

SpotView

Water Efficiency in the Pulp & Paper Industry Situation and new Challenges

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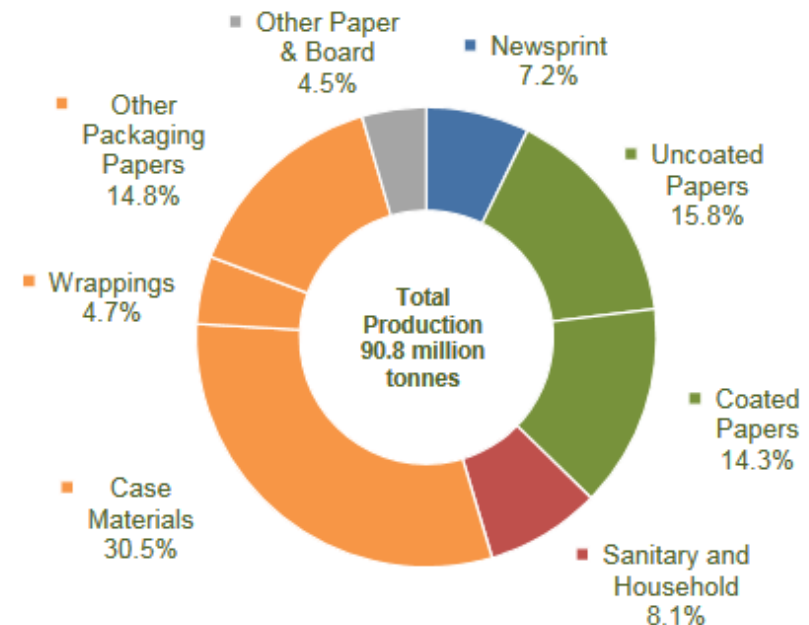
Horizon 2020
European Union Funding
for Research & Innovation



Context, Background

- CEPI Preliminary Statistics 2016, (08 Feb.2017)
 - 515 pulp, paper and board producing companies across Europe (18 countries)
 - Total paper and board production : **91 million tonnes**
 - 23% of world production
 - Packaging grades: 50%
 - Case material: 30%
 - Graphic grades: 38%
 - Sanitary and household: 8%
 - Paper for recycling
 - 43 million tonnes
 - recycling rate = 72%

Production of paper and board by grade in CEPI countries in 2016



Paper and board production



Context, Background

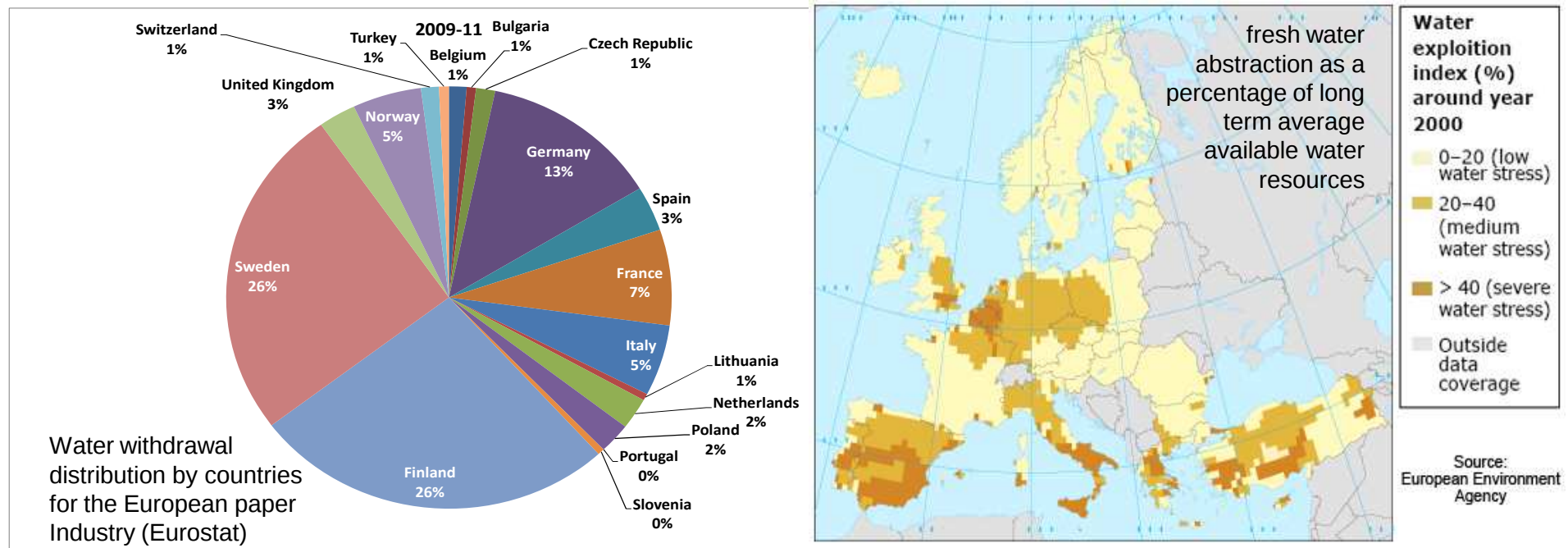
- **Water withdrawal in European paper production**
 - Water volume withdrawal for pulp, paper and board production was around **3,700 million m³ in 2012**, [CEPI sustainability report (2013)].
 - 90% from surface water; 8.5% groundwater sources
 - For paper and board production **from recycled fibers**, water volume withdrawal is estimated around **400 million m³ in 2012**.
 - Freshwater withdrawal decreased between 1990 and 2012 by -20% in total volume and **-47% as a specific value**, m³ per ton of product.
 - 92.3% of this water returned to surface water after cleaning
 - Organic matter rejects (COD) decreased between 1990 and 2012 by **-81% as specific value** (26 to 5 kg per ton of product)
- http://www.cepi-sustainability.eu/uploads/FIN_Full%20version_sustainability%20report_LOW%20WEB.pdf
- http://eippcb.jrc.ec.europa.eu/reference/BREF/PP_revised_BREF_2015.pdf

Sustainability of Pulp, Paper and Board Production



Sustainability of Pulp, Paper and Board Production

- Baseline for water footprint reduction
 - Water withdrawal for case material and tissue production in Europe
 - Generally from 5 to 20 m³/t, with extreme from 1,5 to 30 m³/t
 - Water footprint indicators
 - Various **water usage and stress** situations in EU countries



Water efficiency for Pulp, Paper and Board Production

- Intensive Water reuse before discharge

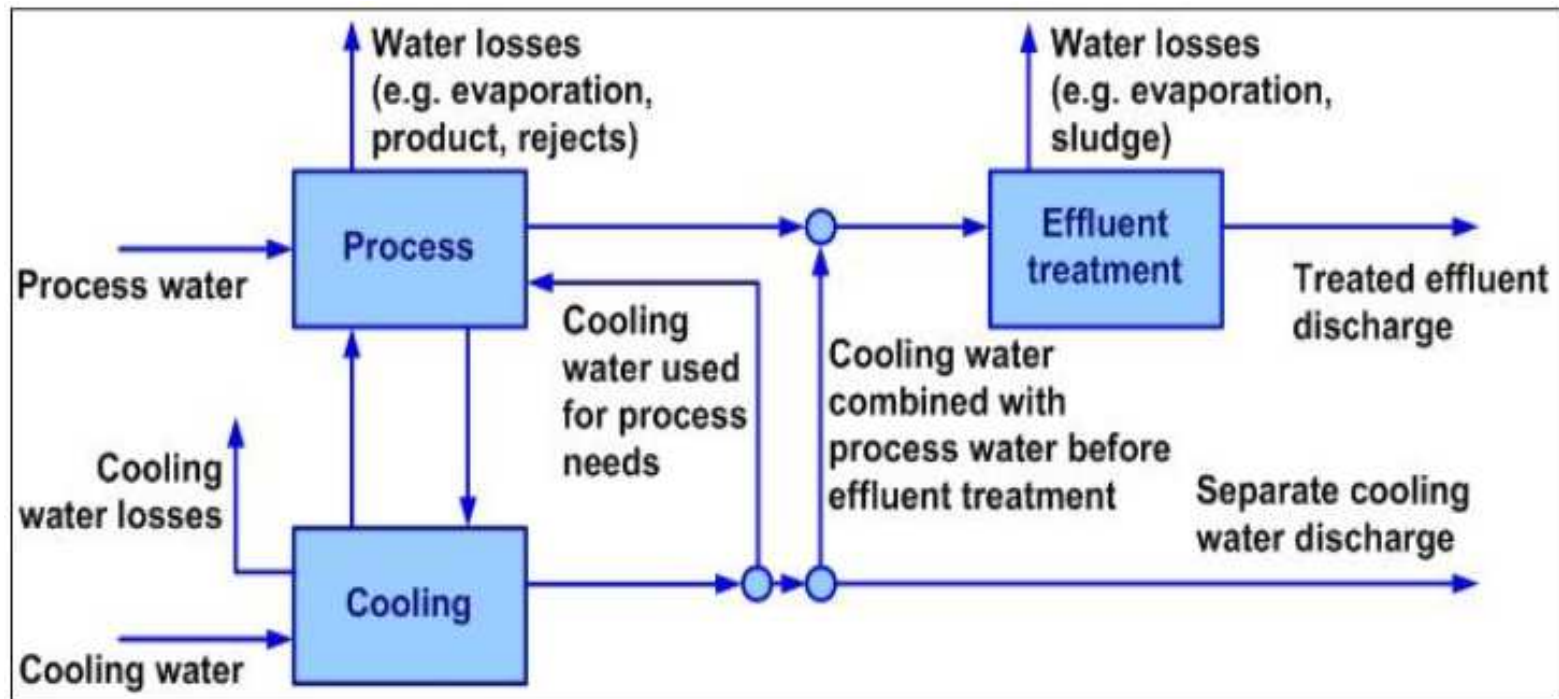


Figure 2.9: Options for use and discharge of cooling water

Water efficiency for Pulp, Paper and Board Production

- Fresh water usages for pulp and paper production

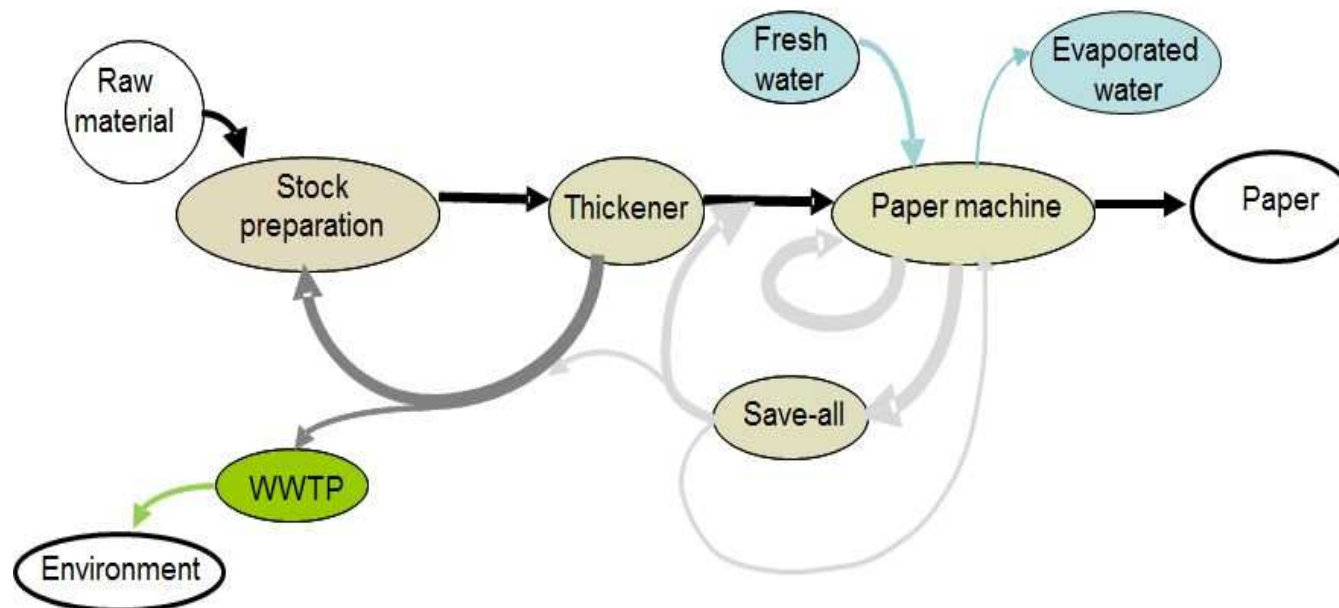
Fresh water usage (m ³ /ADt)	Packaging paper without deinking	Sanitary paper with deinking
Total volume *	1,5-10	10-25
Energy production	2 to 3	
Vacuum production	0.5 to 5	
Cooling water	3 to 10	
Sealing of turning elements	1 to 6	
Preparation and dilution of additives	1.5 to 3	
Addition to the process waters	1 to 2	
Cleaning	5 to 20	

BREF document for the Production of Pulp, Paper and Board: , in:
http://eippcb.jrc.ec.europa.eu/reference/BREF/PP_revised_BREF_2015.pdf, 2015.

Water efficiency for Pulp, Paper and Board Production

Intensive Water reuse before discharge

- Overview of a paper mill water circuit
 - Up to 95 to 98 % of the water is recycled in the process
 - Water loop separation principle



Water efficiency for Pulp, Paper and Board Production

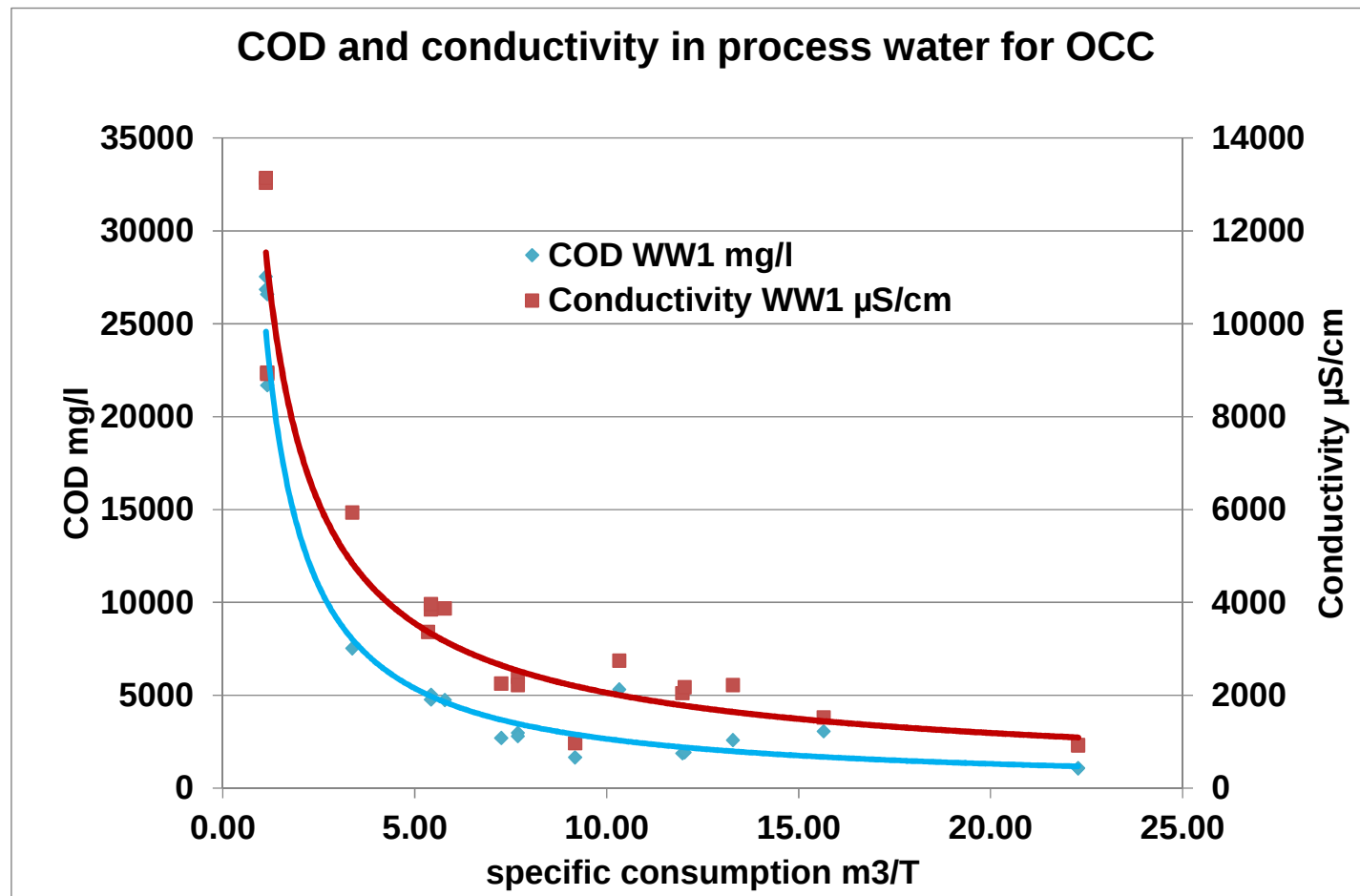
- BAT associated wastewater discharge (Specific Emission Limit Values)

Parameters	Units	Packaging paper without deinking (min - max)	Paper with deinking (min – max)
Effluent Volume*	(m ³ /t _{paper})	1.5 - 10	10 - 25
Temperature	°C	30 - 35	30 - 35
TSS after WWTP	(kg/t)	0,02 - 0,2*	0,1 - 0,4
COD after WWTP	(kg/t)	0,4 - 1,4	0,9 - 3**
NTK after WWTP	(kg/t)	0,008 - 0,09	0,01 - 0,15
Tot-P after WWTP	(kg/t)	0,001 - 0,005	0,002 - 0,015

*Source: BAT conclusions for the production of pulp, paper and board.
Published in OJEC on 30 September 2014; Applicable by 30 September 2018,
in: OJEC (Ed.), 2014.*

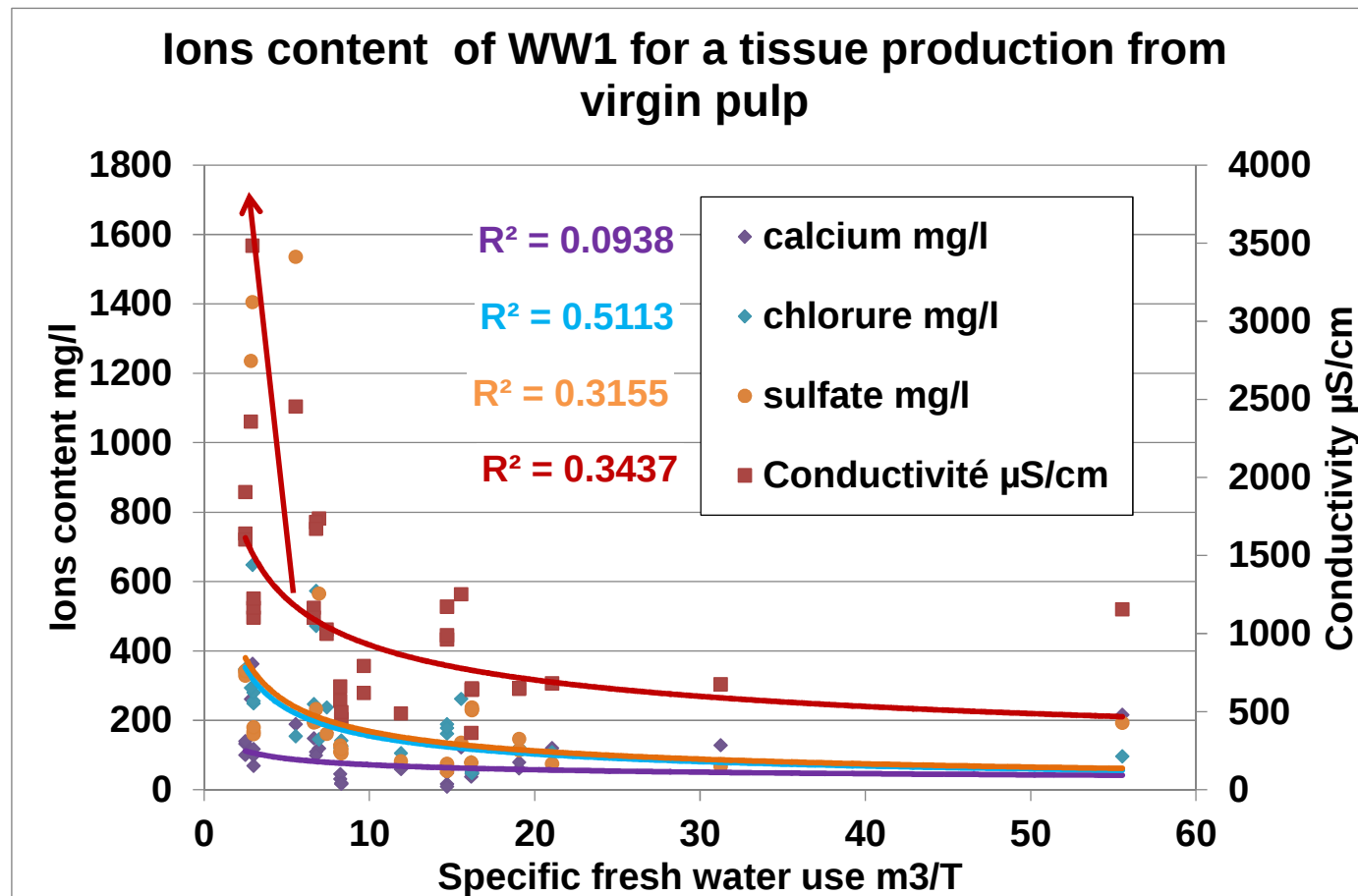
Water efficiency for Pulp, Paper and Board Production

- Intensive Water reuse consequences



Water efficiency for Pulp, Paper and Board Production

- Intensive Water reuse consequences



Water efficiency for Pulp, Paper and Board Production

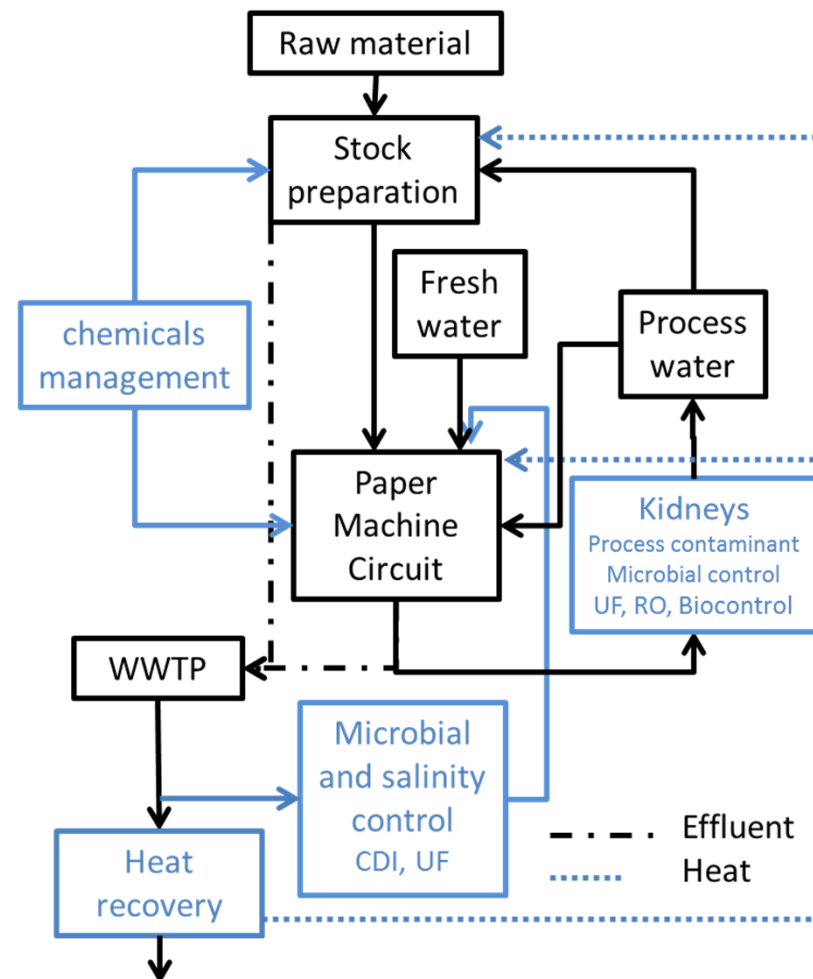
Intensive Water reuse consequences

- **Increased process water recycling leads to :**
 - Temperature up to 45°C
 - COD above 5 g/L (40% organic acids from starch hydrolysis)
 - Conductivity above 4 mS/cm
 - Ca²⁺ above 500 mg/L
 - Colloids and micro-organism build up
- **Detrimental to production efficiency and product quality:**
 - Paper machine speed slow down (lower dewatering efficiency),
 - Lower paper strength,
 - Scaling risk,
 - Wire and felt plugging,
 - Web brakes with increased shut down for cleaning

Water efficiency for Pulp, Paper and Board Production

Strategies proposed to further reduce water use

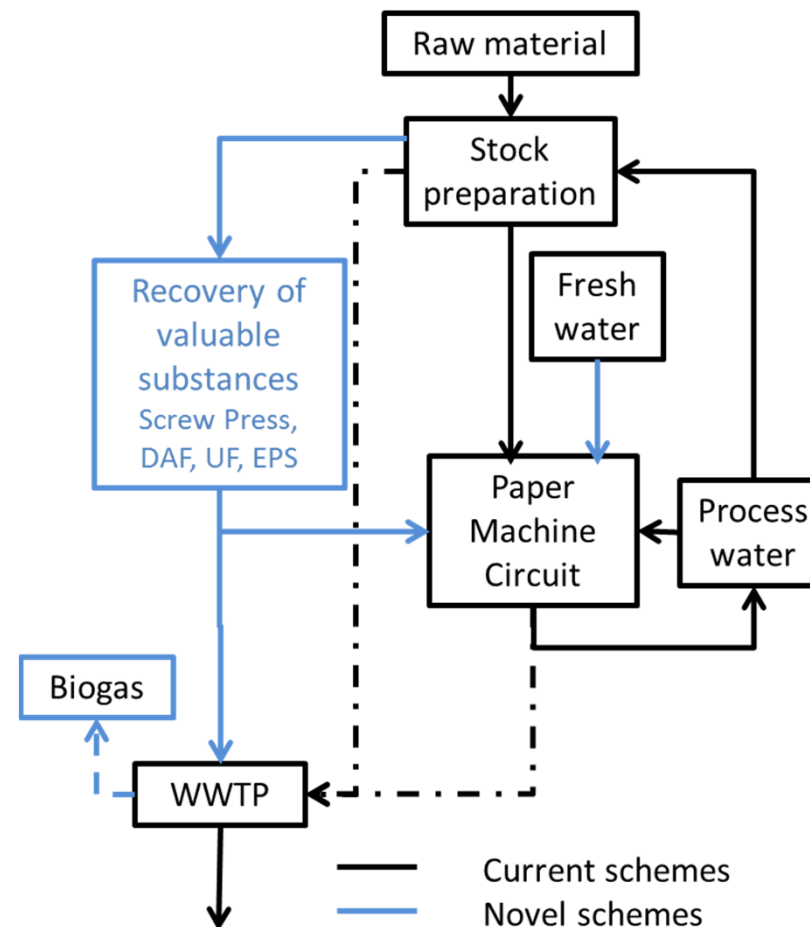
- **Kidney technologies** to remove organic substances from process water
 - new technologies and processes (Task 2.2)
- **Recycling WWTP effluent** to dilute process water
 - new water circuit management strategies (Task 2.3)



Water efficiency for Pulp, Paper and Board Production

Strategies proposed to further reduce water use

- **Recovery of valuable organic substances from process water**
 - **new technologies and processes (Task 2.2)**



Thank You



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