability strategy is fundamental to ensure the economic, social, and environmental development of an organization. An effective strategy is based on goals, indicators, actions, policies, and mechanisms for monitoring, and is also implemented within a well-defined governance structure.

In 2022, 72% of Ibá member companies reporting having some sustainability strategy with defined metrics for monitoring their corporate performance; this result was stable compared to 2021. Roughly 70% of the companies have goals related to the topics of health and safety, diversity and inclusion, and managment of water, waste, and energy.

All of the member companies that responded reported having some policy addressing topics such as compliance, anti-corruption, transparency, ethics, and integrity. Other topics highlighted as relevant for policies and codes were health and safety, environmental, and impact management.

Transparency is a pillar of the forest sector, and 78% of Ibá member companies reported having some type of report that addresses their sustainability.

Veracel

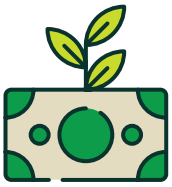
Sustainable financing

Debt securities and lending based on environmental, social, and governance (ESG) characteristics finance a more sustainable economy that is more resilient in the face of climate change, since the resources obtained are directed toward projects and assets with social, environmental, and climate-related benefits, or to companies that commit to implementing more sustainable practices (Febraban, 2023).

According to data from the KPMG ESG Yearbook (2023), the pulp and paper sector presented the highest ESG score during all years analyzed (2018–2022). This score was generated from analyzing public information taken from sources such as sustainability reports, reference forms, and governance documents.

Additionally, this segment has the largest volume of sustainable debt securities (NINT, 2023), one way of capturing resources in the financial market for projects or initiatives with a positive impact.

In 2022, six of the companies that responded to Ibá's ESG survey issued thematic bonds, securities, debentures, and/or sustainable funding. There was a 20% increase compared to the data from 2021. The member companies allocated these resources to their operational, environmental, and social areas.



This segment has the largest volume of sustainable debt securities.

6. Historical series

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Historical series

R$ 260 billion

was the sector's total gross revenue in 2022: an increase of 6.3% over 2021.

The industrial planted tree sector is the fourth-largest segment in Brazilian agriculture, and achieved record performance in 2022. It produced 25 million tons of cellulose pulp and another 11 million tons of paper, as well as 8.5 million m³ of wood panels. These numbers contributed to gross revenues of R$ 260 billion, growth of 6.3%, accompanied by generation of 2.6 million direct and indirect jobs, according to data from RAIS & ESG Tech.

These achievements are the result of decades of work to adapt pine and eucalyptus cultivation to Brazil's tropical climate, alongside the adoption of sustainable management techniques. We are a globally competitive sector, and the world's largest exporter of cellulose pulp.

figure 57

Wood consumption for industrial use (million m³)

Source: Pöyry & Ibá up to 2018; FGV, IBRE, & Ibá 2019–2021; IBGE 2022 | Developed by: ESG Tech

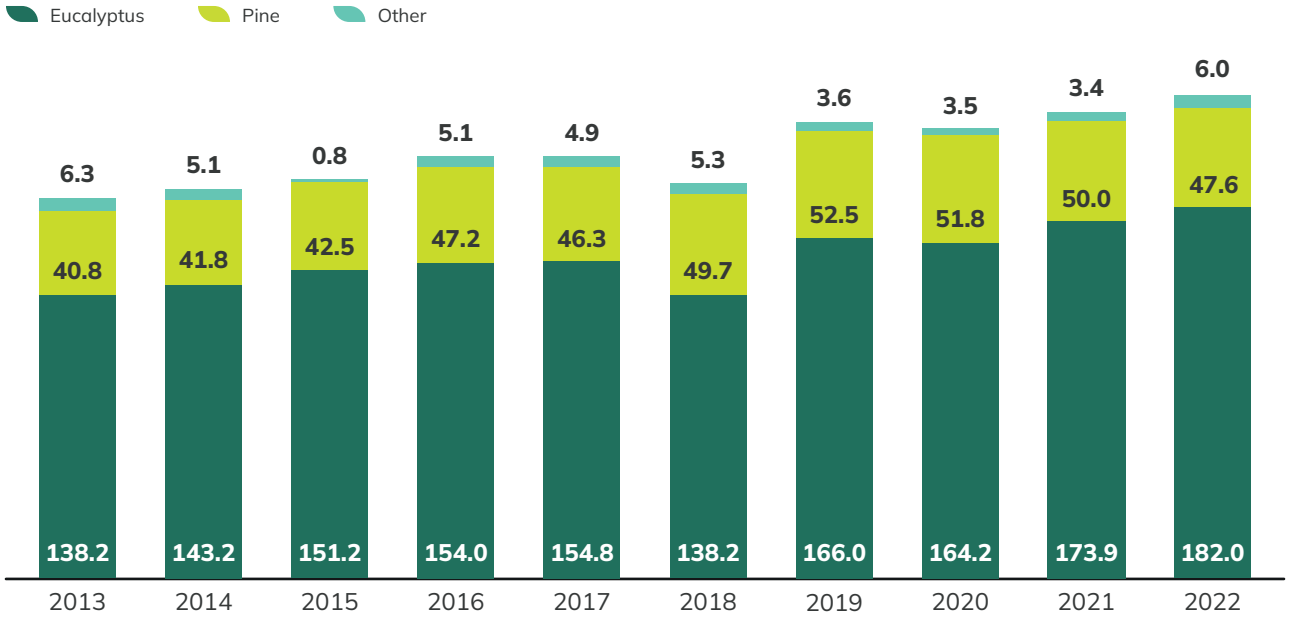


figure 58

Total area planted with trees by state, 2012–2022 (hectares)

Source: Pöyry & Ibá up to 2017| FGV IBRE, Ibá, & Canopy 2018–2021 | Canopy in 2022

State	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
North	319,461	329,011	421,309	431,220	438,197	443,585	485,119	494,013	422,835	425,992	426,342
Pará	159,657	159,657	197,478	203,750	208,129	211,008	212,957	212,436	193,602	193,602	197,717
Tocantins	109,853	111,740	161,870	162,508	163,106	164,751	156,461	156,432	103,766	106,923	106,545
Amapá	49,951	57,614	61,961	64,962	66,962	67,826	67,826	67,826	92,217	92,217	86,539
Roraima							21,557	30,000	23,079	23,079	23,003
Rondônia							26,318	27,319	8,822	8,822	12,153
Amazonas									382	382	362
Acre									967	967	23
Northeast	817,748	868,571	913,853	891,590	897,497	900,628	881,634	902,087	971,716	1,009,653	1,020,326
Bahia	616,694	631,269	671,307	651,761	649,570	646,152	593,404	599,562	639,707	661,608	664,415
Maranhão	173,324	209,249	211,334	210,496	221,859	228,801	225,052	237,859	279,238	297,213	301,181
Piauí	27,730	28,053	31,212	29,333	26,068	25,675	25,675	25,281	34,098	32,159	32,587
Alagoas							21,000	21,512	13,863	13,863	16,997
Sergipe							6,179	6,024	3,381	3,381	3,601
Pernambuco							4,060	4,873	961	961	1,337
Paraíba							5,614	6,109	82	82	144
Rio Grande do Norte									44	44	44
Ceará							650	867	342	342	21
Southeast	2,884,073	2,813,733	2,881,989	2,873,835	2,840,262	2,823,186	3,430,522	4,197,158	3,827,893	3,879,348	3,853,364
Minas Gerais	1,491,681	1,451,236	1,445,219	1,437,997	1,430,125	1,421,702	2,020,786	2,306,205	2,305,918	2,305,582	2,265,929
São Paulo	1,186,497	1,138,137	1,190,329	1,190,903	1,158,859	1,149,884	1,148,089	1,629,768	1,221,441	1,263,620	1,283,267
Espírito Santo	205,895	224,360	246,441	244,935	251,278	251,600	231,073	231,421	270,631	279,821	274,535
Rio de Janeiro							30,574	29,764	29,903	30,325	29,632
South	1,913,064	1,991,276	2,172,166	2,234,420	2,233,635	2,232,068	2,511,617	2,479,757	3,085,886	3,143,898	3,121,413
Paraná	817,566	862,769	914,113	972,273	972,173	976,064	1,066,479	1,008,990	1,165,490	1,177,596	1,164,920
Santa Catarina	645,965	647,887	660,751	665,521	668,218	666,555	664,238	642,310	1,004,844	1,031,694	1,025,014
Rio Grande do Sul	449,533	480,620	597,302	596,626	593,244	589,449	780,900	828,457	915,552	934,608	931,479
Midwest	913,762	1,025,074	1,272,557	1,294,484	1,345,351	1,365,720	1,546,090	1,558,246	1,443,219	1,474,968	1,524,184
Mato Grosso do Sul	597,135	707,458	833,834	855,323	906,077	930,016	1,104,717	1,125,435	1,052,720	1,073,523	1,134,478
Mato Grosso	184,628	187,090	300,339	298,391	297,668	294,098	258,805	260,032	199,235	207,832	207,745
Goiás	131,999	130,526	138,384	140,770	141,606	141,606	178,425	169,094	189,179	191,528	181,962
Distrito Federal							4,143	3,685	2,085	2,085	
Other	18,838	15,657	74,297	75,498	75,379	75,023					
Brazil	6,866,946	7,043,322	7,736,171	7,801,047	7,830,321	7,840,210	8,854,982	9,631,261	9,751,549	9,933,859	9,945,629

figure 59

Area planted with of eucalyptus trees by state, 2012–2022 (hectares)

Source: Pöyry & Ibá up to 2017| FGV IBRE, Ibá, & Canopy 2018–2021 | Canopy in 2022

State	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Minas Gerais	1,438,971	1,404,429	1,400,232	1,395,032	1,390,032	1,381,652	1,970,063	2,231,754	2,233,762	2,236,660	2,201,801
Mato Grosso do Sul	587,310	699,128	803,699	826,031	877,795	901,734	1,093,805	1,111,737	1,022,521	1,042,112	1,110,484
São Paulo	1,041,695	1,010,444	976,186	976,613	946,124	937,138	1,035,874	1,417,708	945,114	981,315	999,987
Bahia	605,464	623,971	630,808	614,390	612,199	608,781	585,258	589,336	637,765	648,143	650,332
Rio Grande do Sul	284,701	316,446	309,125	308,515	308,178	309,602	426,371	456,001	581,338	592,365	589,674
Paraná	197,835	200,473	224,089	285,125	294,050	295,520	255,955	271,042	448,818	449,722	442,222
Santa Catarina	106,588	107,345	112,944	116,250	116,240	114,513	219,199	255,682	307,229	316,137	317,724
Maranhão	173,324	209,249	211,334	210,496	221,859	228,801	200,612	199,911	268,912	286,931	290,846
Espírito Santo	203,349	221,559	228,781	227,222	233,760	234,082	225,520	225,311	260,170	264,094	258,533
Pará	159,657	159,657	125,110	130,431	133,996	135,843	151,888	154,402	167,354	167,354	166,215
Goiás	115,567	121,375	124,297	127,201	127,201	127,201	127,201	159,943	161,940	163,129	154,380
Mato Grosso	184,628	187,090	187,090	185,219	185,219	181,515	187,947	188,838	120,489	127,319	130,003
Tocantins	109,000	111,131	115,564	116,365	116,798	118,443	149,886	149,291	98,988	101,669	100,477
Amapá	49,506	57,169	60,025	63,026	65,026	67,826	67,826	67,826	68,462	68,462	362
Other	46,568	43,710	49,369	48,691	45,307	44,558	87,983	89,291	84,395	82,736	172,060
Total	5,304,163	5,473,176	5,558,653	5,630,607	5,673,784	5,687,209	6,785,388	7,568,073	7,407,257	7,528,148	7,585,103

figure 60

Area planted with pine trees by state, 2012–2022 (hectares)

Source: Pöyry & Ibá up to 2017| FGV IBRE, Ibá, & Canopy 2018–2021 | Canopy in 2022

State	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Paraná	619,731	662,296	673,769	670,906	661,684	661,684	789,194	733,200	704,177	713,769	713,524
Santa Catarina	539,377	540,542	541,162	542,662	545,453	545,453	445,009	386,628	696,130	713,134	702,816
Rio Grande do Sul	164,832	164,174	184,585	184,603	182,508	182,508	264,725	281,548	291,589	289,354	282,842
São Paulo	144,802	127,693	123,996	124,222	122,667	122,667	79,041	184,135	148,609	151,414	151,699
Minas Gerais	52,710	46,807	39,674	37,636	34,764	34,764	50,295	74,451	40,311	38,445	36,778
Goiás	16,432	9,151	9,087	8,569	8,500	8,500	8,500	6,771	6,547	6,661	6,522
Mato Grosso do Sul	9,825	8,330	7,135	6,292	5,282	5,282	2,574	4,652	8,194	6,637	4,179
Other	15,074	11,153	9,589	6,349	6,319	6,319	3,024	2,585	10,523	10,641	10,749
Total	1,562,783	1,570,146	1,588,997	1,581,239	1,567,177	1,567,177	1,642,362	1,673,970	1,906,080	1,930,055	1,909,109

figure 61

Area planted with other tree species by state, 2014–2022 (hectares)

Source: Pöyry & Ibá up to 2017| FGV IBRE, Ibá, & Canopy 2018–2021 | Canopy in 2022

State	2014	2015	2016	2017	2018	2019	2020	2021	2022
Mato Grosso	113,249	113,172	112,449	112,583	70,858	71,194	77,964	79,733	60,304
Rio Grande do Sul	103,592	103,508	102,558	97,339	89,804	90,907	42,625	52,889	58,963
Pará	72,368	73,319	74,133	75,165	61,069	58,034	26,220	26,220	30,415
Paraná	16,255	16,242	16,439	18,860	21,330	4,749	12,494	14,105	8,703
Minas Gerais	5,313	5,329	5,329	5,286	429	-	31,844	30,478	8,596
São Paulo	90,147	90,068	90,068	90,079	33,174	27,926	127,718	130,891	8,468
Tocantins	45,876	45,878	45,878	45,878	6,575	7,141	4,777	5,254	2,259
Bahia	34,000	34,000	34,000	34,000	8,146	10,226	1,907	13,431	1,660
Goiás	5,000	5,000	5,905	5,905	42,724	2,380	20,693	21,738	1,273
Espírito Santo	15,000	15,000	15,000	15,000	5,553	6,110	8,758	13,904	1,035
Mato Grosso do Sul	23,000	23,000	23,000	23,000	8,339	9,045	22,005	24,774	541
Other	64,721	64,686	64,602	62,730	79,233	101,507	61,205	62,241	38,788
Total	588,521	589,202	589,361	585,825	427,234	389,219	438,210	475,658	221,005

Westrock

figure 62

Production and consumption of cellulose pulp in Brazil, 2012–2022 (tons)

Source: Pöyry & Ibá up to 2018; FGV, IBRE, & Ibá 2019–2021; IBGE 2022 | Developed by: ESG Tech

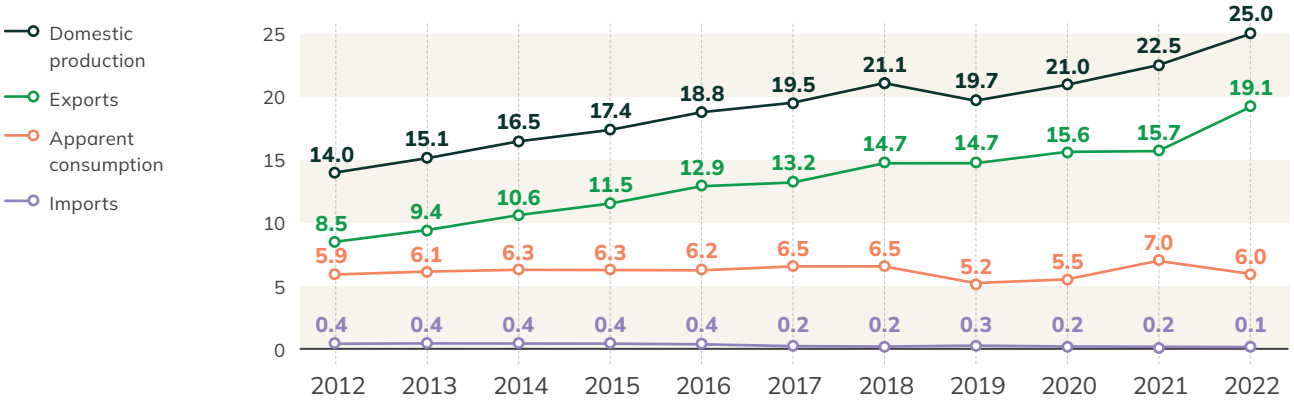
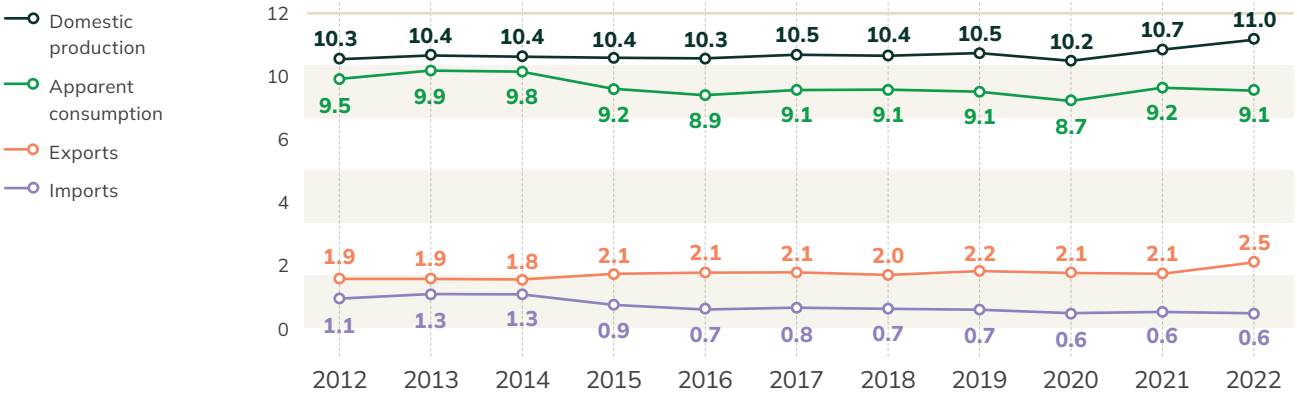


figure 63

Production and consumption of paper in Brazil, 2012–2022 (million tons)

Source: Pöyry & Ibá up to 2018; FGV, IBRE, & Ibá 2019–2021; IBGE 2022 | Developed by: ESG Tech



Freepik

figure 64

Production and consumption of reconstituted wood panels in Brazil, 2012–2022 (million m³)

Source: Pöyry & Ibá up to 2018; FGV, IBRE, & Ibá 2019–2021; IBGE 2022 | Developed by: ESG Tech

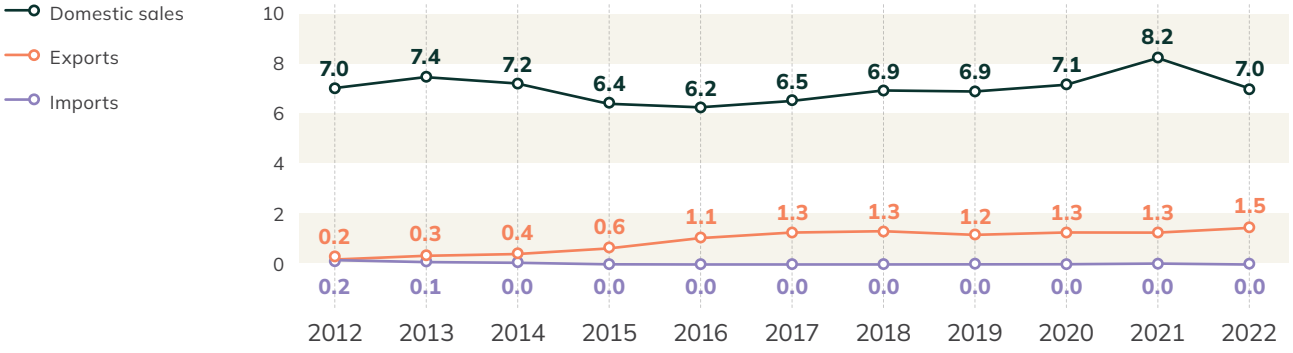
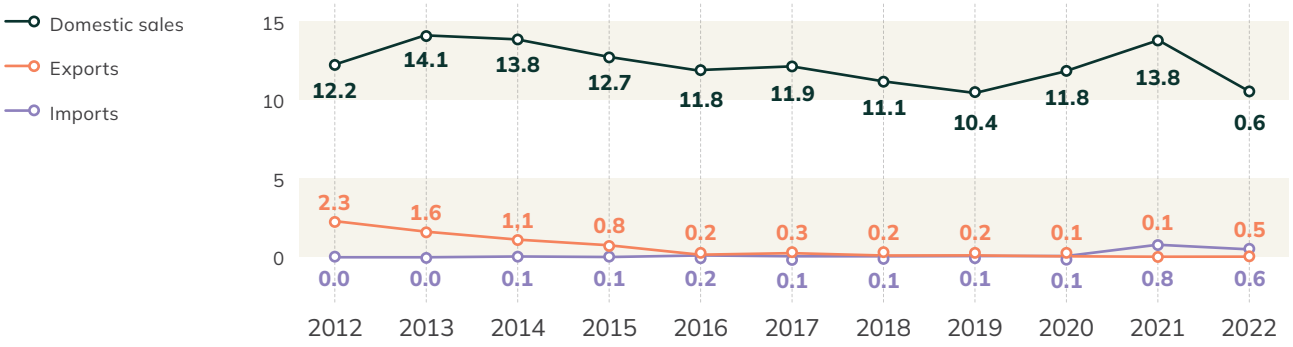


figure 65

Production and consumption of laminate flooring panels in Brazil, 2012–2022 (million m³)

Source: Pöyry & Ibá up to 2018; FGV, IBRE, & Ibá 2019–2021; IBGE 2022 | Developed by: ESG Tech



7.
Methodological notes

Duratex
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Methodological notes

Freepik | Master 1305

This year, the annual report has undergone another round of refinements in the pursuit of constructing more modern methodologies and more relevant indicators. Ibá now receives technical support from ESG Tech to produce and revise the indicators, the questionnaire to collect the primary data, and all of the methodology. Here we present the most notable of these changes.

Cost indicator

To develop the cost index for the forest sector, a structured methodological approach was adopted in order to capture the inherent complexities in the sector's operational costs. To reach this objective, the costs were classified into four key areas: silviculture, harvesting, transport, and manufacturing cost, in which all costs were analyzed on the basis needed to produce 1 m³ of product. Within each activity, the following costs were considered:

- Silviculture: labor, fertilizer, seedlings, herbicides and defenses, leasing, administrative costs, and machine hours.
- Harvesting: machinery, fuel, maintenance, and labor.
- Transport: machinery, fuel, maintenance, and labor.
- Manufacturing costs: inputs, labor, and fuel.

In order to evaluate the relative impact of each component on the total production cost, the proportional contributions of each variable were identified. This detailed analysis permitted a more precise understanding of the influence of different factors within the overall scenario of costs for the sector.

To establish a relationship between internal costs and the macroeconomic factors that influence them, relevant macroeconomic indicators were selected for each cost component. For example, the average price of diesel fuel in Brazil was selected as a proxy for the cost of fuel, considering that it is affected by external variables such as oscillations in the global petroleum markets and exchange rate fluctuations.

Weights were subsequently attributed to each variable, reflecting their respective importance in the overall cost structure. With these weights established, the cost index was calculated based on the reference year, in this case 2017. In this year the index was fixed at 100, which allows us to compare all subsequent years in relation to this starting point.

Productivity indicator

This indicator was calculated considering the contribution of planted area in each state; within each state, the sampled data from the member companies was used for weighting, and market data for non-sampled planted area. By including all the states with planted area in the productivity estimate, representativity can be extended to the national average.

figure 66

Methodology for calculating forest productivity in Brazil, by species

Developed by: ESG Tech | Source: ESG Tech

List of CNAE and NCM codes

To construct some indicators, the following Brazilian National Classification of Economic Activities (CNAE) and Mercosur Common Nomenclature (NCM) codes were utilized:

figure 67

CNAE codes

Developed by: Ibá

Class	Code	Description
2.0	2101	Forest production - planted forests
2.0	2209	Forest production - native forests
2.0	2306	Activities to support forest production
2.0	16102	Lumber milling
2.0	16218	Manufacture of laminated wood and plywood sheets, pressboard, and particleboard
2.0	16226	Production of wooden structures and carpentry objects for construction
2.0	16234	Manufacture of barrels/casks and wood packaging
2.0	16293	Manufacture of objects made of wood, straw, wicker, and woven materials not specified previously, except furniture
2.0	17109	Cellulose and other types of pulp for paper production
2.0	17214	Paper manufacturing
2.0	17222	Card stock and paperboard manufacturing
2.0	17311	Manufacture of paper packaging
2.0	17320	Manufacture of cardboard and paperboard packaging
2.0	17338	Manufacture of corrugated cardboard sheets and packaging
2.0	17419	Manufacture of products made of paper, card stock, paperboard, and corrugated cardboard for commercial and office use
2.0	17427	Manufacture of paper products for domestic and hygiene/sanitary uses
2.0	17494	Manufacture of products from cellulose pulps, paper, card stock, paperboard, and corrugated cardboard not previously specified
2.0	31012	Manufacture of furniture (predominantly wood)

Unsplash | Keagan Heinmen

figure 68

NCM codes

Developed by: Ibá

Product	NCM
Charcoal	44020000
Charcoal	44029000
Woodchips	44012100
Woodchips	44012200
Cellulose pulp	47010000
Cellulose pulp	47020000
Cellulose pulp	47031100
Cellulose pulp	47031900
Cellulose pulp	47032100
Cellulose pulp	47032900
Cellulose pulp	47041100
Cellulose pulp	47041900
Cellulose pulp	47042100
Cellulose pulp	47042900
Cellulose pulp	47050000
Cellulose pulp	47061000
Cellulose pulp	47062000
Cellulose pulp	47063000
Cellulose pulp	47069100
Cellulose pulp	47069200
Cellulose pulp	47069300
Cellulose pulp	47071000
Cellulose pulp	47072000
Cellulose pulp	47073000
Cellulose pulp	47079000
Plywood	44123900
Other	44011100
Other	44013100
Other	44013900
Other	44014000
Other	44031100
Other	44031200
Other	44032100
Other	44032200
Other	44032600
Other	44039800
Other	44091000
Other	44101210
Other	44101290
Other	44101911
Other	44101919
Other	44101991

Product	NCM
Other	44101992
Other	44101999
Other	44109000
Panels	44101110
Panels	44101129
Panels	44101190
Panels	44111210
Panels	44111290
Panels	44111310
Panels	44111399
Panels	44111410
Panels	44111490
Panels	44119210
Panels	44119290
Panels	44119310
Panels	44119390
Panels	44119410
Panels	44119490
Paper	48010020
Paper	48010030
Paper	48010090
Paper	48021000
Paper	48022010
Paper	48022090
Paper	48024010
Paper	48024090
Paper	48025410
Paper	48025491
Paper	48025499
Paper	48025510
Paper	48025591
Paper	48025592
Paper	48025599
Paper	48025610
Paper	48025691
Paper	48025692
Paper	48025693
Paper	48025699
Paper	48025710
Paper	48025791

Product	NCM
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Paper	48025793
Paper	48025799
Paper	48025810
Paper	48025891
Paper	48025892
Paper	48025899
Paper	48026110
Paper	48026191
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Paper	48044900
Paper	48045100
Paper	48045200
Paper	48045910
Paper	48045990
Paper	48051100
Paper	48051200
Paper	48051900
Paper	48052400

Product	NCM
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Paper	48053000
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Paper	48054090
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Paper	48059100
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Product	NCM
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Paper	48131000
Paper	48132000
Paper	48139000
Paper	48142000
Paper	48149000
Paper	48162000
Paper	48169010
Paper	48169090

Product	NCM
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Paper	48172000
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Paper	48181000
Paper	48182000
Paper	48183000
Paper	48185000
Paper	48189010
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Paper	48219000
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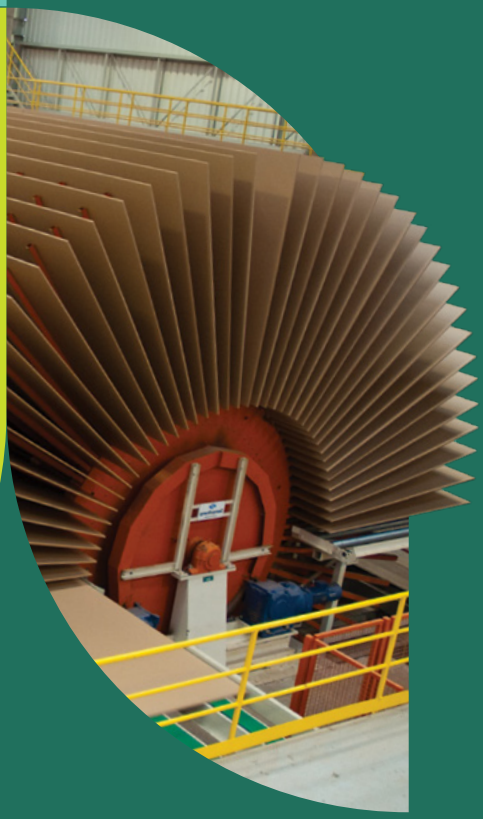
Paper	48229000
Paper	48232010
Paper	48232091
Paper	48232099
Paper	48234000
Paper	48236100
Paper	48236900
Paper	48237000
Paper	48239010
Paper	48239020
Paper	48239091
Paper	48239099
Laminate flooring	44101121
Laminate flooring	44111391
Lumber	44071000
Lumber	44071100
Lumber	44071900
Lumber	44079990

Unsplash | Sebastian Pandelache



8.
About Ibá

Klabin | Anna Carolina Nigri
Freepik | Drazen Zigic
Duratex

About Ibá

Ibá

Mission

Ibá strives to make the sector more competitive, bringing member companies into line with the highest standards of science, technology, and environmental responsibility throughout the entire forest production chain, in the search for innovative solutions for the Brazilian and global markets.

Vision

Planted trees are the future of raw materials that are renewable, recyclable, and friendly to the environment, biodiversity, and human life. The planted tree industry is the industry of the future.

Values

Competitiveness
Durability
Innovation
Responsibility

Freepik | Zirconicusso
Unsplash | Syahrim Seth
Unsplash | Zach Lucero

Berneck

About Ibá

The Brazilian Tree Industry (Ibá) is the association responsible for institutional representation of the planted tree production chain, from the fields to the factory. In order to promote products derived from pine, eucalyptus, and other species that are directed toward industrial purposes, Ibá works to defend the interests of the sector. This work takes place together with government officials and agencies, entities from the planted tree production chain, and significant sectors of the economy, social and environmental organizations, universities, schools, consumers, and the press — in Brazil as well as abroad.

The association, which was founded in April 2014, represents roughly fifty companies and 10 state forest entities. Planted trees have made Brazil a global reference in the production of pulp and paper, as well as for the raw materials used in a variety of laminate products and charcoal (used in the steel industry).

Planted trees are also the source of non-timber products including honey, disinfectants, flavorings, thickeners, solvents, varnishes, glues, synthetic rubber, printing inks, fabrics, waxes and grease, printing paper, sanitary and hygienic papers, diapers, and packaging.

With advances in innovation and major investments in research and development, there will be a plethora of new products from planted trees, making the bioeconomy a reality.

Ibá member companies

PRODUCERS, 2023

Adami S/A Madeiras
Ahlstrom Brasil Ind Com Papéis
Arauco do Brasil
Berneck S/A Painéis e Serrados
Blendpaper Security Papéis Especiais
BO Paper Brasil Ind de Papeis Ltda.
Bracell SP Celulose Ltda.
Caieiras Ind Comércio de Papeis Especiais
Cenibra Celulose Nipo Brasileira S/A
CMPC Celulose Riograndense
CMPC Iguaçu Embalagens Ltda
Copapa Cia Paduana de Papéis
Dexco S/A
Eldorado Brasil Celulose
Eucatex Distribuidora e Logistica S/A
Fábrica Papel Nossa Sra Penha
Floraplac MDF Ltda
Gerdau Aços Longos S/A
Greenplac Tecnologia Industrial
Guararapes Painéis Ltda
Ibema - Cia Bras de Papel
Irani Papel e Embalagem S/A
Klabin S/A
LD Celulose
MD Papéis
Melhoramentos Florestal S/A
Norflor Empreendimentos Agrícolas
Oji Papéis Especiais Ltda
Papirus Ind Papel S/A
Placas do Brasil
Plantar S/A Reflorestamentos
RMS do Brasil Adm de Florestas Ltda
Santa Maria Cia Papel e Celulose
Santher Fca Papel Sta Therezinha
Softys Brasil Ltda
Sonoco do Brasil
Stora Enso Brasil Ltda
Suzano S/A
Sylvamo do Brasil
Tanac S/A
Tarumã Florestal S/A (Lacan)
TRC Agroflorestal/Floresteca
TTG Brasil Investimentos Florestal Ltda
Unilin do Brasil Revestimentos
Veracel Celulose S/A
Westrock Celulose Papel e Embs Ltda

MEMBERS | COLLABORATORS

Albany International Tecidos Técnicos

Suzano

State associations

Forest Plantation Producers Association of Bahia – ABAF

Forest Industry Association of Minas Gerais – AMIF

Mato Grosso do Sul Planted Forest Producers and Consumers Association – Reflore MS

Rio Grande do Sul Forest Companies Association – Ageflor

Paraná Forest Companies Association – APRE

Santa Catarina Association of Forest Enterprises – ACR

São Paulo State Forest Plantation Producers Association – Florestar São Paulo

Association of Planted Forests Mato Grosso – AREFLORESTA

Agribusiness Development Center (ES)- CEDAGRO

Planted trees have made Brazil a global reference in the production of pulp and paper, as well as for the raw materials used in a variety of laminate products and charcoal.

Credits

President of the Ibá Consultative Committee

Daniel Feffer

President of the Ibá Deliberative Council

Antonio Joaquim de Oliveira

Executive President

Paulo Hartung

Coordination

Ibá's Institutional Communications Team

Cindy Correa, Renata Silva, Mariana Polli, Daniel Pompeu, Eduardo Ferreira

Support

Ibá's technical areas

Forest and Bioeconomy Policy, Industrial Policy, Legal, Statistics, Government and Institutional Relations, Sustainability, Taxation, and Regional Associations

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