



# BIO PYROLYSIS OIL

## INFORMATION MEMORANDUM

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# This Info Memo is intended to present the Bio Pyrolysis Oil opportunity by Suzano

## Memorandum chapters

### 1 Suzano Overview

- Suzano's company profile
- Suzano's strategy

### 2 The BPO Opportunity

- Market Overview
- Technology
- Key applications

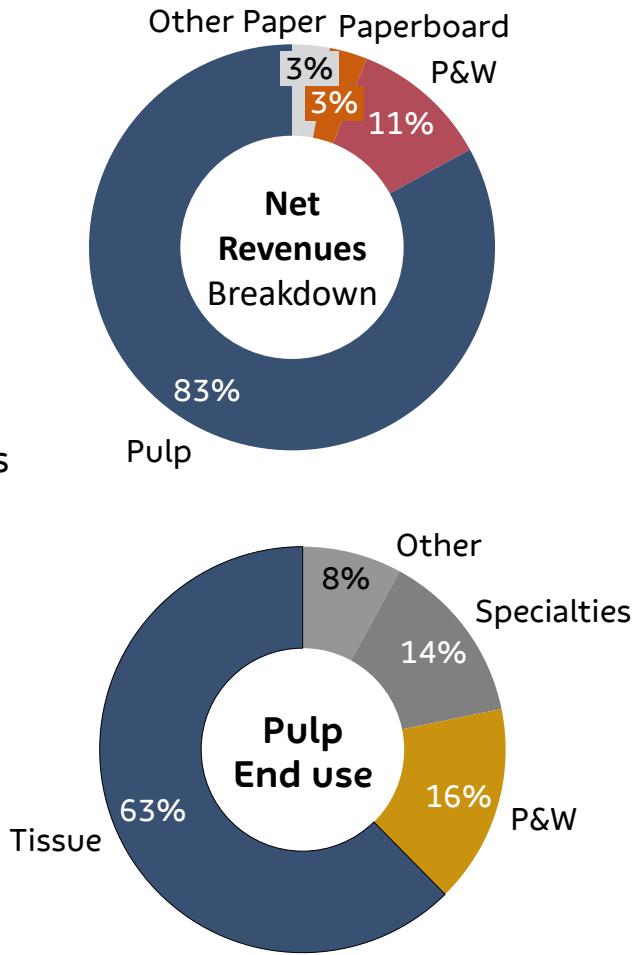
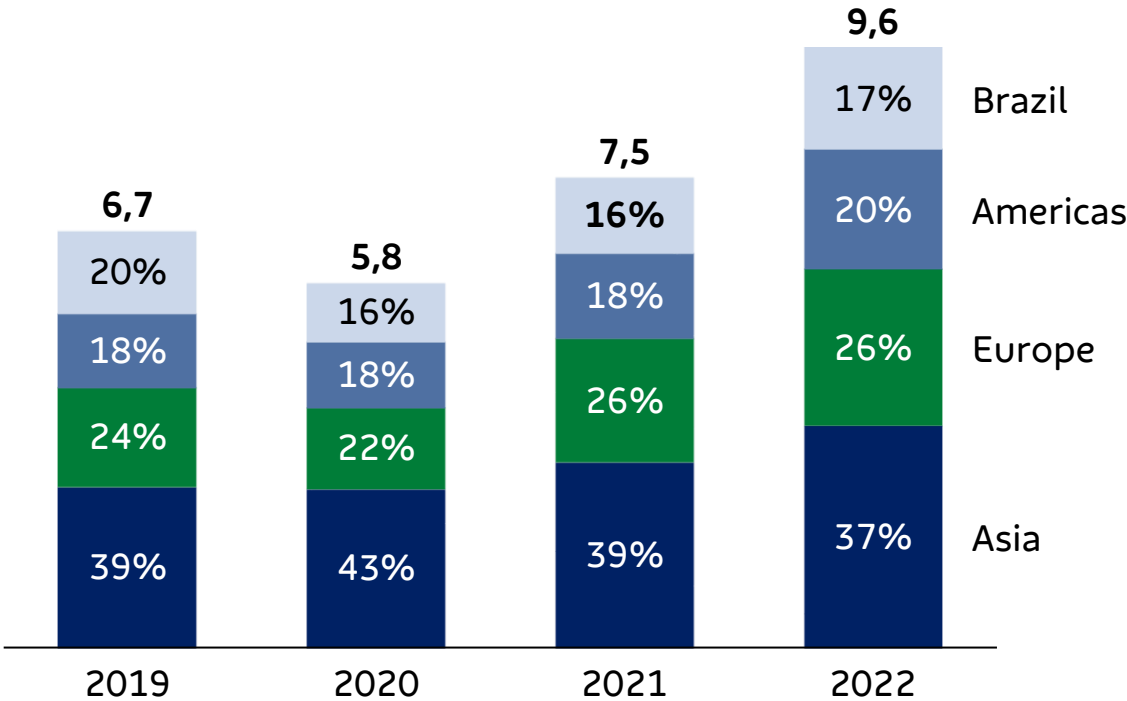
### 3 Brazilian potential

- Operational leverages
- Aracruz Project

# Suzano is a Brazilian company with close to USD 10B revenues geographically diversified



Net revenues (USD billion)



# Listed in B3<sup>1</sup> and NYSE, Suzano has a robust governance...



Listed on Novo Mercado, B3's highest corporate governance segment and NYSE ADR-level 2 program

**SUZB**

B3 LISTED NM

**SUZ**

LISTED

**NYSE**



of management's short-term variable compensation since 2021.



## Board of Directors

9 Members

56% Independent members

33% of Women

Appointment of risk expert

Supported by  
Committees

Audit (Statutory)  
People  
Appointment and Compensation  
Sustainability  
Strategy and Innovation  
Management and Finance

# ... and irreplicable First-Class Assets



## Our plantations

- 1.3 million hectares of planted and certified areas (equivalent to 200x Manhattan)
- Geographically diversified areas
- 40m<sup>3</sup>/ha/year average productivity
- 156 km structural average radius
- Unmatched eucalyptus genetic base
- Unique harvesting and inbound logistics



## Pulp Business

- 10.9 million tons of market pulp
- Integrated supply chain
- 90 MWm average surplus (equivalent to 1.4MM people town)
- 7 pulp mills strategically located



## Our Logistics

- All mills either close to shore or railway connected
- 3 export pulp ports
- 12 fully dedicated vessels
- 86 countries served

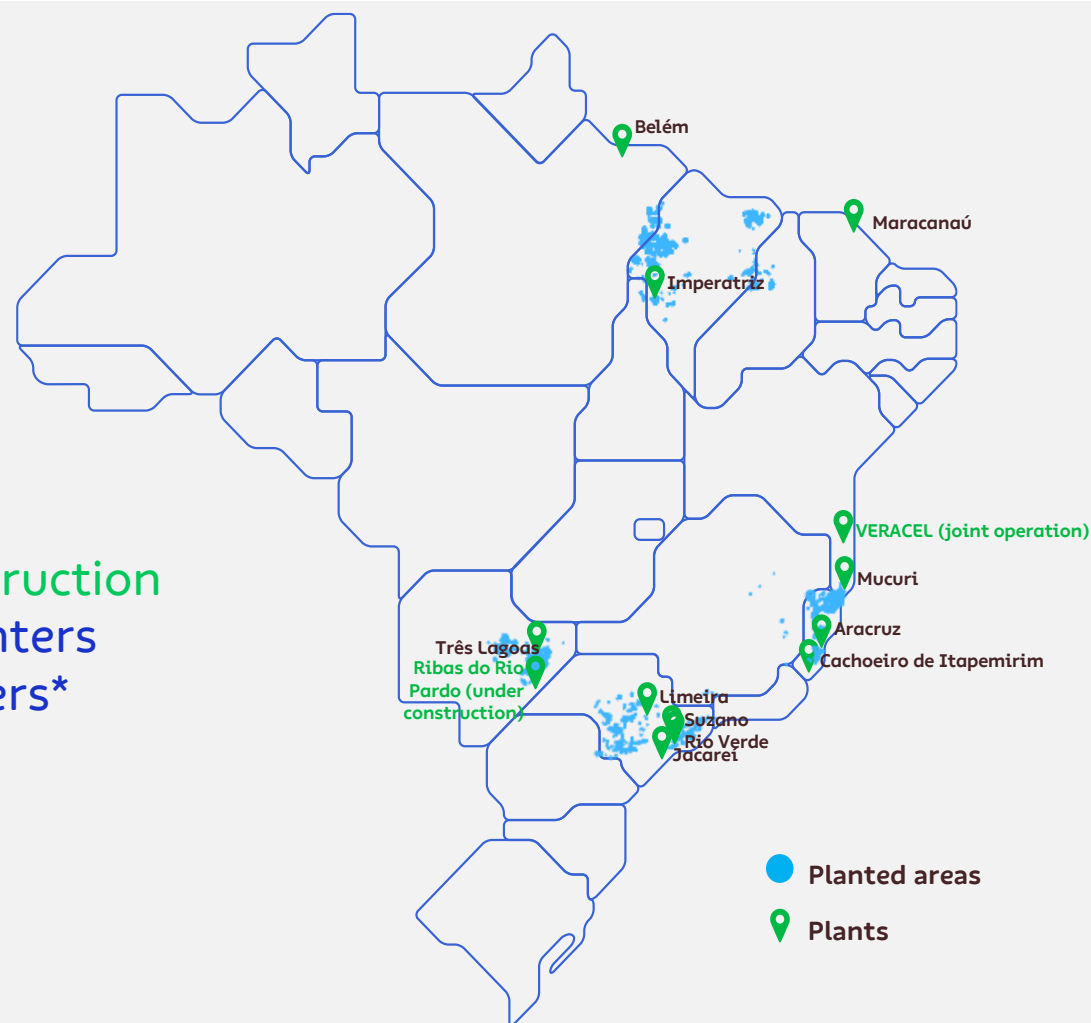


## Paper Business

- 100% pulp integrated
- Unique go-to-market model
- Leading Brazilian brands
- 1.4 million tons of paper
- 35 thousand clients
- ~40% Brazilian market share

# Strong footprint in the most advantageous feedstock geography in the world

12 mills  
1 mill under construction  
21 distribution centers  
5 technology centers\*  
5 ports





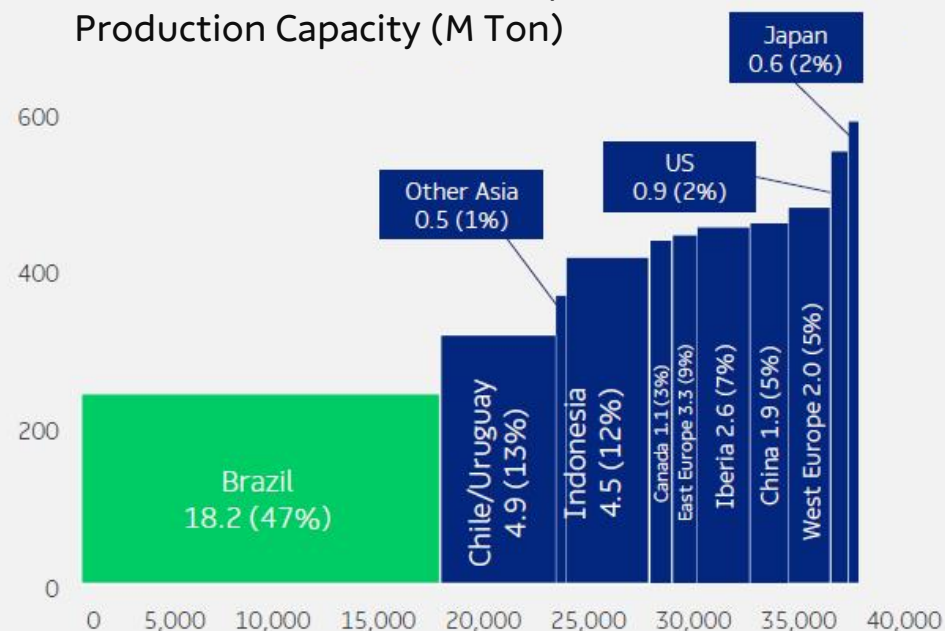
# Fully Integrated Global Distribution



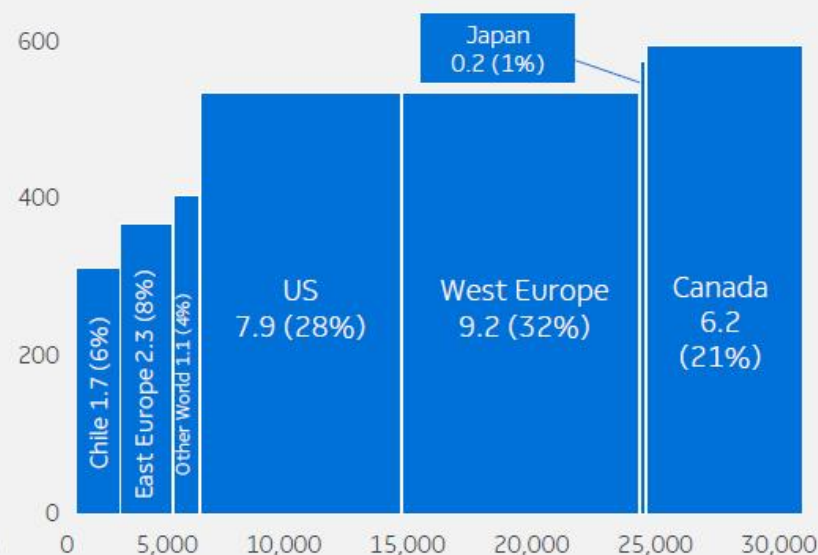
# Undisputed competitiveness in the pulp industry



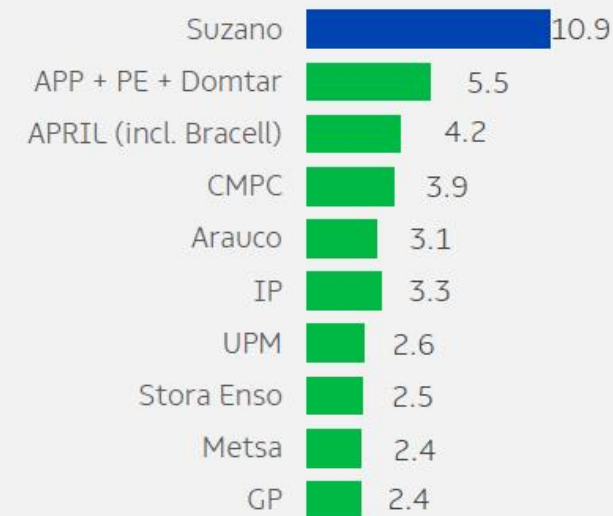
**Hardwood** | CIF China | USD/ton and  
Production Capacity (M Ton)



**Softwood** | CIF China | USD/ton and  
Production Capacity (M Ton)



**TOP 10**





# A new 2.55 Mt project coming online in the 2Q24 will further increase our competitiveness

- Lowest cash cost of our asset base
- Total capex of R\$19.3 billion (~USD 3.7 billion)
- 180 MW average energy export to the grid
- Low execution risk backed (time and budget) by strong track record in projects implementation

Start-Up  
**2H24**

Nominal Capacity  
**2.55**  
M tons/year

Distance from-  
forest-to-mill<sup>(5)</sup>  
**65km**  
avg.

Significant contributions  
to 2030 Agenda



# Large global impact with the offerings of our renewable products

## PULP

**10,9 M**  
TON/YEAR\*



## PAPER AND PACKAGING

**1,4 M**  
TON/YEAR\*



## CONSUMER GOODS

**150 K**  
TON/YEAR\*



## NEW BUSINESSES



**2 BILLION**  
People impacted by  
our products and  
services



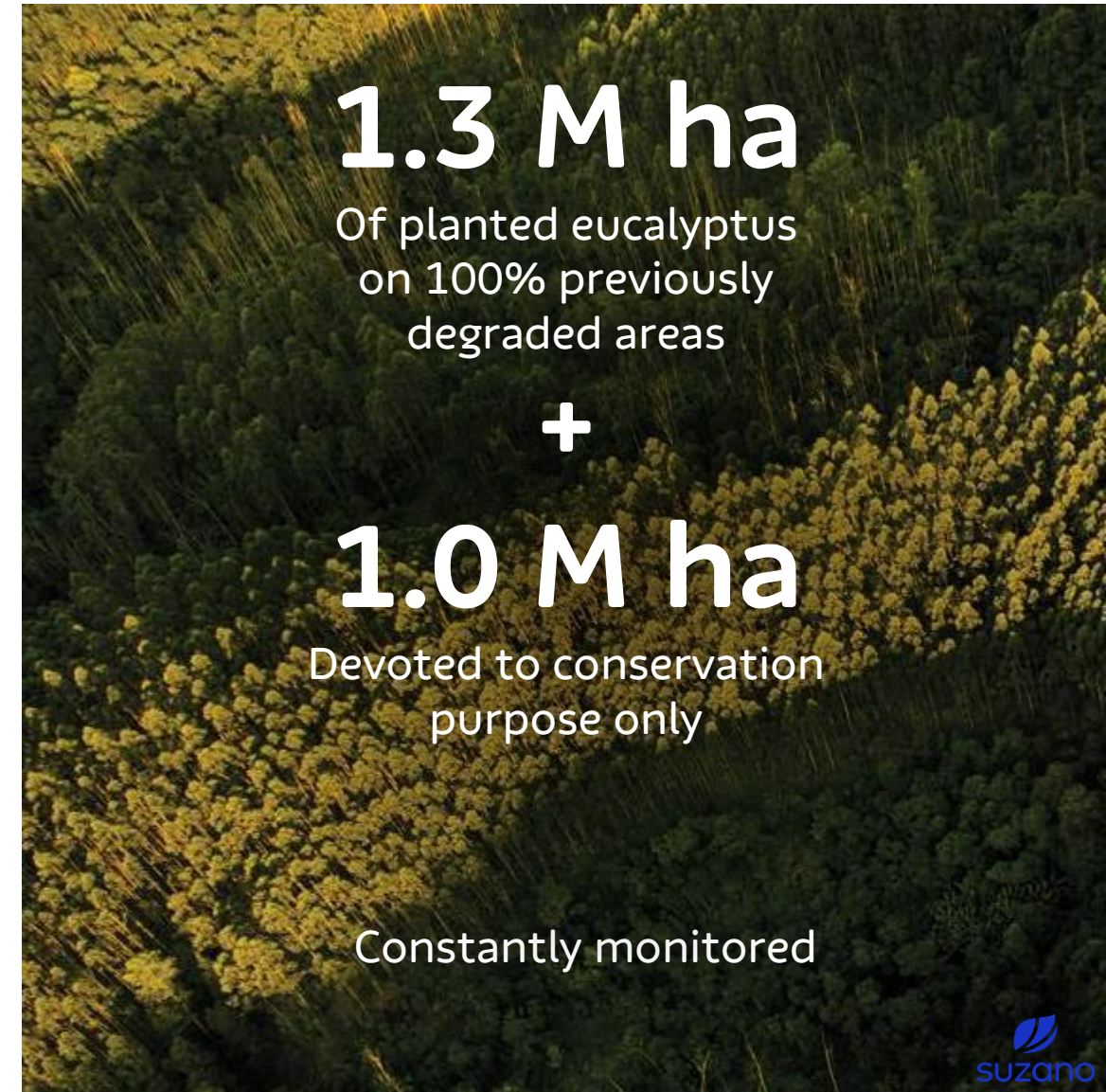
# Committed to zero deforestation and to a sustainable forestry model

## ALL SUZANO INDUSTRIAL UNITS ARE CERTIFIED

- Forest Stewardship Council® (FSC®)<sup>1</sup> and/or CERFLOR® / PEFC
- 87% of areas certified

## COMMITTED TO ZERO DEFORESTATION

- Operations only on already anthropized areas
- Wood purchase policy and forest management plans
  - 100% chain of custody certification
  - 100% traceability: sourcing and supply of wood
- Aiming for biodiversity maintenance / enrichment, soil conservation, carbon sequestration and carbon stock
- Committed to responsible water use



**1.3 M ha**

Of planted eucalyptus  
on 100% previously  
degraded areas

+

**1.0 M ha**

Devoted to conservation  
purpose only

Constantly monitored

<sup>1</sup> License code FSC-C010014

# Fully committed to the SDGs to accelerate the fulfillment of the 2030 Agenda



## CLIMATE CHANGE

- 15% reduction in scope 1 and 2 emissions per ton of production



## INDUSTRY AND INNOVATION

- Offer 10 million tons of products from renewable source that can replace plastics and other petroleum products



## EDUCATION

- Increase the education index (IDEB) by 40% in all priority municipalities



## WATER

- Forest: Increase water availability in 100% of critical watersheds



## WASTE

- Reduce by 70% the industrial solid waste sent to our own or third-party landfills, transforming them into by-products



## POVERTY

- Lift 200.000 people out of poverty in our areas of operation



## BIODIVERSITY CONSERVATION

- Connect half a million hectares of priority areas for biodiversity conservation in the Cerrado (Brazilian savannah), Atlantic Forest, and Amazon...



## ENERGY

- Increase renewable energy exports by 50%



## DIVERSITY AND INCLUSION

- Have 30% of Women and 30% of Black employees in leadership positions
- Achieve 100% inclusive environment for LGBTI+
- Ensure 100% accessibility and achieve a 100% inclusive environment for people with disabilities





# Strategic vision

- 1 Continue being a benchmark in the sector in **efficiency, profitability and sustainability**, from the forest to the client
- 2 Be a transformational agent in the **expansion into new markets** for our biomass
- 3 Be a reference in **sustainable and innovative solutions** for the bioeconomy and environmental services, based on planted trees



# Avenues



Play a Leading  
role in  
sustainability



Expand boldly  
into New  
Markets



Advance in the  
links of the  
chain, always  
with  
competitive  
advantage



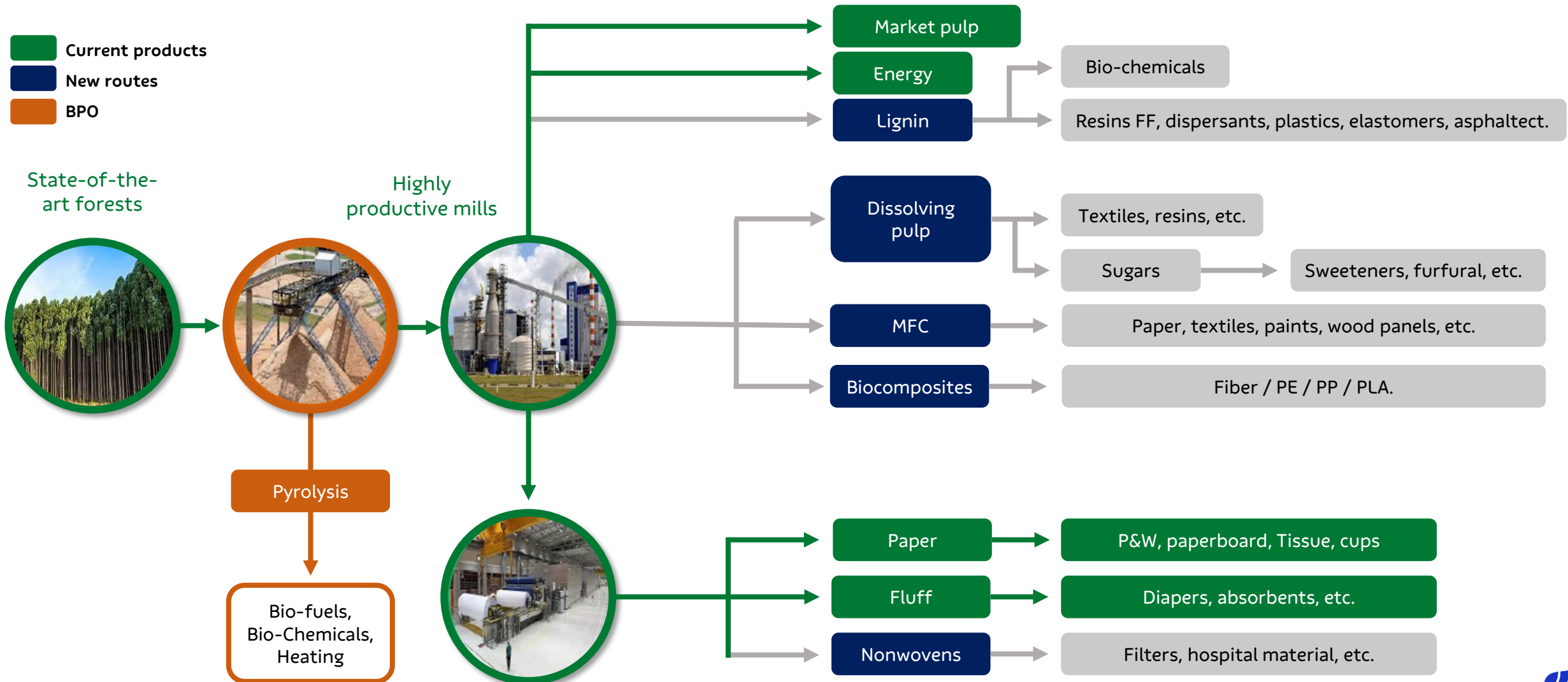
Maintain  
relevance in  
Pulp, through  
good projects



Be "Best-in-  
Class" in the  
Total Pulp  
Cost vision



# Pyrolysis is a key part of the prioritized routes for growth and value creation by our biomass



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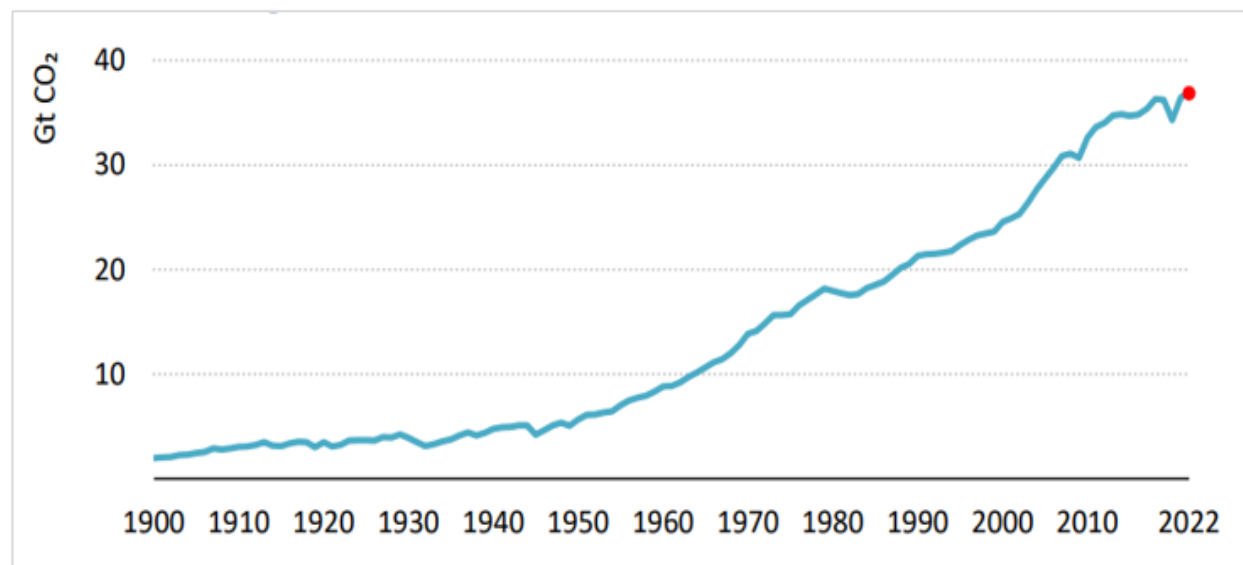
- Operational leverages
- Aracruz Project



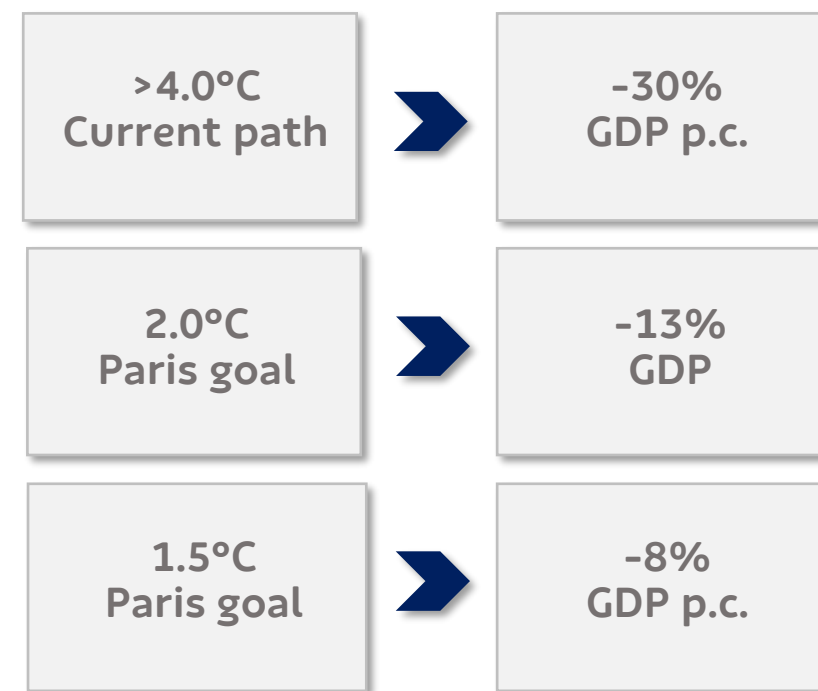
# Decarbonizing world's economy is urgent and crucial to avoid major disasters and loss of wealth

## Global CO<sub>2</sub> emissions (GtCO<sub>2</sub>), 2022

Carbon dioxide (CO<sub>2</sub>) emissions from energy combustion and industrial processes and their annual change, 1900 - 2022

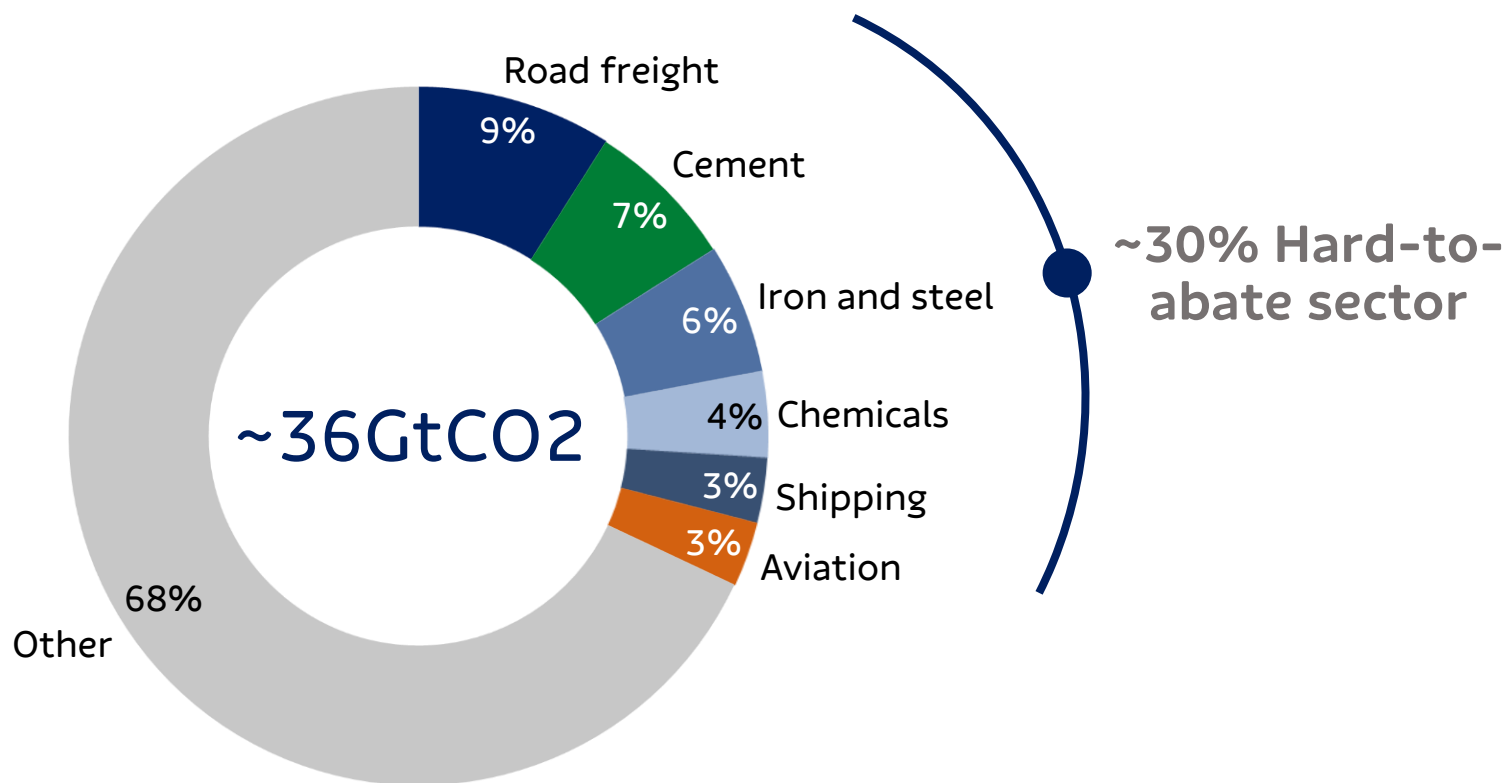


## GDP loss (per capita) by 2100 due to disasters and Climate Change<sup>2</sup>



# Hard-to-abate industries account for about 30% of global emissions...

Global carbon dioxide emissions by sector (%), 2022

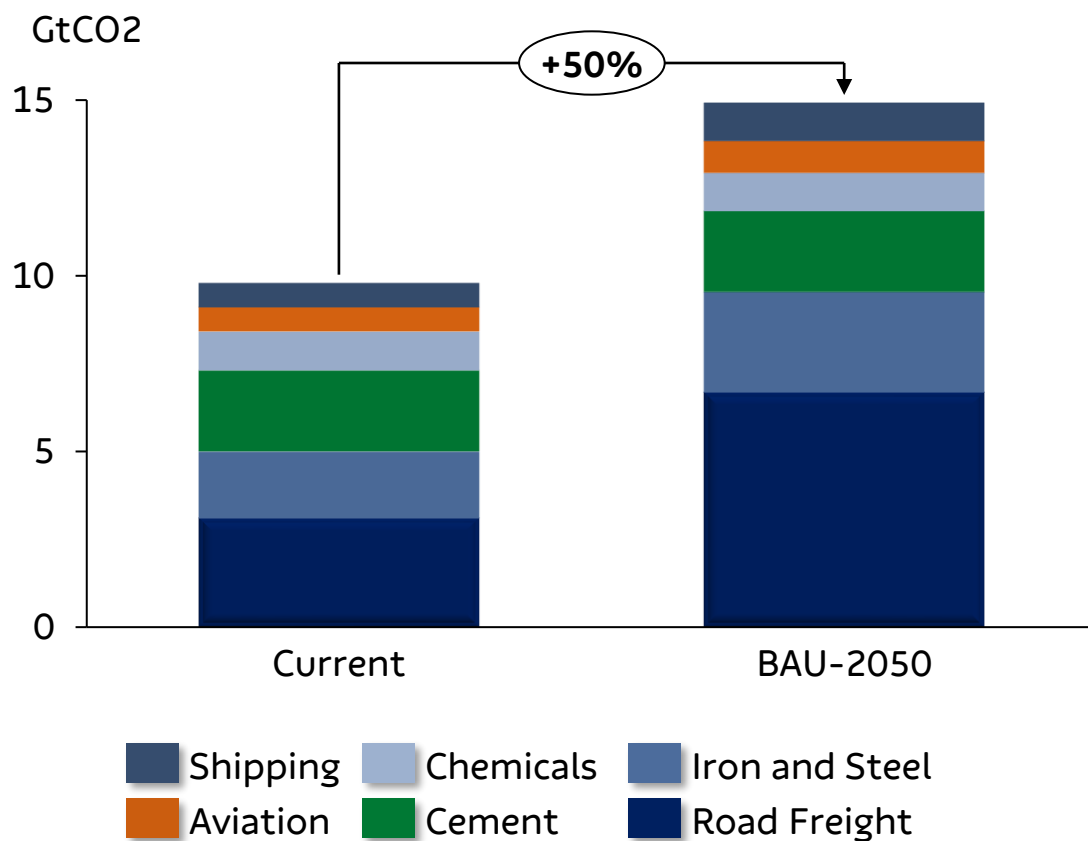


Some of the reasons why these sectors are classified as hard-to-abate

- Lack of maturity of the technologies likely to be relied upon to mitigate their emissions
- High heat requirements which today are exclusively provided by fossil fuels
- Process emissions resulting from chemical reactions rather than the combustion of fossil fuels

# ... and if no action is taken, these emissions could increase by 50% by mid-century

## Current Emissions of Hard-to-Abate Sectors and Future CO2 Under a Business-as-Usual (BAU) Scenario



**Climate goals will not be met without the decarbonization of these industries...**

... if we continue along this path, we will **not be able to contain global warming at 1.5°C**



# BIO PYROLYSIS OIL

**A low-carbon alternative to fossil-based materials that allows a new rising platform for fuels, chemicals and bio-possibilities...**

...generating value for all stakeholders



# BPO is a sustainable and attractive solution

## Proven Technology

Existing commercial production capacity

## Flexible Applications

Platform for multiple bio-possibilities in different segments

## GHG Reductions

Potential to reduce emissions by up to 98% in a full lifecycle basis

## Large Market

+100 Mtpy addressable market in Europe and US alone



# Ensyn's RTP process is a unique and proven technology that allows Suzano to produce BPO

## Biomass feedstocks

Planted forests and forest residues



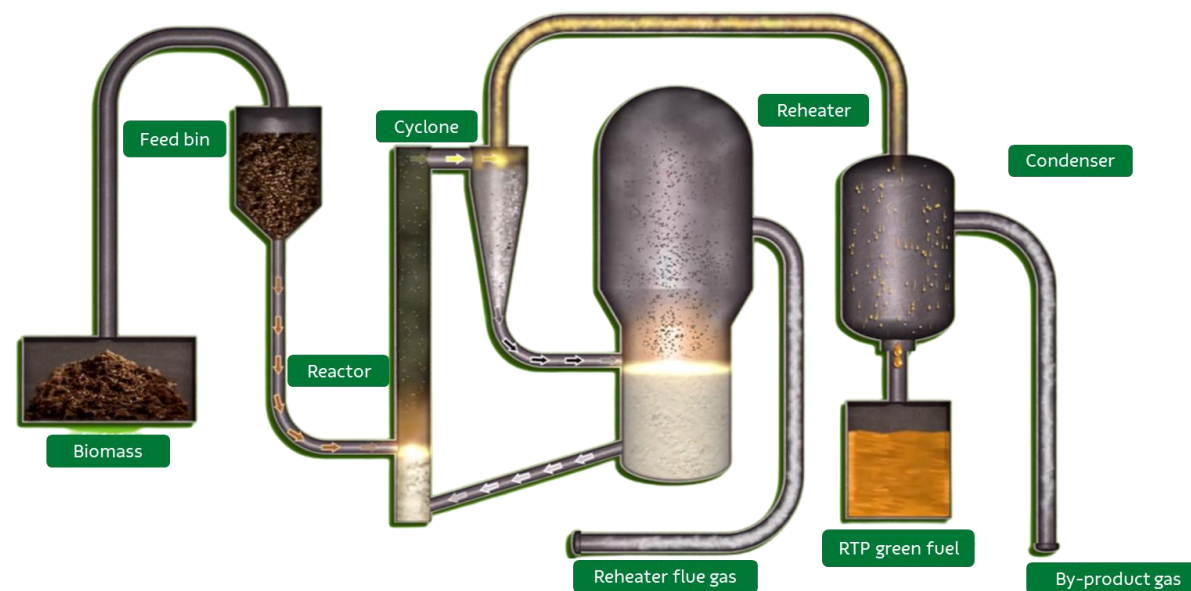
Construction & demolition wood residues



Agricultural residues



## RTP® process

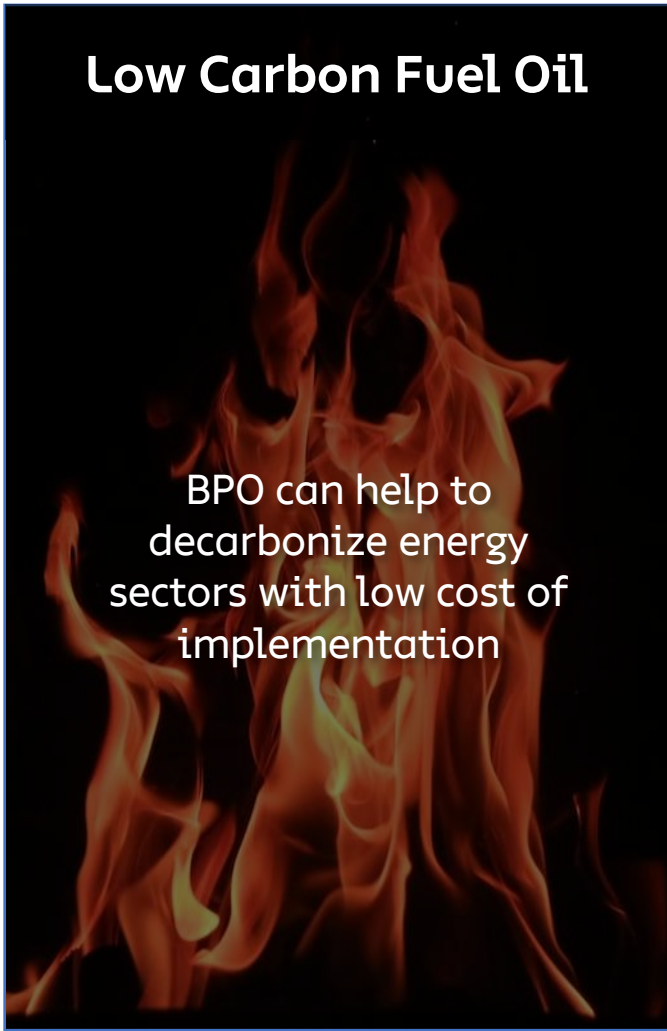


- Biomass is rapidly **vaporized** to moderate temperatures and condensed into a **low-carbon liquid fuel**.
- Non-condensed gas from reactor and reheater chimney gas are recovered and used to **maximize energy efficiency**
- **Yield around 70% biomass to liquid**
- **Biochar can be extracted** at different points and/or used to drive the process.



# BPO is a flexible solution for energy, chemicals and transportation sectors

## Low Carbon Fuel Oil



BPO can help to decarbonize energy sectors with low cost of implementation

## Biochemicals



BPO is a platform for multiple chemical streams

## Co-Processing



BPO co-processing leverages existing refineries, decarbonizing transportation sector

# Low Carbon Fuel Oil is a commercial application by Ensyn and Suzano can be a strong & reliable supplier

## Low Carbon Fuel Oil (LCFO)

- Low Carbon Fuel Oil (LCFO) is a renewable, liquid fuel for heating and cooling produced from solid biomass
- LCFO has been used at scale for industrial heat for 30+ years at Kerry's RTP® operations in Wisconsin
- Ensyn has been **commercially selling LCFO since 2014**
  - Production of 12 million litres/year plant in Ontario, with **deliveries focused on customers in the US Northeast**
  - LCFO has been used commercially in:
    - Large institutional and commercial boilers
    - District energy plants
    - Industrial boilers and furnaces

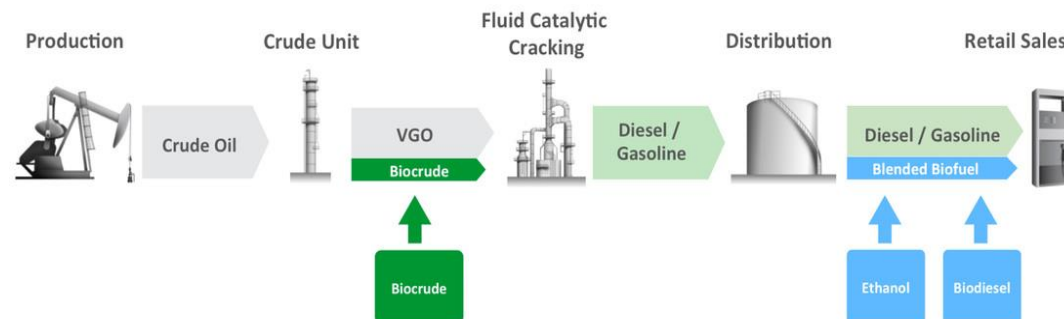




# Co-processing is a competitive and attractive application

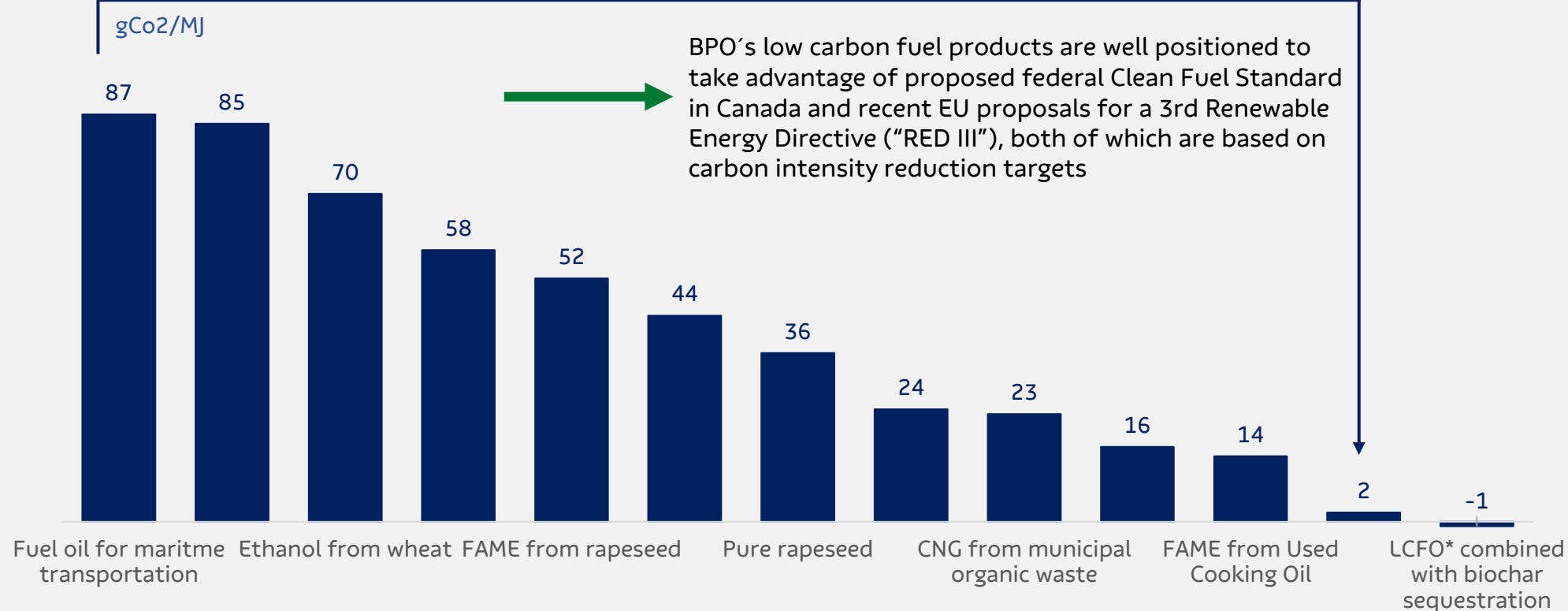
## BPO Co-Processing

- Co-processing involves existing petroleum refineries using BPO as a renewable feedstock for **the production of on-spec transportation fuels**:
  - renewable gasoline
  - renewable diesel
  - bio-LPG
- BPO co-processing is deployed by feeding biocrude into the refinery's Fluid Catalytic Cracking Unit (FCCU) alongside conventional fossil fuel feedstocks**
- Ensyn's powerful competitive position is based on **proprietary technologies**



# Carbon intensity turns BPO into a sustainable and attractive product

Low Carbon Fuel Oil can reduce total GHG emissions by up to 98% on a full life cycle basis



Source: BioGrace–Harmonised calculations of biofuel Greenhouse Gas Emissions in Europe. HVO: Hydrogenated Vegetable Oil. CNG: Compressed Natural Gas.  
\* Low Carbon Fuel Oil figures exclude final transportation to customers and are based on existing RTP® facility operating data using wood processing residues.





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# Suzano's opportunity in BPO is leveraged by our current skills in large scale production with excellence



## Excellence in forests sustainable planted

- **High productivity** compared to other feedstocks;
- **Continuous investment in genetic improvement**; enabling adaptation for use in our bio-business;
- **Top-notch ESG practices** attracting interest from partners;
- **Forest certification**;
- **Integrated landscape**;
- **Connection with operations** in the **carbon market**.



## Operational Excellence

- **Ability to plan, execute and manage large projects**;
- **Continuous scale growth**;
- **Cost optimization**;
- **Multimodal logistics** approach for flexibility and cost optimization;
- Experience in moving **large volumes**;
- **Efficient port operations**;
- **Dedicated vessels and terminals**.



## Market Positioning

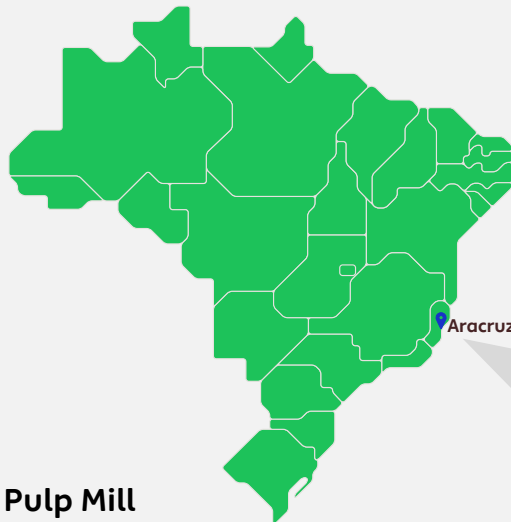
- **Strong reputation for ESG practices**;
- **Ambidextrous organization**;
- **Technological pioneering** in RTP and 1<sup>st</sup> lignin producer in south hemisphere;
- **Solid relationship with stakeholders**.

Continue being a benchmark in the sector in **efficiency, profitability and sustainability**, from the forest to the client

# First project is already in advanced development in Brazil, with start-up in 4Q2025



Location: Aracruz, Espírito Santo, Brazil



Aracruz  
Pulp Mill

**Aracruz Pulp Mill**  
2,3 Million tones per year



## Bio Pyrolysis Oil Project



**Capacity: 111 kt**



### Feedstock

**(a) 100% residues:** tree tops, energy wood and industrial biomass residues

**(b) Planted forest:** SUZ most competitive model



### Transportation

- Transfer from SUZ to terminal by pipeline
- Exports by Petrobras Terminal (TABR): liquid vessels with 10 kton of capacity

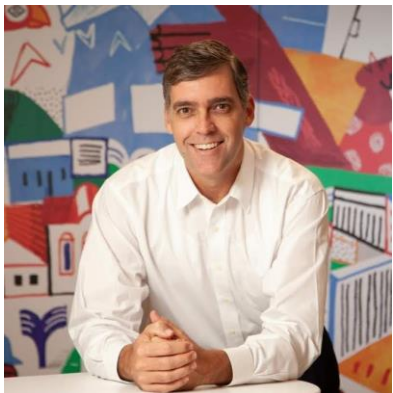


### Timing

- Approval expected for 4Q23
- Start-up 4Q25



# Contact List



**Executive Officer - New BioBusDev, Strategy, Digital Tech - Christian Orglmeister** holds an engineering degree from FEI, a graduate degree from Fundação Getúlio Vargas and an Executive MBA from TRIUM (LSE, HEC and NYU). Between 2000 and 2002, he worked at the logistics startup Intecom of Grupo Martins, after which he worked at A.T. Kearney for four years in the operations area. In 2006, he joined The Boston Consulting Group, where he led the People, Organization and Governance [A1] practice and the Family Business practice in South America. In 2015, he became Managing Director of the BCG offices in Brazil. During his 20 years as consultant, Christian assisted some of the leading Brazilian and international business groups on strategy, governance, people and digital transformation. He is currently New BioBusDev, Strategy, Digital Tech Officer of the Company.

[christian.o@suzano.com.br](mailto:christian.o@suzano.com.br)



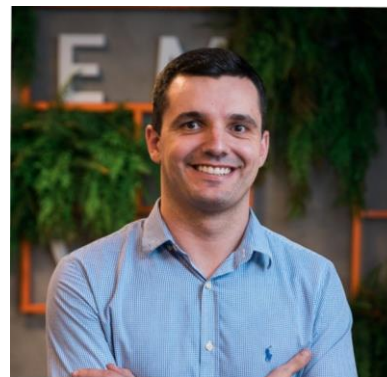
**Manager - New Business Bio Oil – Erik da Silva** holds a degree in Chemical Engineering from Unicamp and a specialization from Fundação Dom Cabral. He is currently New Business Manager. He held the position of Senior Corporate Strategy Consultant at Suzano from 2020 to July 2022. In the last 8 years, he held several high-level positions in companies in the chemical and forestry sectors. He plays an important role as responsible for the development of the Bio Pyrolysis Oil business, coordinating multiple fronts within and outside Suzano. Responsible for the commissioning and operation of the first Kraft Lignin production plant in the southern hemisphere (20.000 tonnes per year of capacity).

[erikms@suzano.com.br](mailto:erikms@suzano.com.br)



**Executive Manager - New Business – Elizabeth Shie** holds a degree in Production Engineering from USP and an MBA from the London Business School, with concentration in Finance and Change Management. She is currently Executive Manager of New Business at Suzano playing an important role in business development initiatives through partnerships models, new business structuring, M&A deals and equity investments. In addition to new business, she acts as Investor for Suzano's Ventures (corporate venture capital of Suzano), conducting financial and legal analysis. Over the past 12 years, she has held several positions in companies in the financial sector.

[emshie@suzano.com.br](mailto:emshie@suzano.com.br)



**Manager - New Business – Gabriel Paulo** holds a degree in Energy Engineering from UFSC and a specialization from Fundação Dom Cabral, with an emphasis on Finance and Business Management. He has already worked in the Forestry area, focusing on the development of digital products, connecting the business with the open innovation ecosystem, technology embedded in machines and project management. He is currently New Business Manager at Suzano, being responsible for corporate finance and business intelligence for all bio business initiatives.

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# THANK YOU



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Acesse nosso site :

