AQUAHIVE

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

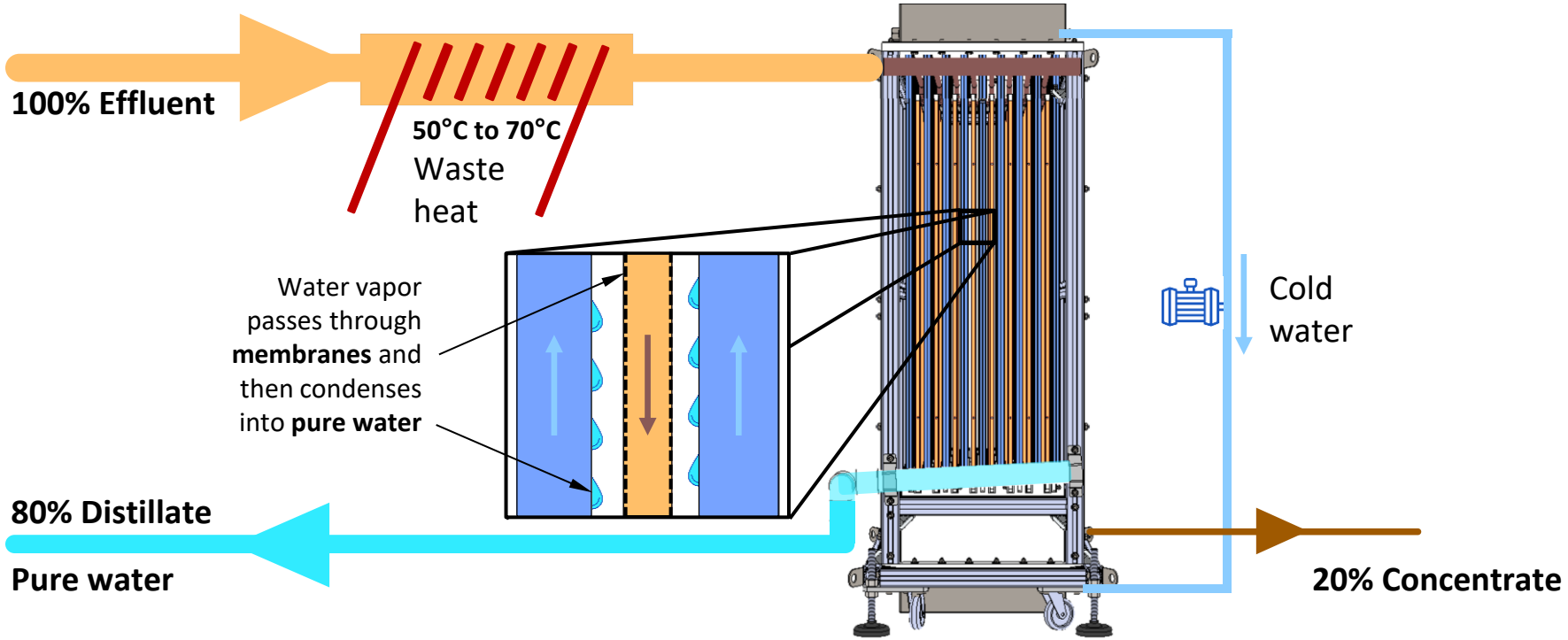
TOWARDS A MORE SUSTAINABLE INDUSTRY

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

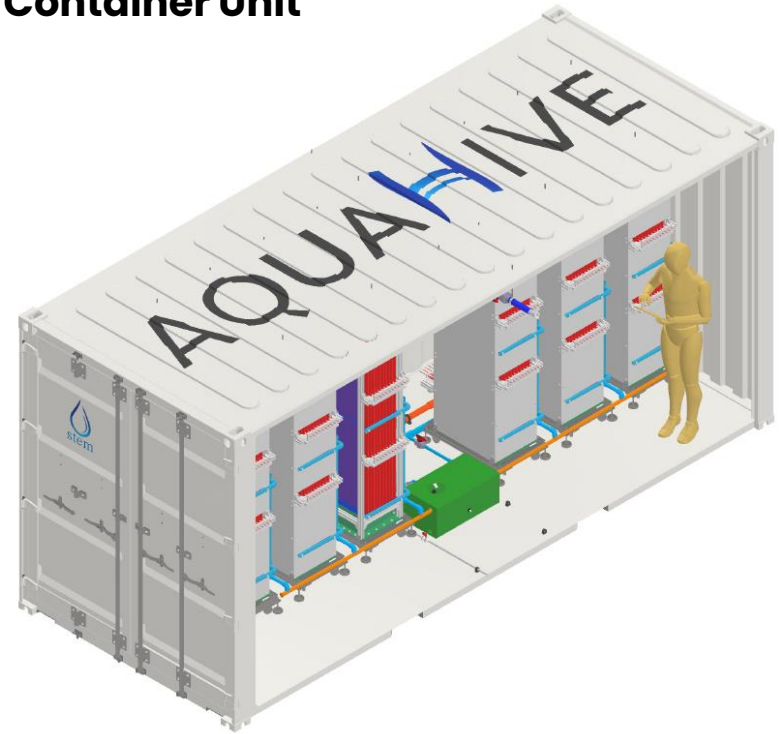
- Filters all pollutants including **organic & PFAS**
- **Concentration of up to 80%** of polluted effluents
- **High purity** of the 1-pass outlet water: 5-9 µS.cm-1
- **High energy efficiency** thanks to low-temperature waste heat (from 50°C)

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

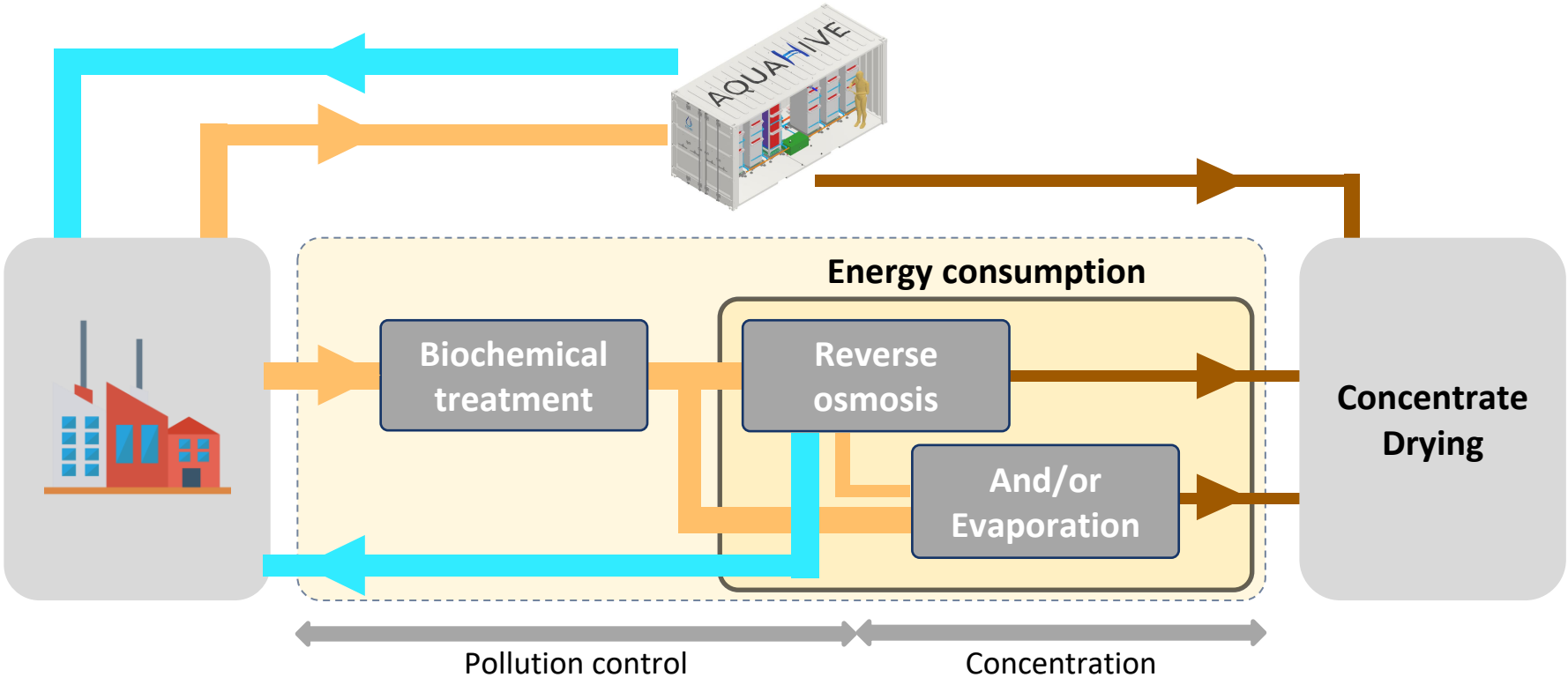
OPERATIONAL LAYOUT

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	m2	**15**
Consumption (with waste heat)	kWh/m3 effluent	**1,0**
Consumption (without waste heat)	kWh/m3 effluent	**160**

SIMPLIFYING EFFLUENT TREATMENT



COMPARATIVE

Technology ⇨ / Pollutants ⇩	AQUAHIVE®	Reverse osmosis	Nanofiltration / Ultrafiltration	Evapo-concentration under vacuum
	✅ 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	✅ Effective	⚠️ Average	✅ Highly effective
COD / OBD 5	✅ Highly effective	✅ 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	✅ Effective	⚠️ 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 (µS.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**

STEM SAS

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