



PERSPECTIVES ON VINYL DEMAND GROWTH OUTLOOK FOR SOUTH AMERICA

WORLD CHEMICAL FORUM
SEPTEMBER 2023

ALMIR COTIAS FILHO



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AGENDA

- BRASKEM OVERVIEW
- VINYL IN SAM: SUPPLY VS DEMAND
- SAM MACROECONOMIC SCENARIO
- BRAZILIAN DOMESTIC DEMAND
- MAIN DEMAND DRIVERS :
 - ✓ SANITATION LEGAL FRAMEWORK
 - ✓ PULP & PAPER PROJECTS
- SUSTAINABILITY & CIRCULAR ECONOMY



BRASKEM OVERVIEW



BRASKEM FOOTPRINT

14 Offices

NORTH AMERICA

PHILADELPHIA
PASADENA
MEXICO CITY

SOUTH AMERICA

SALVADOR	LIMA
SÃO PAULO	SANTIAGO
RIO DE JANEIRO	BUENOS AIRES
PORTO ALEGRE	BOGOTÁ

EUROPE

NETHERLANDS

ASIA

SINGAPORE
INDIA



40 Industrial Units

6 Innovation Centers

INDUSTRIAL
UNITS

OFFICES

INNOVATION
CENTERS

BRASKEM IN FIGURES

Clients in more than
➤ **70** COUNTRIES

➤ **8,650**
team members in 2022

Recurring operating result

➤ **10.6** BILLION
Brazilian Reals in 2021

PRODUCTION OF APPROXIMATELY

➤ **14.9** MILLION
tons in 2021

Free cash flow generation

➤ **3.3** BILLION
Brazilian Reals in 2022

BRL

➤ **514** MILLION
Invested in Innovation in 2022

➤ **153** projects
focused on generating
environmental and/or social
impact in 2022

➤ **+610** million people
benefiting from social and
environmental projects
worldwide in 2022

BRASKEM VINYL



- 6 Terminals
- Ethylene Pipeline (500 km)
- 2 Captive Vessels



2 PVC Units
1 Chlor Alkali Unit

ALAGOAS

BAHIA

Capacity

➤ PVC	710 MMt/y
➤ Caustic Soda	460 MMt/y

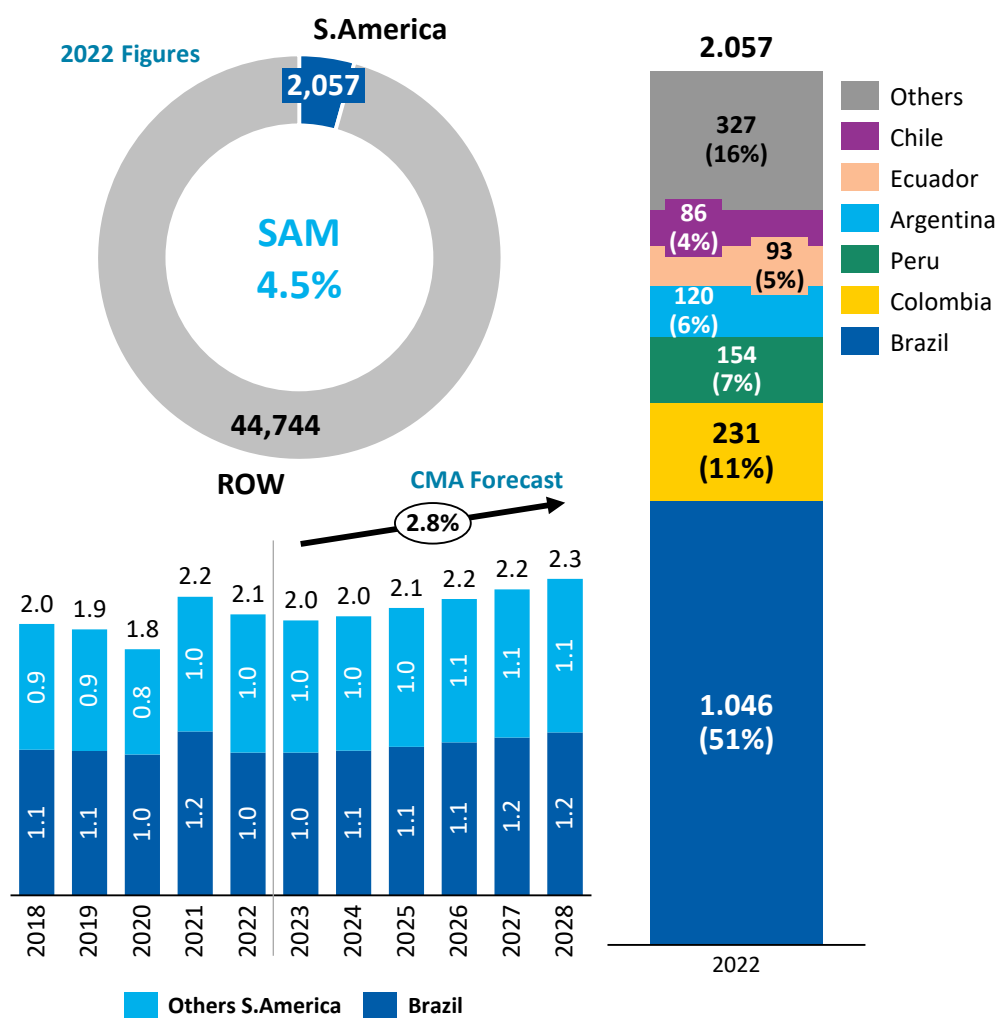


VINYLS IN SAM : SUPPLY VS DEMAND

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SAM SUPPLY AND DEMAND OVERVIEW PVC

DEMAND



PVC

Last 5 years Growth
AAGR +0,9%

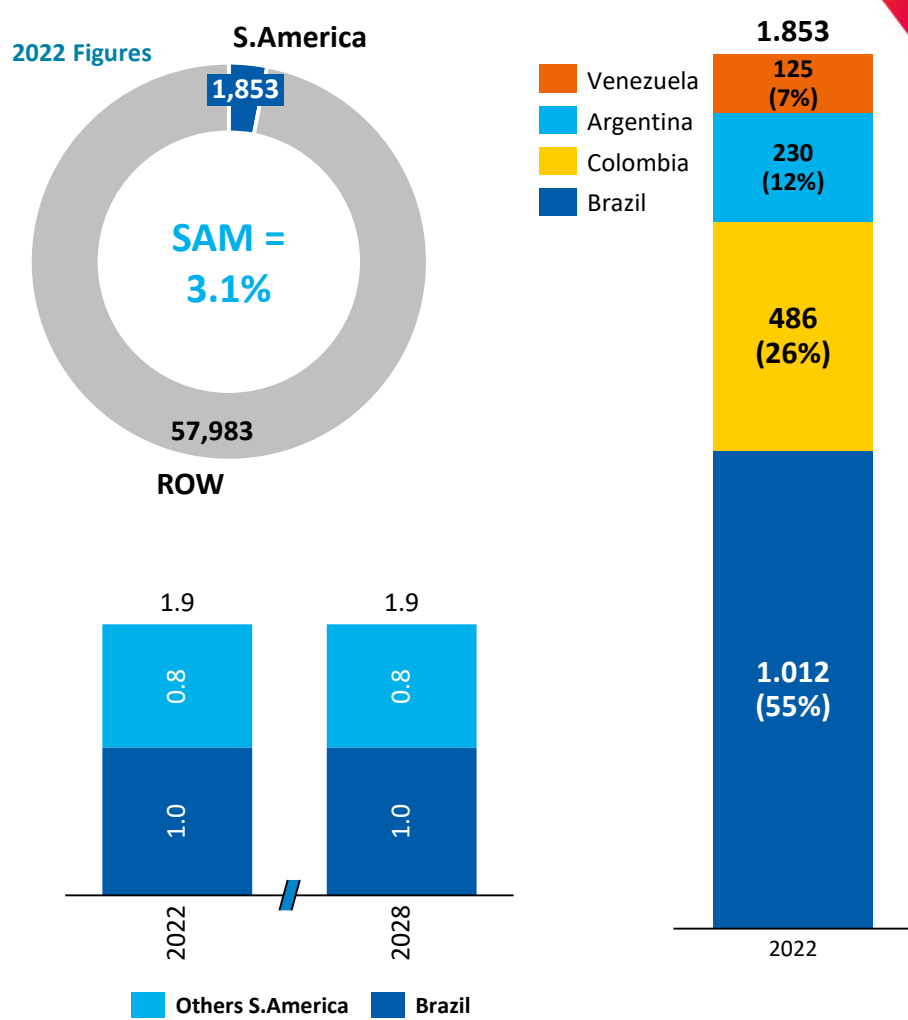
Per Capita Demand:
3,1 kg/capita

Trade Position:
Net Importer

Main sectors
Pipe & Fittings 60%

New Capacities:
No relevant additions

SUPPLY – NAMEPLATE CAPACITY

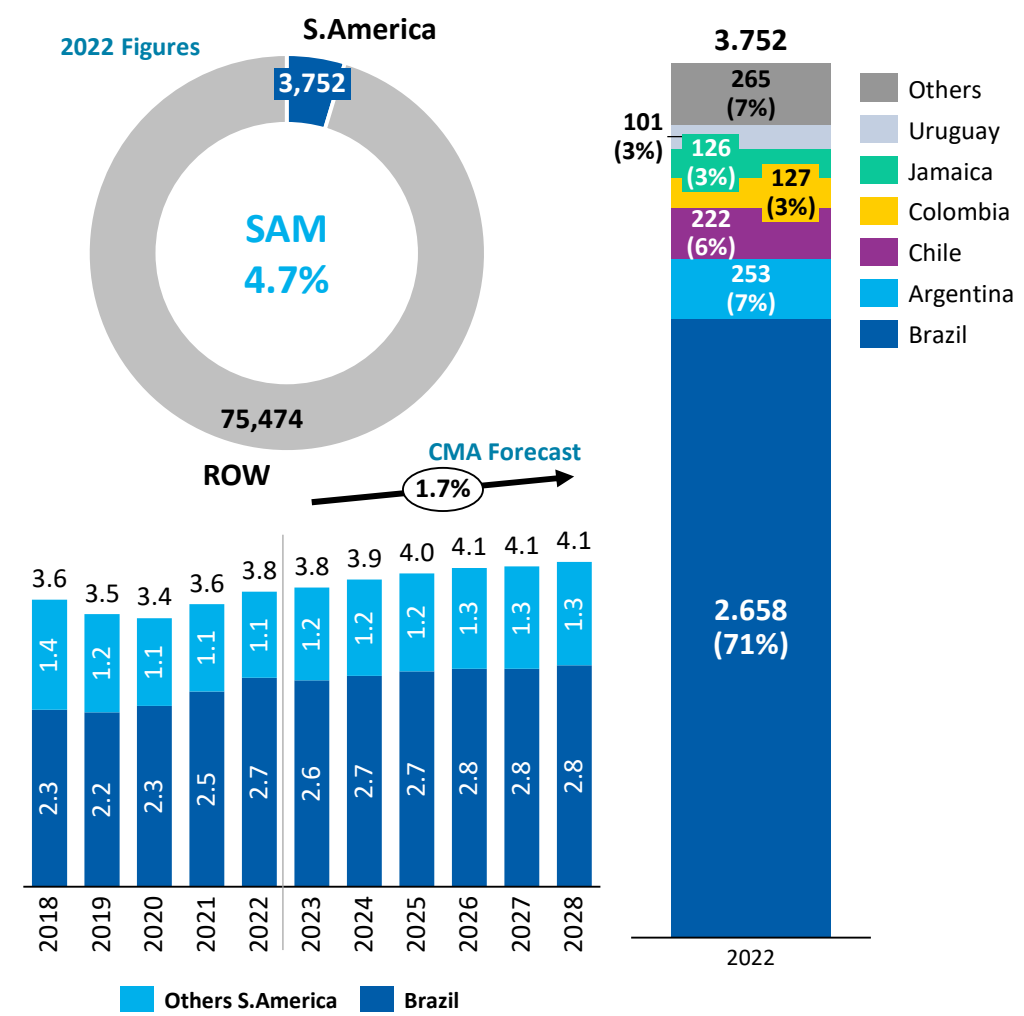


Source: CMA Supply and Demand 2023 Edition: Spring 2023 Update

SOUTH AMERICA SUPPLY AND DEMAND OVERVIEW

CAUSTIC SODA

DEMAND



Caustic Soda

Last 5 years Growth:
AAGR +0,7%

Per Capita Demand:
5,7 kg/capita

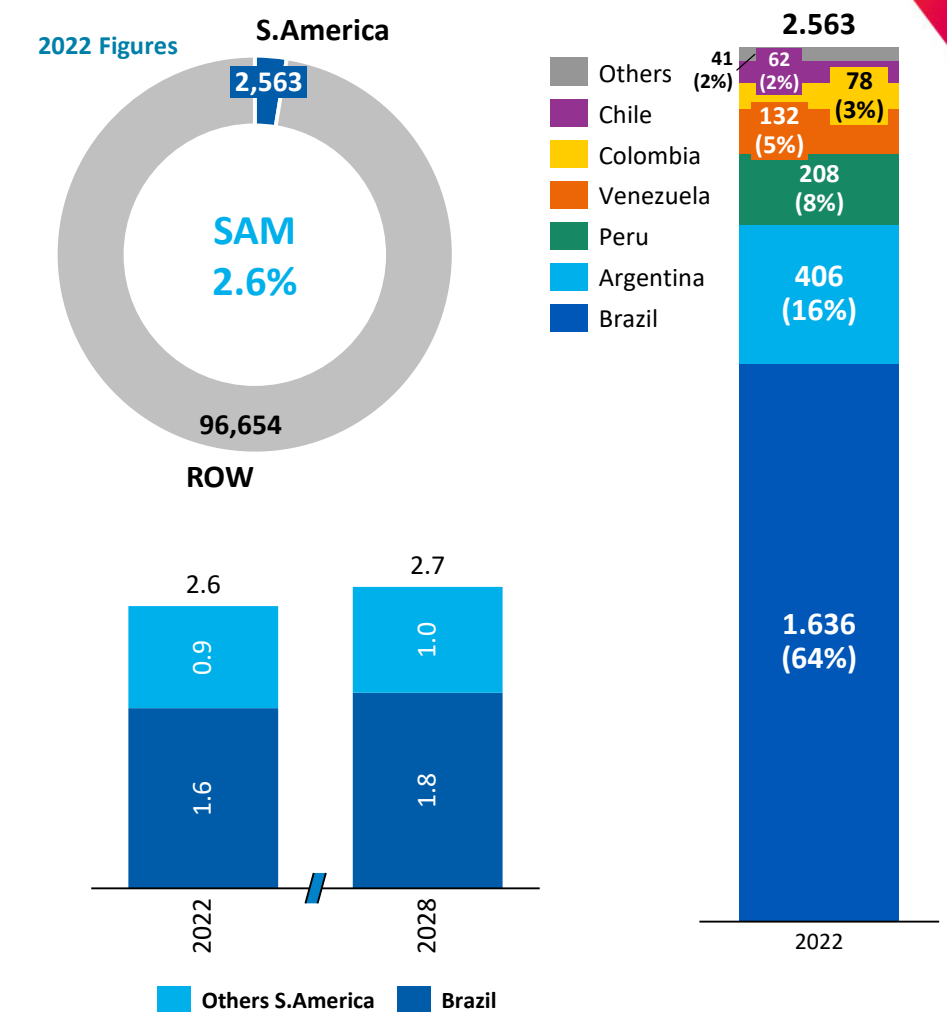
Trade Position:
Net Importer

Main sectors consumption:

Alumina	31%
Pulp & Paper	28%
Chemicals	13%

New Capacities:
Chlorum Solutions 122 kty
Unipar: 32 kty

SUPPLY – NAMEPLATE CAPACITY



Source: CMA Supply and Demand 2023 Edition: Spring 2023 Update

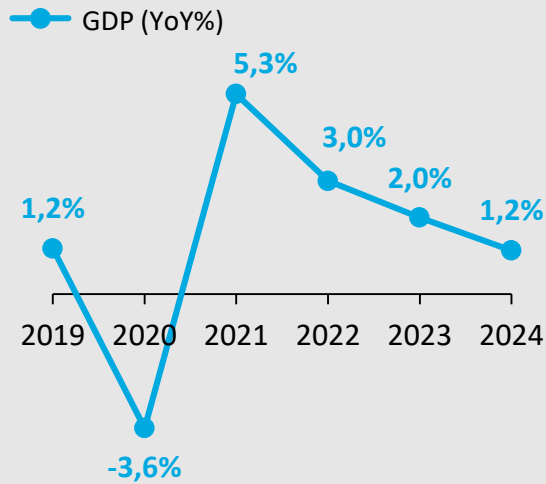




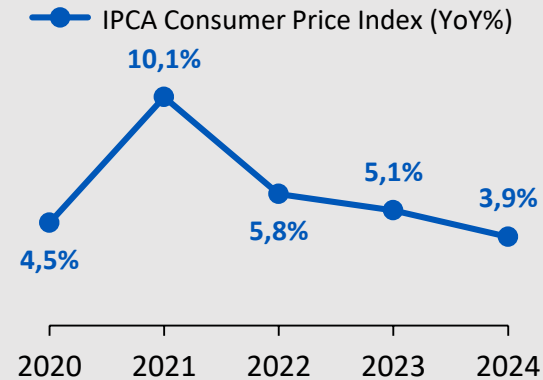
MACROECONOMIC SCENARIO

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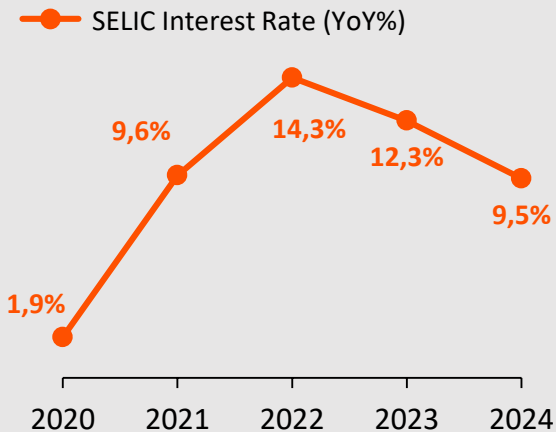
BRAZILIAN MACROECONOMICS: MODERATE GROWTH AHEAD, CONTROLLED INFLATION, AND FISCAL POLICY ON THE AGENDA



Country stabilizes growth at 2% with new fiscal anchor and tax reform

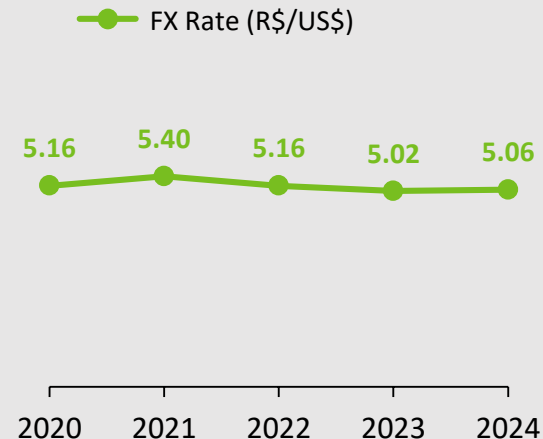


Change in fuel price policy and resumption of food stock policy reduce price variation



Country starts to drop interest rates after signs of inflation anchoring

Stabilization at 9% to avoid a new wave of inflation



Country has an exchange rate peg of R\$5,00 devaluation follows the flow of falling US interest rates

LATIN AMERICA MACROECONOMICS: RESUMPTION OF GROWTH, COMMERCIAL INTEGRATION AND ATTRACTION OF INVESTMENTS



ARGENTINA

Technical recession is expected to last until mid-2024
Strong inflation and **exchange rate adjustment** are the main causes
Resumption of investments after 2025 will depend on **monetary reforms**



COLOMBIA

Political crisis is the cause of the drop in GDP for 2023
Full recovery only from 2025 with **inflationary control and interest rate drop**



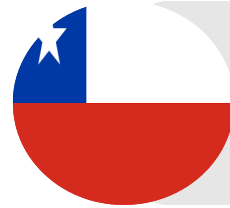
PARAGUAY

Expected to show high growth in 2023, after stagnation in 2022
With an improvement of 4.5% **driven by agriculture** in 2023 and 3.5% in 2024



URUGUAY

A moderate growth scenario is expected around 2% for 2023
Almost 3% for next year **based on livestock exports**



CHILE

Loss of industrial pace and drop in exports point to contraction of the economy
Resumption of Asian demand in 2024, as well as **new mining and pulp projects** could boost GDP



BOLIVIA

More stable growth scenario for the country throughout the cycle at an average of 2%
Trend based on **gas and mineral exports**



EQUADOR

Expected to expand by **around 3% over the next years**
Largely **driven by the export of oil and agricultural commodities**



PERU

Short-term instability marginally affects current GDP
Expectation of lower growth in 2023 due to **harvest problems**.
As of 2024, it **resumes the pace of historical growth**

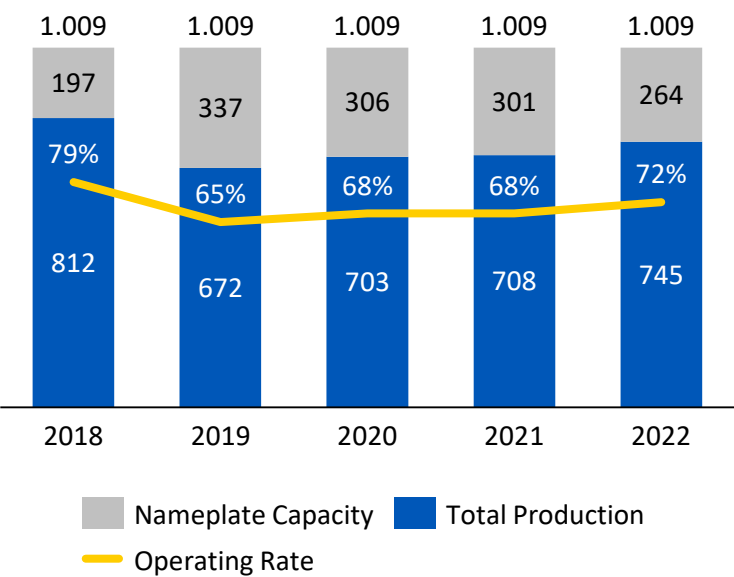


BRAZILIAN DOMESTIC DEMAND

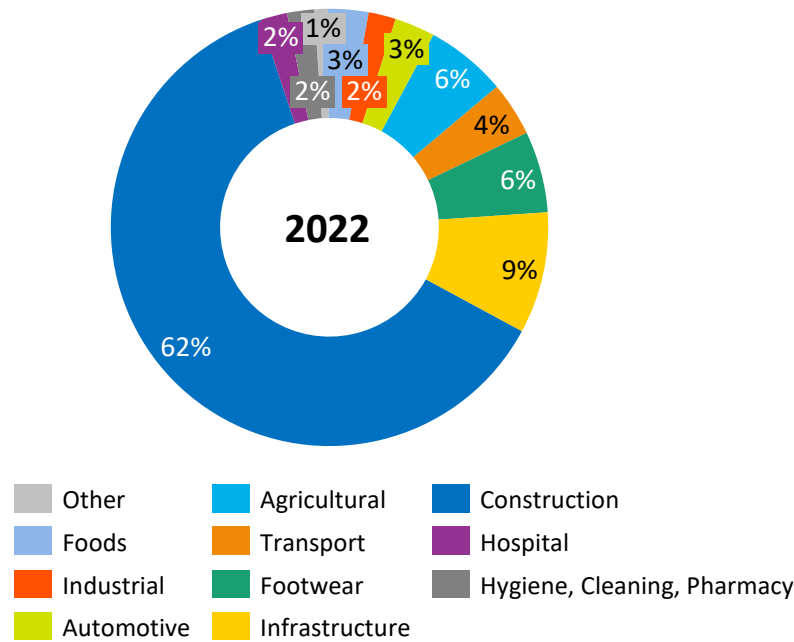
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BRAZILIAN PVC MARKET: BECOMES AN INCREASINGLY ATTRACTIVE DESTINATION AND SHOULD REMAIN A NET IMPORTER

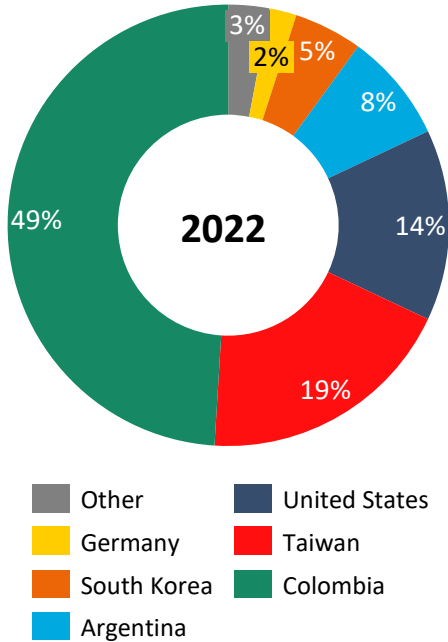
CAPACITY, OP. RATES AND PRODUCTION



PVC DEMAND BY SEGMENT



IMPORTS BY REGION

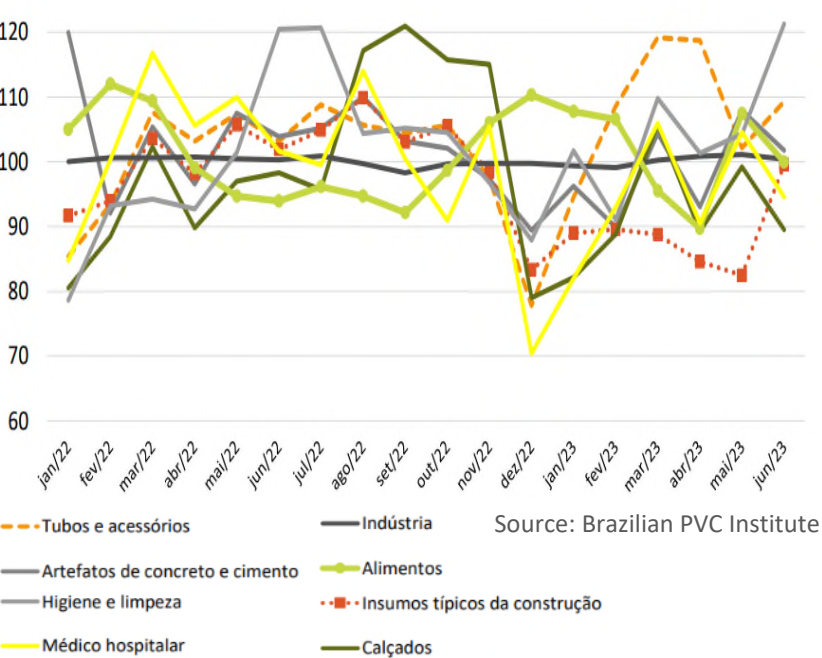


- Brazilian PVC demand is around 1 MMton annually
- More than 70% of total demand is allocated to the construction segment
- Construction market highly influenced by interest rates in the country
- Brazilian market influenced by imports from Latin American countries with tax exemption

Source: Brazilian PVC Institute

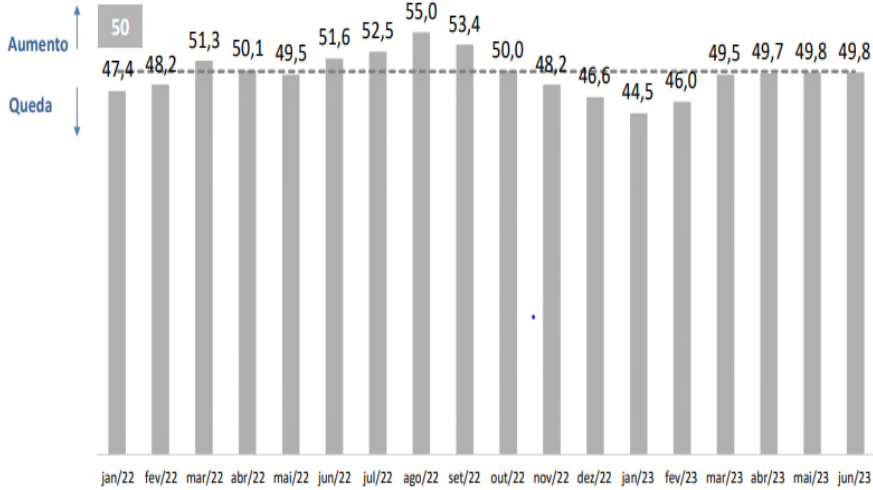
BRAZILIAN PVC DEMAND: MAIN MARKET SEGMENTS AND CURRENT CONSTRUCTION BEHAVIOR

MAIN MARKET SEGMENT



ACTIVITY LEVEL IN CONSTRUCTION

Values above 50 indicate an increase in activity or employment compared to the previous month



INDUSTRIAL PRODUCTION – GROWTH %

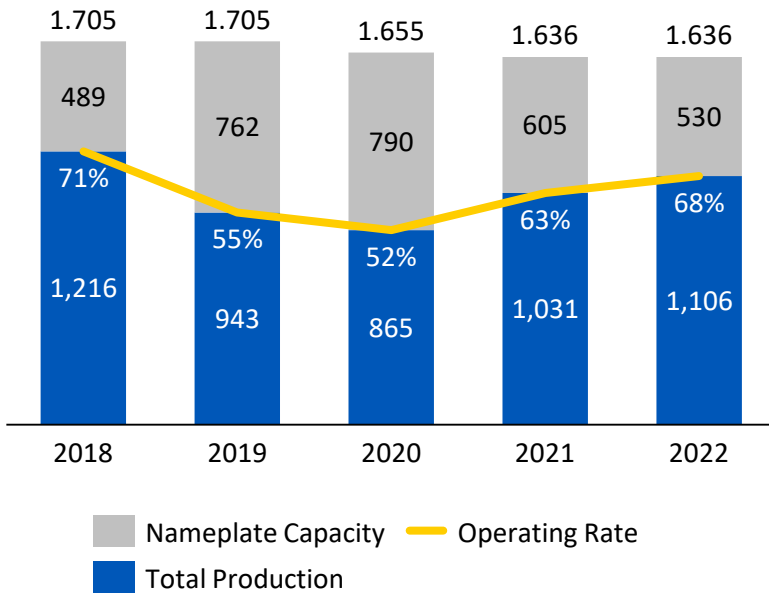
Produção Industrial e outros indicadores de referência para o mercado de PVC no Brasil			
Indicador	Fonte	2T 23/ 1T 23	2T 23/ 2T 22
Fabricação de tubos e acessórios de material plástico para uso na construção	IBGE	2,50%	5,00%
Fabricação de artefatos de concreto, cimento, fibrocimento, gesso	IBGE	4,20%	-2,00%
Fabricação de insumos típicos da construção civil	IBGE	-0,30%	-13,00%
Admissões na construção civil	CAGED	-1,60%	3,00%
Índice de confiança na construção civil	FGV	0,30%	-3,00%
Nível de atividade da construção civil	CNI; CBIC	9,90%	2,00%
Fabricação de calçados e partes de calçados	IBGE	0,50%	-2,00%
Indústria geral	IBGE	1,20%	0,00%
Produção de grãos	CONAB	-0,20%	9,00%
Fabricação de autoveículos montados	ANFAVEA	11,20%	0,00%
Fabricação de alimentos	IBGE	-4,10%	3,00%
Fabricação de cosméticos, produtos de perfumaria e de higiene pessoal	IBGE 8,0% 4%	8,00%	4,00%
Fabricação de instrumentos e materiais para uso médico, odontológico e ópticos	IBGE	3,10%	-9,00%
Fabricação de laminados planos e tubulares de material plástico	IBGE	2,00%	0,00%

Source: CNI CBIC

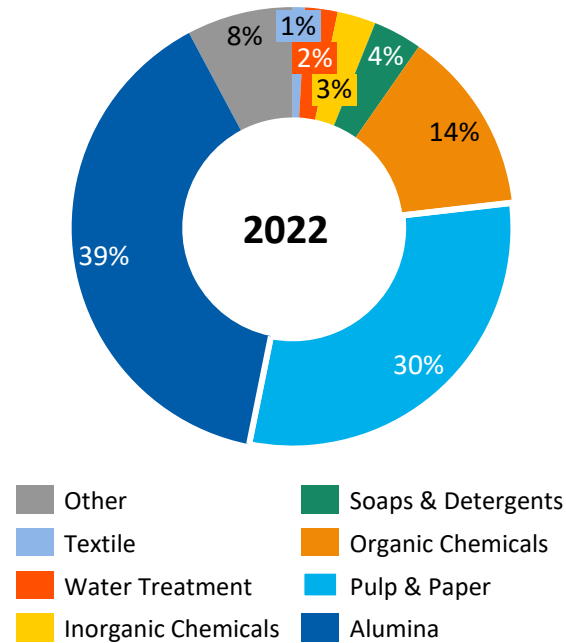
- Sector still faces challenges mainly due to the recent rise in interest rates that finally stopped rising
- Confidence of the business community drastically impacts the progress of projects and investments

BRAZILIAN CAUSTIC SODA MARKET: CAPACITY OF THE ALUMINUM AND PULP AND PAPER SECTORS MAINTAINS A HUGE FLOW TO THE COUNTRY

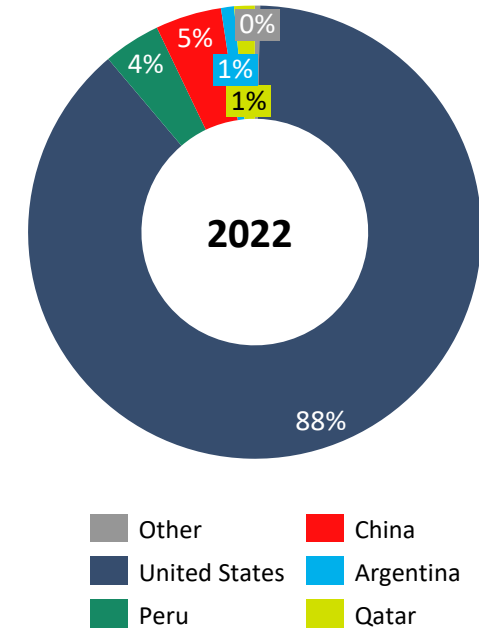
CAPACITY, OP. RATES AND PRODUCTION



CAUSTIC DEMAND BY SEGMENT



IMPORTS BY REGION



- Brazilian caustic soda demand is around 2.5 MMton annually
- Braskem reduced production in 2019 due to mining problems, and return to a more regular rates in 2021
- Almost 70% of consumption is destined for Alumina and Pulp and Paper sectors
- Large volume of imports from the US to meet the needs of aluminum sector

Source: CMA Supply & Demand Spring 2023

CHLOR ALKALI AND CAUSTIC SODA NEW CAPACITIES IN BRAZIL: SMALL SCALE PLANTS, EXPANSIONS AND BRASKEM PROJECT

SMALL SCALE PLANTS

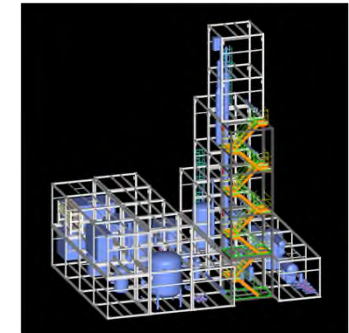
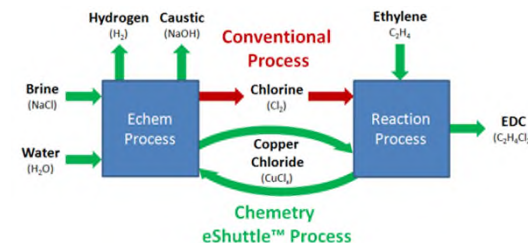
- Small investments must happen to meet specific demands by those giants companies
- Chlorum Solutions Brasil investing in 120 kty expansions in Igarassu, Salvador and Uberlandia, expected to all be completed in 2024

UNIPAR PLANT IN BAHIA

- Project to build a greenfield chlorine/soda production unit at the Camaçari in Bahia
- Capacity of 20 kty of chlorine and 22 kty of caustic soda, expected to be completed in 2024

BRASKEM AND CHEMETRY PROJECT

- Braskem considers that innovation is a key concept to lead initiatives toward competitiveness and sustainability
- The process of eShuttle from Chemetry significantly reduces electrical power consumption and production costs compared with the latest generation chlor-alkali processes
- Lowering the energy requirements results in lower CO2 impact and it avoid chlorine gases, which is better for the environment
- The demonstration unit is in an advanced stage of completion at Braskem's Chlor-alkali Maceio site, Alagoas.





DEMAND DRIVERS:

- SLF
- P&P





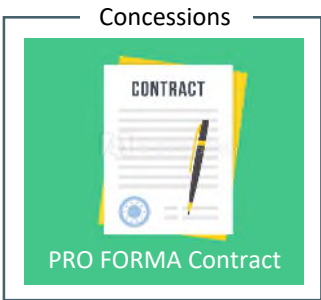
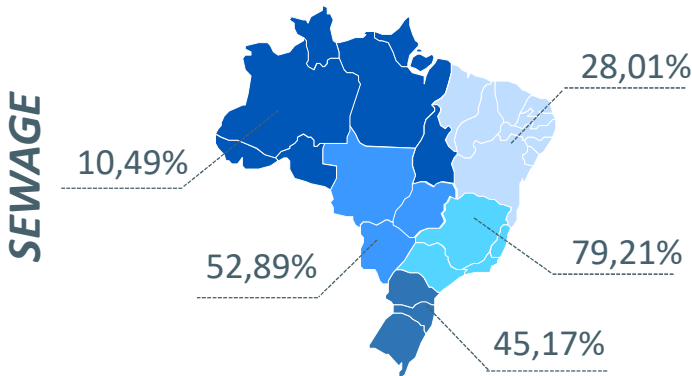
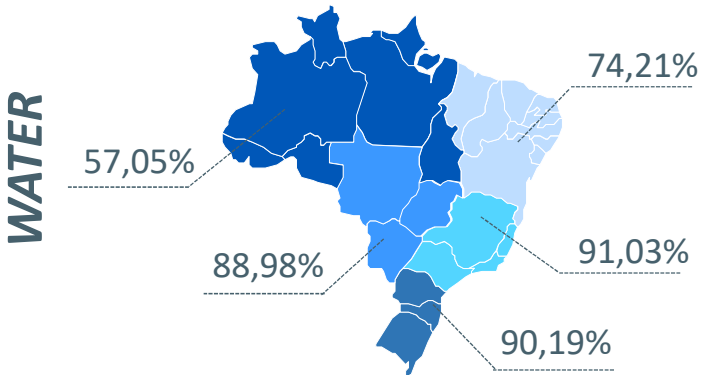
SANITATION LEGAL FRAMEWORK

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SANITATION LEGAL FRAMEWORK: PROVIDE DRINKING WATER AND SEWAGE SYSTEM IS ALSO A WAY TO INVEST IN SOCIAL SUSTAINABILITY

TODAY:

- **83%** of Brazilian population has access to drinking water (**35 MM** people **without** access)
- **53%** of Brazilian population has access to sewage system (**100 MM** people **without** access)



- **99%** of Brazilian population with access to drinking water
- **90%** of Brazilian population with access to sewage system
- **0%** of **dumps** – ‘lixões’ (until 2024)

2033 GOAL:

0,7 a 1,0 MM
Jobs

Investments
R\$ 620 bi

R\$ 410 bi
Water and Sewage

R\$ 210 bi
Urban drainage and
Urban Solid Waste

SOURCE: TRATA BRASIL



POTENTIAL DEMAND GROWTH FOR PVC AND CHLORINE, BUT GOVERNMENT INVESTMENTS NEED TO MOVE FORWARD

WATER SUPPLY PIPES AND ACCESSORIES



SEWER AND DRAINAGE PIPES AND ACCESSORIES



CHEMICAL PRODUCTS FOR WATER



...AND SEWAGE TREATMENT



Potential for PVC demand
(2024-2034) = 100 kt/year

Potential for Chlorine demand
(2024-2040) = From 28 kty to 39 kty in 2040
+ 37% during this period

CURRENT STATUS

- **3 years already** after the approval of the New Legal Framework for Basic Sanitation, on July 15th, 2020
- Among the objectives of the new framework is the **universalization of services by 2033**
- Brazil needs to **more than double its investments** to be able to meet the universalization target by 2033
- **Cities still with pending sanitation contracts** did not present the documentation that proves that they have the financial conditions to comply
- In April 2023, **new rules were edited** by the new president
- In May 2023, the Chamber of Deputies **declined the devices modified** by the new president...

PVC-O: NEW INVESTMENTS TO MEET THE SANITATION DEMAND

PLAYERS SHOWING INCREASING INTEREST IN PARTICIPATING ON THIS MARKET

- PVC-O is made by realigning the PVC molecules through a process of biaxial orientation
- This greatly enhances the material properties - **around twice the strength and ten times the impact resistance is achieved** compared to traditional material
- It means the **wall thickness of PVC-O pipes can be reduced by up to 50% while maintaining the same pressure** as that of the traditional PVC pipe
- **PVC-O has a larger bore offering greater hydraulic capacity**; the pipe is manufactured with significantly less embodied energy and is more material efficient compared to other pipe options
- PVC-O can replace metal and PE pipes

Technical characteristics



Hydraulic capacity

Between 15% and 40% higher



Hydrostatic resistance

Class 500, service life of more than 100 years



Water hammer resistance

Supports exceptionally network openings and closings



Impact resistance

No crack propagation



Ductility

Withstands large deformations of the inner diameter



Watertight

Socket manufactured in the same process as the tube



Chemical resistance

No need for special protection or coating



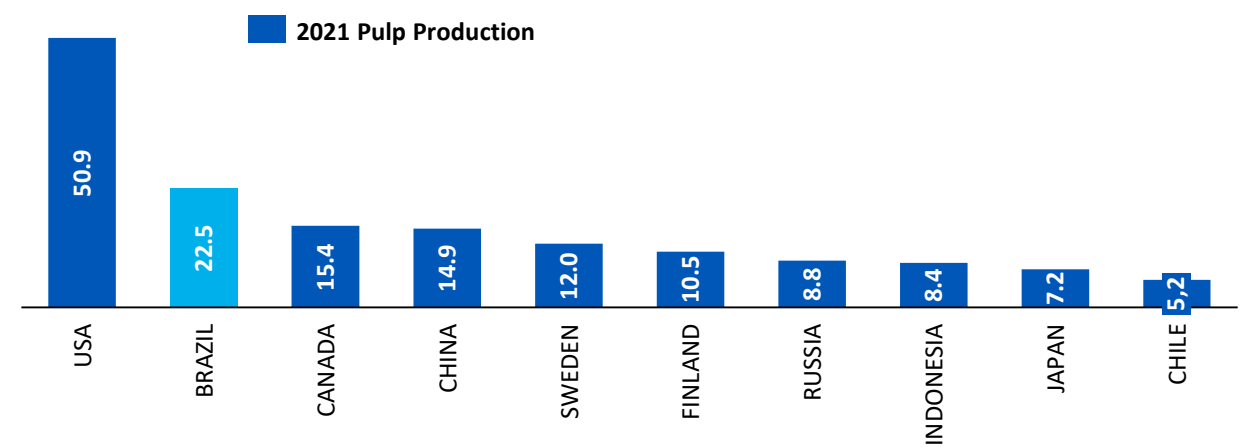


PULP & PAPER SECTOR

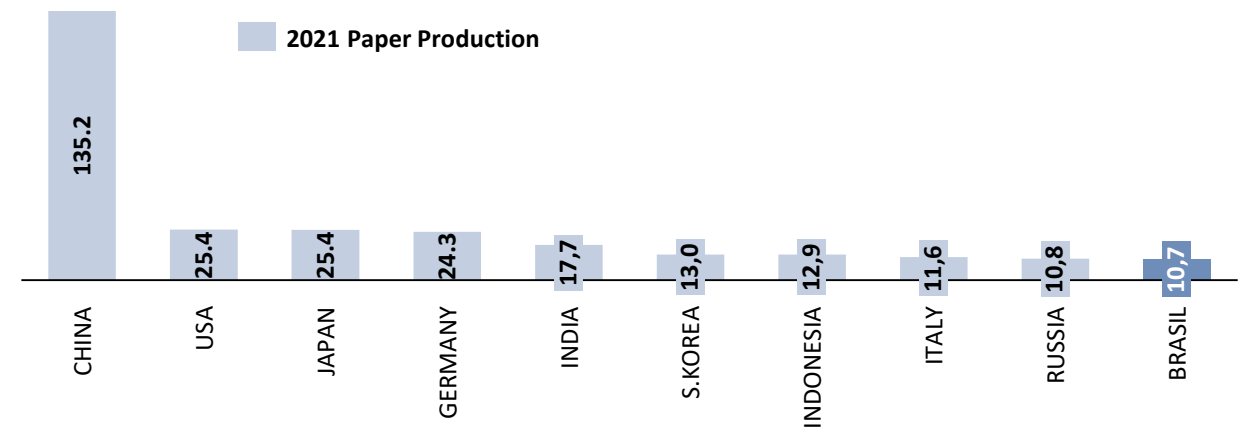
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WORLD PULP AND PAPER OVERVIEW: BRAZIL'S POSITION AND MAIN NUMBERS

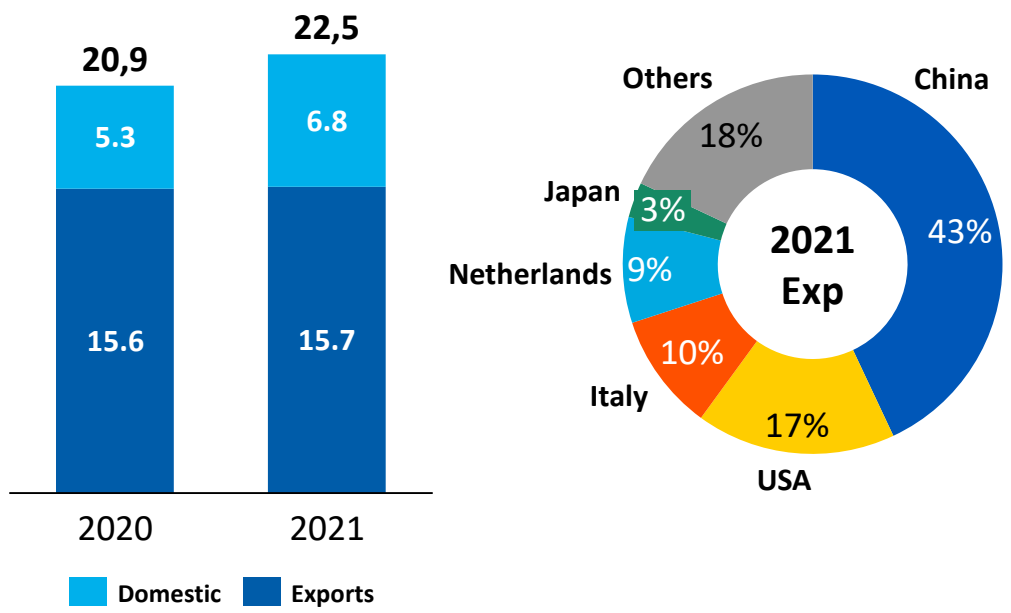
MAIN PULP PRODUCTION COUNTRIES (MMT)



MAIN PAPER PRODUCTION COUNTRIES (MMT)



BRAZILIAN PULP DOMESTIC DEMAND AND EXPORTS (MMT)



- Brazil is the 2nd largest pulp producer in the world
- Regarding Exports, Brazil is in the 1st position
- Main export destinations continue to be China and the US
- New projects are expected for Pulp & Paper production in Latin America

Source: IBA – Brazilian Industry of Trees Association



PULP EXPANSIONS AND NEW PLANTS IN SOUTH AMERICA: PROJECTS EXPECTED TO START

Start Period	Company	Volume	Location
2Q 2022	LD Celulose	0.5 MMt/year	Minas Gerais, Brazil
3Q 2022	Arauco	1.6 MMt/year	Holcones, Chile
1Q 2023	UPM	2.1 MMt/year	Paso Deros Tros, Uruguay
4Q 2023	CMPC	0.3 MMt/year	Guaiba, RS, Brazil
2H 2024	Suzano	2.5 MMt/year	Ribas do Rio Pardo, MS, Brazil
4Q 2024	Paracel	1.5 MMt/year	Concepcion, Paraguay
2028	Arauco	2.5 MMt/year	Brazil



Source: Braskem Global Market Intelligence Team



SUSTAINABILITY & CIRCULAR ECONOMY



INVESTMENTS *in* RECYCLING

MECHANICAL RECYCLING

Improve the quality of post-consumer recycled resins and explore new applications

ALCAMARE (MX): marketing of post-consumer recycled resin with low level of contaminants and partnership to improve the recycling chain in the region.

AIM EUROPEAN BRANDS ASSOCIATION (EU): development of technologies to improve waste separation process and increase recycling rates.

FOOD CONTACT (EUA): Development of grades with 25% of PCR, approved by FDA, for food and beverage packaging use.

Investing in strengthening mechanical and advanced recycling enables us to make progress in the development of high-quality post-consumer recycled resins and expand research and collaboration with partners that are relevant in the plastics chain.

ADVANCED RECYCLING

Research and development of disruptive technologies that leverage the topic.

INSTITUTE FOR SUSTAINABLE PROCESS TECHNOLOGY (EU): investment of GBP 2 million in technology development for separation and advanced recycling of different types of plastics.

SENAI INNOVATION (BR): partnership with EngePol (UFRJ) and Fábrica Carioca de Catalisadores and investment of BRL 2.7 million to boost advanced recycling in Brazil.

ENCINA (USA): Transformation of 175,000 tons of plastic waste into 90,000 tons of recycled chemicals per year.

ISCC (GLOBAL): Braskem is the first Brazilian company to be awarded the ISCC Plus certification for advanced recycling, which validates the use of alternative raw materials, such as **pyrolysis oil**.

ENGAGING THE SUPPLY CHAIN

Partnership with institutions in order to eliminate plastic waste and foster the **engagement of government, businesses** and the **entire community**



We are one of the founding members of the **Alliance to End Plastic Waste (AEPW)**.

Besides Braskem, another 46 large companies with worldwide operations and engaged in the plastic supply chain have signed to set up an alliance in the fight against plastic pollution.

AEPW has announced a commitment to invest **USD 1 billion** in projects and technology to end plastic waste disposal into the environment, especially in the oceans. Investment is targeted to increase to **USD 1.5 billion** in the next **5 years**.

OTHER
PARTNERSHIPS



BRASKEM LAUNCHED WENEW: CIRCULAR ECONOMY ECOSYSTEM



[Home](#) [Our Products](#) [Meet Wemove](#) [News](#) [Contact Us](#)

 EN-US 



A circular future is possible, and we can build it together!

Only connected actions and efforts can produce the great effect the world needs.

Meet Wenew, an ecosystem developed to represent Braskem's products, technologies and initiatives that help drive the circular economy.

**Join us in transforming the world.
Join us on this journey.**

WENEW EMBRACES PRODUCTS, INITIATIVES, PARTNERSHIPS AND PROJECTS THAT BRASKEM'S DEVELOP TO FOSTER THE JOURNEY THROUGH THE CIRCULAR ECONOMY



BRASKEM CIRCULAR ECOSYSTEM



CIRCULAR PRODUCTS

Circular resins and chemicals



TECHNOLOGY

Innovative technologies able to boost the circular economy



EDUCATION

Environmental education and consumer engagement initiatives



CIRCULAR DESIGN

Rethink the products and packaging design are essential for circular economy

THE NEW ECOSYSTEM HAS BIG IMPACT ON BRASKEM'S GOAL TO REDUCE THE PLASTIC WASTE

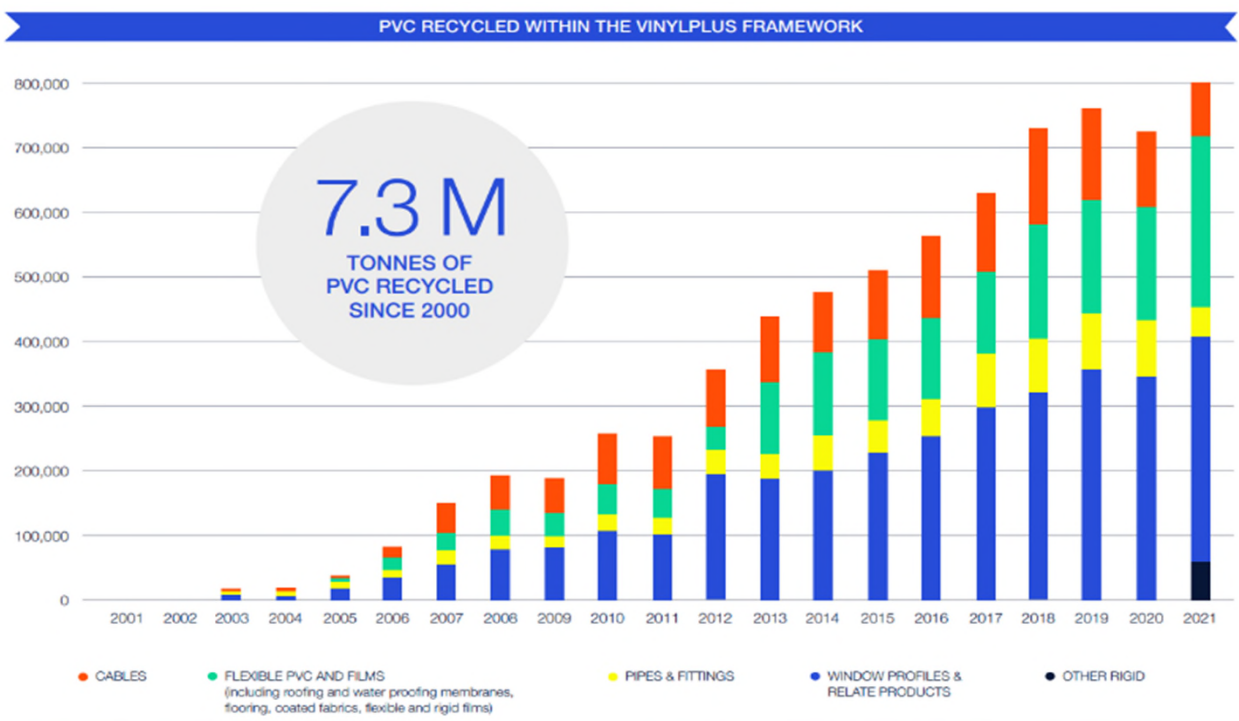


LEARN MORE

PVC RECYCLING: BRAZIL STILL MOVING TO APPROACH THE PARTICIPATION OF RECYCLED IN THE WORLD AVERAGE

WORLD

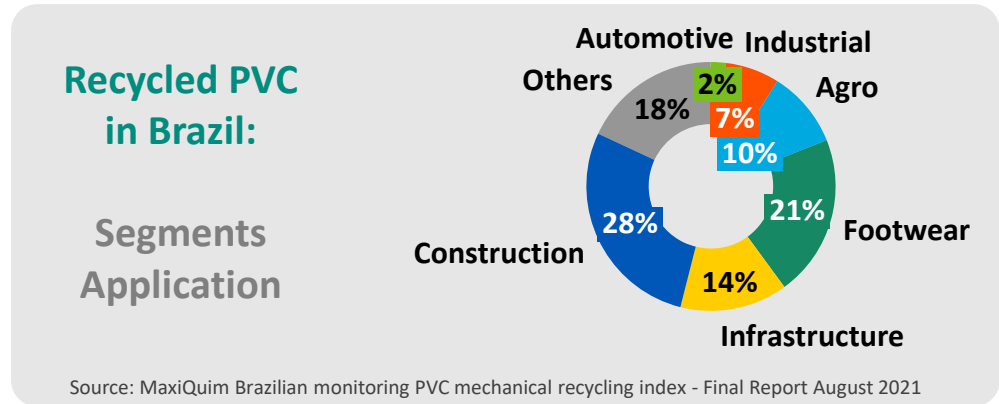
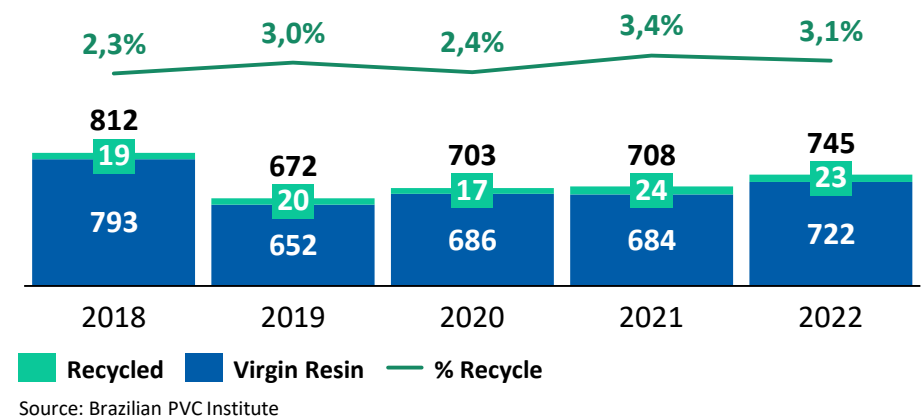
- 1.7 million tons, **about 4% of the annual PVC demand**, is mechanically recycled annually
- Europe is the largest recycling market** in the world, accounting for around 44% of share, especially for applications such as pipes, rigid profiles and flooring



Source: 2022 World Analysis – Vinyls Report – CMA

BRAZIL

- In Brazil, PVC recycling is still in the informal market**, less than 1,5% of total demand (considering compound market as well)
- Production: recycled represents almost 3% of annual production**



PVC RECYCLING IS ALREADY A REALITY IN OUR COMPANY

BRASKEM LAUNCHED TWO GRADES OF RECYCLED PVC COMPOUND THIS YEAR

Braskem introduces new recycled PVC solutions to the market

Compounds produced using recycled raw materials amplify the company's Wenew portfolio and further enhance its position towards promoting a circular economy. The solutions have the potential to return upwards of 1,000 tons of recycled PVC compound per year to the production chain.



Braskem Catalog

PVC Resina Reciclada

Clorato de Polivinila Reciclado
Recycled Polyvinyl Chloride
Cloruro de Polivinilo Reciclado

25 kg
Peso Líquido | Net Weight | Peso Neto

Prazo de validade: 36 meses após a fabricação.
Shelf life: 36 months after date of manufacture.
Fecha de vencimiento: 36 meses después de la fecha de fabricación.

Insistente Braskem | Made in Brazil | Hecho en Brasil.

www.braskem.com

Unidade de Atendimento ao Cliente
Atendimento 24h
recicla@braskem.com

Braskem S.A. - Unidade Vinhos
PVC AL
Reciclação
End: Estrada Farago - km 12 - Vila I
57500-000 - Marabá do Sul - AL
CNPJ: 42.550.305/0005-14
Responsável Técnico:
Mário Sérgio Pereira
CRQ Nº 0710312-4/2ª Região

PVC BA
Reciclação
Rua 18 de Agosto, 3.342
41800-000 - Carapicuíba - SP
CNPJ: 42.550.305/0005-14
Responsável Técnico:
Lorena de Souza de Sá e Sá Matos
CRQ Nº 065535477ª Região

Braskem

Braskem has the ambition to reach 1,0 MM ton of recycled materials until 2030
Recycle PVC must support this achievement with up to 10% of this share

KEY TAKEAWAYS

BRASKEM VINYL

KEY MESSAGES

- ❑ **Vinyls demand will continue to grow in SAM** even with a moderate economy scenario
- ❑ **Brazil** will continue to be the **main market** and **Argentina monetary reform** remains unclear
- ❑ **SAM** will remain **net importer** for PVC and SODA . **No announcements** of relevant **new capacities** in the region
- ❑ **Governmental programs** for water treatment and popular housing **will support growth in Brazil**
- ❑ Competition with a **higher performance products will** increasingly **support new developments**
- ❑ **Investments in pulp** production in the region **will provide opportunities** for caustic soda
- ❑ **Recycling is a reality in Vinyls** and players have been gradually positioning themselves

THANK YOU