AAQUA

AQUAPROX

The future of water and water reuse in the tank cleaning sector

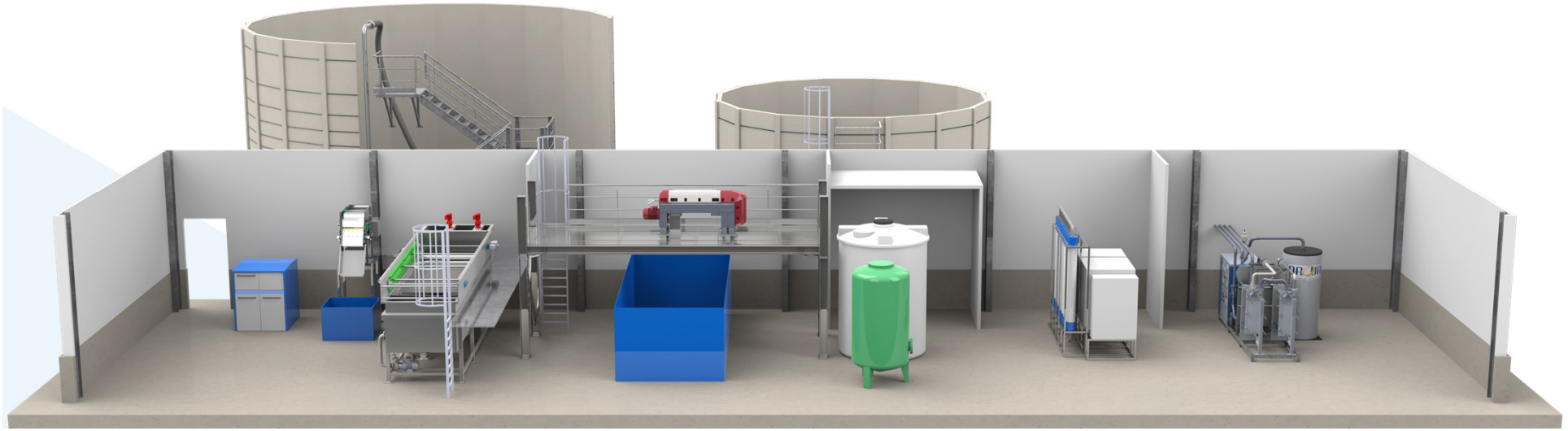
EFTCO 25th anniversary open house conference

Dr. Ing. Rob Van den Broeck

April 4th 2019, Brussels

Who is AAQUA?

- Established in 1999
- Team: 18 people
- Since 2016, member of the AQUAPROX group
  - Turnover: ±50M€ (AAQUA ±6M€)
  - Staff: ±150
  - Portfolio >2000 clients
- Located in Sint-Katelijne-Waver (Belgium)

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Activities AAQUA

- **Wastewater treatment**: design, engineering, build and commissioning
- **Reuse**: from wastewater to process water or ultrapure water
- **Process water treatment**: softeners, deferrization, manganese removal, reverse osmosis
- **Pilot units**
- **R&D**

Experience in tank cleaning

- 20 years of experience in tank cleaning
- Advantage of Flemish environmental legislation
  - Stringent discharge limits for this sector
  - Potable water is expensive
  - “If we can do it in Flanders, we can do it anywhere”
- No-nonsense approach: *we make our designs as simple as possible and only as complicated as needed*
- >80 references in tank cleaning world wide

Presentation content

1. Opportunities for water reuse in tank cleaning

2. Barriers for reuse

3. Drivers for reuse

Opportunities for water reuse in the tank cleaning sector

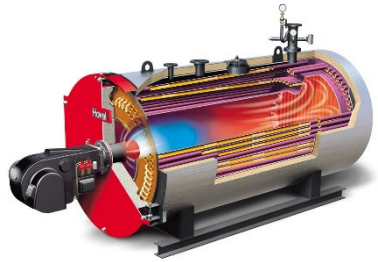
Conventional water flows in tank cleaning

- Three important consumers

  1. Truck wash

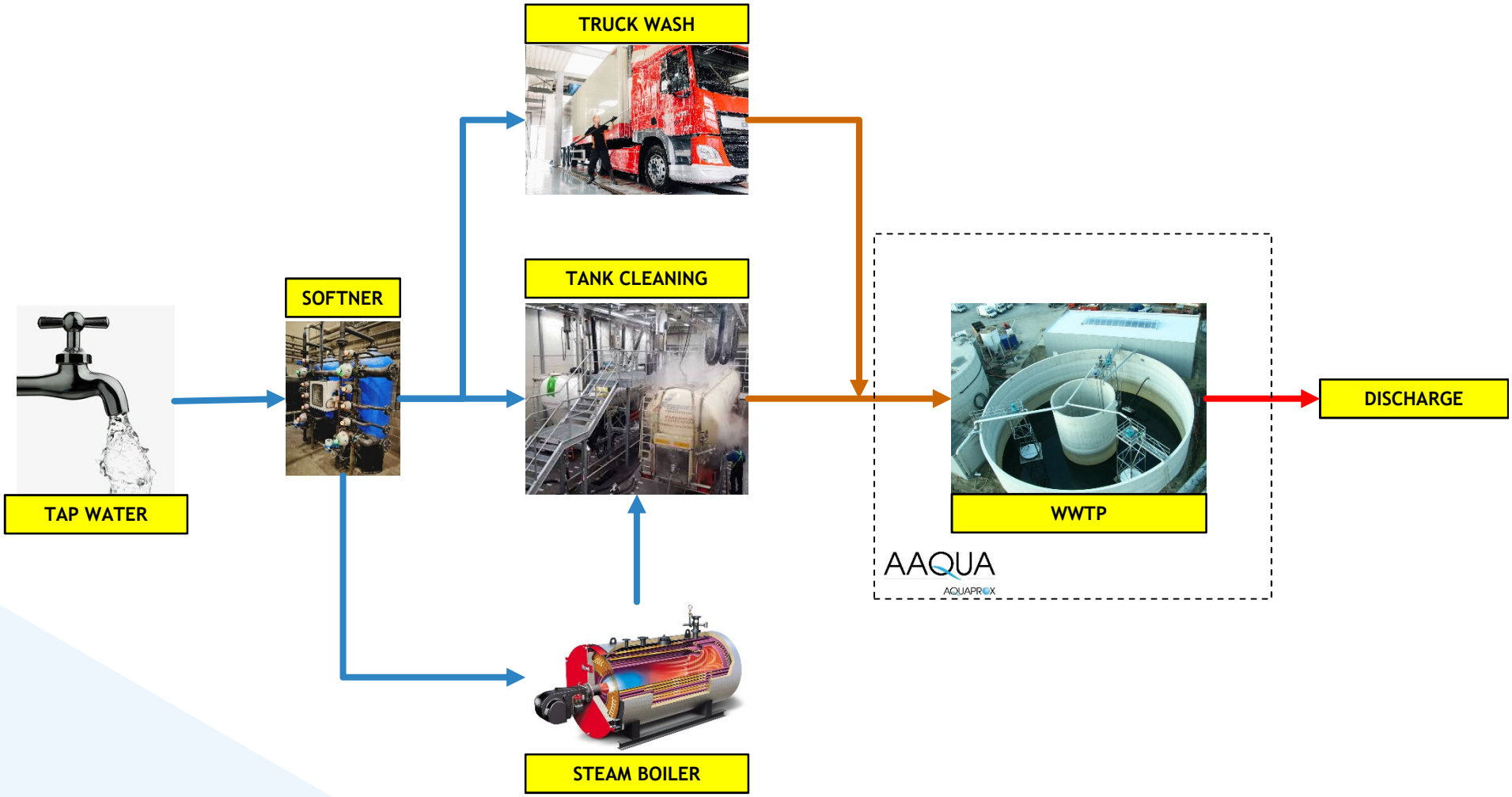
  2. Tank cleaning

  3. Steam boiler

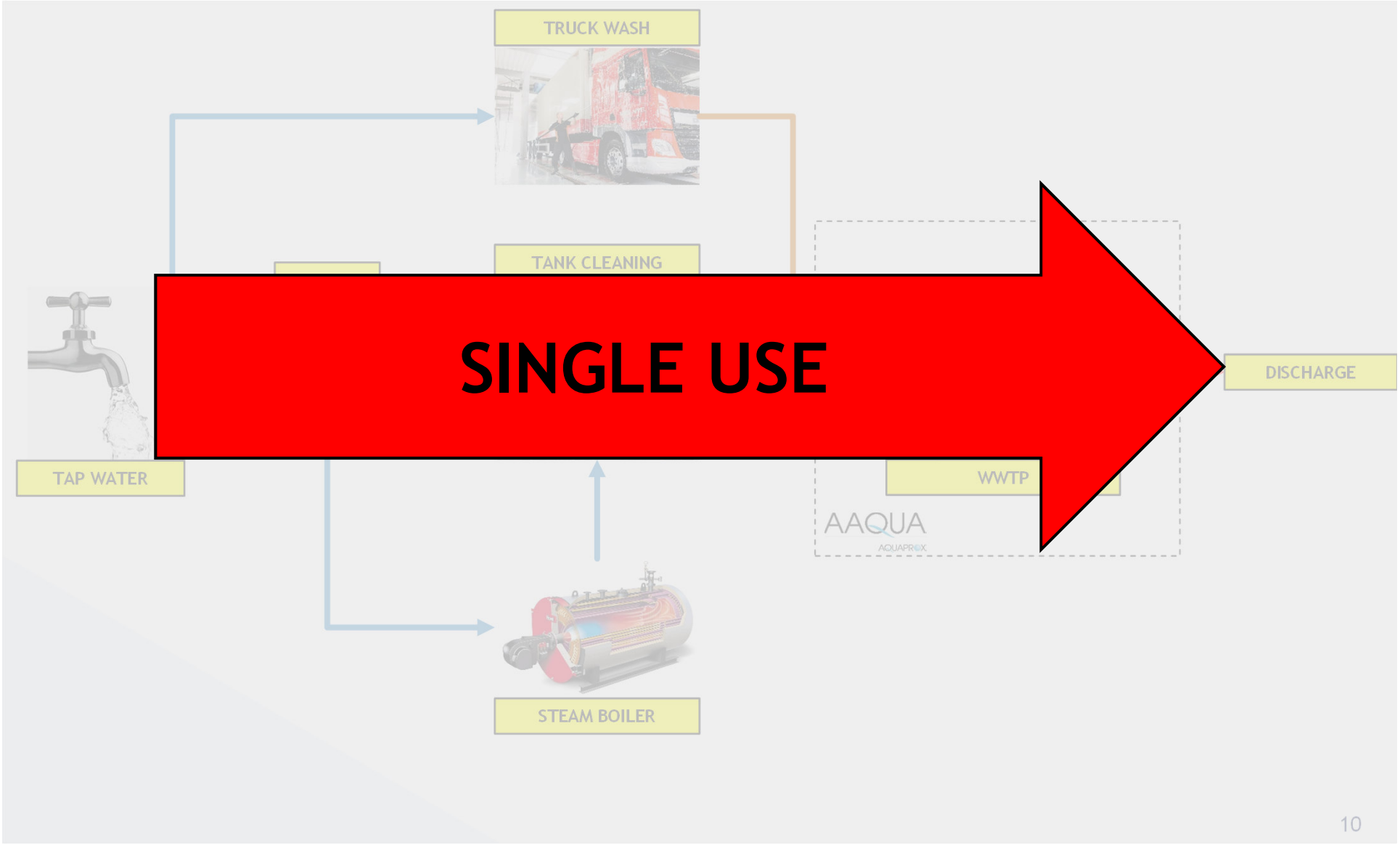


- Required water quality differs for each consumer

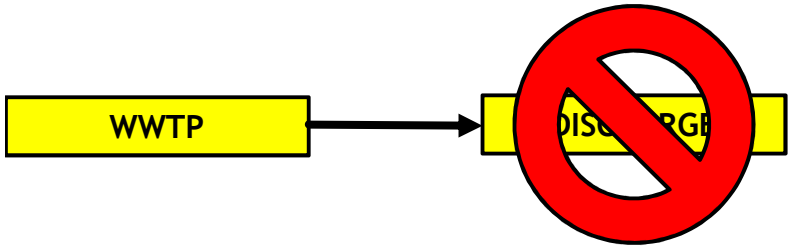
Conventional water flows in tank cleaning



Conventional water flows in tank cleaning

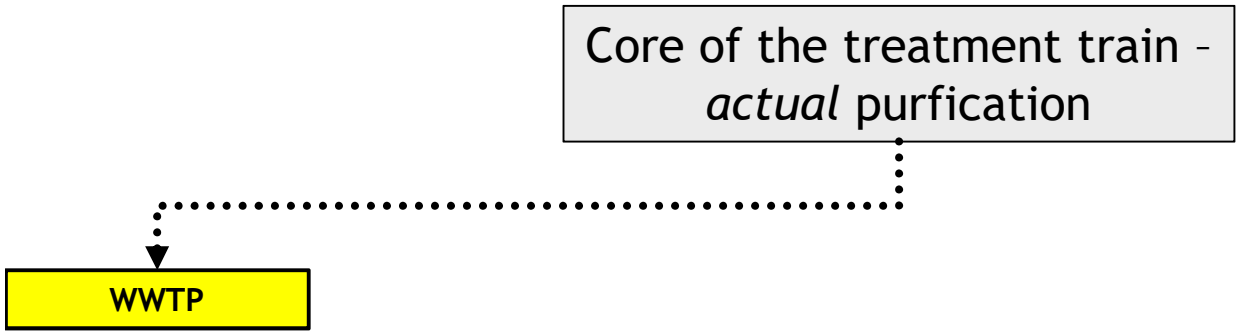


From single use to reuse

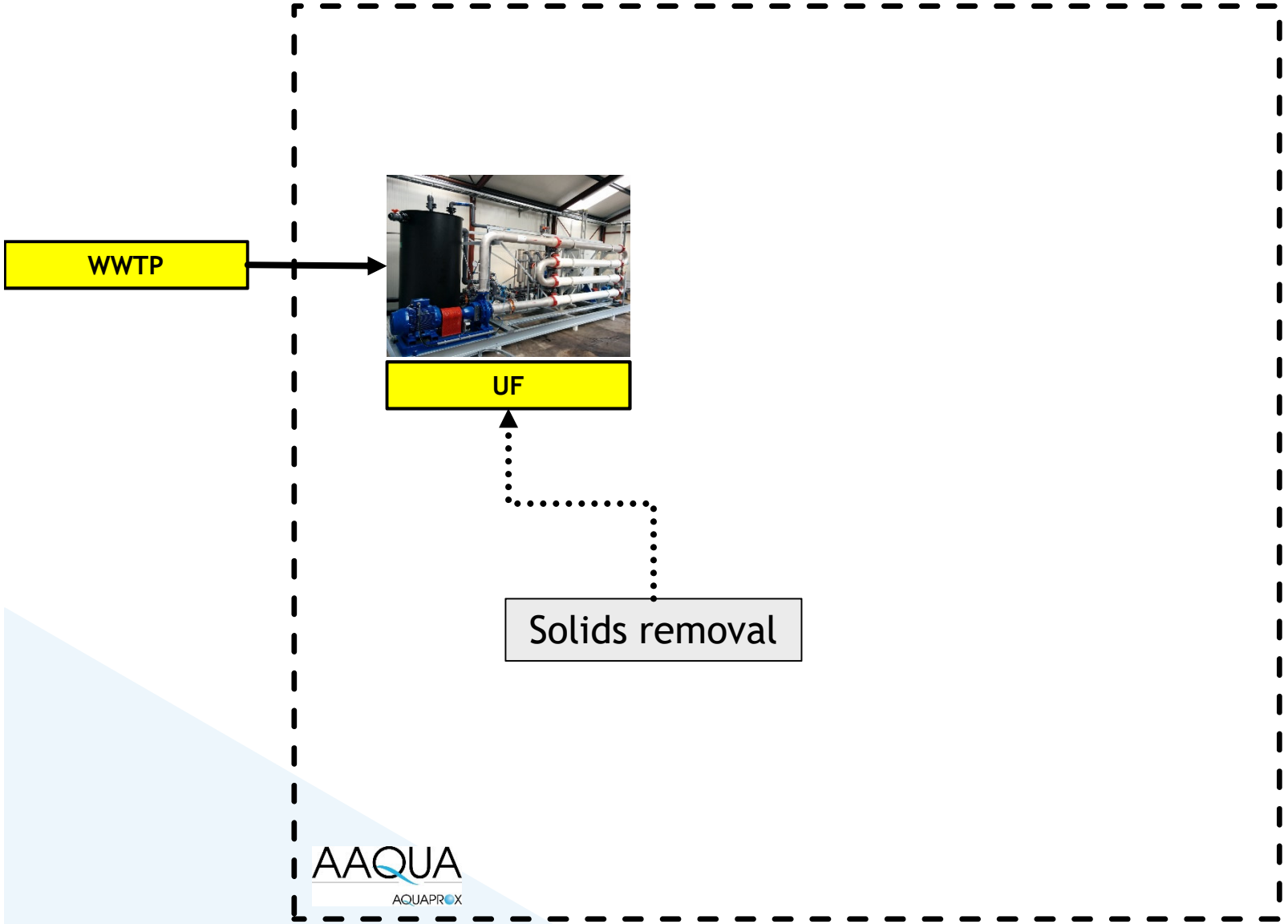


What is needed to make this happen?

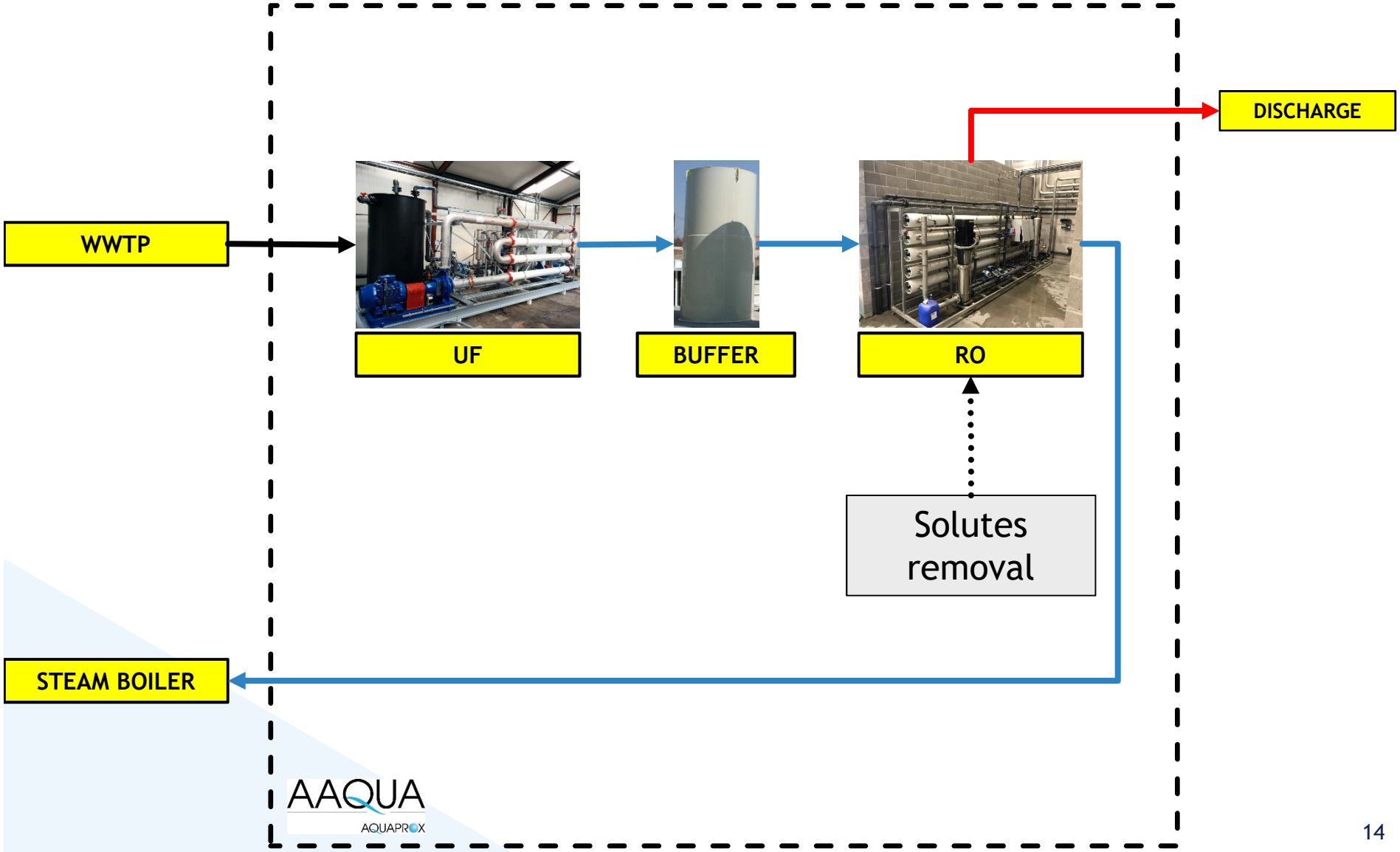
From single use to reuse



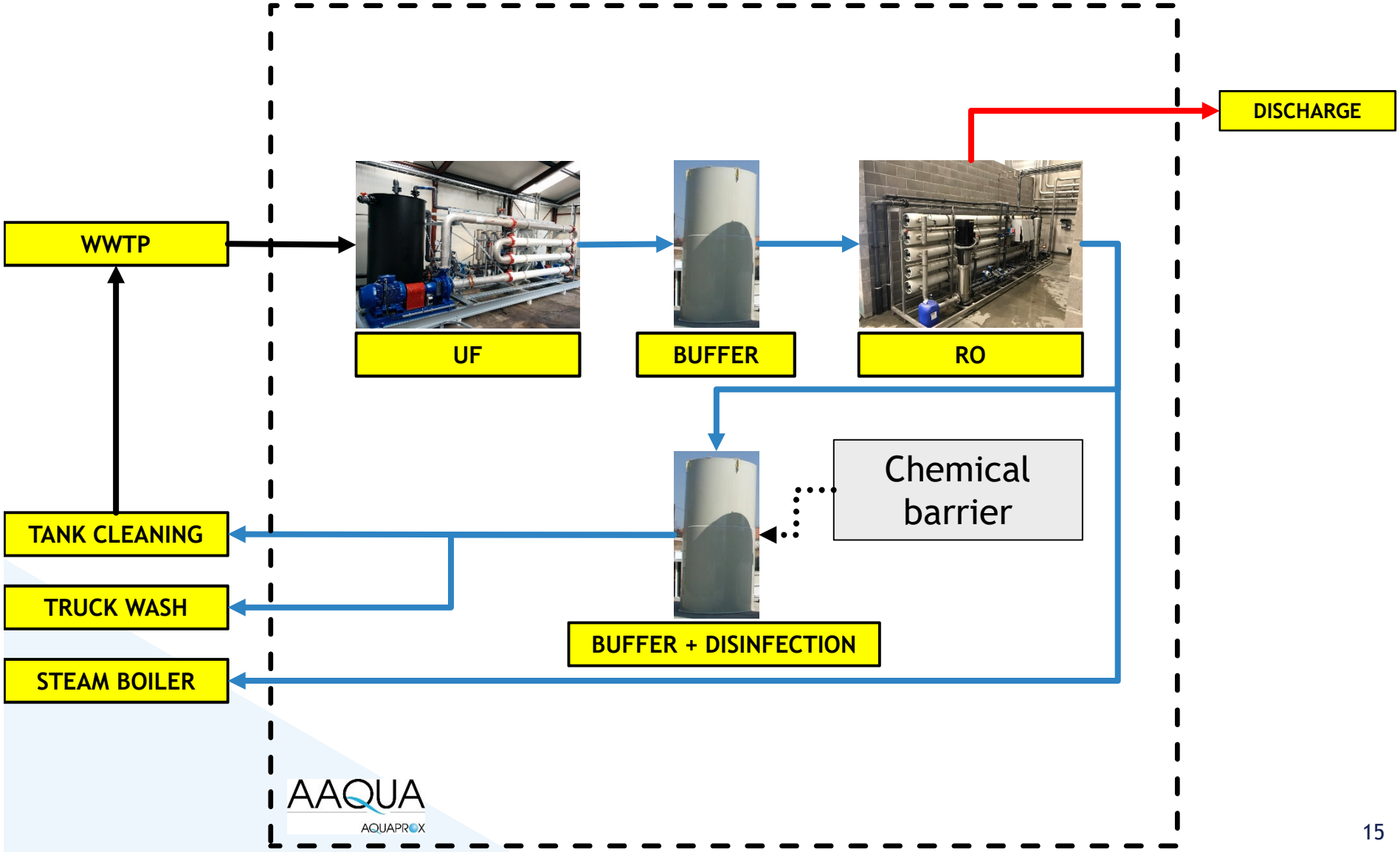
From single use to reuse



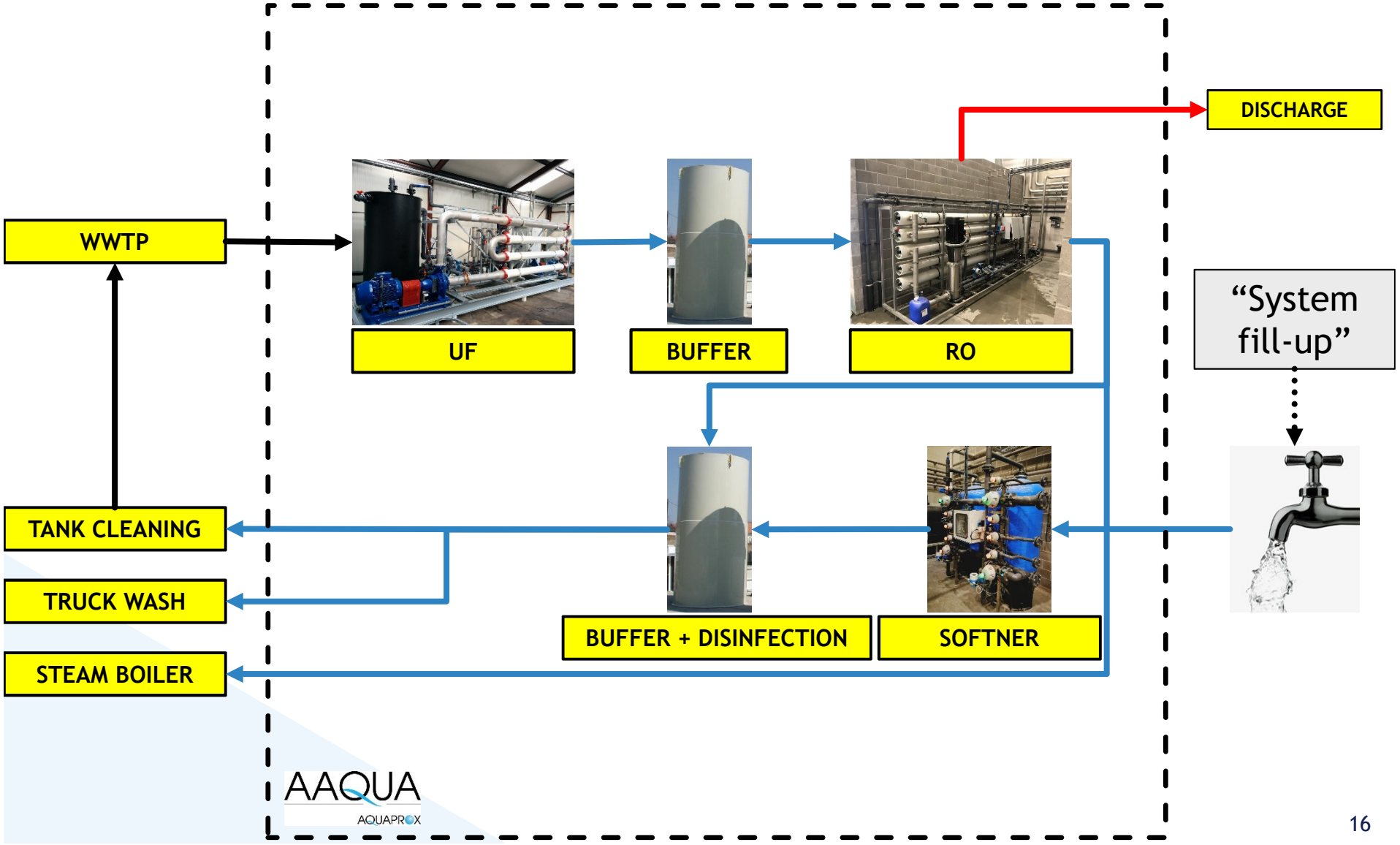
From single use to reuse



From single use to reuse



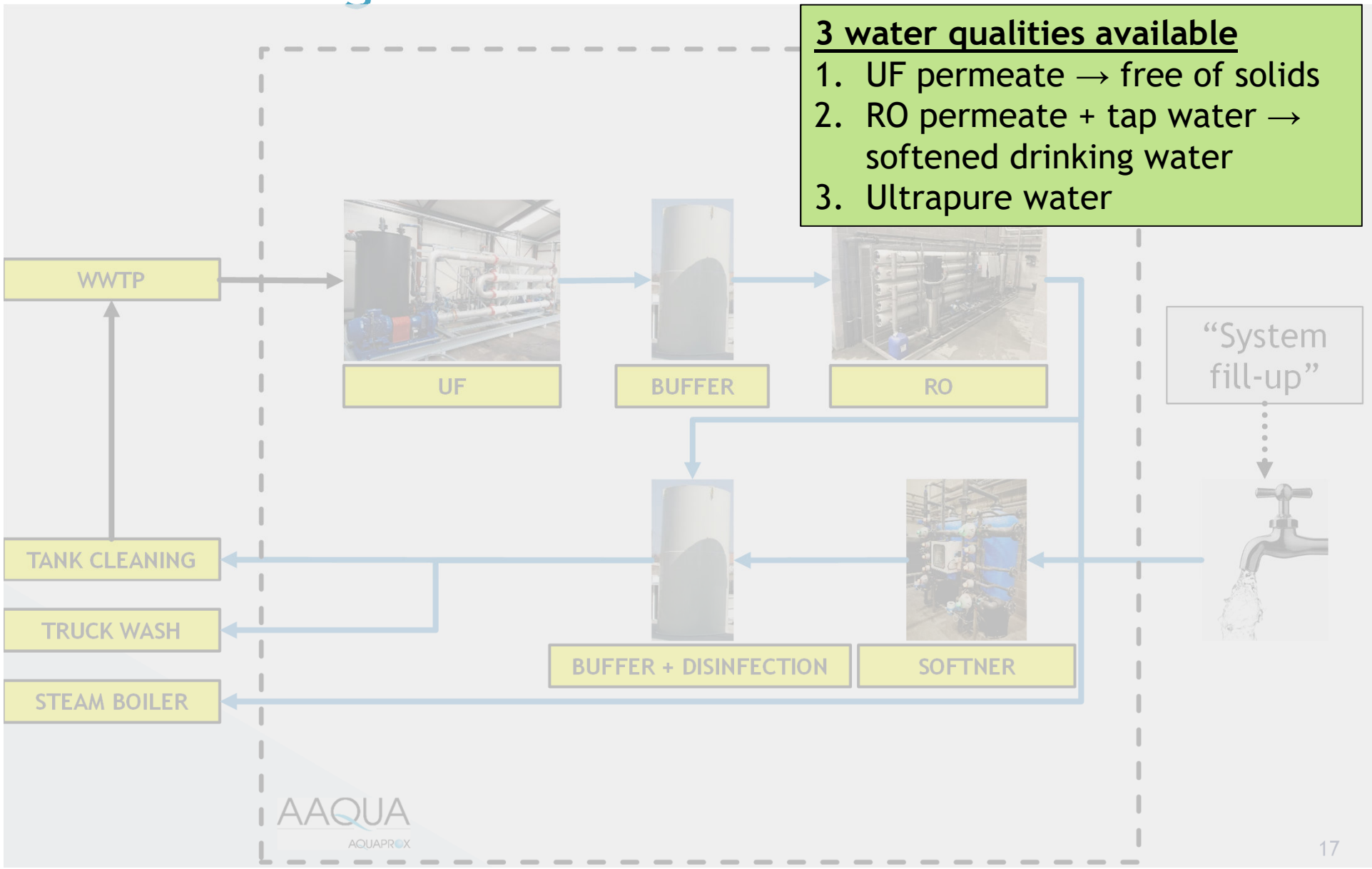
From single use to reuse



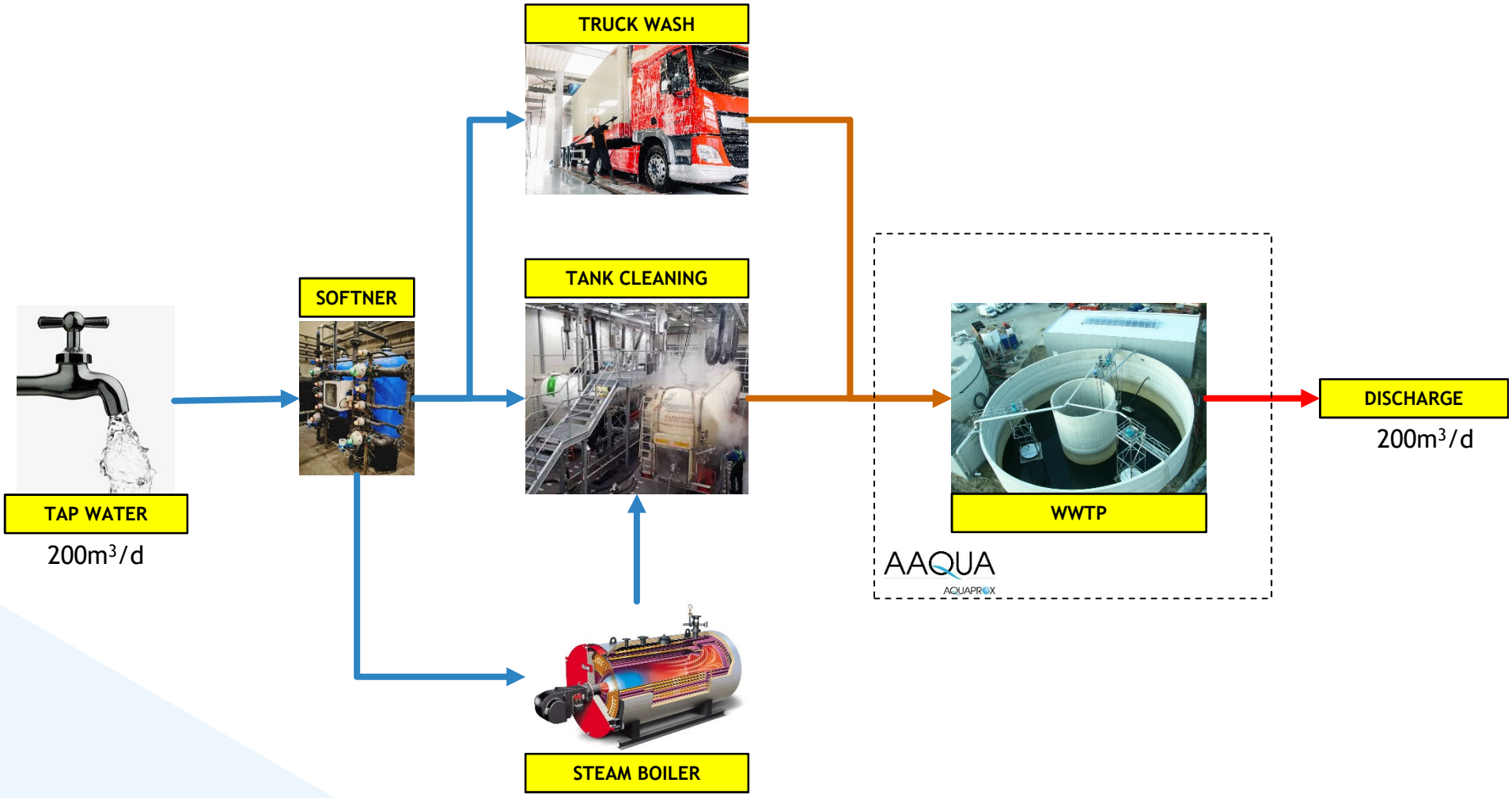
From single use to reuse

3 water qualities available

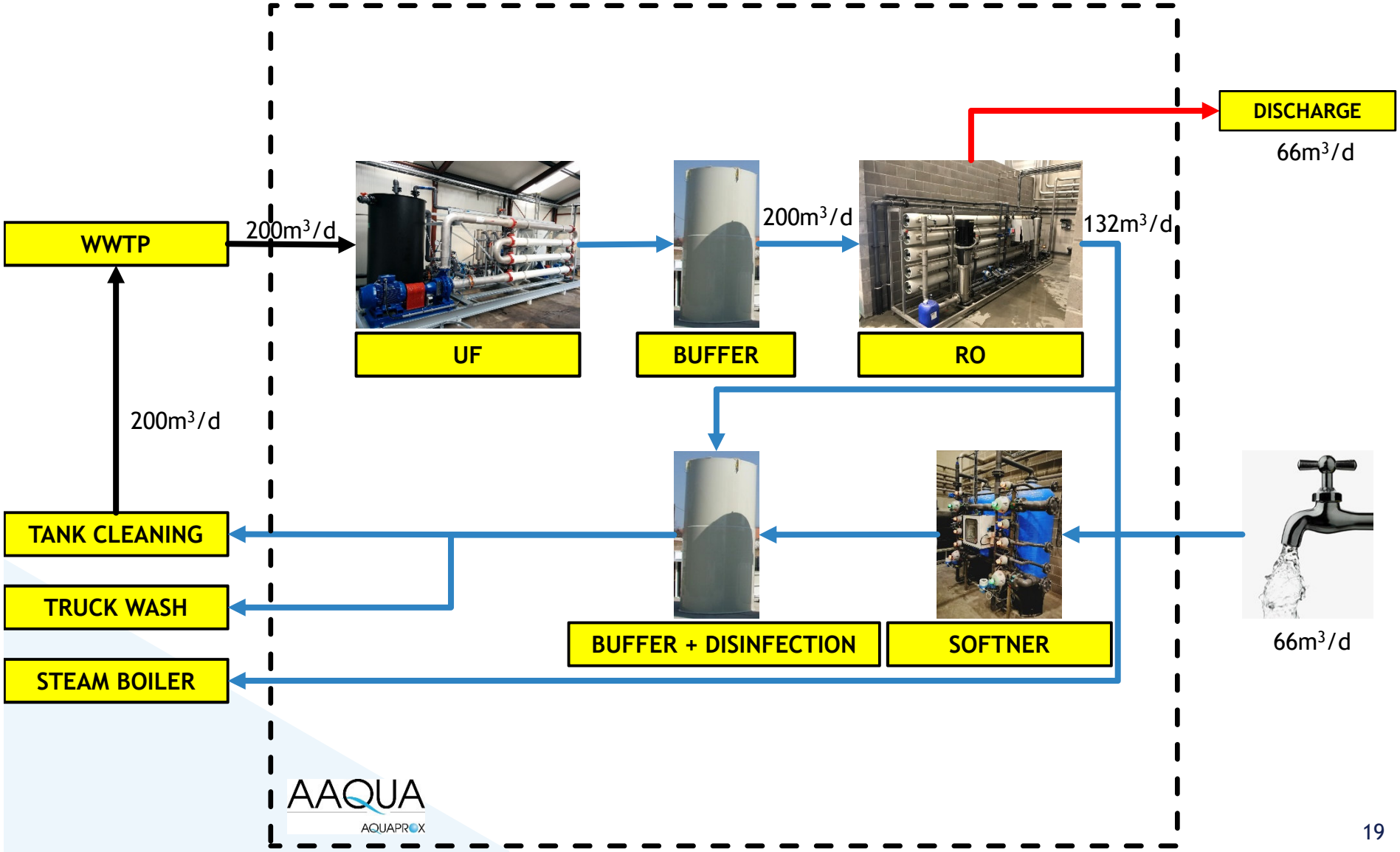
1. UF permeate → free of solids
2. RO permeate + tap water → softened drinking water
3. Ultrapure water



Conventional water flows in tank cleaning



From single use to reuse



Opportunities for water reuse in tank cleaning

In our example

- Tap water consumption 200 → 66 m^3/d (66% reduction)
- Water softener 200 → 66 m^3/d (66% reduction)
- Temperature of reuse water 30-35°C (vs. 10-15°C tap water)
- Boiler reduced blowdown

Barriers for water reuse in the tank cleaning sector

Barriers for water reuse

Financial aspect: "Water reuse is expensive!"

OPEX UF/RO ≈ 0.6 – 0.8€/m^3

The return on investment is very case specific

- Price of intake water source (tap, well, surface)
- Discharge permit
- Discharge price
- Energy price
- …

Barriers for water reuse

Example

- Tap water
- Discharge into sewer
- 80/20 hot/cold water
- 200m³/h, 260d/y
- **SAVINGS 10 y: 916k€**

Cost item		Cost (€/m³)		Cost (€/y)
OPEX UF/RO		0,80 €		41.600 €
Intake water reduction	-	**2,00 €**	-	**68.640 €**
Discharge cost reduction	-	**1,30 €**	-	**44.616 €**
Reduced water softening	-	0,23 €	-	7.894 €
Energy reduction for heating	-	0,70 €	-	29.009 €
Energy reduction for reduced steam boiler blowdown	-	12,00 €	-	3.120 €
TOTAL			-	111.678 €
CAPEX				200.000 €
ROI				1,8

Barriers for water reuse

Social acceptance "We are cleaning with wastewater"

- There is at least a triple barrier → after the RO water has drinking water quality or better
- We are not creating water, we are generating a water quality, just like your drinking water company is doing
- Online and offline monitoring!

Barriers for water reuse

Social acceptance "We are cleaning with wastewater"

Example from the food industry

- Slaughterhouse: discharge permit decreased to 90m³/d → reuse is required
- Today, 70% of the wastewater is recycled to the plant as drinking water quality
- Treatment train: physical/chemical treatment → biological treatment → sand filtration → ultrafiltration → reverse osmosis → chlorination
- In operation since 2015, ROI < 3 years

Barriers for water reuse

Social acceptance "We are cleaning with wastewater"

How can we tackle this?

- Explain it, prove it to your external auditors
- Role of sector federations
- Start in non-food cleaning bays

Barriers for water reuse

Legislation

- Concentration based discharge limits… while the discharge load is reduced

→ load based discharge limits

Drivers for water reuse in the tank cleaning sector

Drivers for water reuse

- Fresh water sources are getting scarce and more expensive
- Discharge is getting more difficult and more expensive
- The quality requirements for discharge are close to quality requirements for reuse
- Reuse can offer different water qualities depending on the needs
- RO water is soft water → no softening needed
- Reuse water is already warm

Points of attention for reuse

- When considering water reuse, always follow a holistic approach (water, energy, environmental impact)
- Good cleaning practices are key for water reuse
  - Proper collection of residual loads!
  - Correct use of cleaning agents and detergents
- A good WWTP is crucial
- Membranes ≠ membranes

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Questions?
We are here to help

Marc Feyten – Jelle Van Opstal – Jan Verbruggen – Rob Van den Broeck

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