Innovation Fund Workshop
CEPI – European Commission

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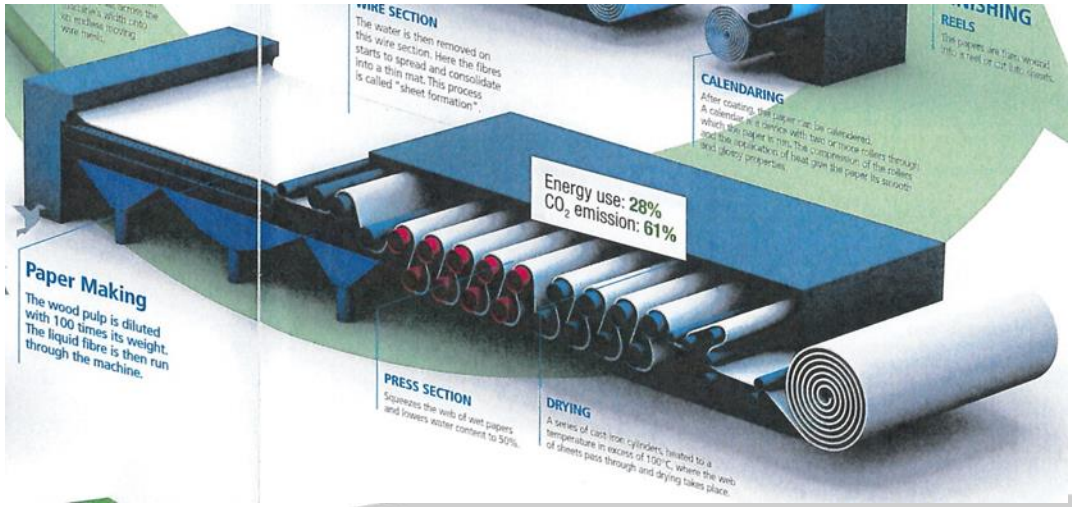
centre technique du papier

- **Reduced water flow evaporation for a given functional paper surface**
- **Heat recovery**
- **Wet lamination of MFC films on paper/board**
- **Chromatogeny on lignocellulosic fibres**

Increase press dryness ➔ reduced water flow evaporation for a given functional paper surface

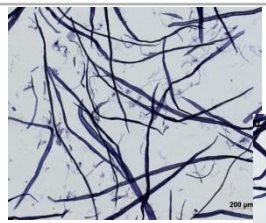
- **CO_2 emissions in the papermaking process (61 % of the whole emission) are mainly due to paper drying (use of gas / fuel oil to produce steam).**
- **Drying energy is directly linked to the press outlet dryness which depends on :**
  - The amount of water to remove (forming consistency)
  - The fibre water absorption
  - The fines content, type and location in the thickness



Source : CEPI
TwoTeam

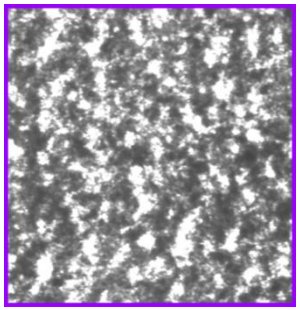
Increase press dryness ➔ reduced water flow evaporation for a given functional paper surface

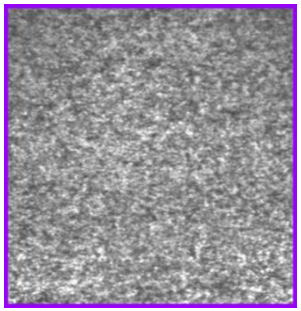
- **CTP's approach focused on :**
  - **Minimising fines release** during pulp manufacturing and its subsequent treatments



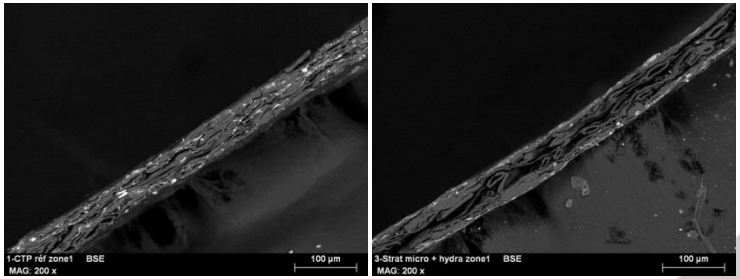
Flexible fibres

Flocculating stiff fibres





  - Treating only stiff fibres to reduce flocculation and **increase forming consistency**
  - **Reduced fibre water absorption** by tailoring fibre hydrophobicity / hydrophilicity
  - **Structuring the sheet** with different layers / fractions allowing to tailor properties and **reduce grammage at identical strength**



Energy in Pulp and Paper industry

PAST

Thermal energy

Heat waste

Paper manufacturing

Specific energy consumption **– 40 %**

TODAY

Optimized thermal energy production

Reduced heat waste

Paper manufacturing

Heat recovery into the process mainly via heat exchanger

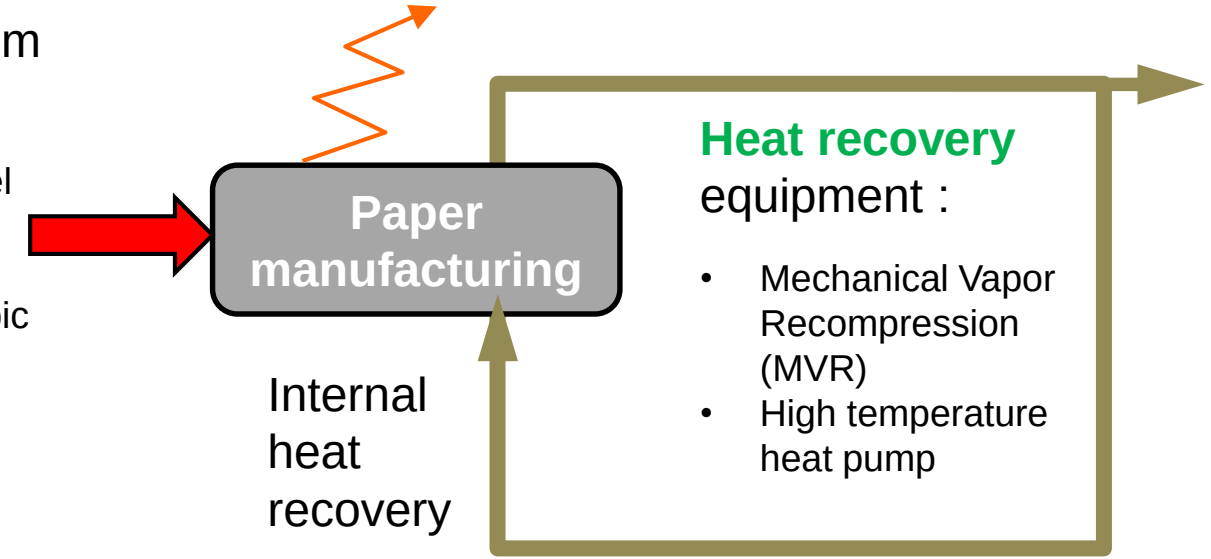
Energy in Pulp and Paper industry

ONGOING AND FUTURE

Low heat waste

Thermal energy from **alternative fuel** :

- Solid Recovered Fuel (SRF)
- Gasification
- Biogas from anaerobic co-digestion
- Etc.



CO2 reduction
Fossil fuel substitution.
By-product valorization.

Specific energy consumption
– 10 % to -20 % potential

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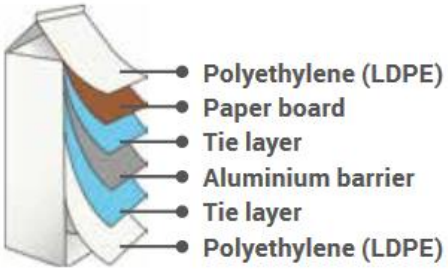
Wet lamination of MFC films on paper/board

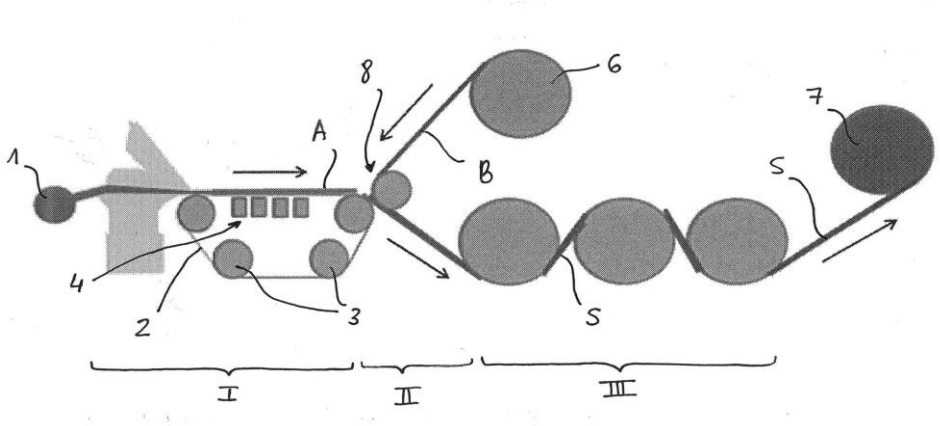
- **Objective : Decrease the CO_2 emissions associated to the use of Aluminum foils in paperbased packaging**
  - ✓ “According to one of our customers, aluminum film carries as much as 50% of the CO2 footprint of their primary packaging material”, Jukka Kankkunen
  - ✓ http://www.storaenso.com/newsandmedia/a-future-for-mfc

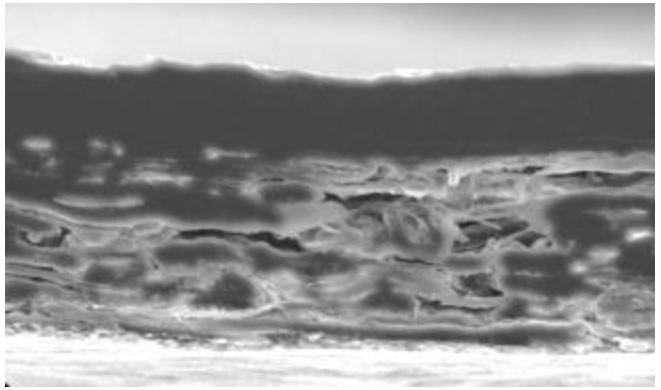


Source
http://www.elopak.com/resources/publications/EnvironmentalReport_2013_LOW.pdf

- **Concept**
  - Use of MFC layers
  - According to a pending technology patent
    - ✓WO 2016174348 A1 - PCT/FR2016/050986
  - “Process and device for manufacturing a laminated material comprising a fibrillated cellulose layer”

Wet lamination of MFC films on paper/board





- **Concept**
  - Filtration of a MFC suspension (I) up to 5 to 20% of dryness
  - Pick up and Lamination of the wet MFC film (II) on a dry paper/board web (6)
  - Drying of the assembly without glue (III)
- **Results**
  - MFC stratified materials with MFC layers thickness in the range of 5 to 20µm

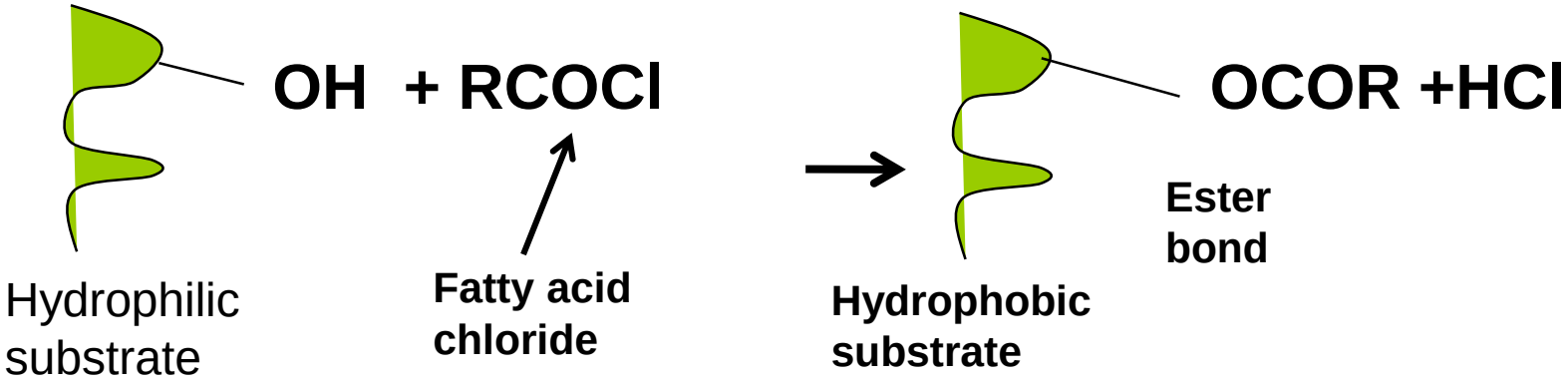
Use of chromatogeny on lignocellulosic fibres

- **Objectives**
  - Reduce energy for dewatering and drying of lignocellulosic fibres by turning them partially hydrophobic
  - Increase the share of lignocellulosic fibres in composite by turning them partially hydrophobic
  - Replace petroleum based chemicals (wet strength agents) by biobased chemicals

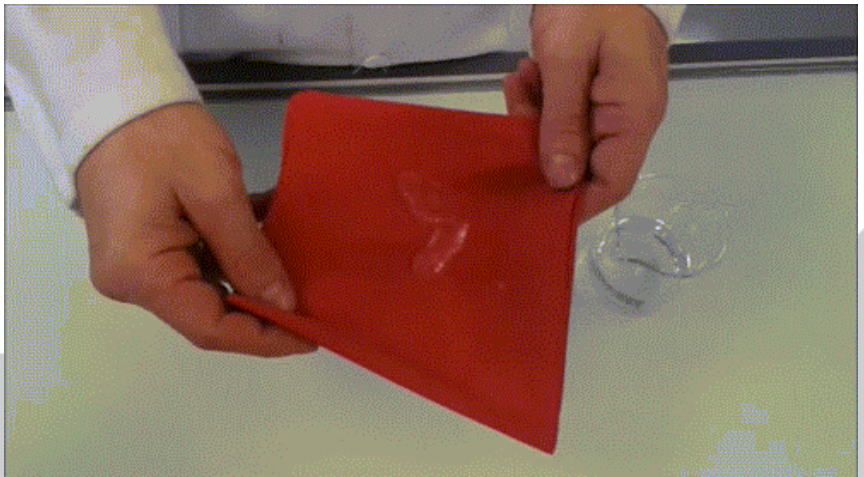
- **Concept**
  - Use of a solvent free chemistry (nammed chromatogeny) to turn fibres of fiber mats hydrophobic
    - ✓A low CO2 emission proven technology

Basic principle of chromatogeny

- **Use the reaction of Fatty Acid Chlorides with hydroxyl groups**
  - Protect water sensitive material by grafting alkyl chain (fatty acid chloride) at the surface of a layer containing OH groups



- **Use the liquid/vapour equilibrium**
  - ultrafast
  - solvent free reaction



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