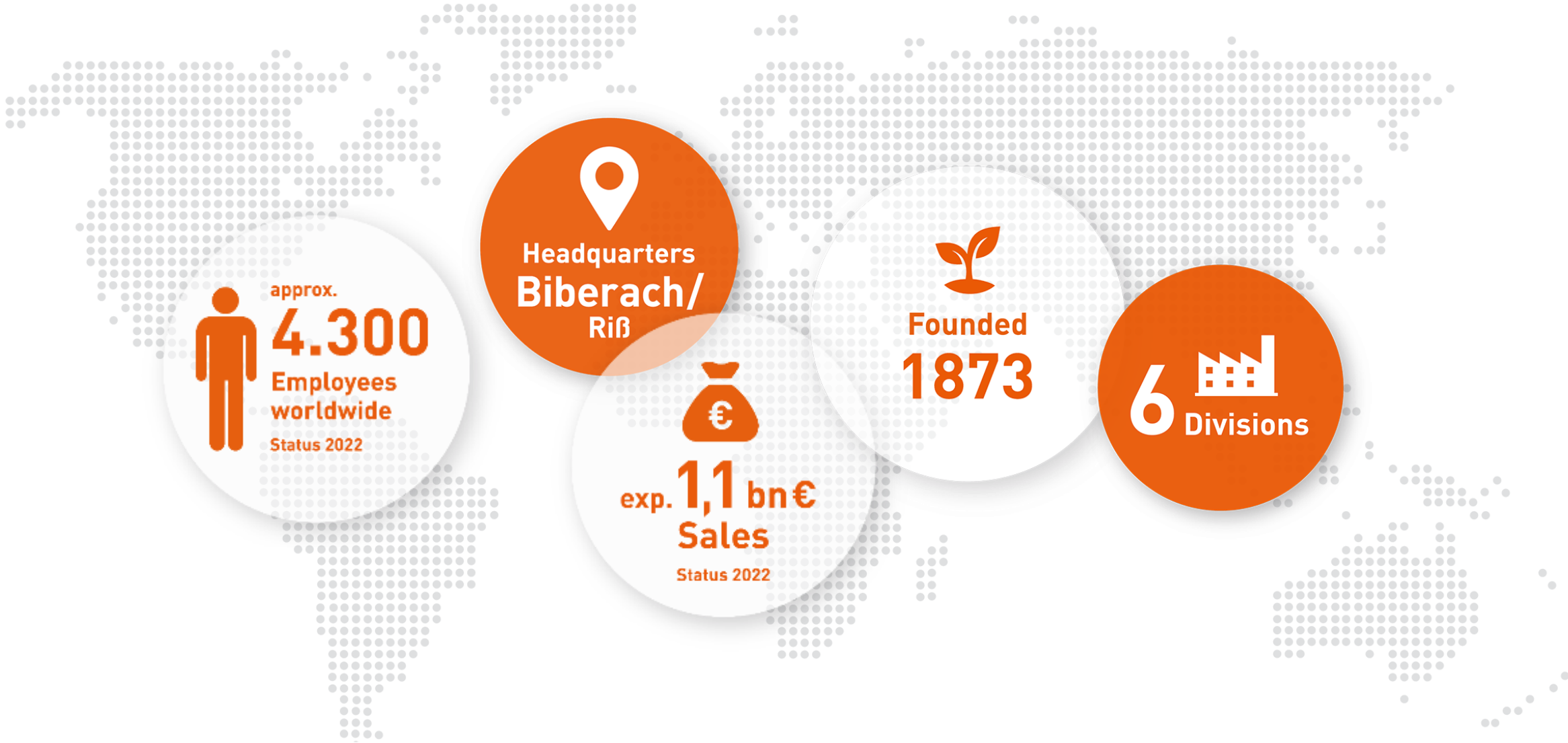
THE HANDTMANN GROUP OF COMPANIES

HANDTMANN OVERVIEW



HANDTMANN WORLDWIDE

DIVISIONS

MOBILITY

Light metal casting

System Engineering

Plastics Engineering

e-solutions

FOOD

Filling and portioning systems

Process technology

Handtmann Group of Companies

Handtmann Armaturenfabrik
Ideas for process technology

PROCESS TECHNOLOGY

- Beverage industry
- Brewing industry
- Dairy industry
- Food industry
- Chemicals
- Pharma-, Cosmetics- and Organic industry

PRODUCT PORTFOLIO

Components

- Tank dome caps
- Safety and vacuum valves
- Process valves
- Valve blocks

Process Technology & Plant Engineering

- Individual planning and automatization
- Tailor-made beverage solutions
- Complete cold block systems
- Dairy process applications
- Filtration and separation

OUR BRAND WORLDS

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Ideas for the future.

aha INOVA
Processing the Future

aha FLOW
Processing the Future

aha CLEAR
Processing the Future

aha BIOTECH
Processing the Future

aha BIOTECH PHARMA
Processing the Future

aha INOVA

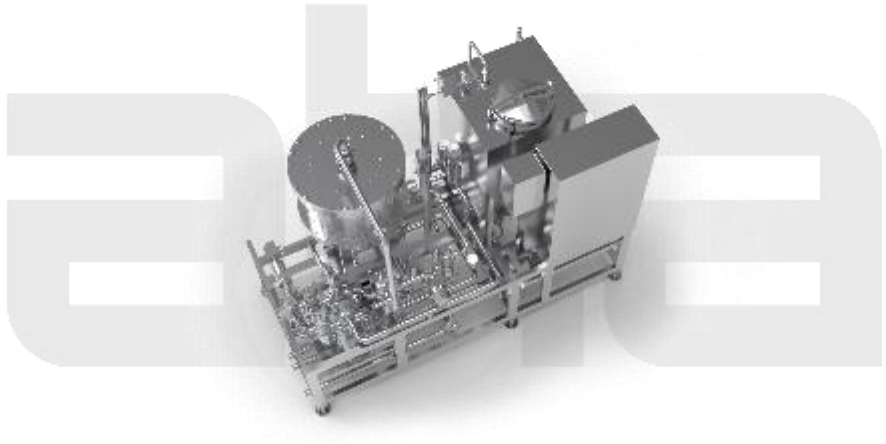
- Functional valves for protection, regulation and control in the beverage industry
- Safety valves for pretecting pressurized, closed containers or systems
- Vacuum valves for vacuum protection of containers or systems
- Tank dome caps as modular, mechanical platform for easy combination of different functional fittings
- Compact, modular, mechanical cleaning air/valve combinations of various functional fittings
- Double-seat valves for the safe separation of different media. Butterfly valves for controlling and regulating process media

aha FLOW

- Hygienic and reliable pumping of liquids
- Piping systems for fermentation, storage and pressure tank cellars
- Yeast management with propagation, storage and vitalization

aha CLEAR

- Innovative filtration processes for the food and beverage industry
- CIP media filtration, crossflow filtration for environmentally friendly caustic recycling. Gentle beer stabilization to maintain beer quality



aha BIOTECH

- Large-scale industrial radial flow chromatography processes in biotechnology and food production
- Innovative chromatography processes using adsorption technology. RFC offers state-of-the-art technology in the functional food sector for the extraction of lactoferrin or in other adsorber processes on a large scale

aha BIOTECH PHARMA

- Planning, production and installation of complex process systems for the pharmaceutical industry and biotechnology with documentation and qualification
- Separation process: chromatography, membrane filtration, precipitation system
- Preparation techniques and buffer production for hygienic and sterile solutions
- CIP/SIP systems
- Storage and distribution of high-purity media and gases
- The process systems are planned in 3D, taking into account efficiency, product purity and the applicable regulations, and are individually designed to meet the existing requirements

CROSSFLOW FILTRATION

Handtmann –
CIP Media Filtration

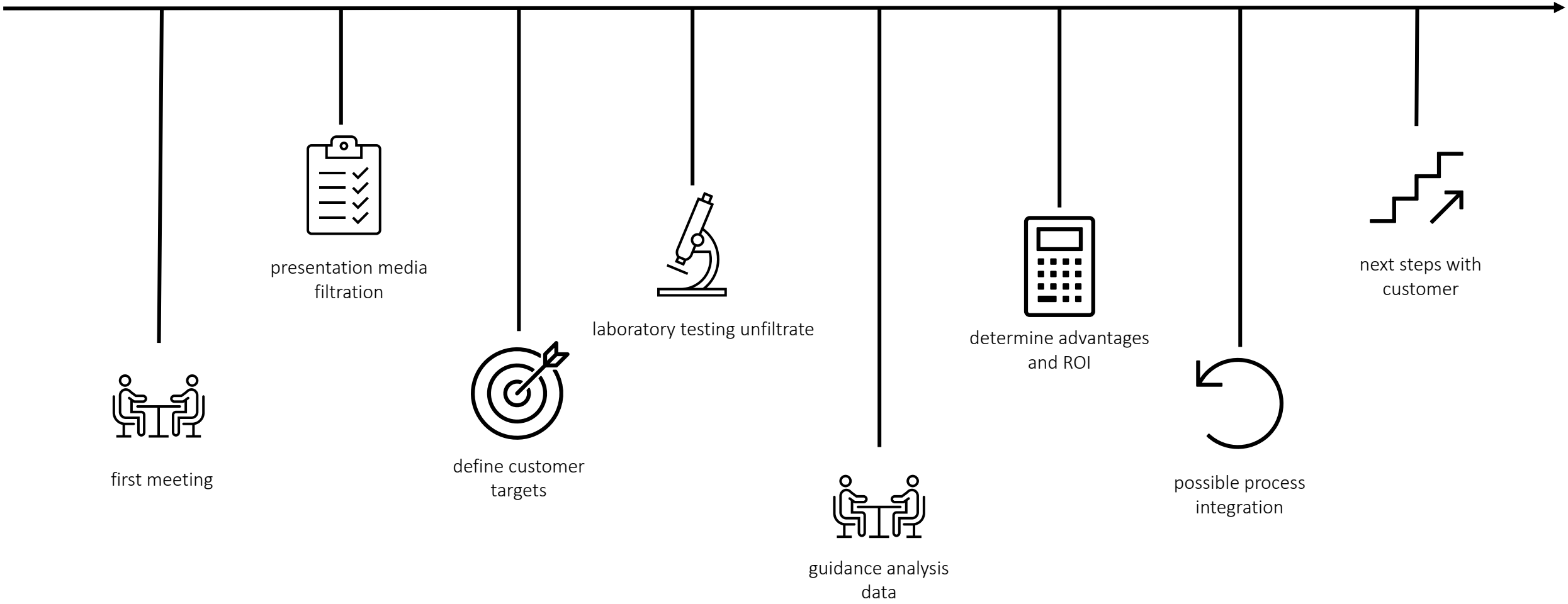
SCAN ME

Handtmann Armaturenfabrik - CIP Media Filtration - CF INOVA ECOCLEAN - YouTube

CF CIP MEDIA FILTRATION – WHY?

- ✓ Rising costs in fresh and waste water
- ✓ Rising costs in concentrate
- ✓ High costs for precipitants
- ✓ High costs for additives
- ✓ Disposal problems
- ✓ Waste carry-over in the bottle washing machine
- ✓ Legal restrictions
- ✓ High waste water pollution

WORKING PACKAGES



TRADITIONAL METHODS

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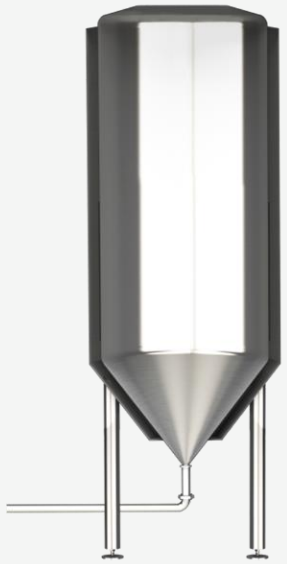
Ideas for the future.

Settling tank lost CIP

- Long settling times / sedimentation
- Only hudge particles are settling down
- Not usable for all type of caustic



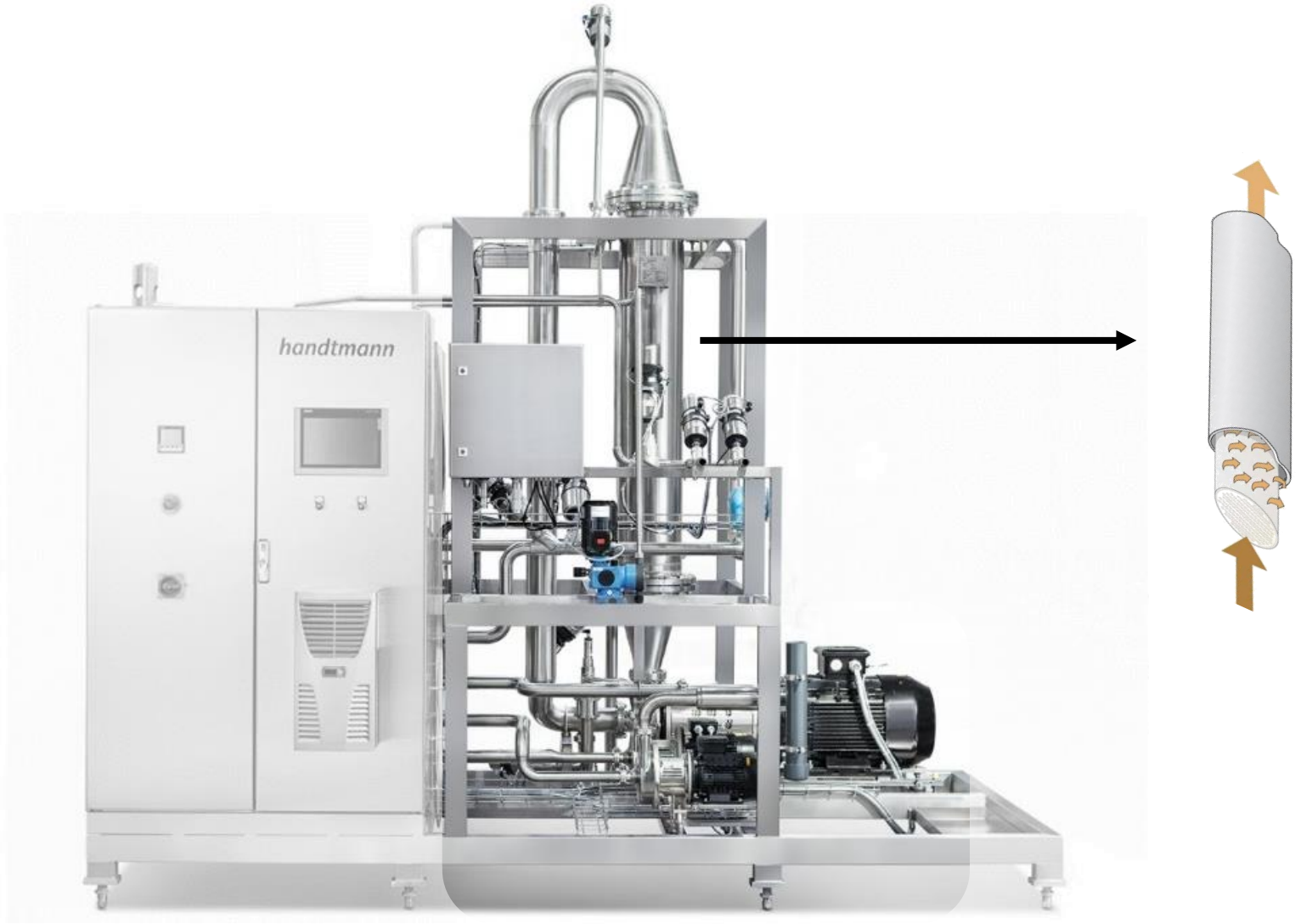
Separator

- Maintenance and cost-intensive
- High energy consumption
- Not available at any time

CF FILTRATION PROCESS

Cross-Flow-Principle

CF FILTRATION PROCESS



CF CIP MEDIA FILTRATION

CIP-caustic beverage

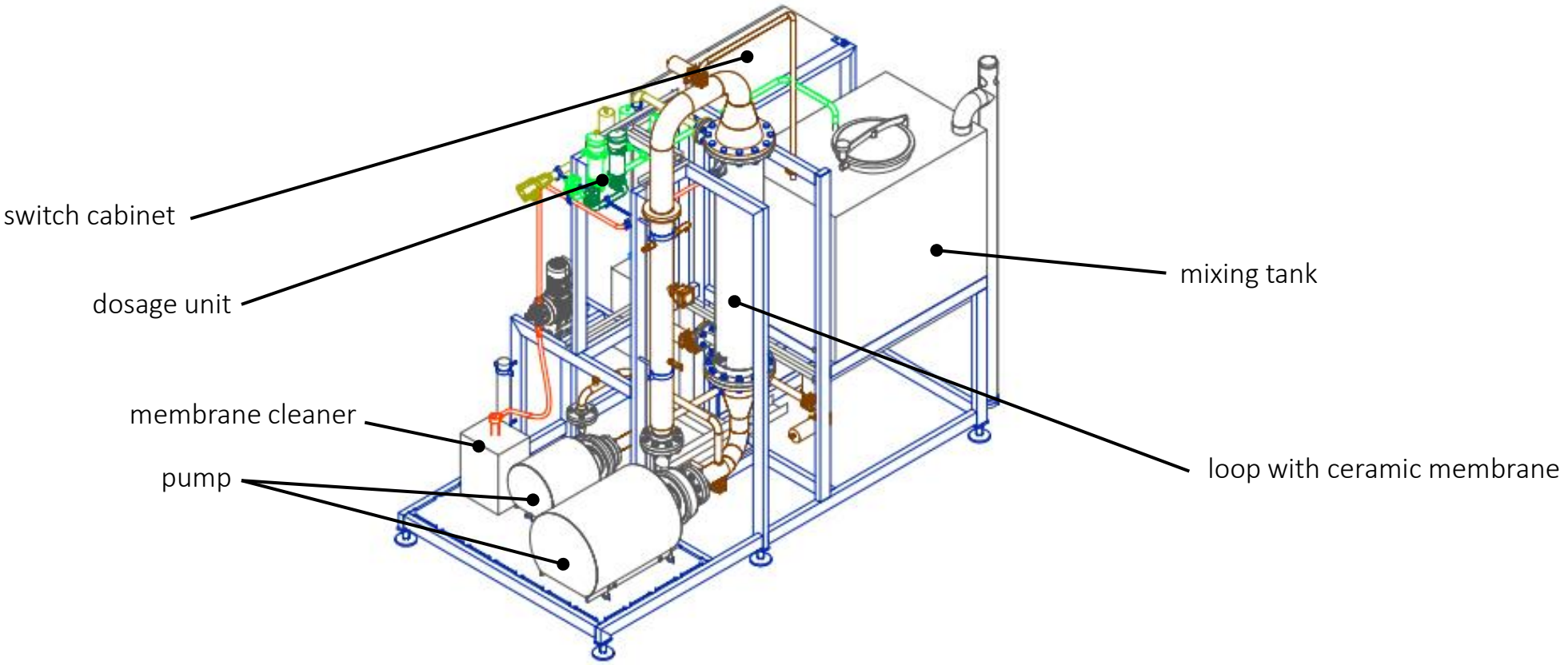
CIP-caustic dairy

UHT-caustic dairy

bottle washing machine dairy

bottle washing machine brewery

CF FILTRATION PLANT CF016



CF FILTRATION PLANT CF016

Weight: 1.600 kg

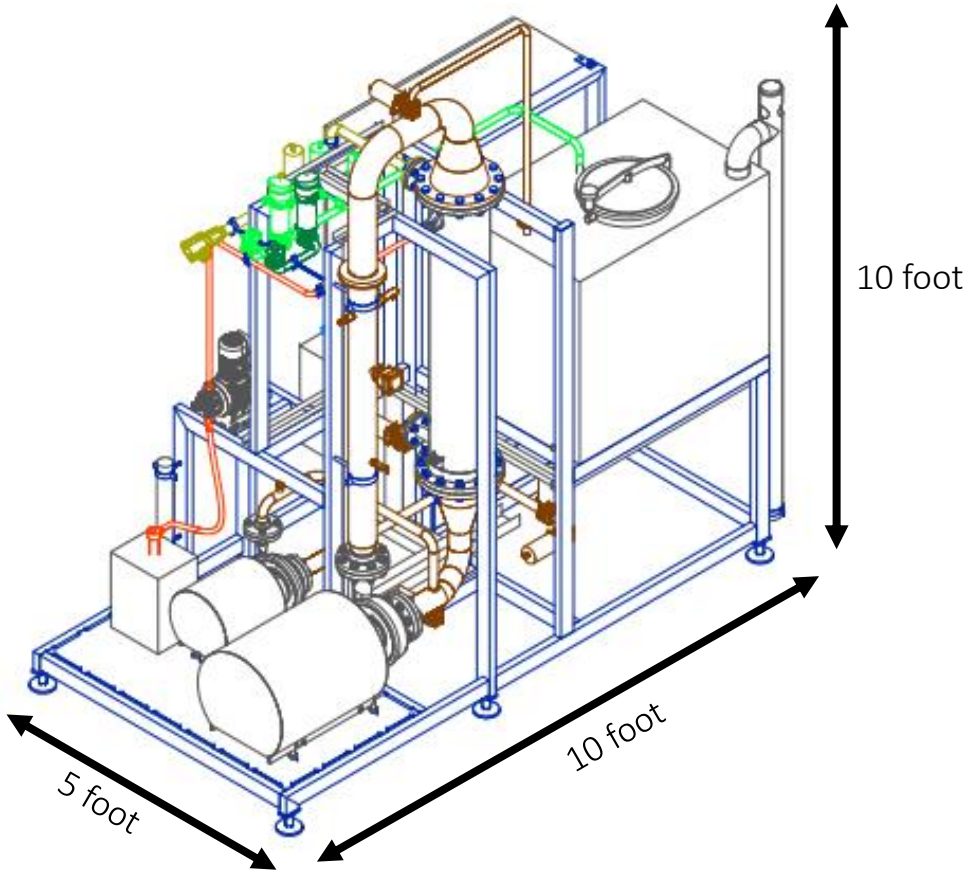
Footprint: 17 foot²

Maintenance area: 20 m²

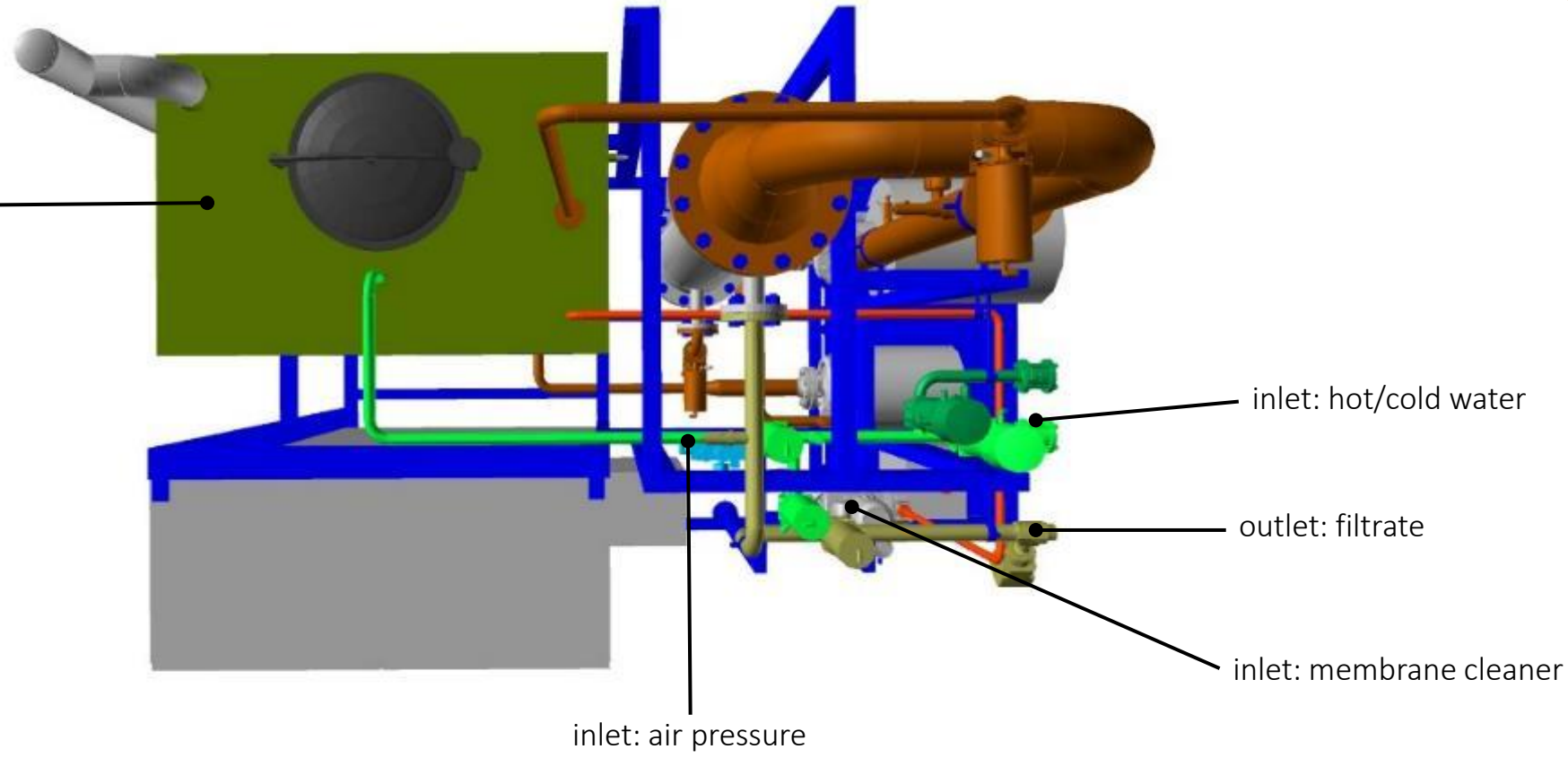
Mixing tank: 1500 gallon l

Filter surface: 52 foot²

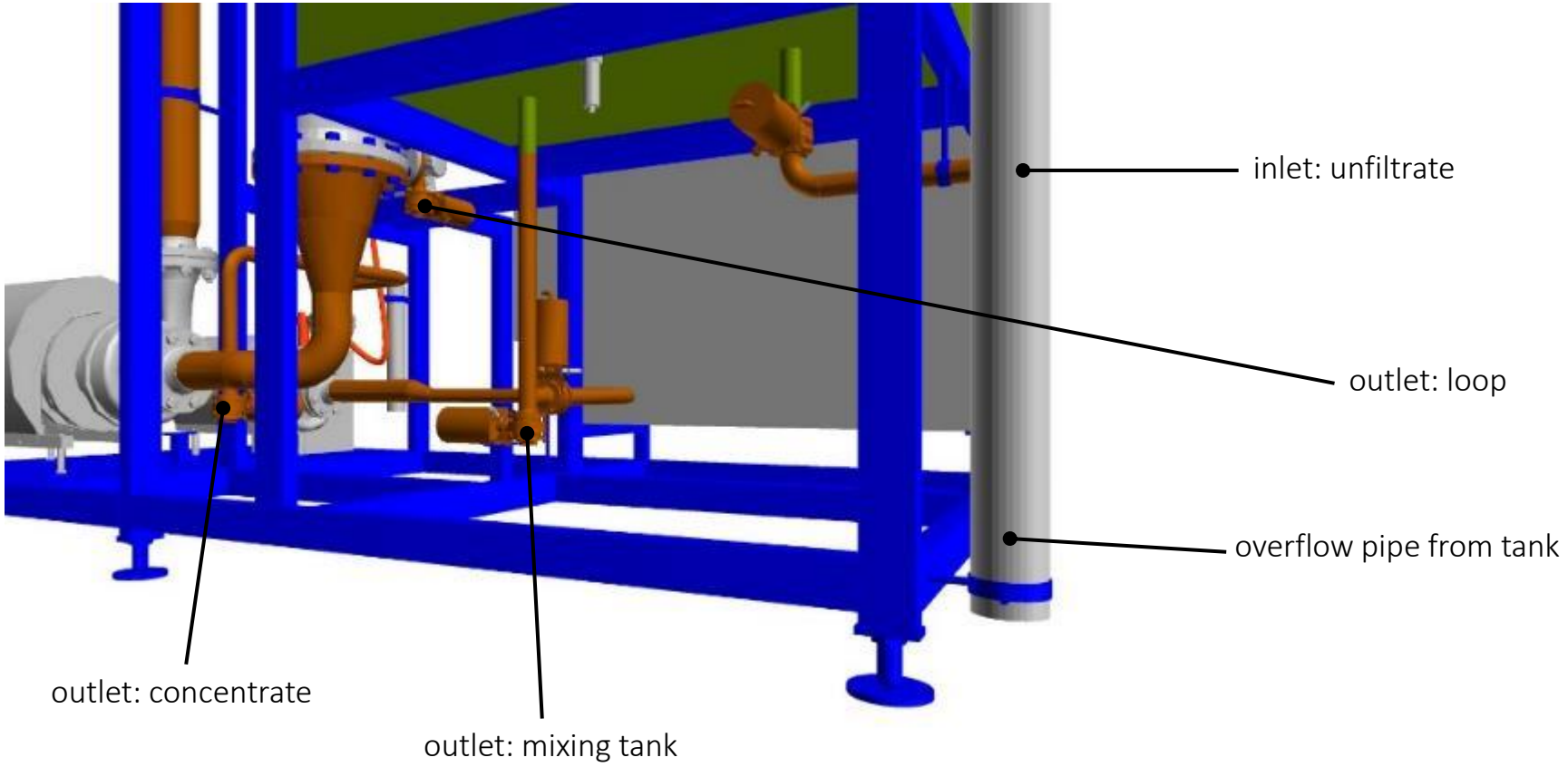
Output: 530 gph



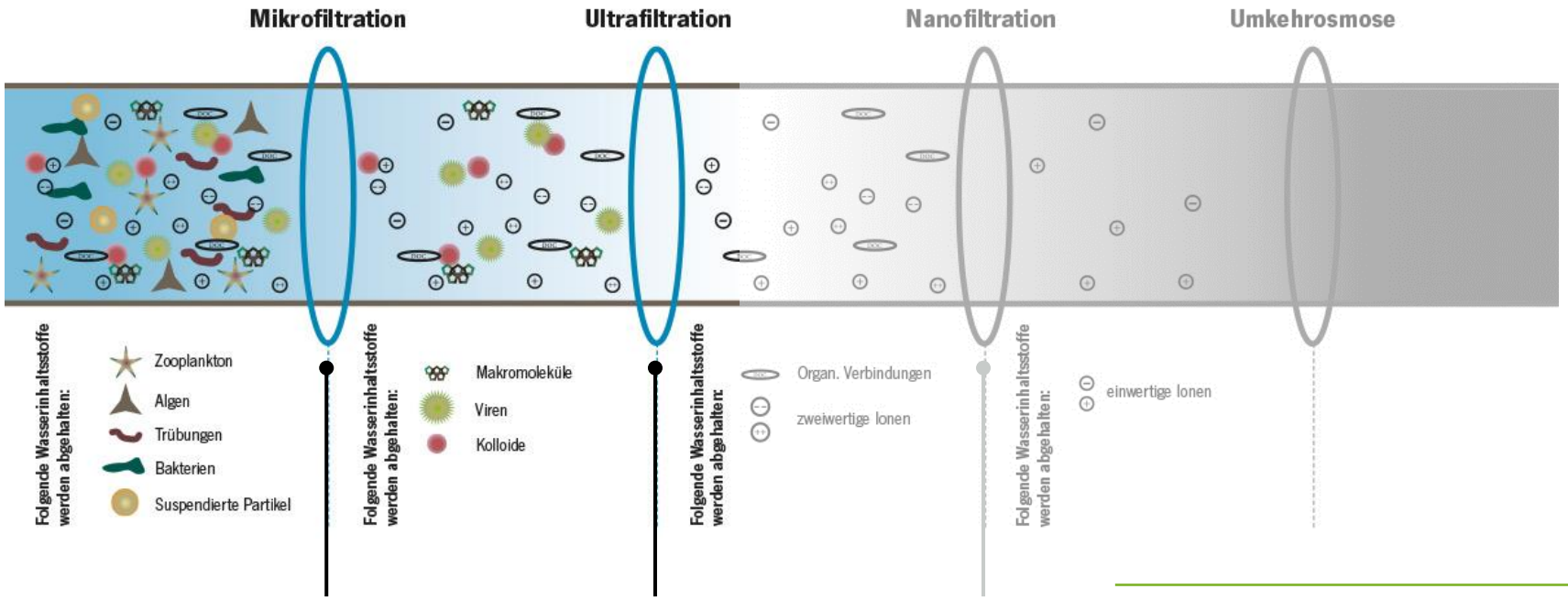
CF FILTRATION PLANT INLET/OUTLET



CF FILTRATION PLANT INLET/OUTLET



CF FILTRATION MATERIAL



micro filtration
ceramics
Polyethersulfon (PES)
Polyetraflourethylen (PTFE)

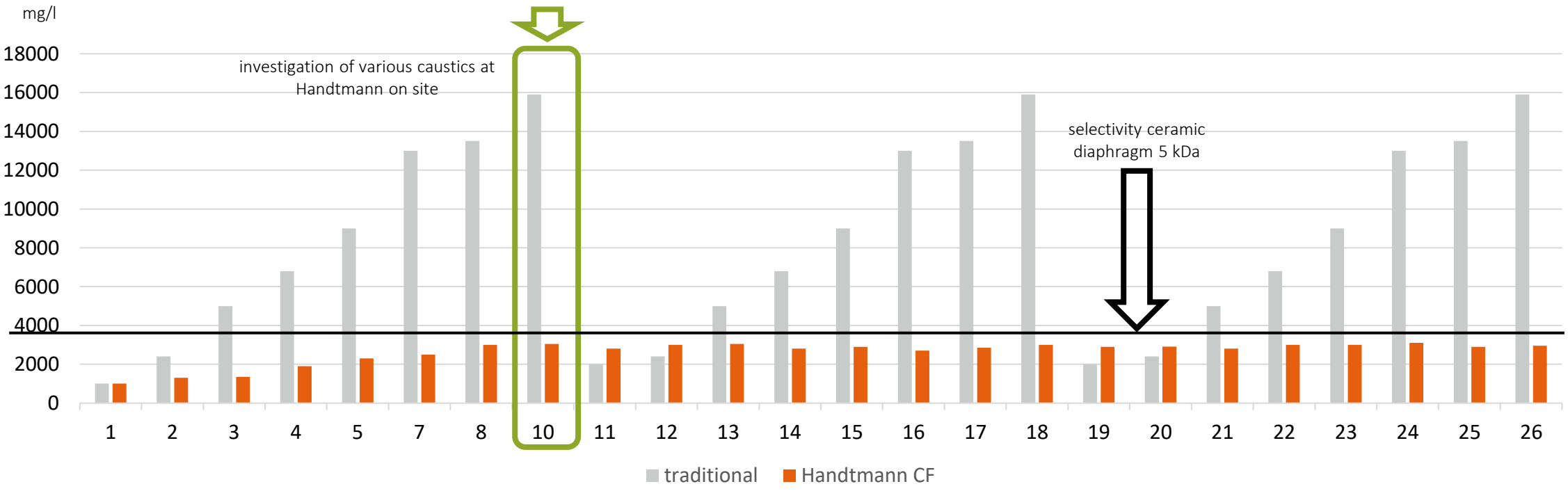
ultra filtration
ceramics
PES

nano filtration
ceramics

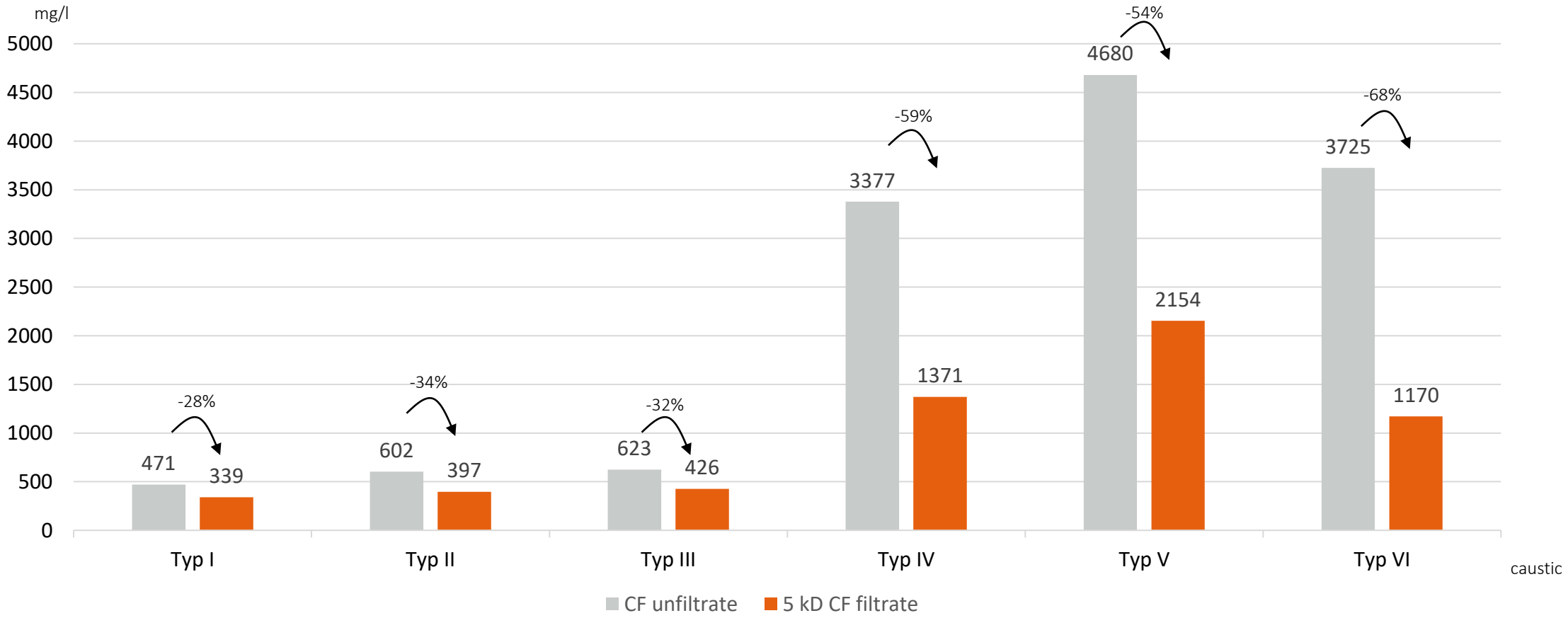
Process	Pore size [µm]	Molecular Weight [Da]
Reverse osmosis	< 0,001	< 100 Da
Nanofiltration	0,001-0,01	0,3-2 kDa
Ultrafiltration	0,01-0,1	1-500 kDa
Microfiltration	> 0,1	> 500 kDa

CF ANALYSIS DATA UF

reduction of the chemical oxygen demand (COD) of a dairy CIP caustic by an UF filtration by 28% to 68%

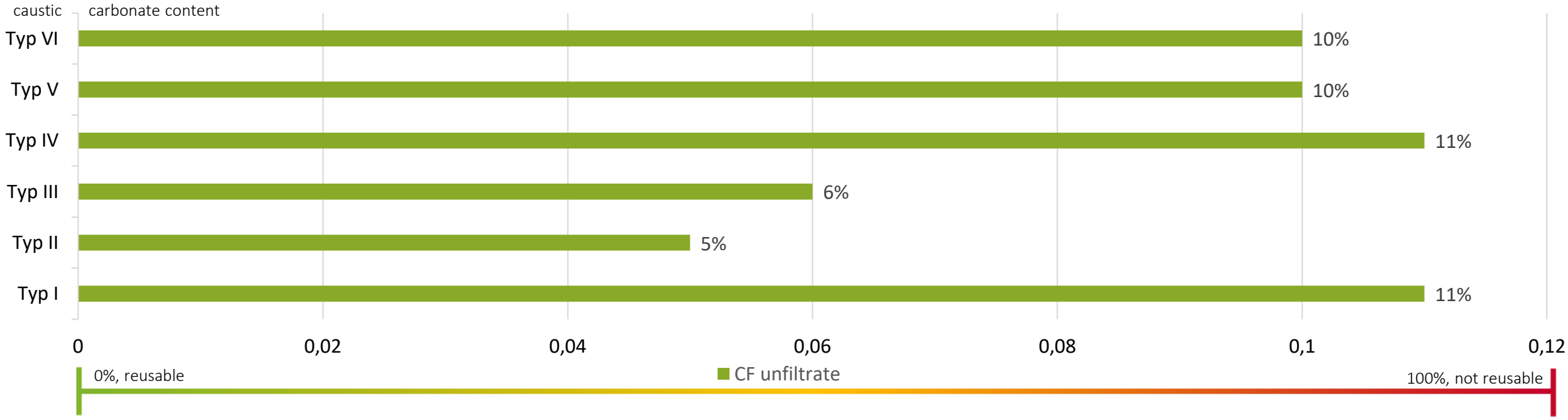


CF ANALYSIS DATA UF



CF ANALYSIS DATA UF

P&M analysis: very good
(titration with Phenolphthalein and Methylorange)



CF REGENERATION

CIP

1. Water flushing
2. Cleaning solution 1%-2%
3. Water flushing

Cleaning time approximately 50-60 min.

DISPOSAL OF THE CONCENTRATE

fields

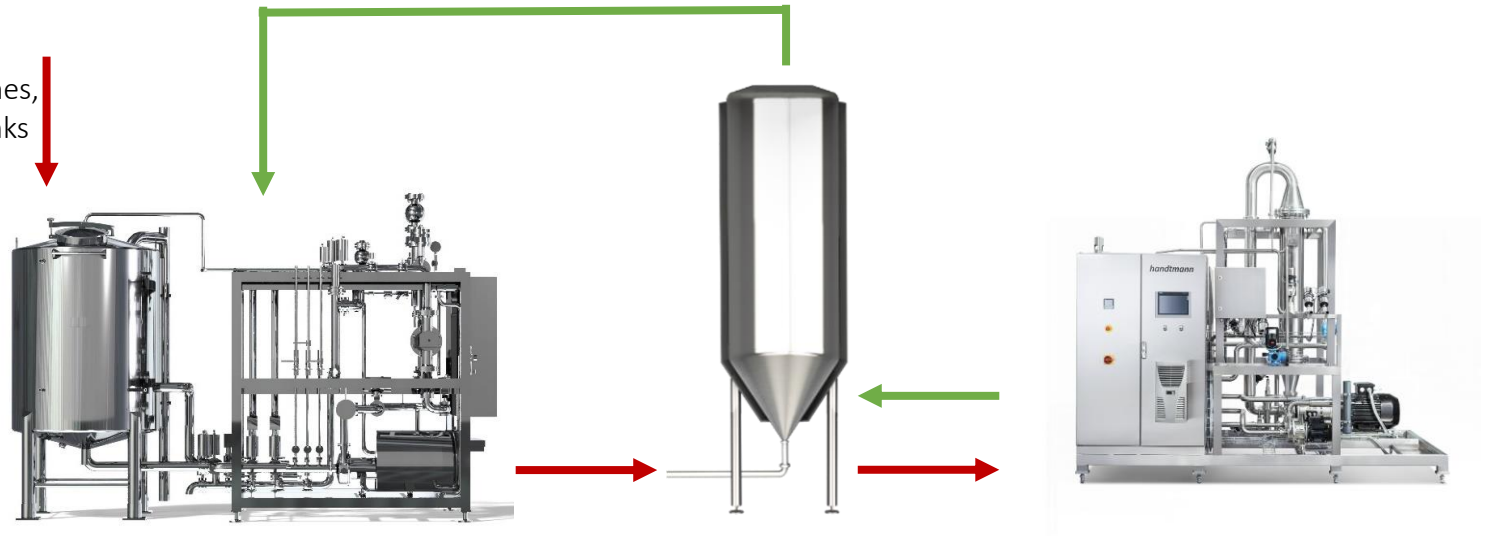
wastewater plant

biogas plant

laboratory waste

CF PROCESS –TANK CIRCULATION

dirt from pipelines,
production, tanks



filtrate — unfiltrate

CF PROCESS – TANK TO TANK

dirt from pipelines, production, tanks

filtrate — unfiltrate

CF PROCESS – Reusable quantities

Expected Process loses in the plant:

- Seatlifting of double seat valves
- Push outs
- Further looses

Upconcentration of chemicals and water

VIII: +20 %

II: 100 %

III: 80 %

I: 100 %

V: 80 %

VII: 80 %

VI: 80 %

Wastewater

IV: - 20 %

Filtrat — Unfiltrat

ROI CALCULATION

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Ideas for the future.

initial situation dairy:

medium-sized plant:	2.000 L/h
new approach caustic:	40 m^3/week
caustic concentrate:	3%
new approach/cleaning:	4 h/week
wastewater savings:	40 m^3/week

resulting costs can be saved!

gross savings:
Σ(114.600€ + 3.150€ + 10.400€) = 128.150€/year

running costs:
electricity + maintenance = 18.000€/year

net savings:
gross savings – running costs = 110.150€

ROI:
plant invest 250.000€ / net savings 110.150€ = **2,27 years**

caustic requirement:
40 m^3/week X 52 weeks/year = 2.080 m^3/year (3%-caustic)

2.080 m^3 → 3%
6.240 m^3 → 1%
124,8 m^3 → 50%

124,8 m^3 X 1.000 L/m^3 = 124.800 L (density 50% caustic: 1,53 kg/l)
124.800 L X 1,53 kg/l = 190.950kg (50%-caustic)

190.950 kg X 0,60 €/kg = **114.600 €/year**

wastewater:
40 m^3 X 52 weeks = 2.080 m^3

2.080 m^3 X 1,50€/m^3 = **3.150 €/year**
+ COD-surcharge per kg wastewater

new approach/cleaning:
4h X 52 weeks = 208 h
208h X 50€/h = **10.400 €/year**

CF APPLICATION DAIRY INSTALLATION

since 2009

Application:
- *attachment tank (70 m³)*
- *2% caustic*
- *discarded every week*

customer post calculation

- 4.026 m³ / 2% caustic
- 226.667 kg / 50% caustic
- 226.667 kg x 0,30€/kg

  = **68.000€/year** (pot. savings new caustic)

- wastewater, storage costs, personal costs, etc.

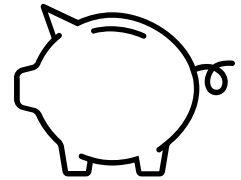
  = **91.000€/year** (pot. savings above all)

- ROI at that time

  = **~ 1,8 years**

- profit after 11 years

  = **~ 1.000.000€**



PERFORMANCE DATA CF PLANTS

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Ideas for the future.

CF Caustic Recovery System

System	CF004	CF011	CF016	CF026	CF040
Feedpump approx.	3 kW (5 bar)	3 kW (5 bar)	3 kW (5 bar)	4 kW (5 bar)	4 kW (5 bar)
Looppump approx.	7,5 kW (4 bar)	18,5 kW (4 bar)	22 kW (5 bar)	30 kW (4 bar)	45 kW (4 bar)
Supplypump approx. (optional)	1,1 kW (1,5 bar)	1,5 kW (1,5 bar)	1,5 kW (1,5 bar)	1,5 kW (1,5 bar)	1,5 kW (1,5 bar)
Output approx. *	3000 gallon/day	8000 gallon/day	12000 gallon/day	19000 gallon/day	30000 gallon/day

* dairy application

CF MEDIA FILTRATION

CF004

- Location: Dairy, Germany
- Process: partial flow to central CIP tank
- 3,42 m² filter surface
- 600-1.100 l/h filtrate capacity

CF MEDIA FILTRATION

CF007

- Location: Brewery, Germany
- Process: partial flow on 2 CIP tank filling
- 6,84 m² filter surface
- 800-1.500 l/h filtrate capacity

CF MEDIA FILTRATION

CF016

- Location: Dairy, Austria
- Process: 1 CIP tank
- 15,84 m² filter surface
- 1.900-3.500 l/h filtrate capacity

CF MEDIA FILTRATION

CF032

- Location: Dairy, Italy
- Process: 2 CIP tanks
- 31,68 m² filter surface
- 3.500-5.000 l/h filtrate capacity

CF MEDIA FILTRATION

CF087

- Location: Brewery, Mexico
- Process: partial flow on 21 CIP tanks
- 84,64 m² filter surface
- 3.000-25.000 l/h filtrate capacity

CF MEDIA FILTRATION

TEST PLANT

- CF-lab for membrane selection
- CF-001 for micro and ultrafiltration
- CF-Multi for low and high pressure ranges

ADVANTAGES AND SAVINGS

Our plants are characterized by

- ✓ Fully automatic filtration and cleaning
- ✓ 24/7 operation
- ✓ Easy to use
- ✓ Data recording
- ✓ On-demand cleaning
- ✓ Short cleaning times
- ✓ Low consumption, high yield
- ✓ Fast ROI

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Ideas for the future.