

AQUAHIVE

Energy-Efficient
Decontamination of industrial effluents and
circularization of process water



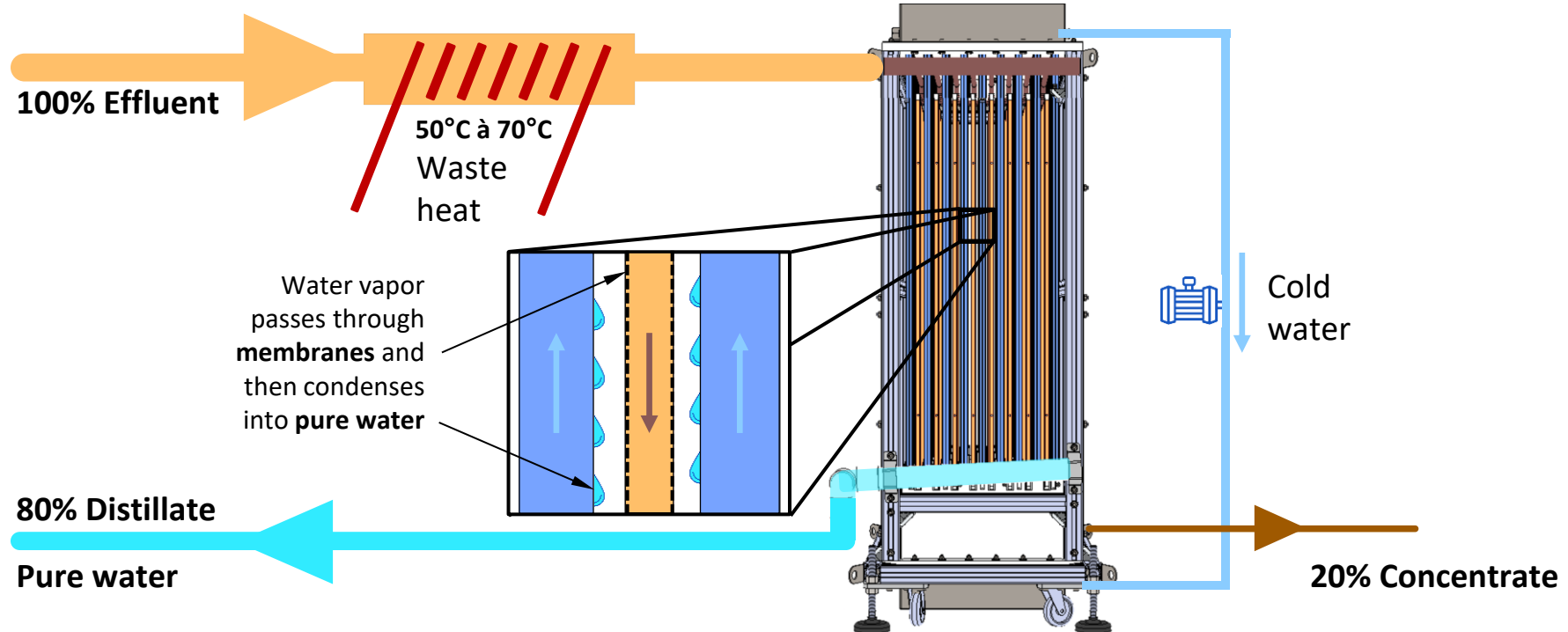
TOWARDS A MORE SUSTAINABLE INDUSTRY

Environmental regulations are getting tougher and water pressure is intensifying

- The treatment of industrial water (PFAS, ionic and organic compounds,...) must be organized
- Water consumption must be reduced to anticipate future shortages
- We must continue to reduce the carbon footprint

THE AQUAHIVE® SOLUTION

Water vapor extraction by membrane separation



FEATURES

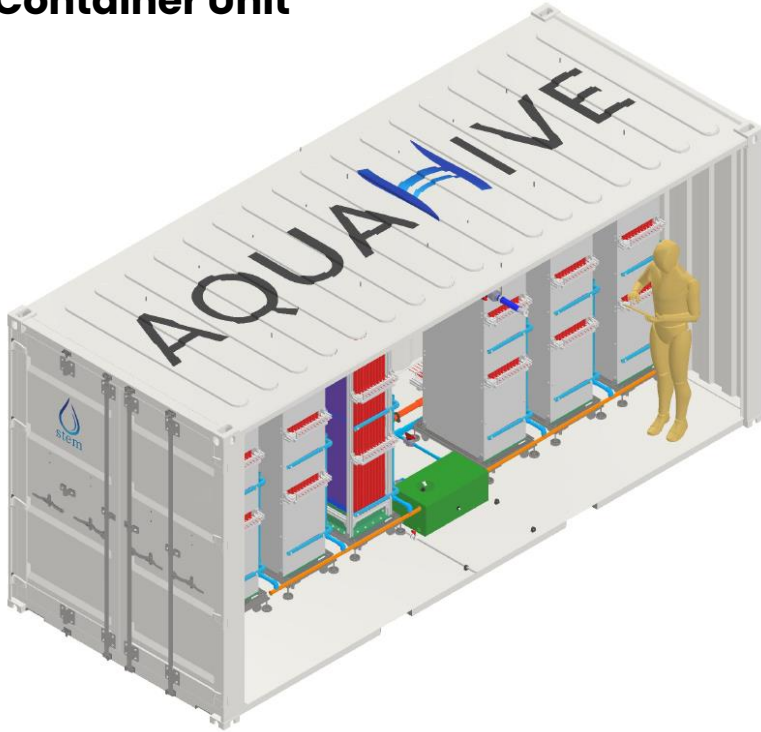
- Filters all pollutants including **organic & PFAS**
- **Concentration of up to 80%** of polluted effluents
- **High purity** of the 1-pass outlet water: 5-9 $\mu\text{S.cm}^{-1}$
- **High energy efficiency** thanks to low-temperature waste heat (from 50°C)

BENEFITS

- **No chemical or biological pre-treatment** of effluent
- **Simplified membrane maintenance**: operation at atmospheric pressure and standard materials
- Capable of treating **different sources of effluent** (process water, wash water, rainwater, etc.) **without changing configuration** or membrane
- **Possible financing** with CEE and/or Water Agencies

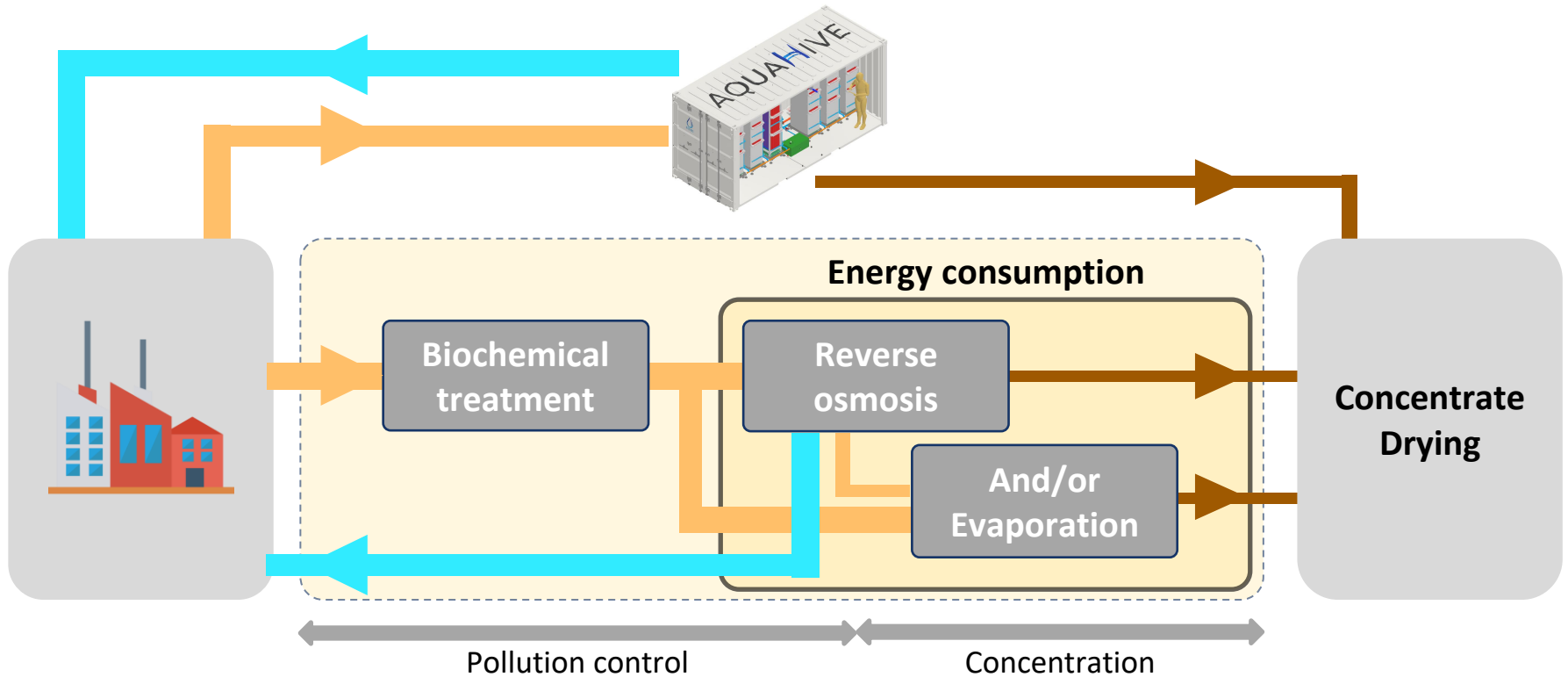
OPERATIONAL LAYOUT

Container Unit



Characteristic	Unit	Value
Inflow	m ³ / jour	3,0
Distillate flow rate	m ³ / jour	2,4
Distillate quality	μS.cm-1	5-9
Concentration	Distillate/Effluent	5
Qty of modules		4
Container surface	m ²	15
Consumption (with waste heat)	kWh/m ³ effluent	1,0
Consumption (without waste heat)	kWh/m ³ effluent	160

SIMPLIFYING EFFLUENT TREATMENT



COMPARATIVE

Technology ↗	AQUAHIVE®	Reverse osmosis	Nanofiltration / Ultrafiltration	Evapo-concentration under vacuum
Pollutants ↘	Low pre-treatment Easy maintenance	Complex pre-treatments High maintenance	Medium pre-treatment Average maintenance	Medium to high pre-treatment Medium to high maintenance
Dissolved Salts / Chlorides / Salinity / SEC-SEH	Highly effective	Highly effective	Inefficient	Highly effective
Heavy metals (Pb, Cd, Zn, Ni, Cu...)	Highly effective	Very good rejection	Average	Highly effective
COD / OBD 5	Strong reduction	Effective	Inefficient	Highly effective
NTK (Organic Nitrogen + Ammonia)	Volatile NH ₃ according to pH/T°	Highly effective	Average	Depends on volatility
NOx (Nitrates / Nitrites)	Depends on volatility	Highly effective	Average	Average
Total Phosphorus (Pt)	Highly effective	Highly effective	Average	Highly effective
HCT (Total Hydrocarbons)	Highly effective	Average	Inefficient	Depends on volatility
Organohalogens (AOX, chlorinated solvents)	Depends on volatility	Very good rejection	Inefficient	Depends on volatility
Organo-aromatics (PCBs) and Organo-polycyclics (PAHs)	Highly effective	Effective	Inefficient	Highly effective



PILOT UNIT

Food alcohol distillation site

Application :

- Treatment of phlegmasses at the distillation outlet before evacuation to the treatment plant
- Circularization of pure water without organic compounds to steam generation processes

Operating Parameters

- Cold solution temperature: 20°C (supplied by the network)
- Hot effluent temperature: 60°C (already hot phlegmasses)



PILOT UNIT



Results and Analysis

Hot phlegmasses (55-60°C) are directed at the AQUAHIVE® pilot. After a few hours of operation, the distilled water produced by the pilot is collected and analyzed.

Parameter analyzed	Input flegmasses	Output pure water
pH	6,594	6,090
Conductivity ($\mu\text{S.cm}^{-1}$)	129,5	5,4
Chlorides (ppm)	0,14	0,07
Sulfates (ppm)	17,49	0,33
COD (mg/L)	179	<20

CONCLUSION

The **best solution** to **significantly reduce the treatment bill** for charged industrial effluents while **improving its water sobriety**



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