E4WATER

Economically and Ecologically Efficient Water Management in the European Chemical Industry

Recycling of wash water at P&G

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TRADITIONAL : WASH WATER = WASTE - WASTE WATER

- add chemicals and/or energy
- convert COD into CO2 and sludge waste
- use incineration for difficult streams

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E4WATER : Wash water = product + water ≠ waste

- use tubular membranes to split in WATER and PRODUCT fraction
- recycle these 2 fractions separate
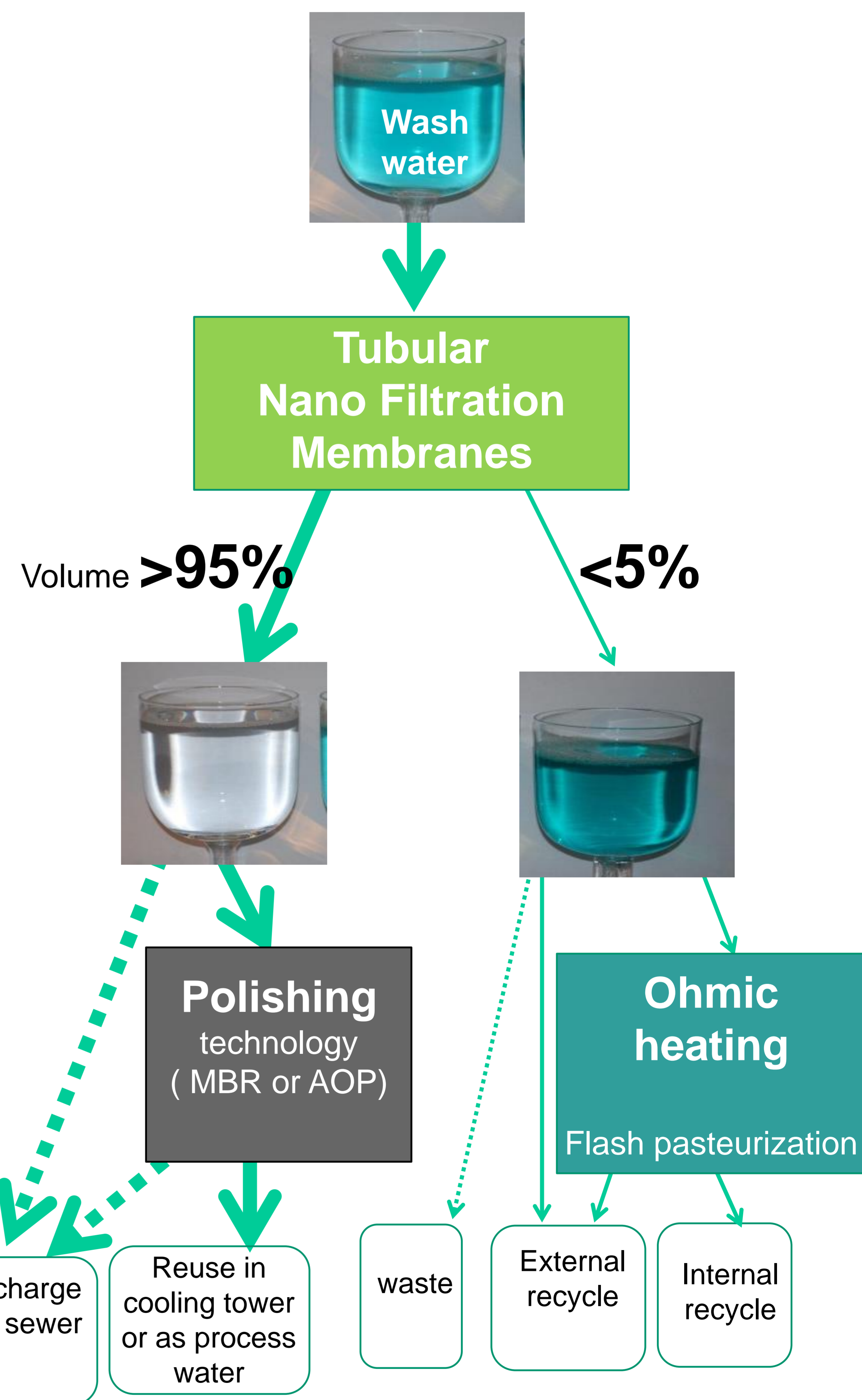- when micro contamination concern : pasteurize to allow reuse/recycling

Sustainable:
   100% recovery of <u>water</u> and <u>raw materials</u>
   NO chemicals needed in the process
   NO waste generated
Simple:
   Fully automated; light-off operation
   performance by design
Cost effective:
   same/lower capital versus traditional
   less space required
   Opex neutral/ generating revenue

Flow diagram

Wash water

→ Tubular Nano Filtration Membranes

Volume **>95%** | **<5%**

Polishing technology (MBR or AOP)

Ohmic heating — Flash pasteurization

Discharge into sewer | Reuse in cooling tower or as process water | waste | External recycle | Internal recycle

Industrial application at P&G

First industrial unit , based on tubular Nano Filtration + MBR + Activated Carbon.
16 ton/day, designed as containerized system 'plug in and start-up'.
Build in Europe by SME's.
First unit running in P&G China since Feb 2015; more than 3000 ton of high concentrated wash water treated.

Stream	COD (mg/l)	Anionic surfactant (mg/l)
Equalization buffer tank	10000 - 50000	800
Nano Filtration permeate	1000 - 3000	30
MBR permeate	<100	<0.5
Final quality after polishing with ACF	<50	<0.5
Target to recycle into cooling tower	<50	<0.5

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