IUFRO World Congress 2019
Forests and Forest-based Products for a Greener Future

Using Forests and Trees for a Greener Future

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C T O - Klabin S A
Trees, hundreds of years of evolution resulted in super materials
The stone age didn’t end for lack of stone. The oil age will end long before the world runs out of oil. “Sheik Ahmed Zaki Yamani”
KLABIN was founded in 1899.

120 yrs making history in Brazil.
**Integrated business model**

**Diversification and flexibility**

**TOTAL LAND**
- **532 k hectares**

**TOTAL FIBERS**
- **3.5 MM tpy**
  - **BLEACHED PULP**
    - **1.6 MM tpy**
  - **INTEGRATED PULP**
    - **1.7 MM tpy**

**TOTAL CAPACITY**
- **3.5 MM tpy**
  - **PULP**
    - **SHORT FIBER**
      - **1.2 MM tpy**
    - **LONG FIBER / FLUFF**
      - **0.4 MM tpy**
  - **PAPER**
    - **COATED BOARDS**
      - **750 k tpy**
    - **CONTAINERBOARD**
      - **1.250 MM t/a**
  - **PACKAGING**
    - **CORRUGATED INDUSTRIAL BOXES**
      - **750 k tpy**
    - **175 k tpy**

**TOTAL LAND**
- **155 k hectares**
- **91 k hectares**

**PLANTED FORESTS**
- **PINE**
- **EUCALYPTUS**

**Preserved 230 k ha**

**OCC 275 k tpy**
Operations map

Klabin has 18 industrial units distributed across 8 states in Brazil and 1 in Argentina.

- **Pulp**
  - PR: Ortigueira

- **Recycled Paper**
  - PE: Goiana
  - SP: Piracicaba

- **Packaging Paper**
  - SP: Angatuba
  - PR: Monte Alegre
  - SC: Correia Pinto
  - SC: Otacilio Costa

- **Industrial Bags**
  - PE: Goiana
  - SC: Lages
  - ARG: Pilar

- **Corrugated Boards and Boxes**
  - MG: Betim
  - BA: Feira de Santana
  - PE: Goiana
  - SC: Itajaí
  - SP: Jundiaí
  - AM: Manaus
  - SP: Piracicaba
  - PR: Rio Negro
  - RS: São Leopoldo

- **Forestry**
  - SP: Alto do Paranaíba
  - PR: Planalto Guaruapuava
  - PR: Campos Gerais
  - PR: Vale do Itajai
  - SC: Alto Vale do Itajai
  - SC: Planalto Catarinense
Paper and Packaging
Leadership in Resilient Markets

Market destination (%)
- Food: 67%
- Other consumer goods: 13%
- Building: 8%
- Others: 12%

Kraftliner
Coated Boards
Industrial Bags
Corrugated boxes
EUCALYPTUS PULP
BEKP IN BALEs

PINE PULP
BSKP IN BALEs

DIFFERENT FIBERS, DIFFERENT MARKETS
Biodiversity
Conservation and growth

**FAUNA**
883 SPECIES identified**

**FLORA**
1,872 SPECIES identified**

Puma, pygmy brocket and howler monkey are some of the endangered species, protected in areas owned by Klabin.

43% of native forests conserved

Private Natural Heritage Reserve (RPPN) from Klabin

PARANÁ + SANTA CATARINA

8,839 HECTARES holding a High Conservation Value Area (HCVA) and a newly inaugurated Nature Interpretation Center
More than 98% of the materials used by Klabin in its production are from renewable origin.
KLABIN 2030 GROWTH STRATEGY

Define goals and projects up to 2030

Strategic Directions to assure Klabin’s sustainability for the future
KLABIN’S TECHNOLOGY CENTER
5 Development Routes

Wood

Pulp

Packaging Paper

New Technologies on Wood Based Products

Environmental and Sustainability
ENVIRONMENTAL FRIENDLY PRODUCTS

Introduce renewable, biodegradable and repulpable materials
FOREST BASED OPPORTUNITIES FOR GREENER FUTURE
GLOBAL FIBER CONSUMPTION - PAPER

GLOBAL 417

VIRGIN 172

RECYCLED 245

*MM tonnes

Source: Pöyry, Hawkins Wright, PPC.
WORLD PULP HISTORICAL GROWTH

Source: Brian McClay
DEMAND – PAPER PRODUCTS
GROWTH PER YEAR

DEMAND (2014 - 2030)

Source: Poyry
NEW OPPORTUNITIES FOR A GREENER FUTURE
WHAT CAN COME FROM A TREE?

**Energy**
- Heat
- Electricity
- Pellets
- Biocoal
- Biooil
- Ethanol
- Methanol
- Biogasoline
- Biodiesel

**Chemicals/materials**
- Lignin
  - Carbon fibre
  - Binder
  - Chemical intermediates
- Hemicellulose
  - Fiber additive
  - Barriers
  - Chem intermediates
- Extractives
  - Bioactive chemicals
  - Tall oil, turpentine
- Cellulose
  - Ethanol
  - Lactic acid
  - Acetic acid

Source: RISE
Plastic - main uses

Source: National Geographic.
Plastic x Paper - evolution

Paper and Plastic Consumption (MM t)

- Plastic
- Paper

1973: oil crisis
2008: recession

Source: Pöyry, Klabin, National Geographic.
Unboxing: a silent revolution

Packaging has ceased to be a commodity and has become a factor that influences purchase decisions in the consumption chain.
Packaging for a Sustainable Future
EUKALINER

The 100% eucalyptus based Klabin Kraftliner has been successfully produced in basis weights from 80 to 210 g/m².

Physical Properties, at same basis weight, better or similar to traditional Softwood kraftliners;

Compression Tests and Printability were found much better.

less forest area, energy and water

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<th>500.000 ton/yr</th>
<th>Plantation Area</th>
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<td>Hectares</td>
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Paper x Plastic - Sustainability
New Technologies

- Bio-composites
- High-quality packaging solutions
- Intelligent packaging
- Future bio-based chemicals
- Next generation liquid and food packaging
- Building components and systems
- Bio barriers
BARRIERS

- Water
- Insects
- Oil & Grease
- Odors & Fragrances
- Light & Temperature
- Gases
  - Water Vapor
  - $O_2$
Microfibrillated Cellulose
Strong Papers

Internal Bonding

Ply Bonding

Surface
CNC
CNC - Cellulose Nano Cristals

CNC - nano cristals, extracted from cellulose at strong acid conditions. This Cristals have impressive resistance and can form translucid films. A new path for renewable barrier applications.
Application

A film can be formed...

Barriers!!
Focus in different barrier formulations

Oil & Grease

Oxygen
LIGNIN
LIGNIN BARRIERS
Lignin

Application

Phenolic Resins and Urea – Formadehyde Substitution
Polyurethane Foams
Thermoplastics

Market
Wood Panels industry
Isolation in civil construction and car industry
Car Industry Furnitures Civil Construction
Lignin + Polypropylene
Lignin

Application

Polymers
PP, PE, PVC, OS, ABS, PLA, others

Market
Polymers and plastics Industry

“Carbon Fiber”
Car Industry, Aeroespacial, Sports, Construction
The environmental concern is clearly growing.

Consumers know non-renewables are damaging to the environment.

A great opportunity for forest-based materials - renewable and sustainable solutions.

Source: Opticom International Research
60% of consumers consider our forests a scarce and decreasing resource.

Many don’t see fiber-based materials as renewable.

Most consumers don’t think that our forests are managed sustainably.

There’s still a strong need to better communicate our sustainability story.

Source: Opticom International Research
Join us in this journey to make a better world with forest-based products

Image: Opticom International Research