

## German Pulp and Paper Industry

Overview and latest developments



Mr. Christopher Soldwedel

Eproplan GmbH  
Consulting Engineers  
SchoettfestraÙe 34 A  
D-70597 Stuttgart

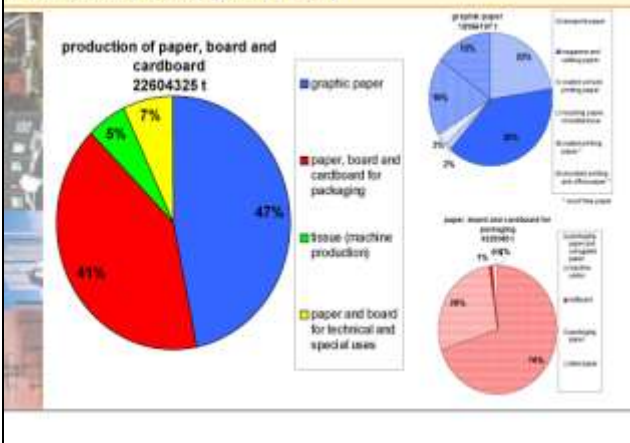
Tel.: +49 (0)7 11 7 69 88-0  
Fax: +49 (0)7 11 7 69 88-51  
e-mail: info@eproplan.de  
Internet: www.eproplan.de

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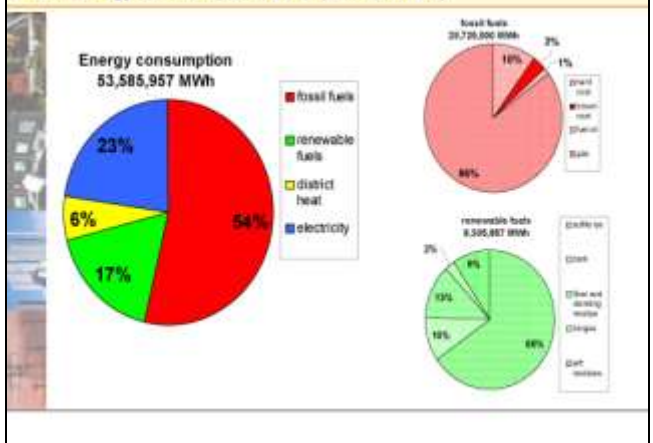
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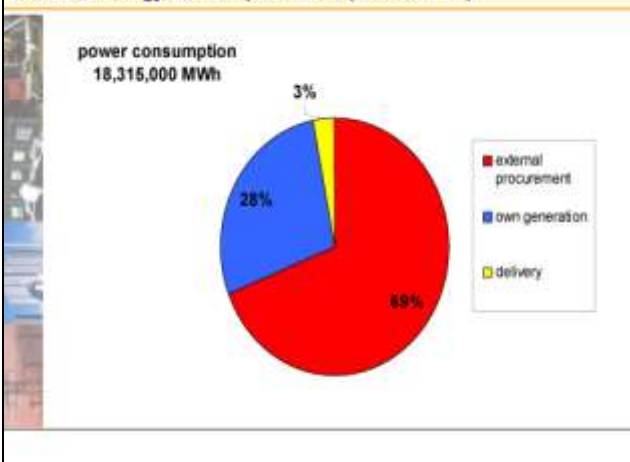
## Production data 2006 (Source VDP)



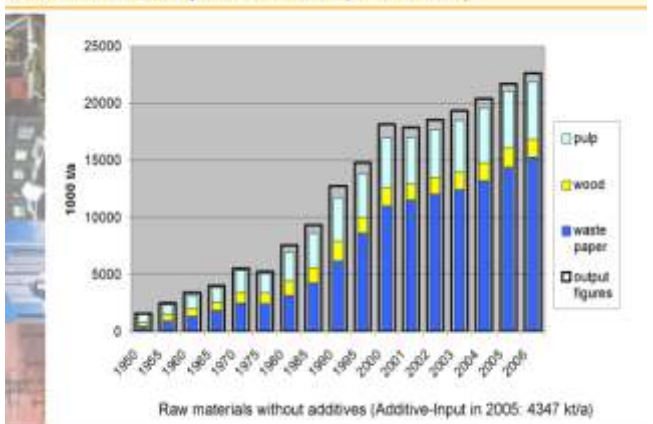
## Fuel / Energy consumption 2006 (Source VDP)



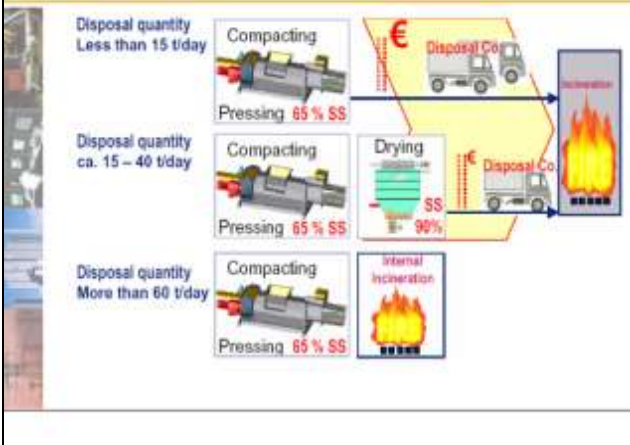
## Electrical energy consumption 2006 (Source VDP)



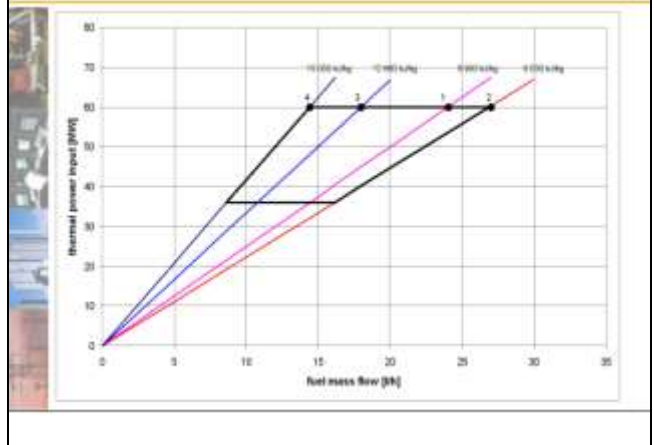
## Raw materials and production data (Source VDP)



### Disposal concepts (Source: Voith)



### Thermal power input diagram



### Steam and condensate system (1)

**Current situation in European paper mills**

- Cascade systems with / without thermocompressors
- Thermocompressor systems mainly in tissue mills
  - High pressure level required (reduction of electrical power generation)
  - Control range of drying capacity is wider than with cascade system

**Typical parameters for the steam and condensate cascade system**

- Return rate of condensate: 80 - 90 %
- Temperature of condensate: 85 - 95 °C
- Blow through steam: 100 kg/h per drying cylinder
- Specific losses end condenser: 5 - 10 % of steam demand

### Steam and condensate system (2)

**Checklist**

- Operation of the equipment
- Pipe configuration
- Differential pressure in the dryers and within the sections
- Insulation and Maintenance

Losses in the end condenser are not 'real' losses at any rate (e.g. heat is used to increase temperature of process water)

### Typical parameters for different hood concepts

	High humidity closed hood	Medium humidity closed hood	Open hood
<b>Exhaust air</b>			
- humidity, g H <sub>2</sub> O/kg d.a.	160 - 180	120 - 140	40 - 70
- temperature, °C	80 - 90	80 - 90	50 - 60
- dew point, °C	61 - 63	53 - 57	37 - 45
<b>Supply air</b>			
- temp into hood, °C	90 - 100	90 - 100	40 - 60
- mass flow, % of exhaust	70 - 80	50 - 70	30 - 50
Typical steam savings compared to open hood, kJ/kg H <sub>2</sub> O	400 - 500	250 - 350	0

- **Advantage of a high due point**
  - Low exhaust air mass flow
  - Low required power for ventilation
  - Low steam demand for heating the supply air
- **due point is too high**
  - condensation in the hood

### Drying Hood

**Checklist**

- Supply air temperature too high (e.g. to avoid condensation in a damaged hood)
  - Supply air temperature is not increasing the performance of the hood but only the temperature of the exhaust air
- Too high supply / exhaust air mass flow (e.g. change of product)
- High leakage air mass flow (e.g. open doors in basement)
- Heat recovery potentials are not completely used
- Insulation and Maintenance

### Measurement for Open Hood



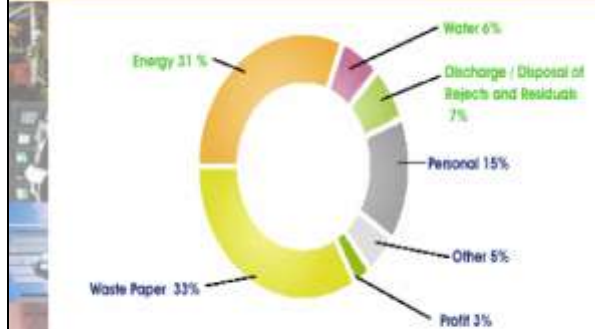
- Installation of plastic roll curtains
- Closing of openings up to 25 m width
- Operating temperature up to 80 °C
- Opening / Closing fully automatic

#### Advantage

- Reduction of leakage air mass flow

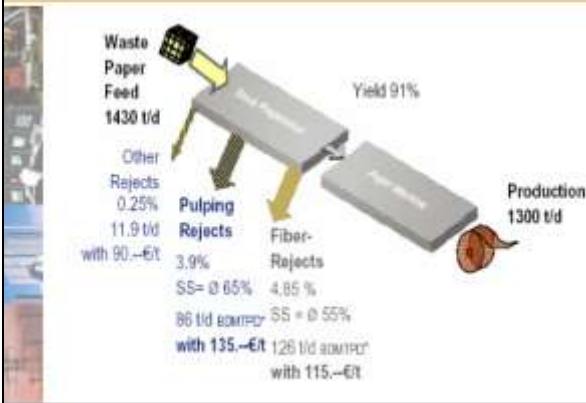
Source: VLP Flexibele Afscheidingen, Netherlands

### Cost structure of European paper mill, brown paper (Source: Voith)



Typical Cost for Energy, Reject and Water is 40 to 44% in Europe in 2006!

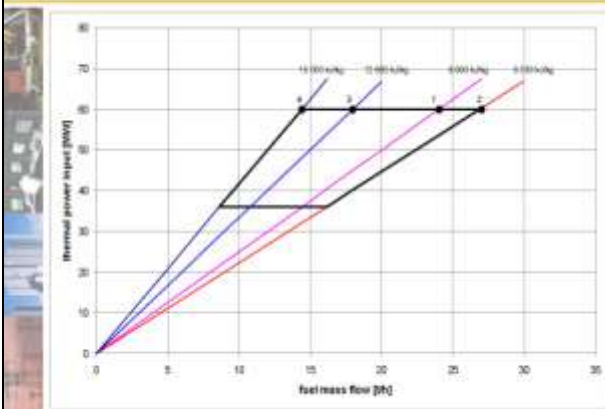
### Rejects and residuals (Source: Voith)



### Incineration of process waste, concepts

- Incineration of rejects in separate boiler
- Available technology from 2 MW (thermal power input)
  - Steam parameters
    - 40 bar, 400 C°
  - Burning rejects with different calorific values difficult
    - Good mixture is required
    - Pre-treatment (drying) of rejects with low calorific value
- Co-incineration of rejects with other fuels (coal, external waste)
- Concepts: Fluidized bed combustion or grate firing
  - Steam parameters
    - > 100 bar, > 500 C° possible but:
    - Chloride content of rejects (high temperature corrosion) may require limitation of steam parameters.
  - Limitation of fuel mixture with grate firing
    - E.g. > 10% of rejects mixed with black coal difficult
    - Required fuel mixed has to be discussed with boiler manufacturer.

### Thermal power input diagram



### Disposal concepts (Source: Voith)

