INTERNAL

Optimal design of bleach plant & global trends

24 Mar 2018

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Vice President Pulp & Energy

Asia pacific

Valmet

Agenda

- Design criteria for bleach plant
- Recent installations
- Operational cost structure globally
- Global trends
  - Raw material utilization
  - Water and effluent volume and quality
- What can be done in India?

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Purpose of the fiberline

Convert wood chips to bleached pulp

Design Criteria for Best Possible Conversion

- **Raw material**
- **Pulp quality**
- **Environmental**
- **Conversion cost**
- **Investment cost**
- **Footprint**

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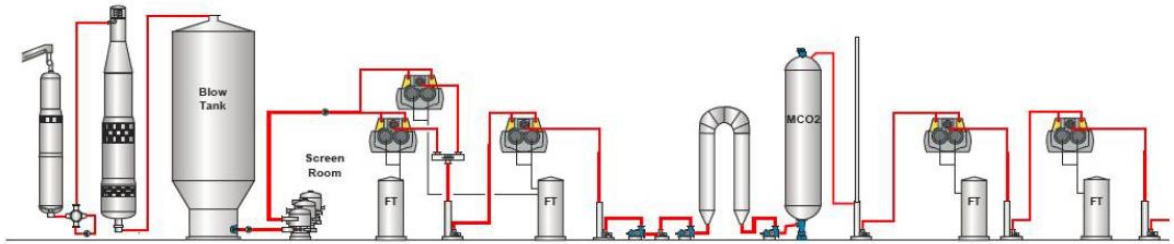
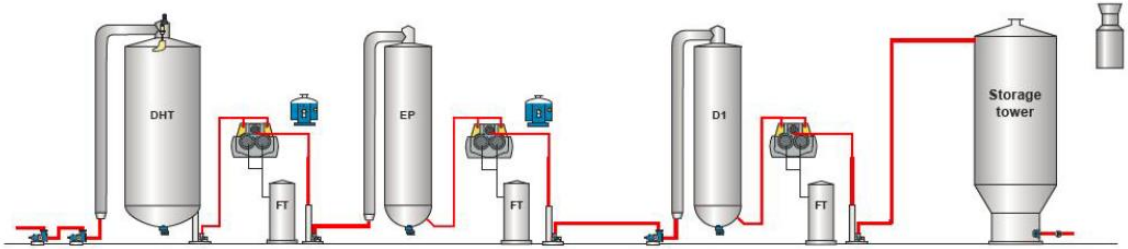
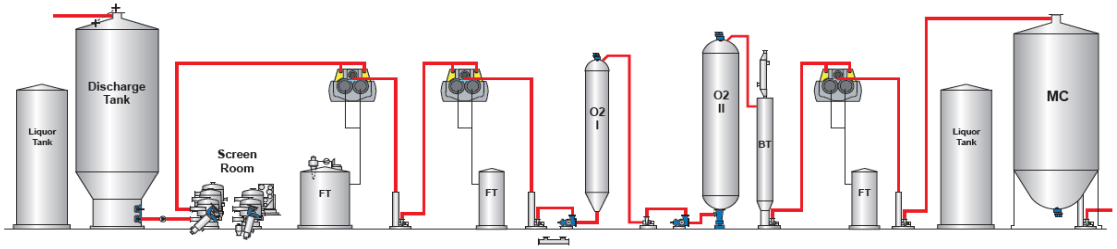
Recent fiberline installations

With 3-stage bleach plant, final pulp brightness 90%ISO

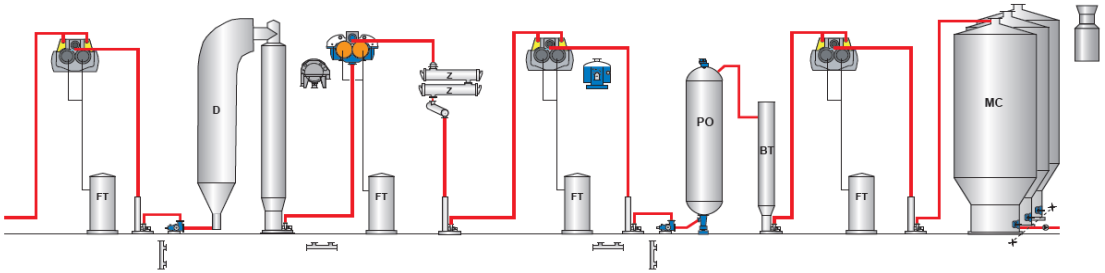


Dht(EP)D



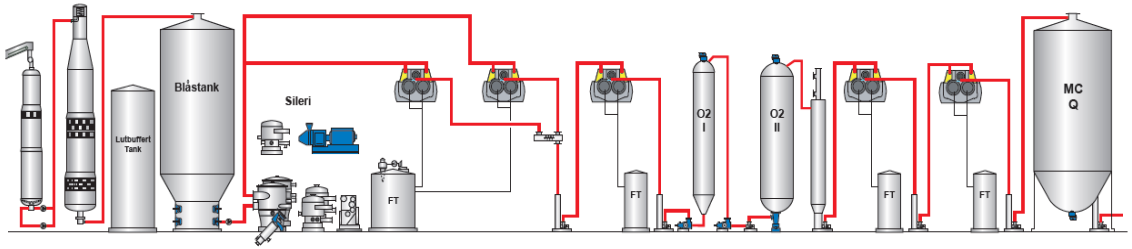


DZ(PO)



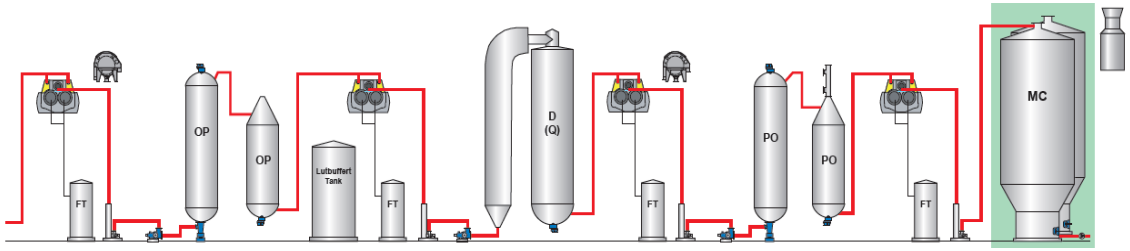
Recent fiberline installations

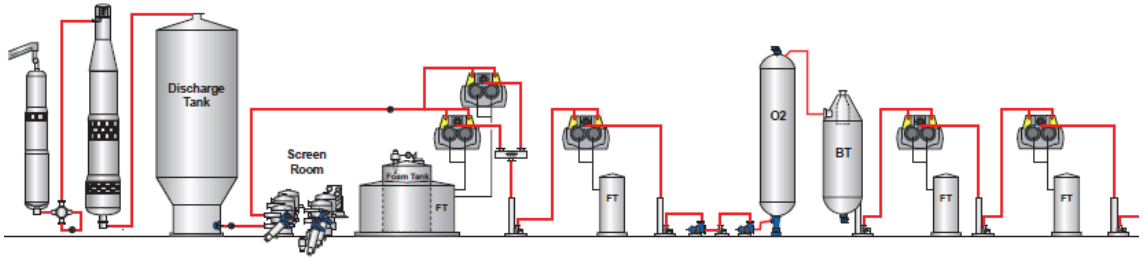
With 4-stage bleach plant, final pulp brightness 90%ISO



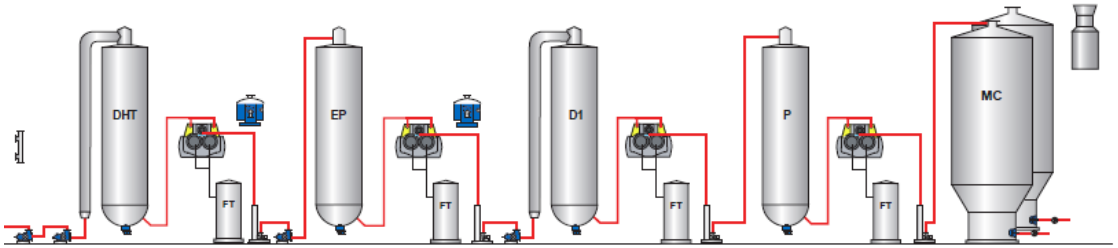
Q(OP)(D)(PO)

Q(OP)(Q)(PO) (86%ISO)



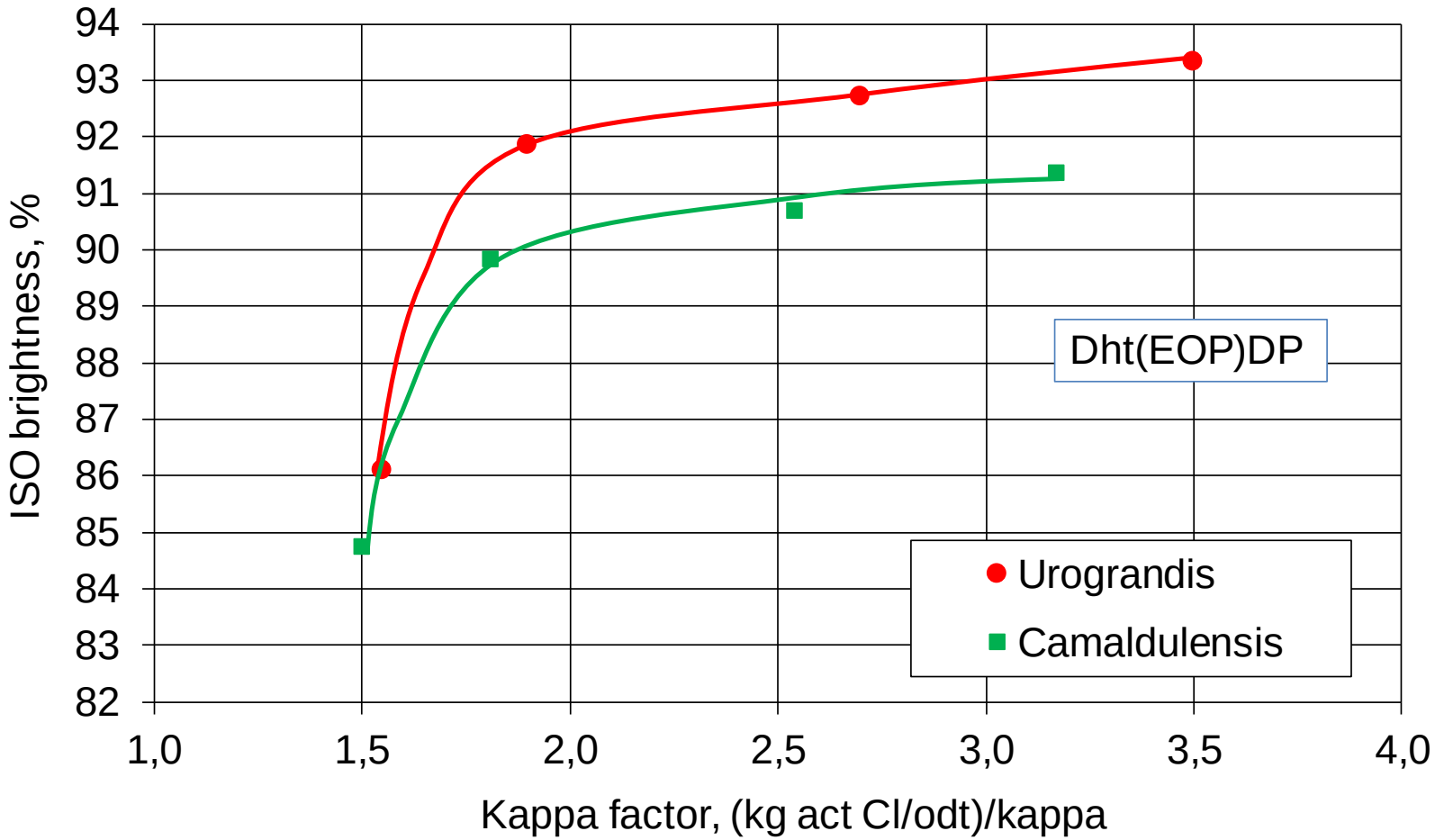


Dht(EP)DP



Raw material & final pulp brightness

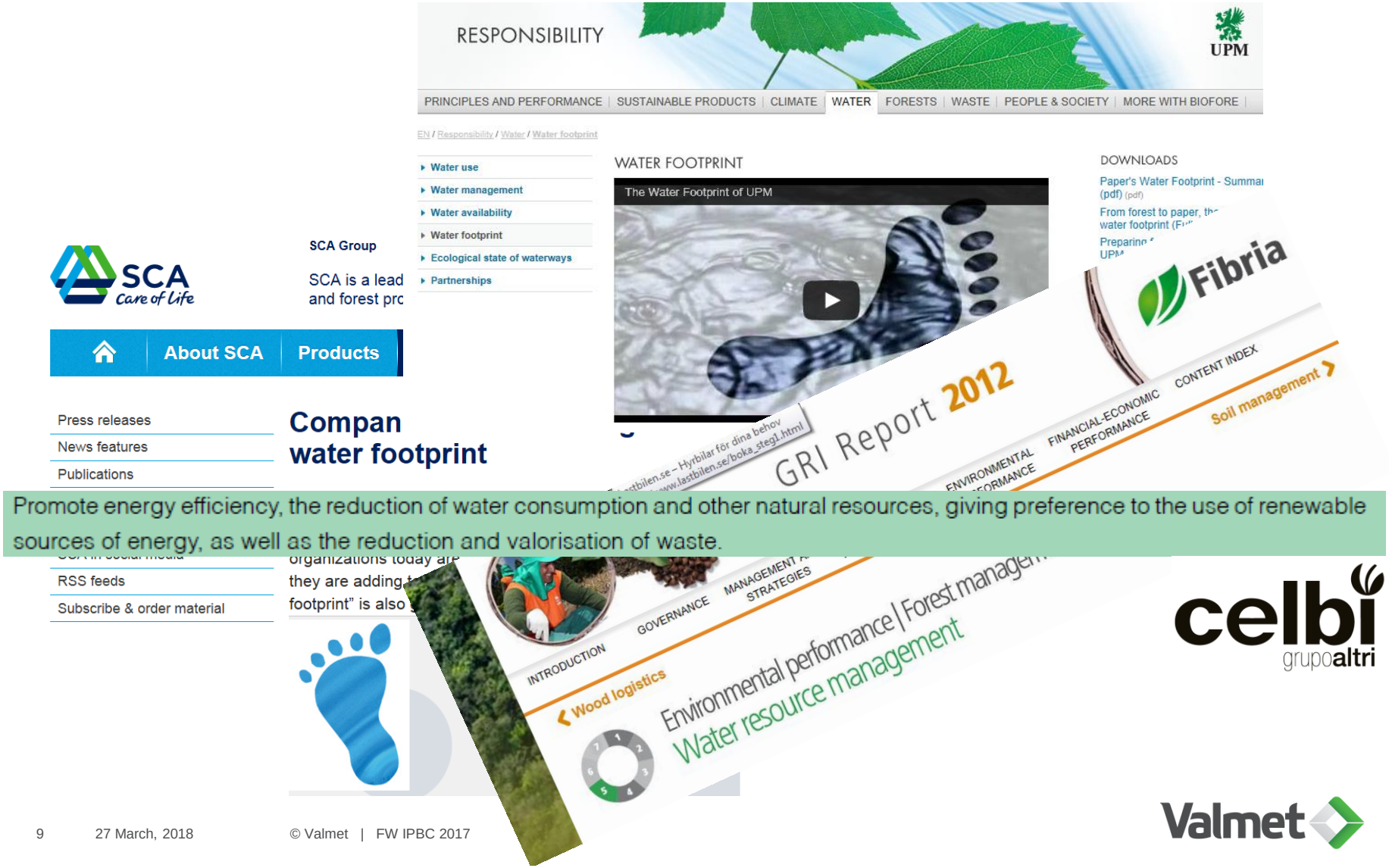
Bleachability for 2 different eucalyptus species



Kappa after oxygen delignifiction: ~ 10
Peroxide charge: 6 kg/Adt

Environmental: Water footprint

Focus area for many large pulp producers



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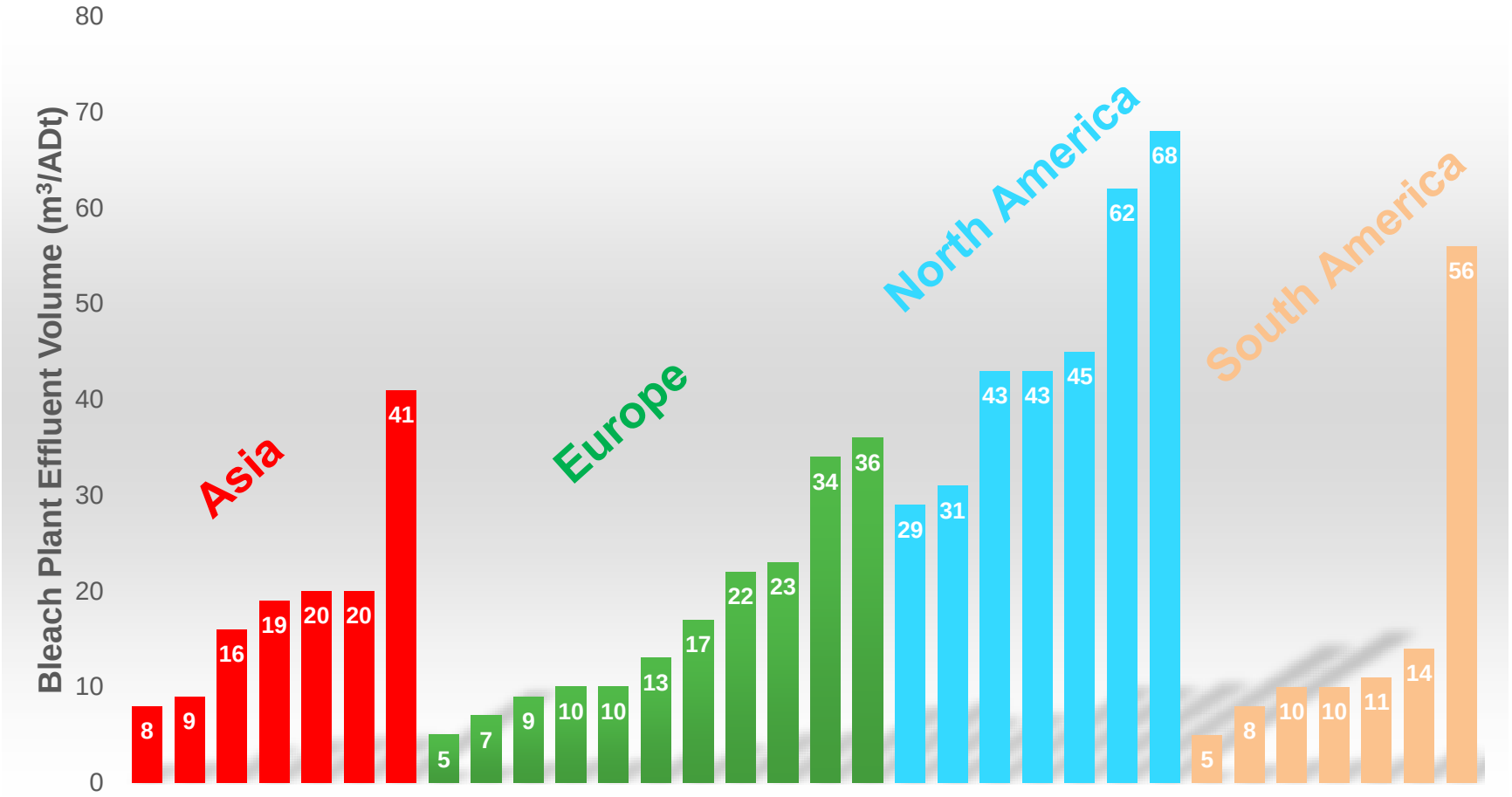
Environmental: Bleach plant effluents

Global view



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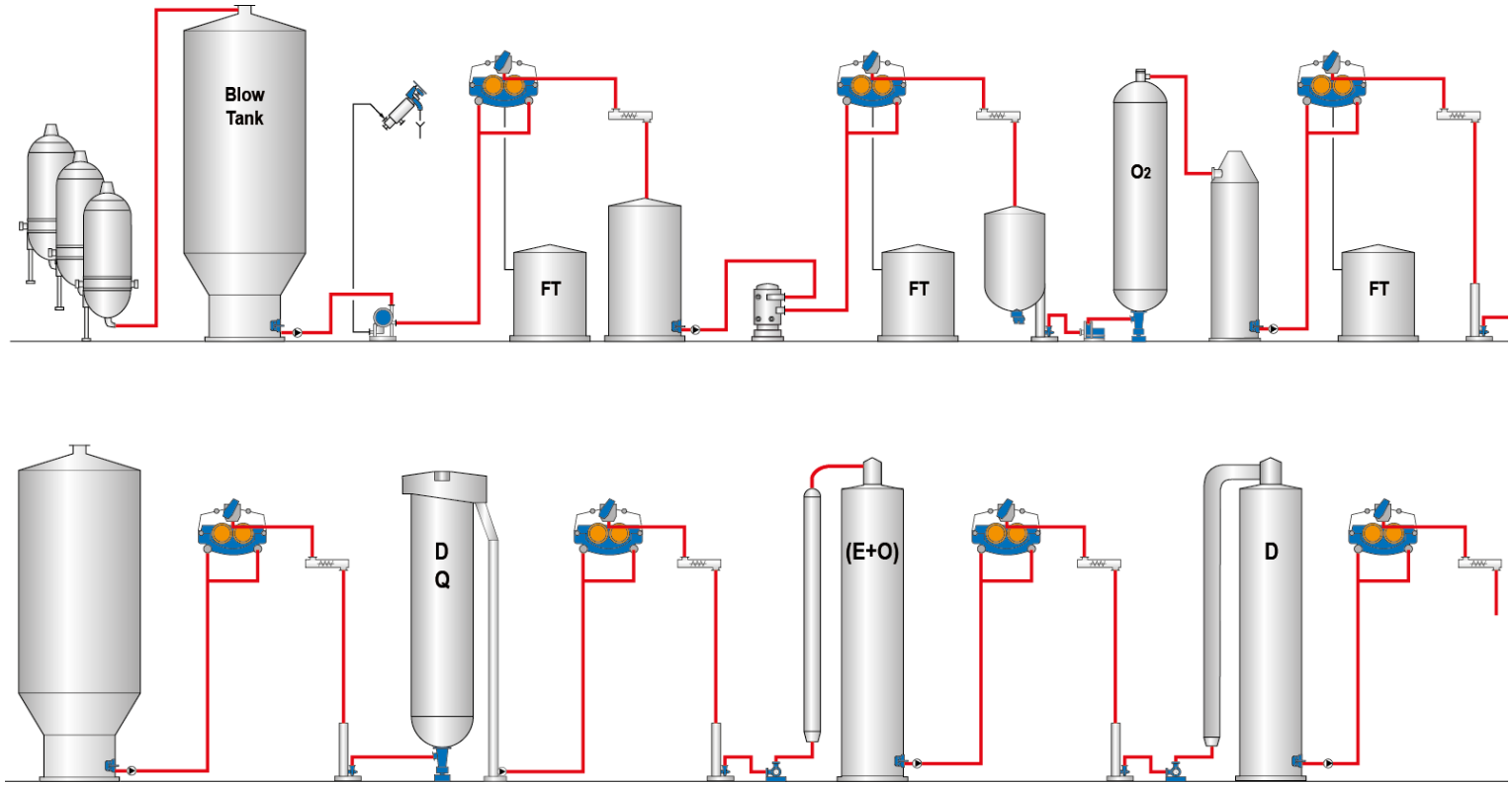
Typical Fiberline late 90's



- Oxygen stage
- Use only ClO_2
- Low effluent < 10 m3/adt

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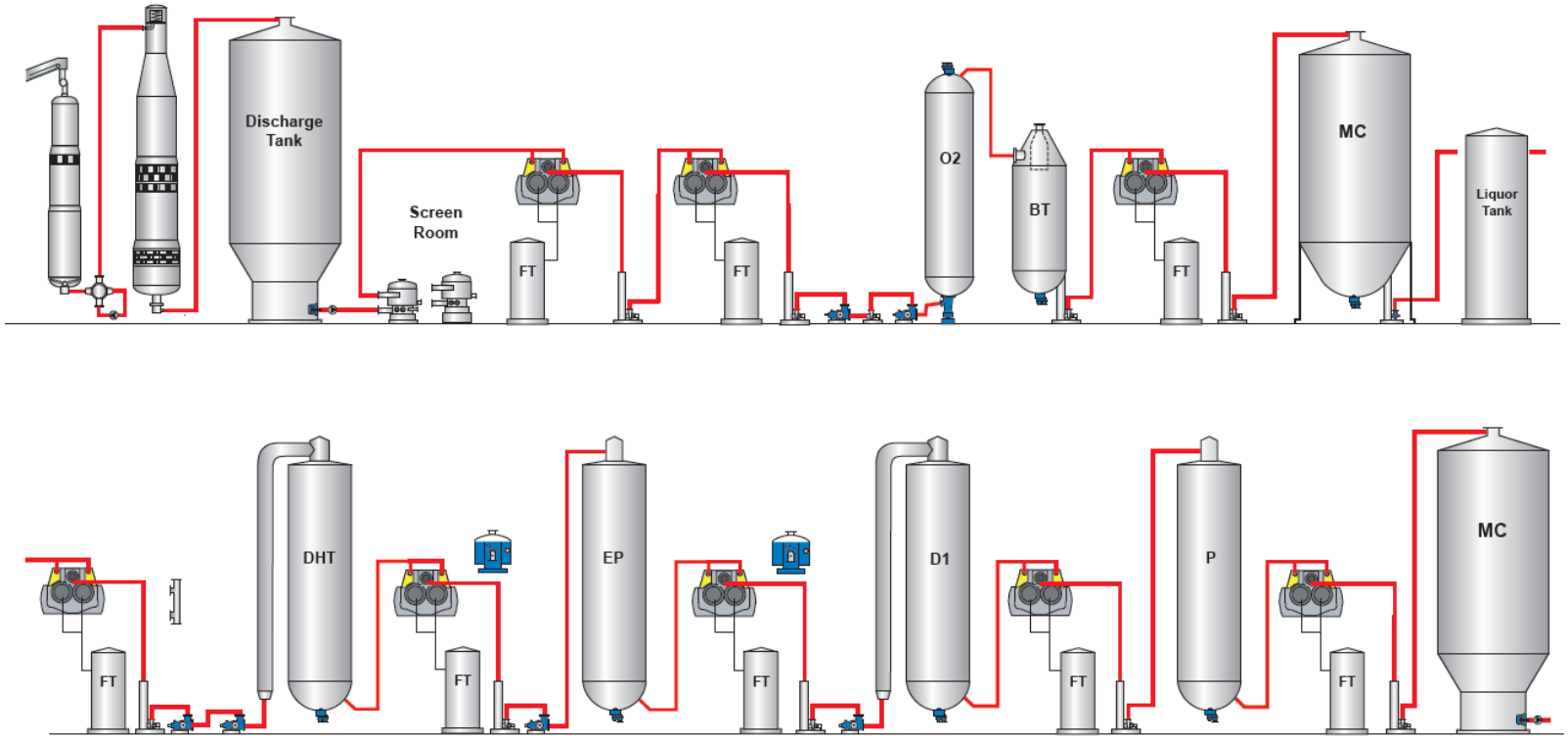
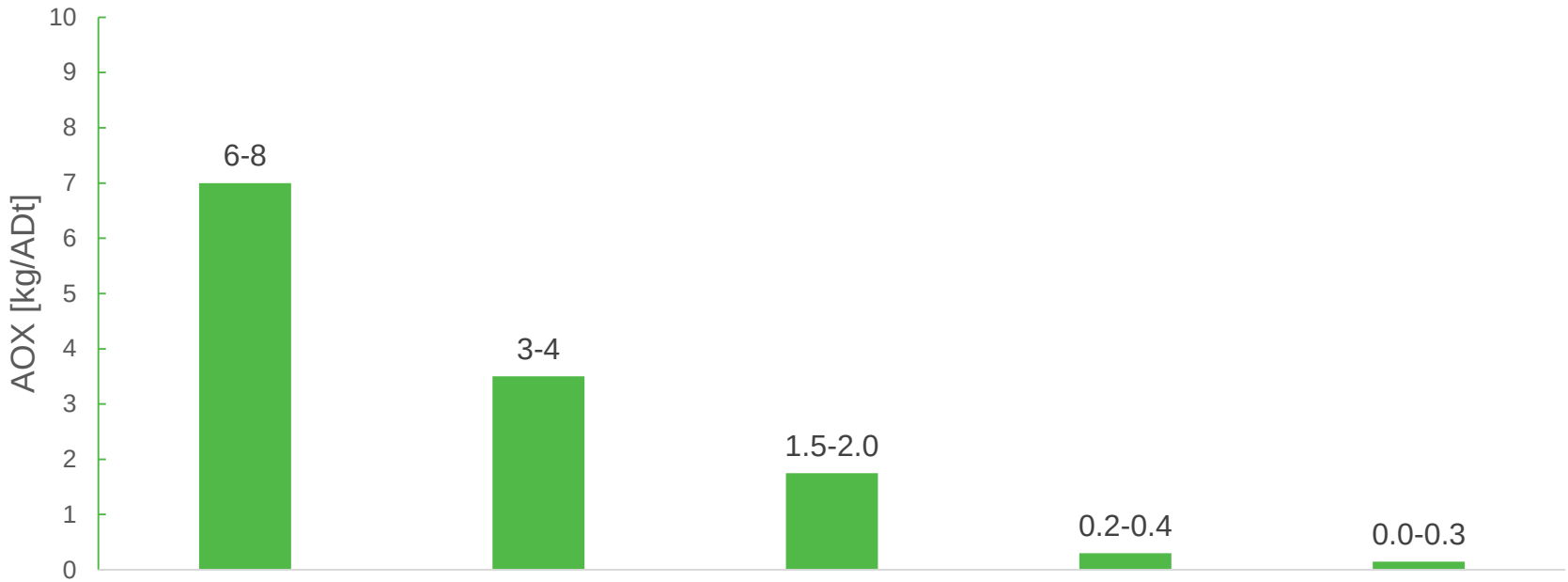
Typical Fiberline 2010's



- Oxygen stage
- Reduce ClO_2 and use peroxide
- Low effluent < 7 - 8 m3/adt

Environmental impact

AOX discharges



Sequence	CEHED	O(C90D10)EDED	O(D50+C50)(EO)D(EP)D	OD(EO)D(EP)D	OD(EOP)DP
Sec. treatment	No	No	Yes	Yes	Yes
Year	1970	1980	1990	2000	2010

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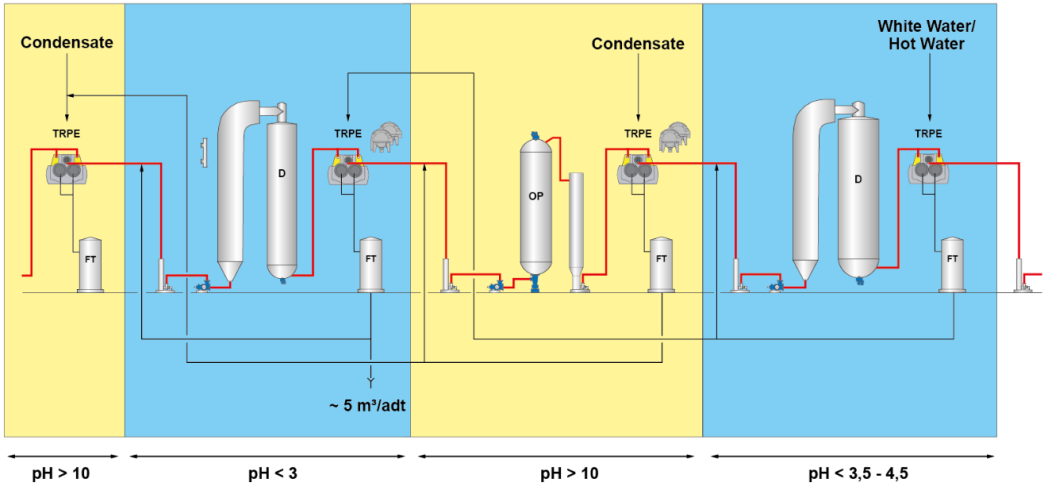
Challenges with EOP recycling

and high degree of closure

- Scaling in fibreline
  - pH change control



  - High pressure cleaning of wash presses
    - ProStream™

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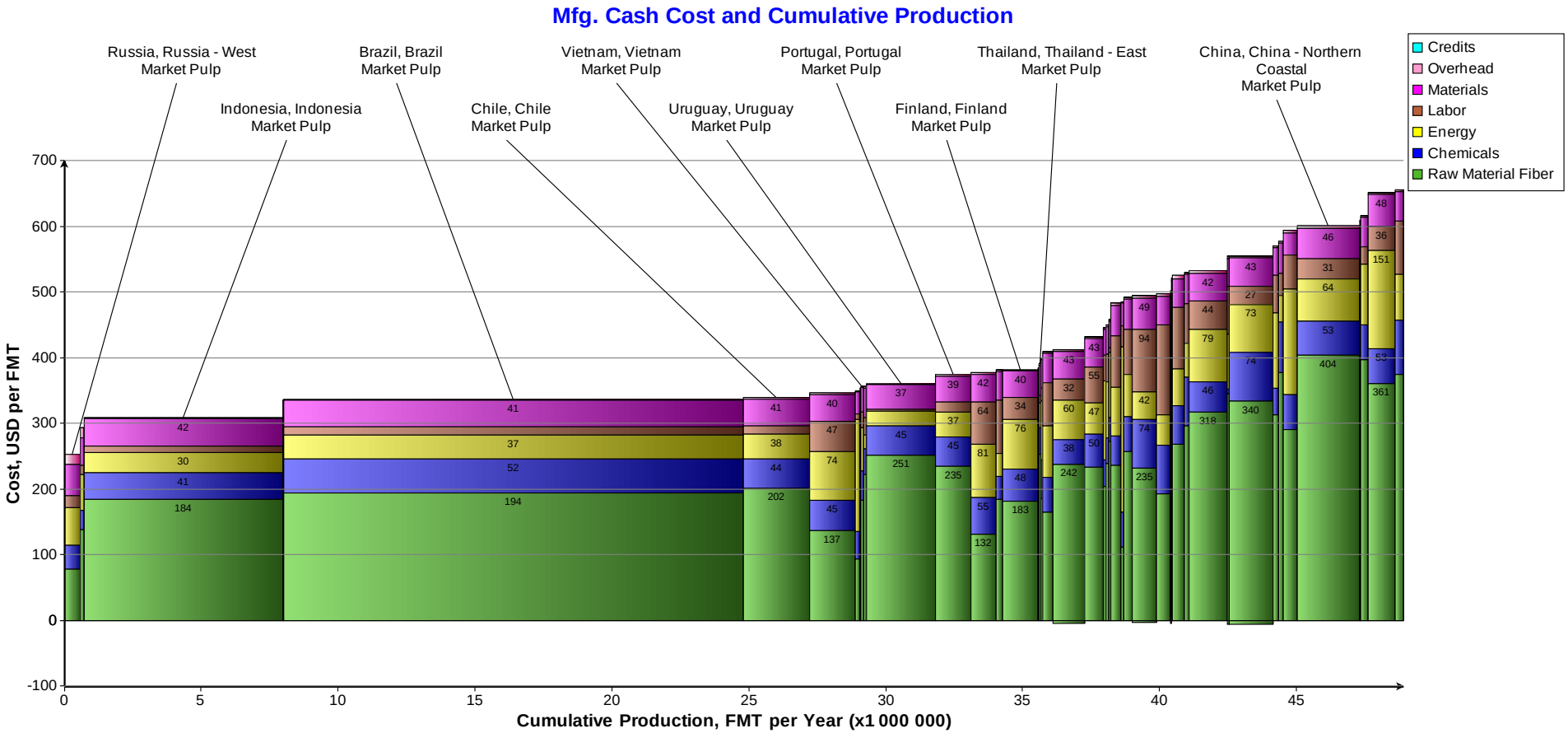
Operational cost structure for HW market pulp

Global variations



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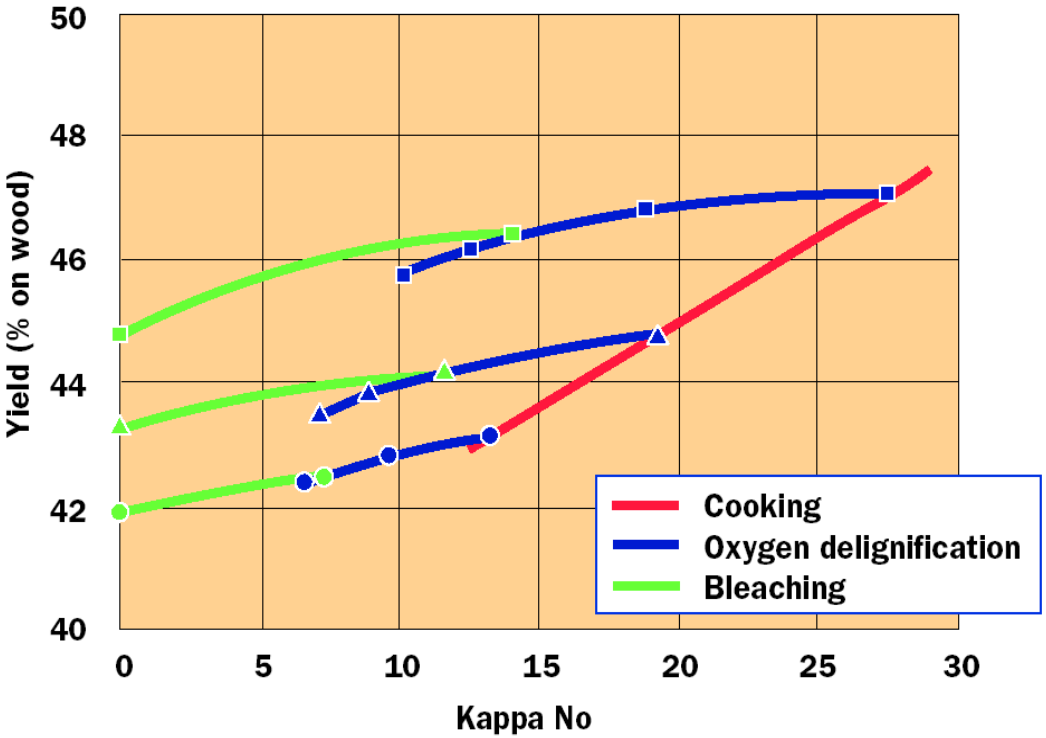
Source: FisherSolve™

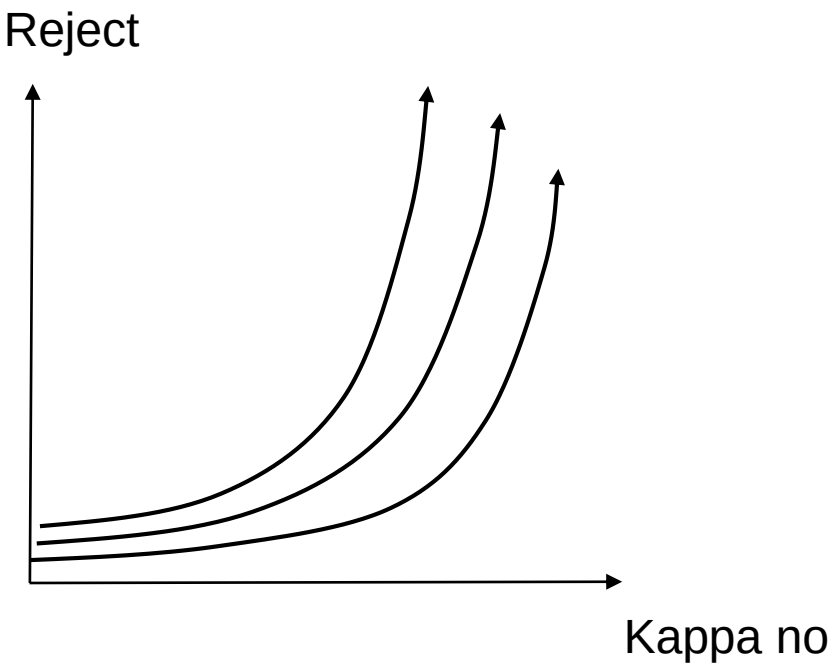
Source: FisherSolve™, Fisher International Inc

Wood cost - Biggest contributor to OPEX

Focus on utilization – Yield increase



Cooking techniques for switching defibration point exists



A need for Improved oxygen delignification

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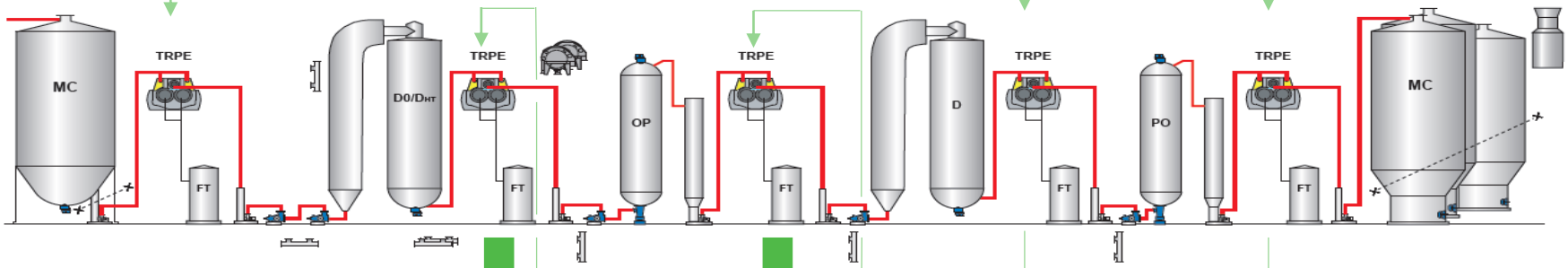
Bleach Plant – Normal solution with presses

No fresh water consumption! - Use of secondary condensates

Sec. Condensate
4.5 m^3/ADt

Sec. Condensate
3 m^3/ADt 85 °C

White water
3 m^3/ADt



Effluent to treatment:
9 m^3/ADt
~ 20 kg COD /ADt

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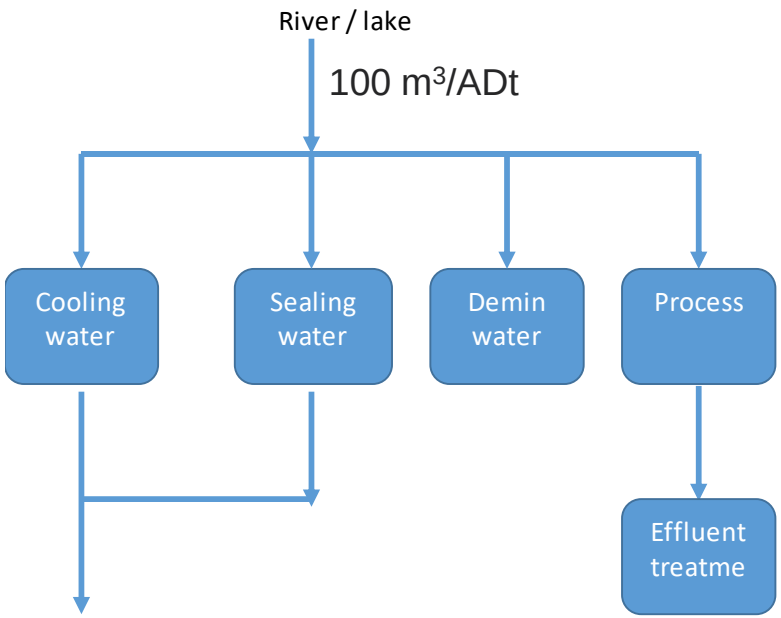
Water system set-up depends on location

Large impact on water footprint

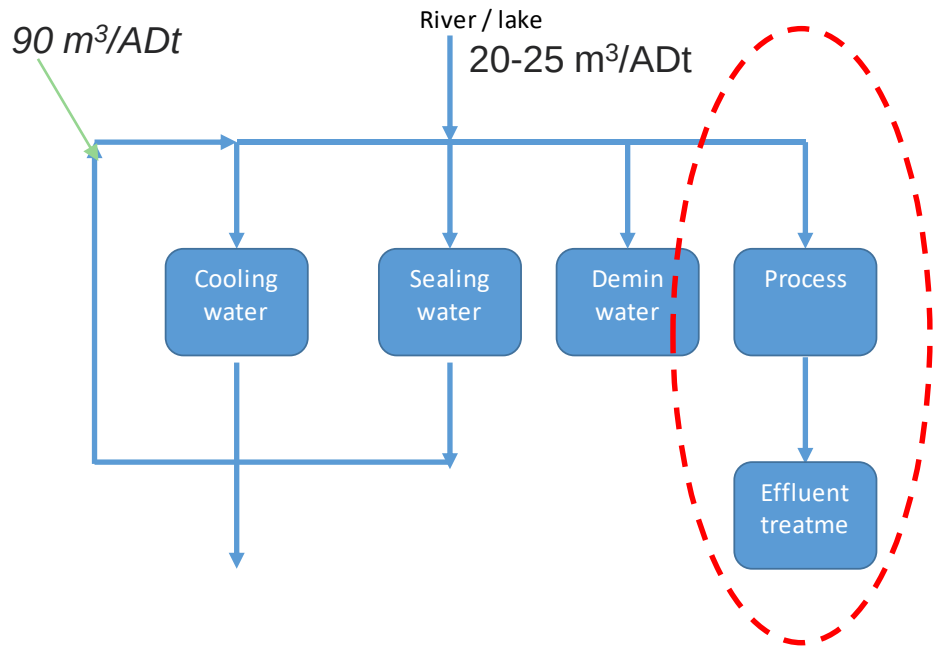
Open cooling system



90 m³/ADt

10 - 20 m³/ADt

Closed cooling system



2 m³/ADt

10 - 20 m³/ADt

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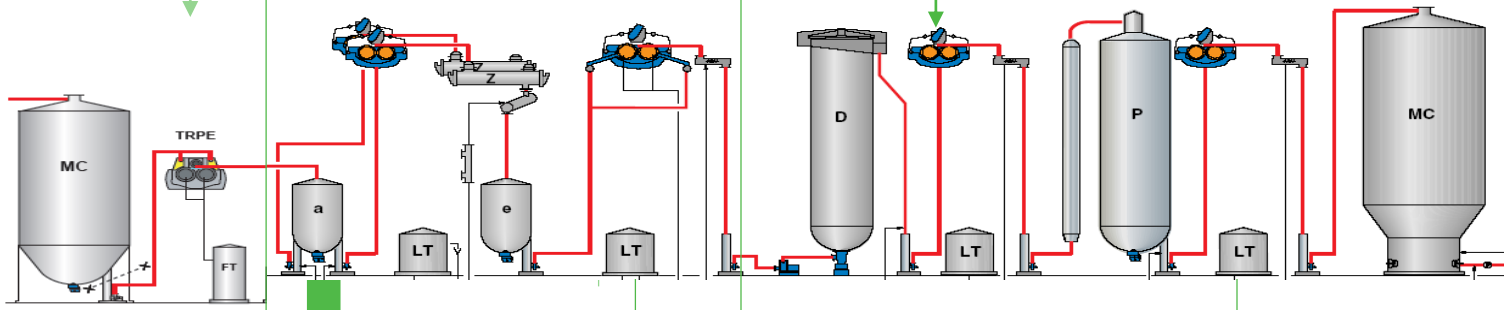
Bleach Plant – Normal solution with presses

No fresh water consumption! - Use of secondary condensates

Sec. Condensate
1.5 m^3/ADt

White water
3 m^3/ADt

Sec. Condensate
3 m^3/ADt 85 °C



Effluent to treatment:
5 - 6 m^3/ADt
~ 12 - 15 kg COD /ADt

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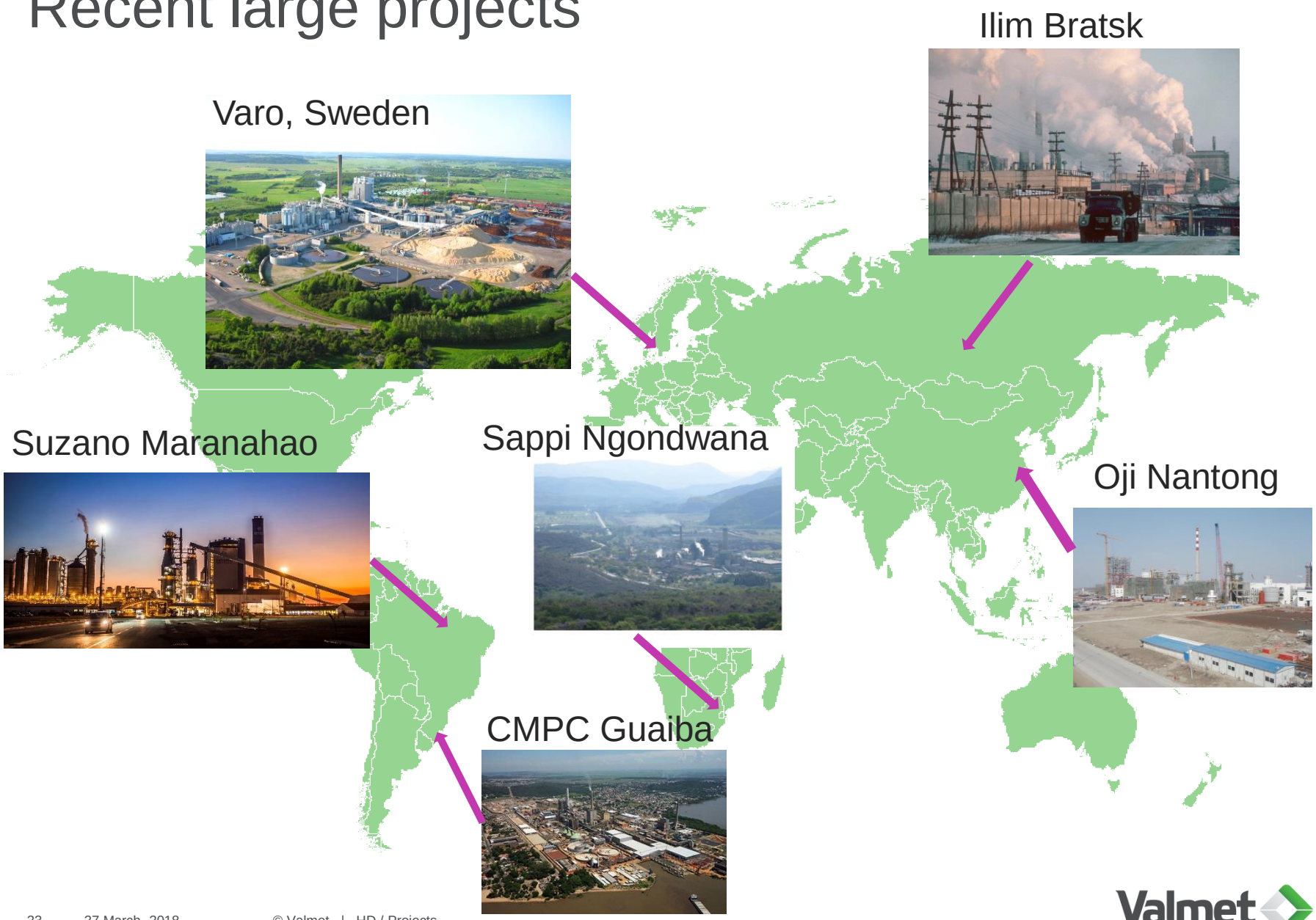
Suzano Maranhão

The most energy efficient pulp Mill in the world

Suzano Maranhão produces it’s own energy & exports in average 90 MW to grid.

Recent large projects



Summary

- Bleaching sequence and use of chemicals depends on
  - Raw material and final bleached pulp quality
  - Cost of chemicals
  - Environmental limitations
- Technology is available to reduce water consumption and achieve low levels of AOX and COD in effluent
- With possibilities of tertiary treatments in ETP, we can get good quality of water to be used in cooling purpose.

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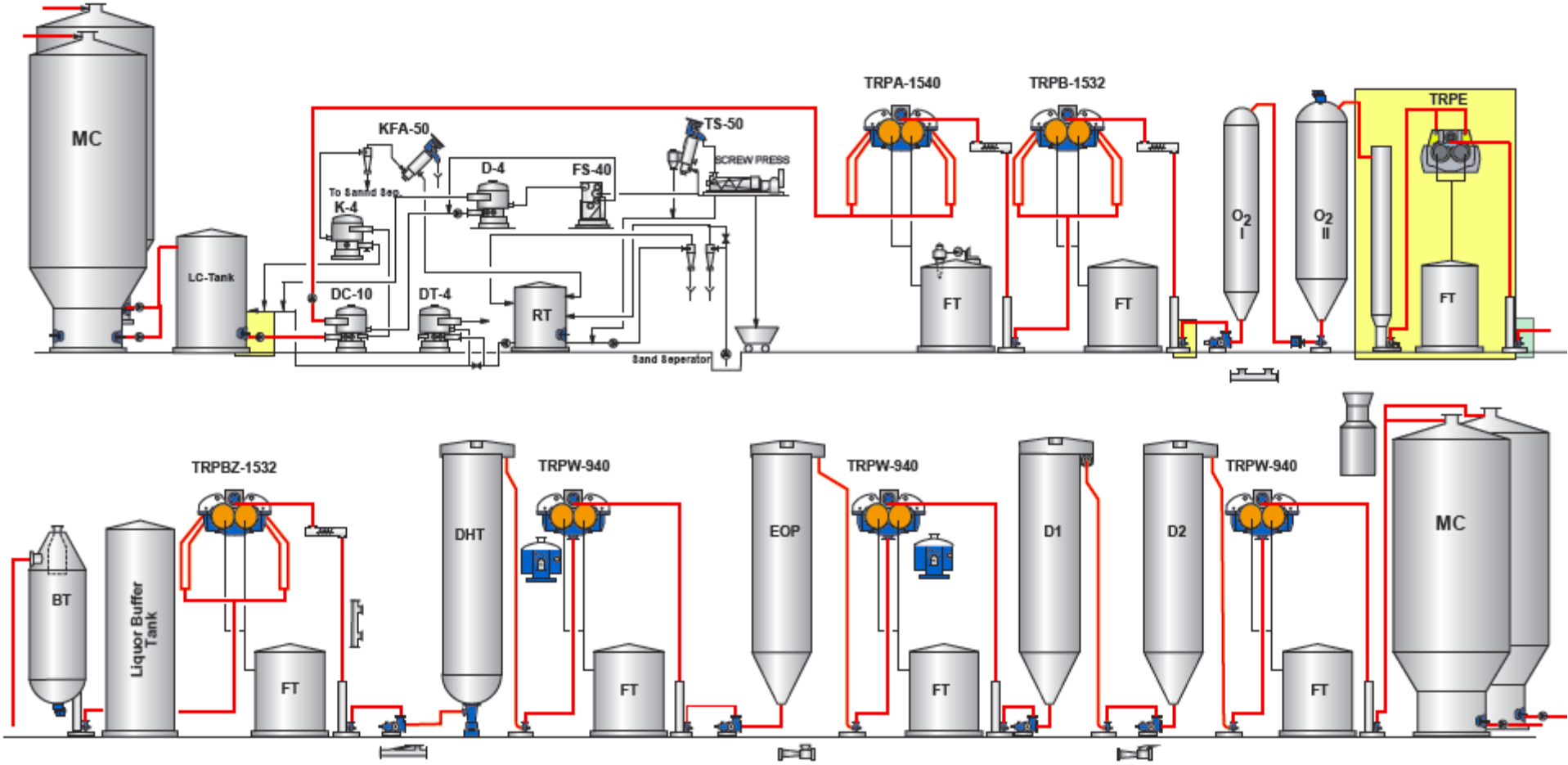
Fiberline for West Coast Paper, India

Designed for 650 odt/d hardwood



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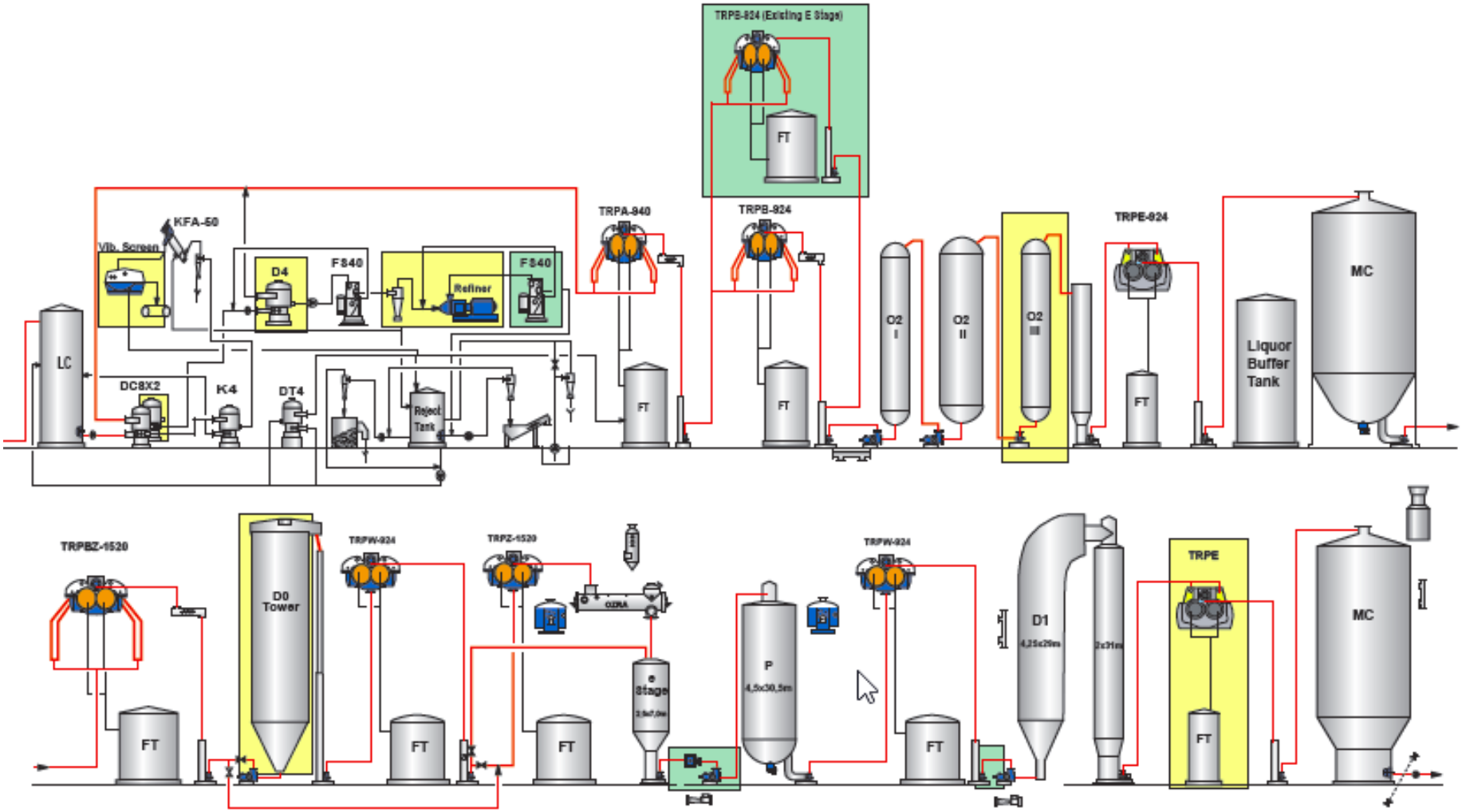
ITC Bhadrachalam, India

580 bdt/d Bleached - New bleaching sequence D (Z(EP)) D



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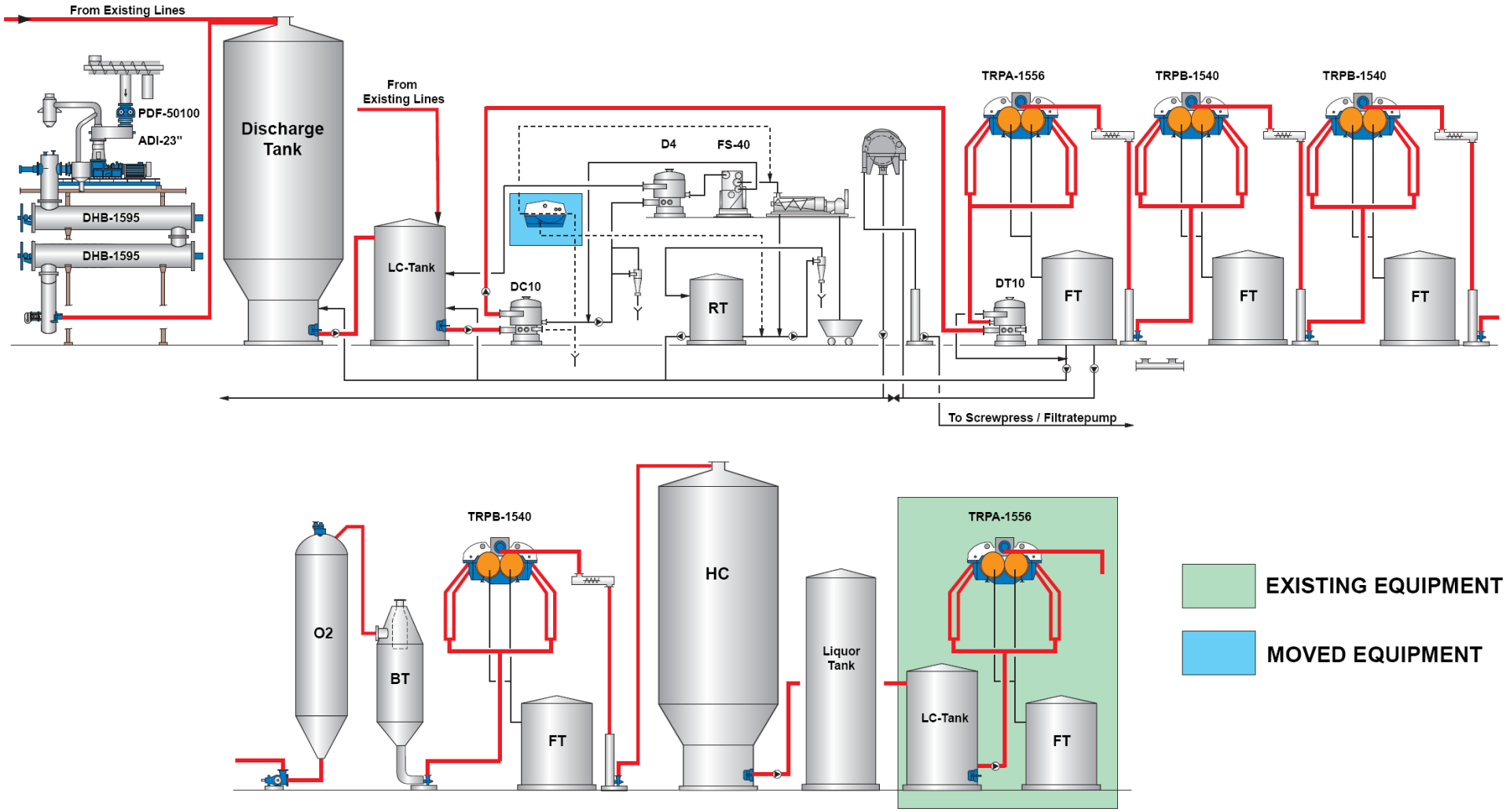
Cooking & fiberline at Tamil Nadu Newsprint, Karur, India

Designed for 600 (300) adt/d bagasse



What can be done in India?

- Effective Oxygen stage is a must
- Segregate condensate from Evaps to be able to use as post Ox washing and EO stage
- Look for Ozone alternative to reduce effluent flow < 7 m^3/adt while rebuilding bleach plant
- Integrated pulp and paper mills should look for low levels of water consumption and effluent flow < 20 m^3/adt

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FORWARD