Ph.D. Program in Bioenergy

Modeling of Sucrose Extraction Process in Industrial Diffusers: Studies with Sugarcane and Energy Cane

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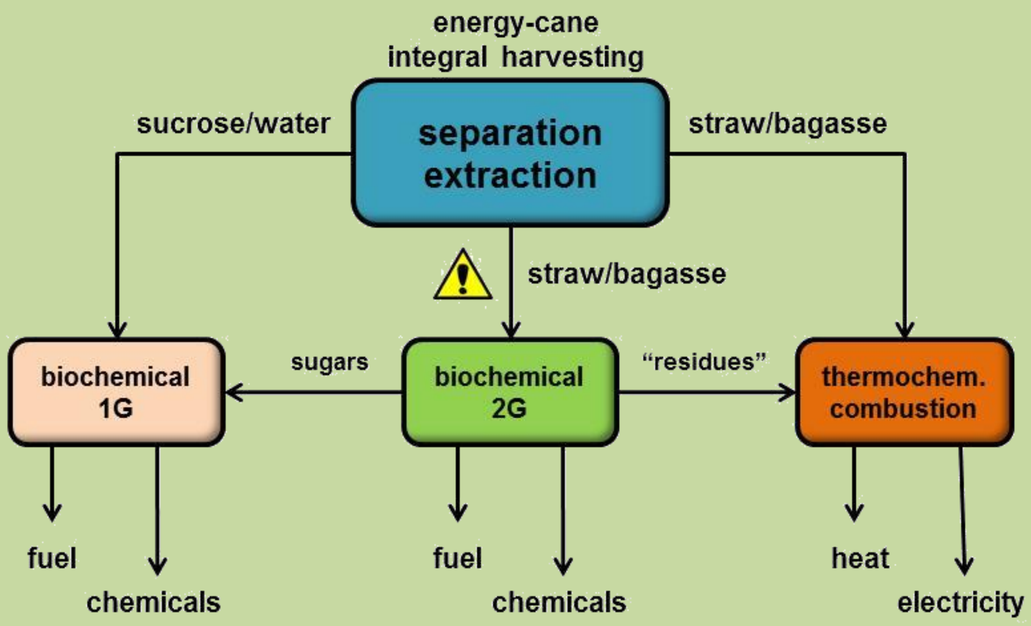
MOTIVATION

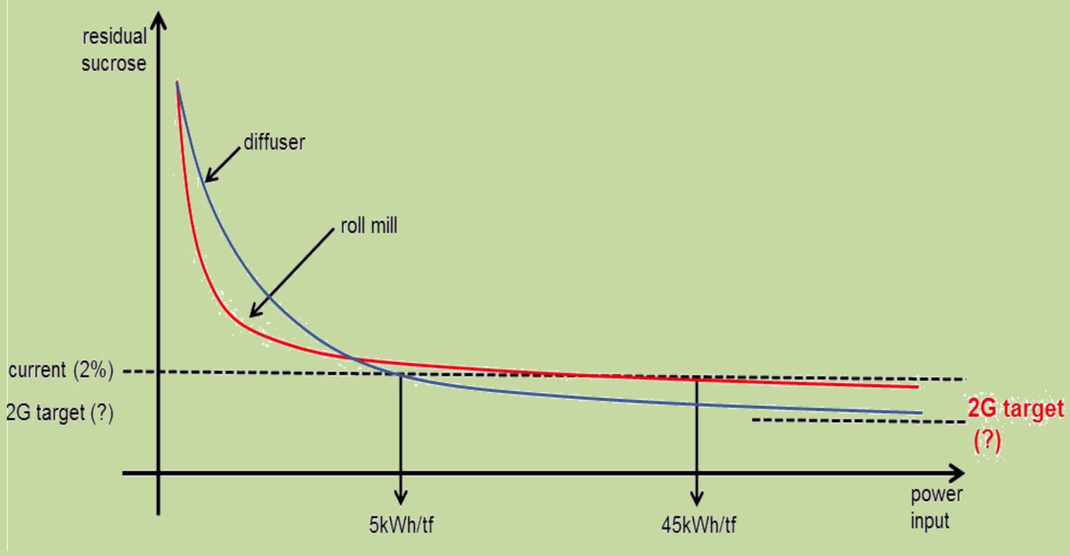
The use of diffusers has shown great results when compared to roll mills:

- **Higher Extraction Efficiency**
- **Lower specific power consumption**
- **Lower MTTR**
- **Bagasse is produced with lower levels of residual sugars**



Very sensitive to residual sucrose !

Extraction: milling and diffusion technologies



Energy Cane

- **A hybrid of commercial sugarcane and wild sugarcane**
- **High fiber content**
- **Low sucrose and water content**
- **Increased productivity per hectare**
- **Larger production cycles**

OBJECTIVES

- To develop an industrial extraction process combining different technologies applicable to different types of biomass: ENERGY-CANE

- Dependence on mechanical preparation of the raw material, extraction efficiencies and energy demands

- Multiobjective optimization of performance

- Experimental tests at bench and pilot scales

- Economic analyses

Experimental Methodology

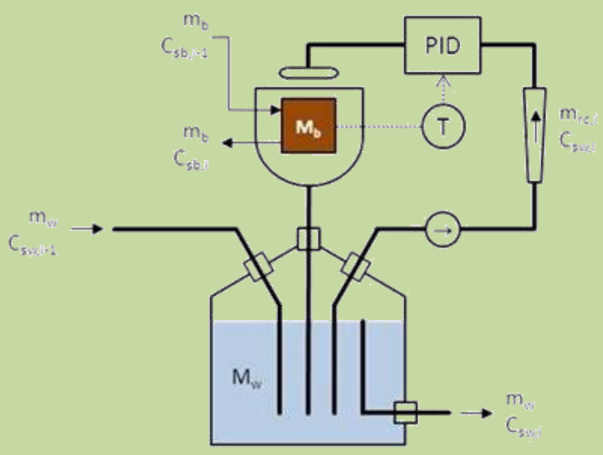
Bench top model (one extraction module)

$$Mb \cdot \frac{dCsb}{dt} = -Q + mb \cdot (Cb - Csb)$$

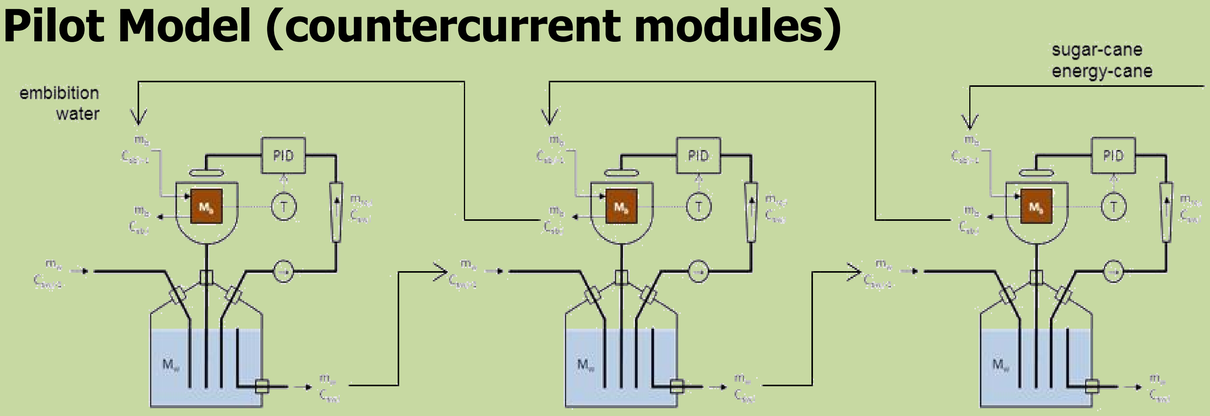
$$Mw \cdot \frac{dCsw}{dt} = +Q + mw \cdot (Cw - Csw)$$

$$Q = \frac{A}{R_{TM}} \cdot (Csb - Csw)$$

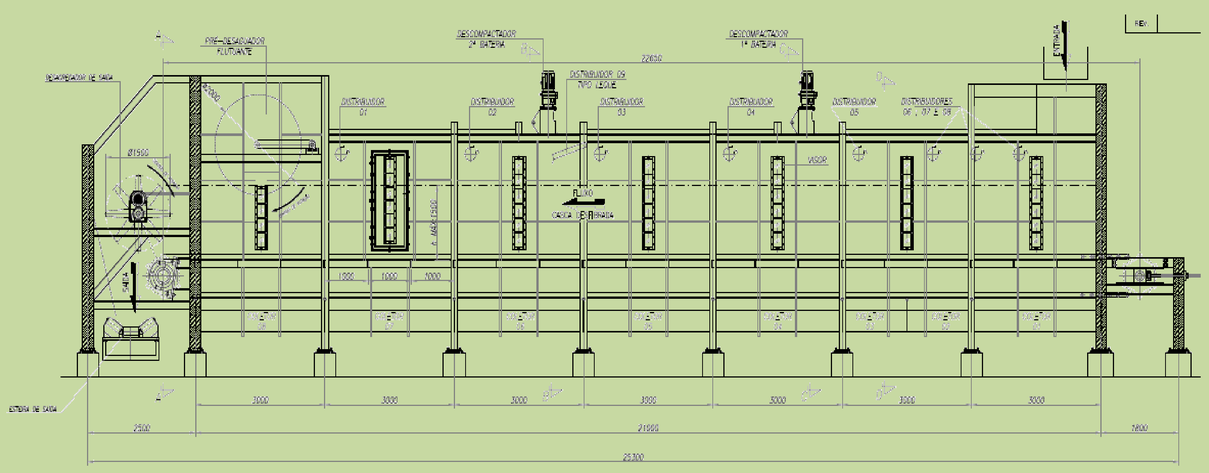
$$R_{TM} = R_{diff} + R_{conv} = \frac{e}{k} + \frac{1}{h}$$



Pilot Model (countercurrent modules)



Industrial Diffuser



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