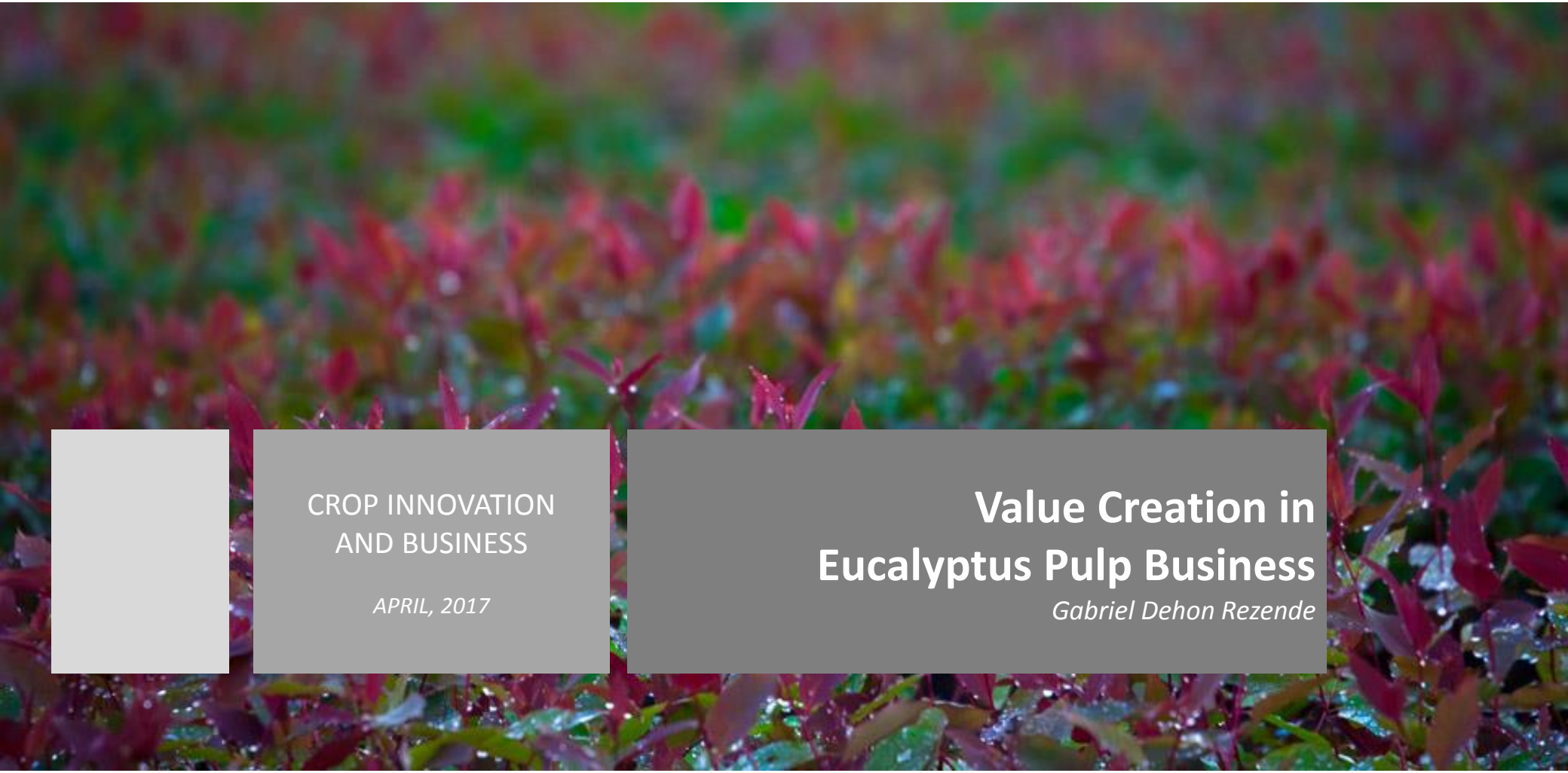


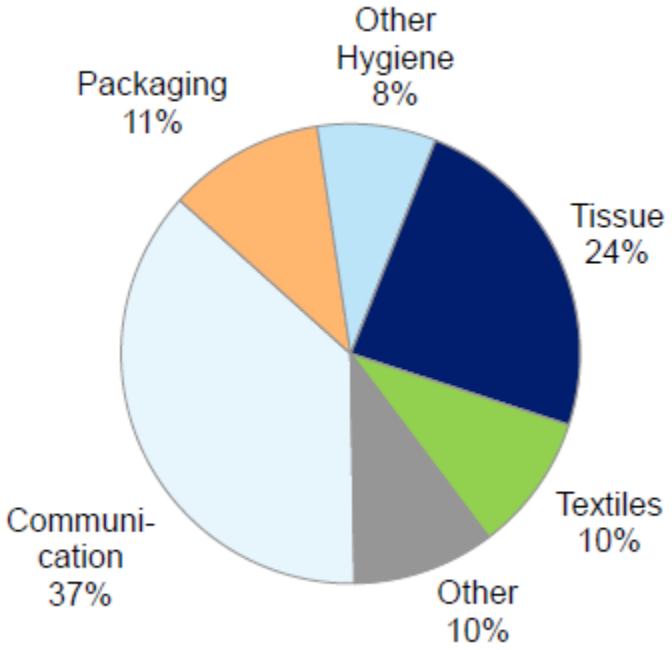
CROP INNOVATION
AND BUSINESS

APRIL, 2017

Value Creation in Eucalyptus Pulp Business

Gabriel Dehon Rezende

"Market Pulp is a global business and serves many value chains" (68 million tons ~ 45 billion US$ / year)



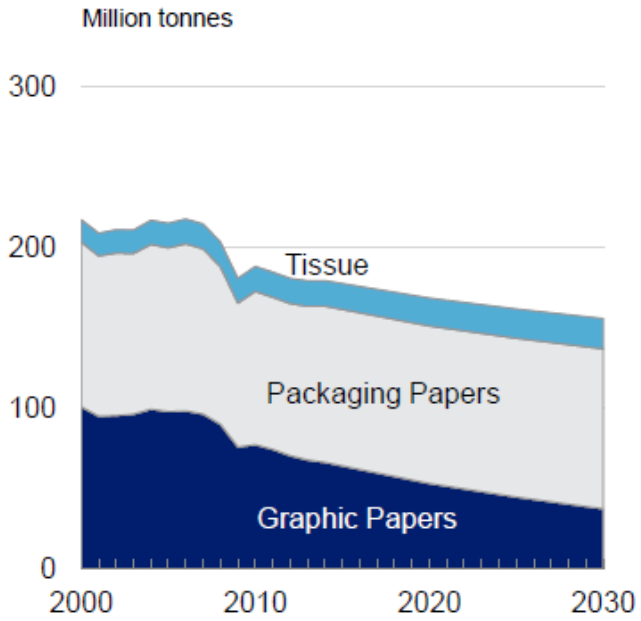
PÖYRY

FIBRIA INVESTOR TOUR 2016
SEPTEMBER 2016

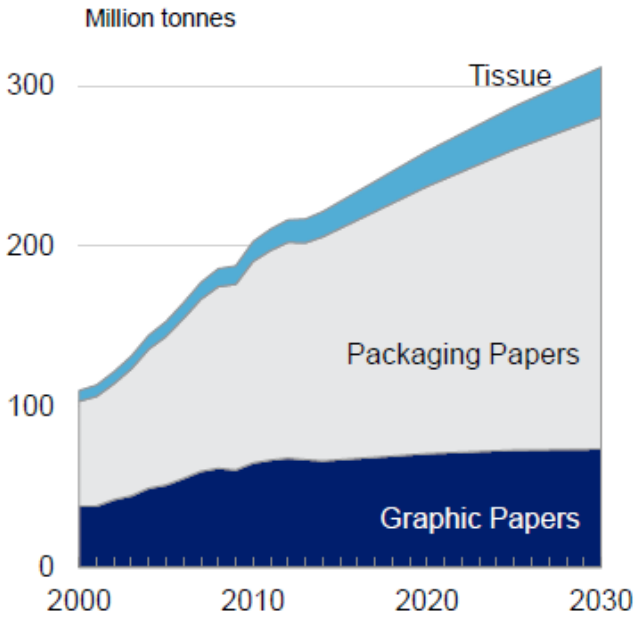
"What drives the demand for Market Pulp?"

Demand is not a concern. Tissue, packaging and China leading healthy growth ahead.

Total Paper & Board Demand in the "West"



Total Paper & Board Demand in the "East"



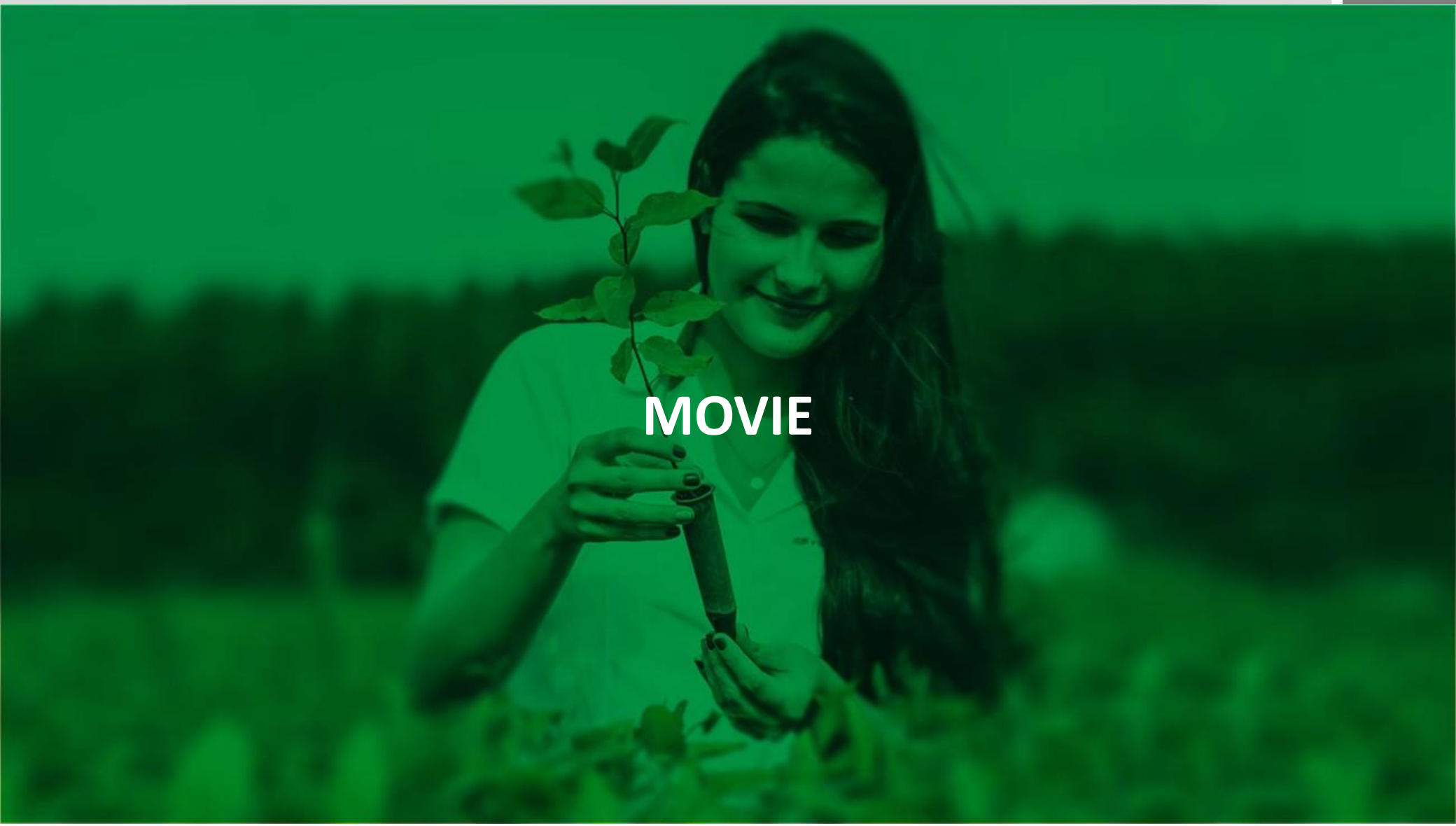
West = North America, Western Europe, Japan, Oceania
East = All other world regions

PÖYRY

FIBRIA INVESTOR TOUR 2016
SEPTEMBER 2016

"Where will the Supply come from?"

- ✓ **ASIAN PULP INDUSTRY HAS GROWN, BUT BASED ON INCREASING DEPENDENCE ON IMPORTED WOOD CHIPS. CHINESE WOOD DEFICIT MAY INCREASE FURTHER.**
- ✓ **SOUTH AMERICA REMAINS THE KEY SUPPLIER OF NEW PULP VOLUMES FOR THE FORESEEABLE FUTURE.**
- ✓ **WE WILL NEED AFRICA SOMEDAY (HUGE SOCIAL CHALLENGES).**
- ✓ **BHKP MARKET PULP A HUGE POTENTIAL TO SUBSTITUTE OTHER FIBRES.**
- ✓ **MARKET BALANCE WILL BE FOUND VIA EXITS, PROJECT DELAYS AND MORE DISCIPLINE.**


MOVIE

Três Lagoas – Mato Grosso do Sul – 1,300 thousand t/year

Jacareí – São Paulo – 1,100 thousand t/year

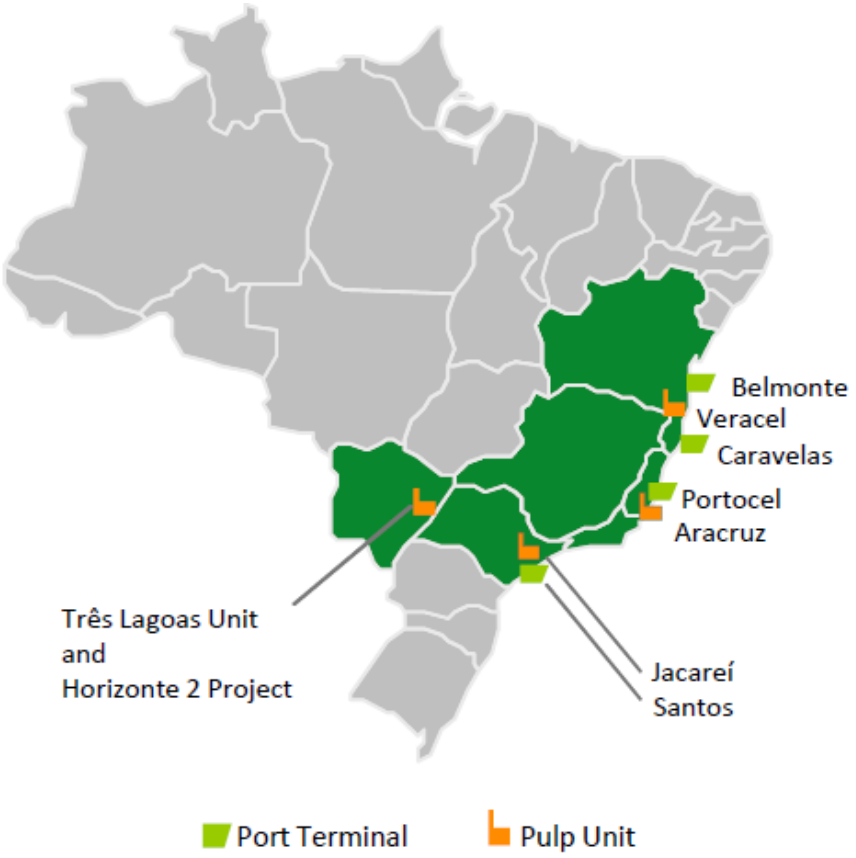
Aracruz – Espírito Santo – 2,340 thousand t/year

Veracel – Bahia – 560 thousand t/year *

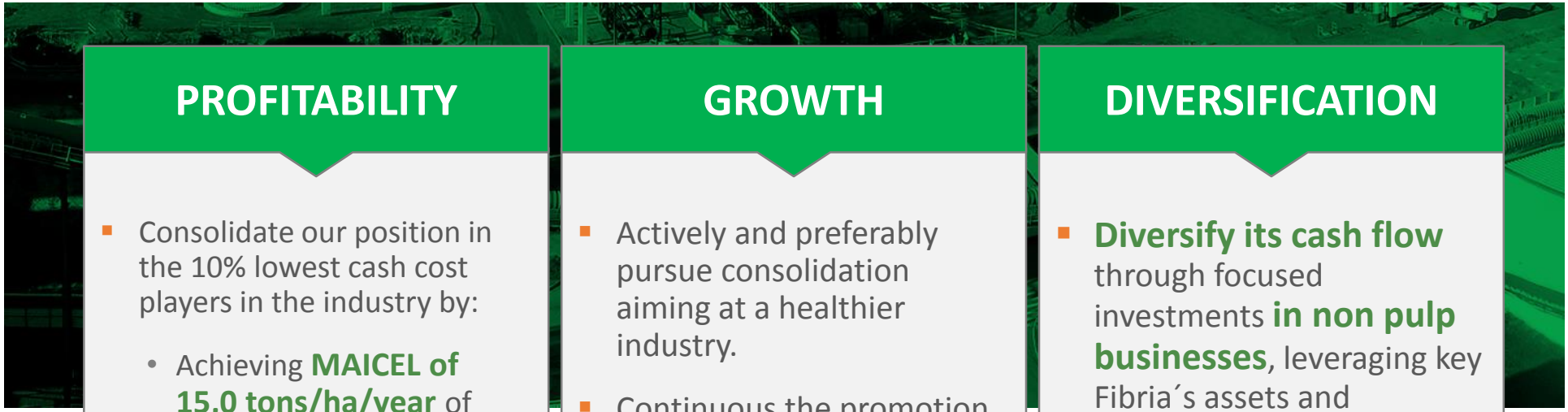
* Veracel is a joint venture between Fibria (50%) and Stora Enso (50%) and the total capacity is 1,120 thousand ton/year

"What are the main threats to Fibria?"

- ✓ **CLIMATE CHANGES**
- ✓ **COMPETITION**
- ✓ **BRAZIL**
  - **COSTS ON THE RISE**
  - **POLITICAL INSTABILITY**
  - **LOGISTICS**



Key Aspirations



PROFITABILITY

- Consolidate our position in the 10% lowest cash cost players in the industry by:
  - Achieving **MAICEL of 15,0 tons/ha/year** of pulp by 2025 for new planted forests.
  - Pursuing a minimum of **10% of differentiated pulp volume** priced with a premium.

GROWTH

- Actively and preferably pursue consolidation aiming at a healthier industry.
- Continuous the promotion of growth through expansions and partnerships in a disciplined way.
- Maintain **active "healthy and safe" forest formation** to be ready for growth opportunities.

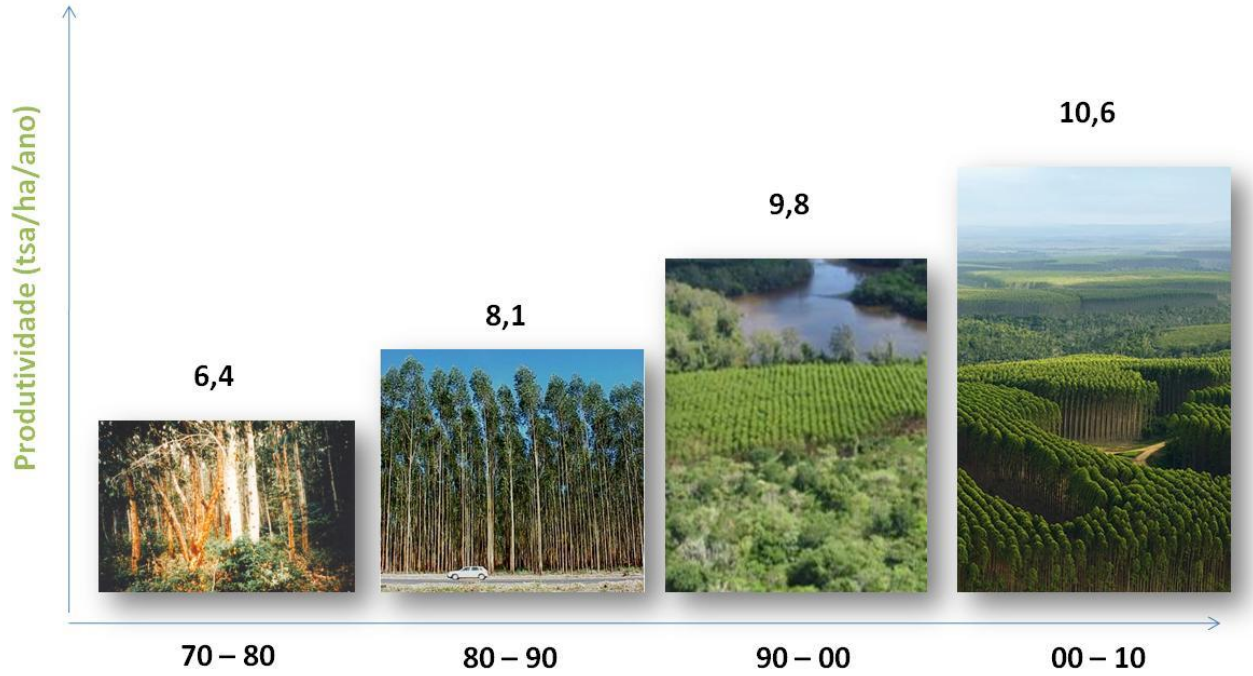
DIVERSIFICATION

- **Diversify its cash flow** through focused investments **in non pulp businesses**, leveraging key Fibria´s assets and competencies.
- Achieve a sizable free cash flow **from new businesses in comparison with pulp business**.

Technological Innovation in the Core of Business Strategy

(0,7% of net revenues, 140 people, 38 researchers)

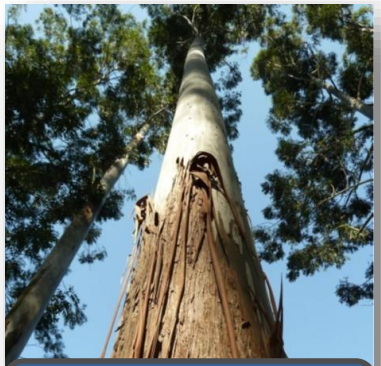
"Profitability: MAICEL of 15,0 tons/ha/year of pulp by 2025 for new planted forests"



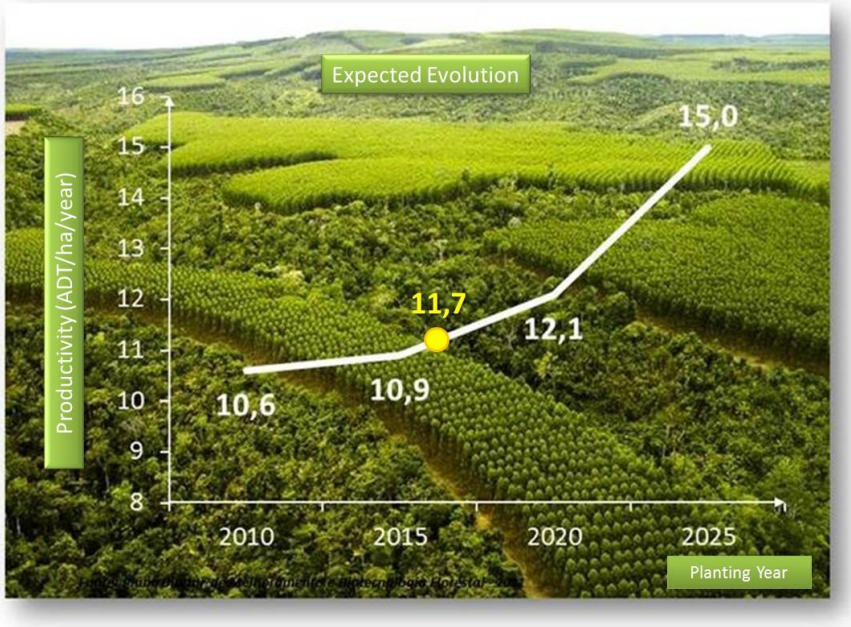
Technology and Innovation contribution:

- ***Species and provenances selection ("E. urograndis").***
- ***Vegetative propagation in commercial scale (The Marcus Wallenberg Prize - 1984).***
- ***Superior clones from initial recurrent selection cycles.***
- ***Spacing x rotation age optimization.***
- ***Fertilization based on nutritional balance for each plantation block.***
- ***Integrated management of pests and diseases, including biological control.***

"Profitability: MAICEL of 15,0 tons/ha/year of pulp by 2025 for new planted forests"



Expected yield (adt/ha/year) for new clones effectively planted each year



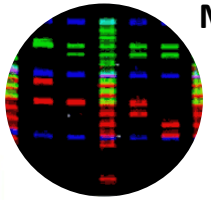
- *MAICel (adt/ha/year):*
  - *Volume (m3/ha/year): adaptation, including tolerance to biotic and abiotic stress.*
  - *Specific Consumption (m3/adt): basic density (Kg/m3) and pulp yield (%).*

$$SC = \frac{(1 - pulp\ moisture)}{BD\ x\ PY\ x\ (1 - total\ losses)}$$

- *Product Quality:*
  - *Density (Kg/m3).*
  - *Fiber Morphology (N fibers / gram, fiber length, etc).*

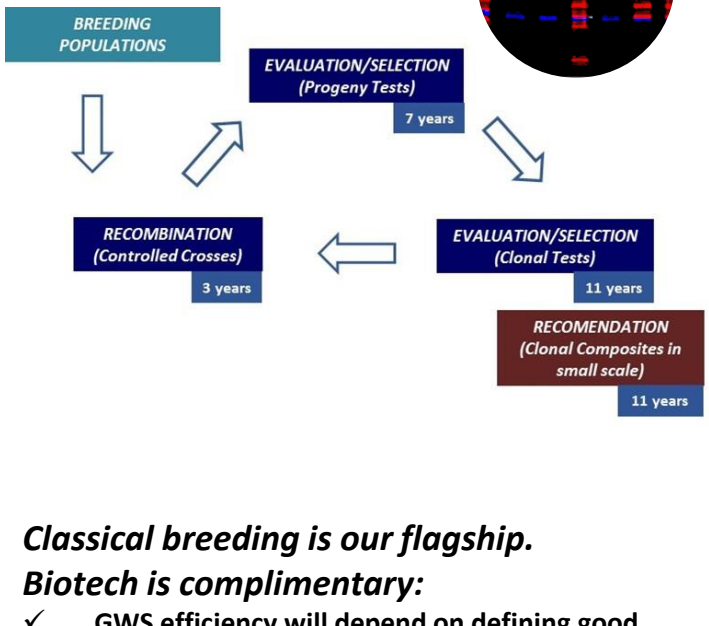
Quantitative Traits !!

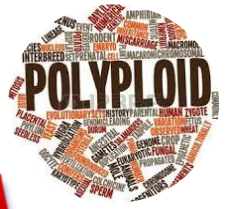
"Profitability: MAICEL of 15,0 tons/ha/year of pulp by 2025 for new planted forests"



Molecular Markers

GWS: If it works, there will be a four year reduction in breeding cycles !!





Polyploids

Genetic Transformation

SweTree Technologies
Innovators in Forest Biotechnology

Genome Edition

KeyGene

Classical breeding is our flagship.

Biotech is complimentary:

- ✓ **GWS efficiency will depend on defining good enough base populations for long term application, good phenotyping (training populations as "clonal progeny tests" for increasing h2) and modelling.**
- ✓ **Agro Crops: commercial transgenic cultivars so far limited to qualitative traits.**

"Profitability: MAICEL of 15,0 tons/ha/year of pulp by 2025 for new planted forests"

Challenge: managing GE in a Climate Change context …

Brazil, 2007-2016: changes in BA State rainfall and temperatures patterns caused local eucalypt clones inadaptability (Physiological Disturbance).

Aracruz Unit 2016: severe drought in ES and BA States.

"Profitability: MAICEL of 15,0 tons/ha/year of pulp by 2025 for new planted forests"

6437
(Susceptible)

6791
(Tolerant)

New (adapted) clones tolerant to Disturbance in Bahia State !

New drought tolerant clones in Minas Gerais State (out of current plantation areas)!

Managing GE:

- ✓ Ignore it: selection based on the clones overall mean performance (stable clones).
- ✓ Exploit it: selection based on local performance (specific clones).
- ✓ Reduce it: target environments are grouped in more homogeneous zones in which GE is not significant.
- ✓ **All above options.**

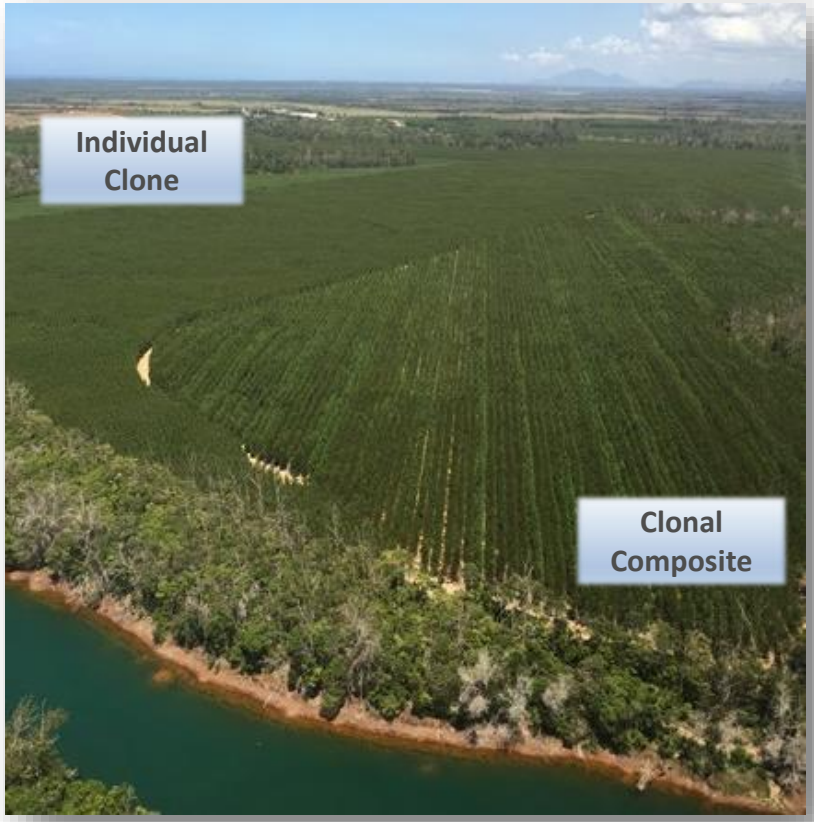
"Profitability: MAICEL of 15,0 tons/ha/year of pulp by 2025 for new planted forests"

Clonal Composites mitigating GE effects !

Nursery

- 10-20 clones / composite.
- Balanced mix at expedition still needs optimization.

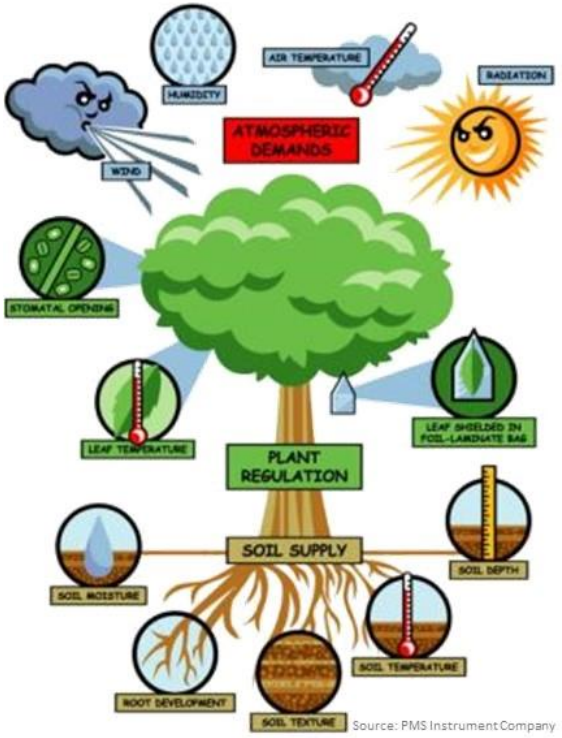
Field

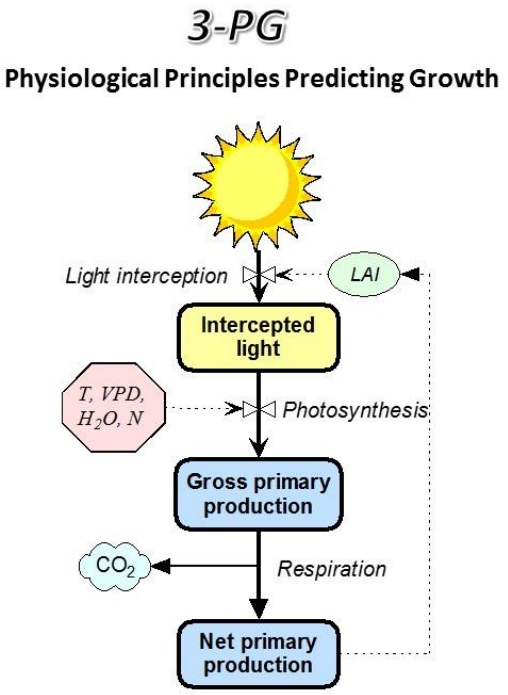


- Over 11,000 ha already planted.
- Growth and uniformity similar to monoclonal plantations.
- We currently recommend 16 individual clones and 11 clonal composites (116 different clones) = 132 clones total.
- **Overall genetic variability at plantation level increased 8x. Genetic variability within blocks increased 10-20x.**

"Growth: Active "healthy and safe" forest formation"

- From a solid climate, soil and forest physiology data base, we support forest management optimization and generate more efficient plantations regarding natural resources utilization.
- Furthermore, we are able to better understand and anticipate the expected effects of climate change on the Eucalyptus growth.





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"Growth: Active "healthy and safe" forest formation"

FIBRIA'S INTEGRATED SYSTEM FOR FOREST PROTECTION

INTEGRATED PEST MANAGEMENT

- ***Use of biological control and genetic resistance*** *in order to avoid losses through the forestry chain and the use of chemical pest control.*

BIOLOGICAL PEST CONTROL METHODS

CLONAL RESISTANCE TO MAJOR DISEASES

WEED : SPECIFIC SYSTEM TO SUPPORT CONTROL DECISION

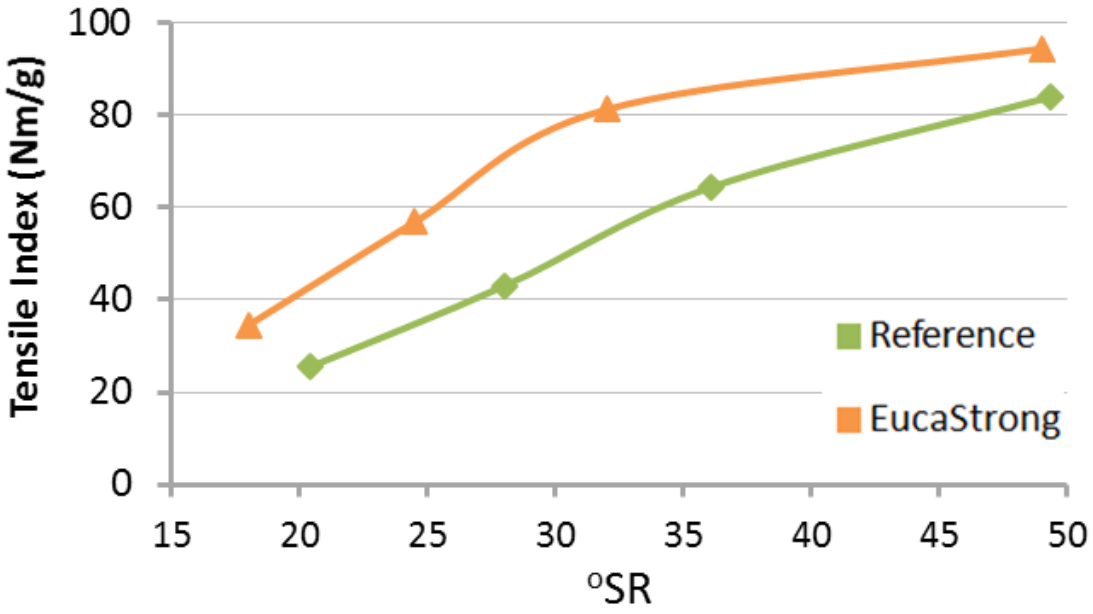
DETECTION AND FIRE COMBAT

✓ *Aligned with legal aspects and the best practices under certification processes and social demands !*

"Profitability: 10% of differentiated pulp volume "

EucaStrong™

- Provide improved mechanical properties (strength) without jeopardizing bulk or drainability (classical trade-offs).
- Fibria's exclusivity on the process additives (co-development with upstream suppliers).
- IP secured by 2 patents.
- Product cleared for human and food contact by both FDA and BfR XVI.



"Diversification: non pulp businesses"

Prioritized Paths

- PYROLISIS
- LIGNIN
- NANOCELLULOSE
- BIOCOMPOSITES

Adding value with Lignin Business Development

LIGNIN

BURNED FOR ENERGY

Currently lignin is burned as fuel

VALUE ADDED PRODUCTS

Potential to apply lignin to other value-added uses

Acquisition of Lignol in 2014 accelerates time to market

Human Resources	Patent and Research Portfolio	Equipment
▪ 10 full time employee ▪ Full integration with Technology Center in Brazil (kraft + Organosolv)	▪ 20 existing patent families ▪ 85 patents ▪ More than 10 years of research data	▪ Full equipped labs ▪ Pilot plant on Organosolv process

Fibria

OBRIGADO !!