ABTCP 2015 48º CONGRESSO E EXPOSIÇÃO INTERNACIONAL DE CELULOSE E PAPEL

48º CONGRESSO INTERNACIONAL DE CELULOSE E PAPEL
1ª CONFERÊNCIA IBEROAMERICANA SOBRE BIOECONOMIA

HOW BRAZILIAN PULP MILLS WILL LOOK LIKE IN THE FUTURE?

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REALIZAÇÃO ABTCP

CORREALIZAÇÃO IPEF

A challenging project

Imagine you were recently hired by a major pulp company and you are given the following project:

"How our pulp mills will look like in the future?"

A guideline for future investments

(to be delivered to our C-level managers)

Current scenario:

- Modern kraft pulp mills
- Bleached eucalyptus market pulp
- Fiber lines with production capacity ranging from 1 to 1.5 MM adt/yr
- Operational excellence in forest, manufacturing, and logistics activities
- High energy/environmental efficiency - very competitive cash cost
- **Today biorefinery is an additional opportunity for a growing eucalyptus pulp industry**

Structuring the project

Guidelines

to support informed and systematic decisions about the design of future mills, and retrofit of existing ones.

Major trends in the Brazilian pulp industry

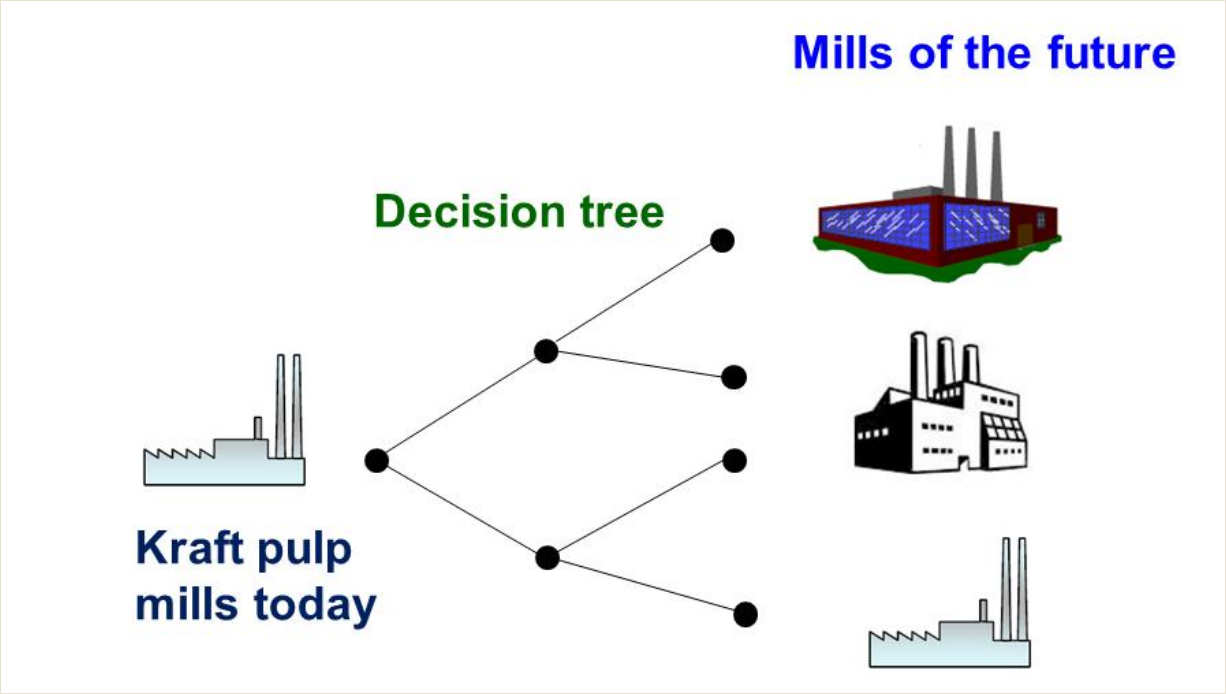
Power generation *vs* New products

Aspects related to product diversification

Structuring the project

Definition of the main line of reasoning

A sequence of strategic decisions will lead to different types of mills in the future



Leading to an open-ended response to the project question

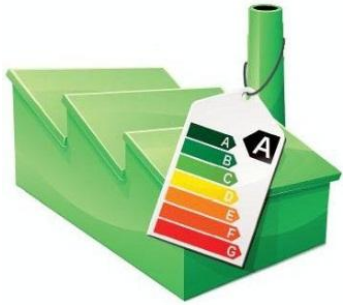
1 – Identification of trending changes in pulp mills

Long-term competitiveness

Corporation growth and business expansion

Environmental sustainability

Increasing forest productivity and sustainability



Energy efficiency

New products and technologies

Increased value from by-products and residues

2 - Main strategic decisions: (a) Which product(s)?

- **New business model**
- **Revenues diversification**
- **Corporate transformation**

PRODUCT

- **Commodity thinking** (competition by scale and not differentiation)
- **Risk aversion**

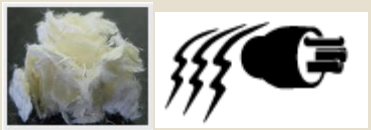
"New businesses"

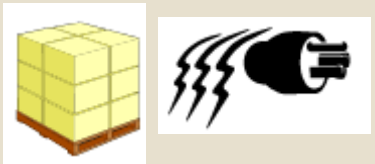
"Business as usual"

Biorefinery products

Specialty pulp

Market Pulp





- Progress ratio of technological learning curves
- Cost reductions (including cost of capital)
- Evolution of emerging markets
- Government incentives

2 - Main strategic decisions: (b) Cogeneration *vs* biorefinery

Different drivers to increase energy efficiency

Mill model: "business as usual"

Market pulp
Differentiated pulp (e.g., dissolving pulp)

drivers ⇨

- **Increase of selling of power to the grid**
- Reduction of cash cost
- Energy self-sufficiency including substitution of fossil fuels (reduction of GHG emissions)

→ **In 2013, Fibria:**

30 MW to the grid
6 USD/adt

~ 5.3 MM adt/yr

Mill model: "new businesses"

Biorefineries (integrated to the mill)

drivers ⇨

- **Increase of surplus biomass to the biorefinery**
- More steam available for the biorefinery (steam availability is an important design constraint)
- Reduction of cash cost and GHG emissions

→ **Lignin**

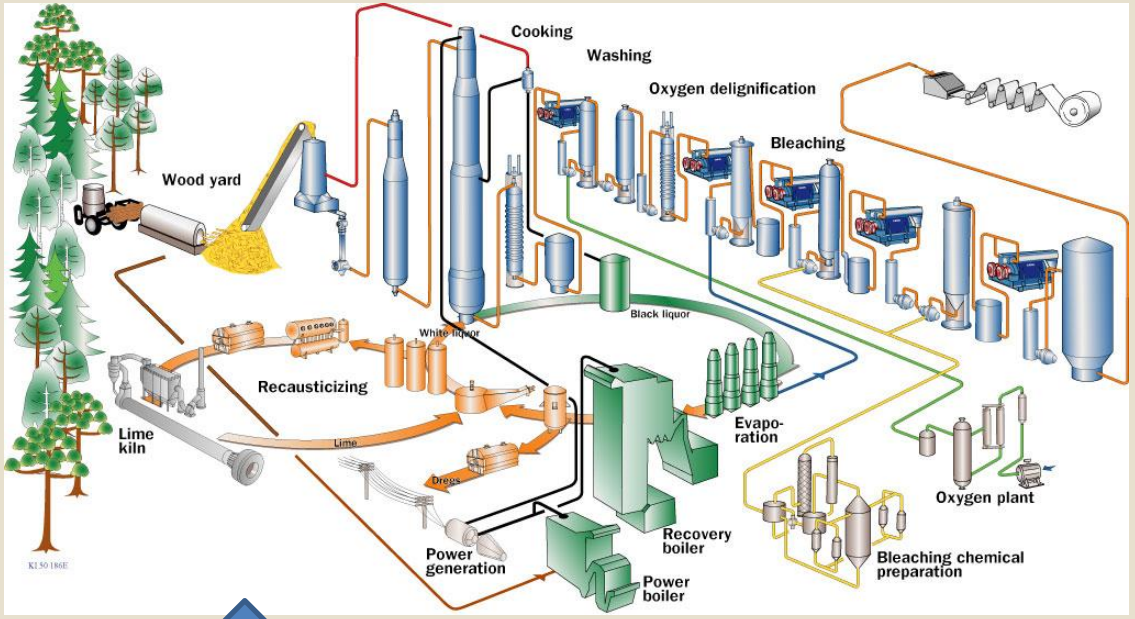
U.S. electricity grid mixture → **0.78 $kgCO_2$-eq/kWh**

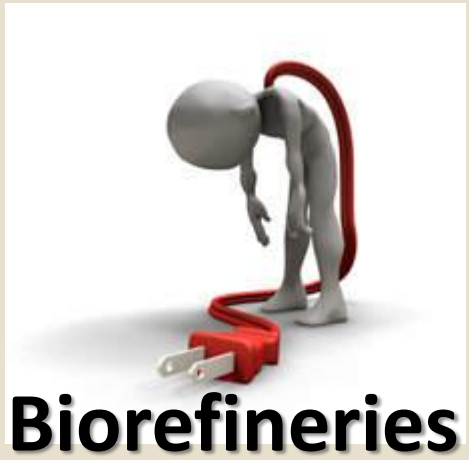
Brazilian electricity grid → **0.096 $kgCO_2$-eq/kWh**

2 - Main strategic decisions:

(c) Which biorefinery strategy? (*if biorefinery is the case!*)

BIOMASS ENERGY

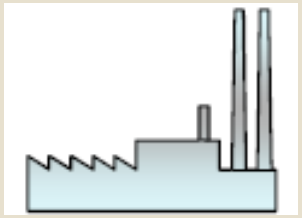




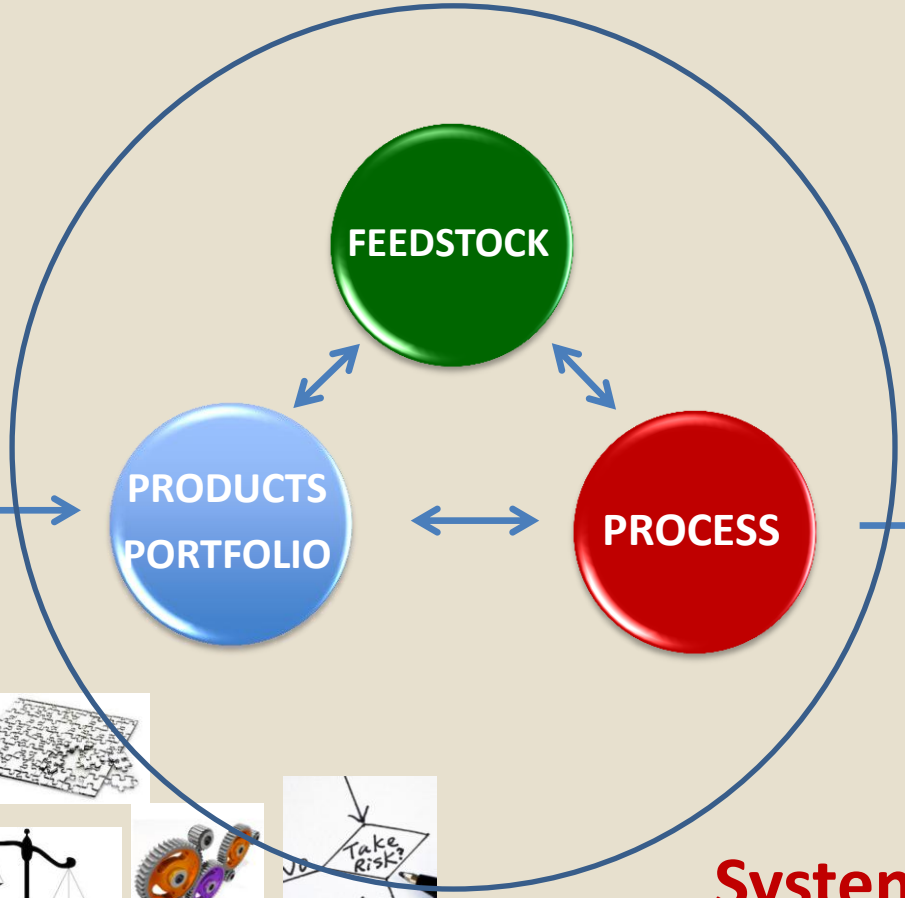
Biorefineries

2 - Main strategic decisions:

(c) Which biorefinery strategy? (*if biorefinery is the case!*)



Current mills



Biorefinery

Systemic approach

PRODUCT PORTFOLIO

Technology

Integration

Design of the product portfolio

Biofuels
- commodity
- high volumes
- competitiveness by cost reduction

Chemicals and specialties
- Value-added / smaller markets
- Lower volumes
- Competitiveness given by functionality and cost

value-added / commodity mix

Technology strategy serving a bold business strategy

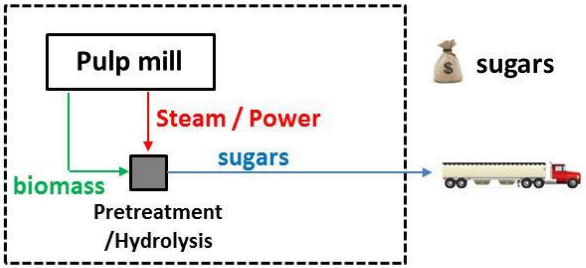
Technologies /process design

Design constraints

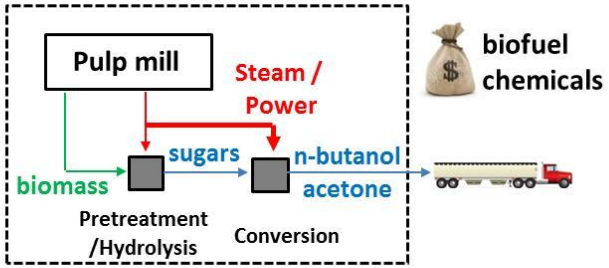
- **Feedstock type and availability**
- **Capital integration / reduction of cash cost of core business**
- **Power and steam demand**
- **Waste water treatment unit**

Business models and energy demand from the host mill

(1) Supplier of lignocelullosic sugars to off-site customers

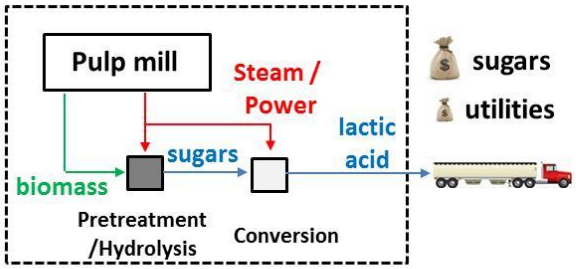


(3) Producer of biofuel/chemicals

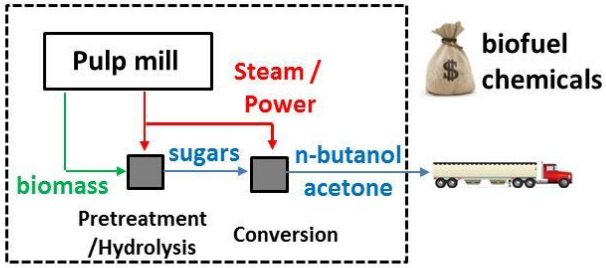


Non-patented conventional conversion technology

(2) Supplier of lignocelullosic sugars to either an on-site or over-the-fence customer (conversion)



(4) Producer of biofuel/chemicals (technology licensee)



Patented advanced conversion technology

Adjust IRR in case energy demand cannot be met by the host mill

Increased technology risk

2 - Main strategic decisions:
(d) How are we going to create value from by-products and residues?

Internal use vs. **New product**

- Energy generation
- Substitution of fossil fuels (reduction on GHG emissions)
- Zero market risk
- Generally, lower ROI
- Reduction of cash cost (core business) in the short term

- New business
- Market risk
- Revenues diversification
- Likely limited economies of scale
- Generally, better ROI
- Reduction of cash cost (core business) in the mid term

Systematic design methodology to create a guideline for future investments

Step 1: Basis for the synthesis of potential solutions

(a) Identification of trending changes in pulp mills

(b) Definition of the main line of reasoning

Step 2: Synthesis of potential solutions: main strategic decisions

(a) Which product(s)?

(b) Cogeneration vs biorefinery

(c) Which biorefinery strategy?

(d) How are we going to create value from by-products and residues?

Step 3: Analysis and Screening

(a) Possible technology-product alternatives and their expected development through the coming years

(b) Critical criteria to be used to eliminate alternatives

Take-home messages

1. **Rupture** from a design with exclusive focus on market pulp and cogeneration may bring additional value for eucalyptus forests and support sustainable business expansions (in both feedstock and product ends)

   Rupture (2): the capacity of a company to evolve from the traditional commodity thinking will be a key business success factor

2. **Success rate** is expected to increase if in the synthesis phase of the design process, priority is given to the definition of candidate product portfolios and implicated business model options

3. **Technological solutions** available for a given product portfolio should be assessed according to their risks and potential integration issues with the host pulp mill, especially the availability and demand of energy

Complete study available in:

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