
ALFA
LAVAL

MBR system without pumps and minimized maintenance

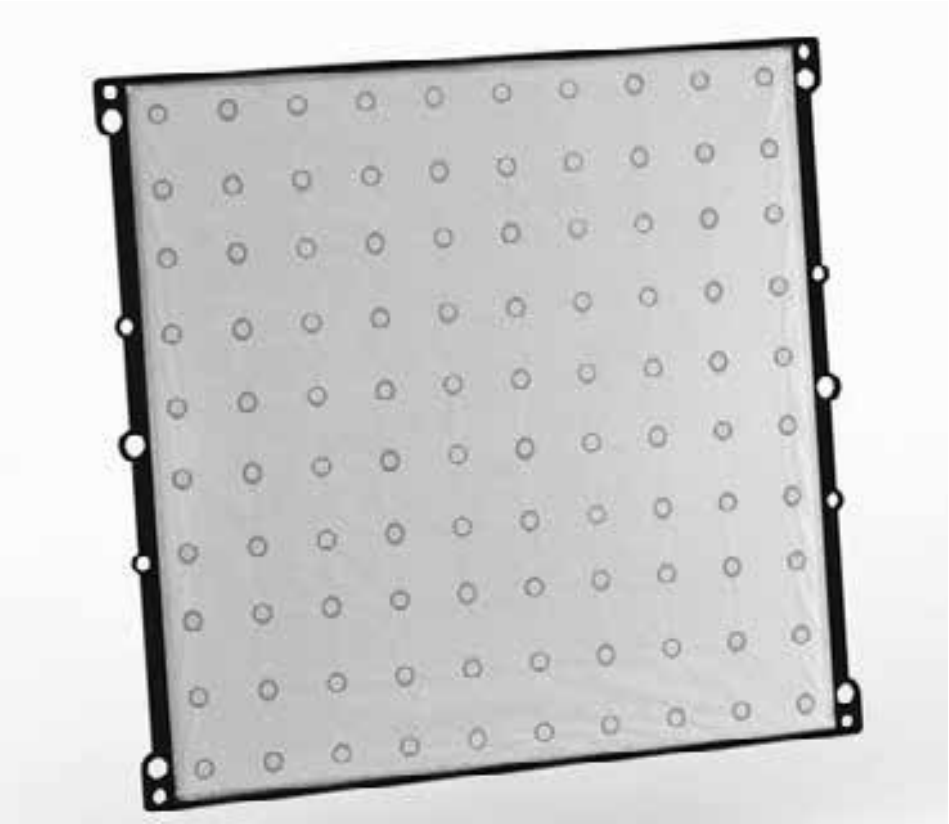
ALFA LAVAL Environment Technology

Christian Tougaard

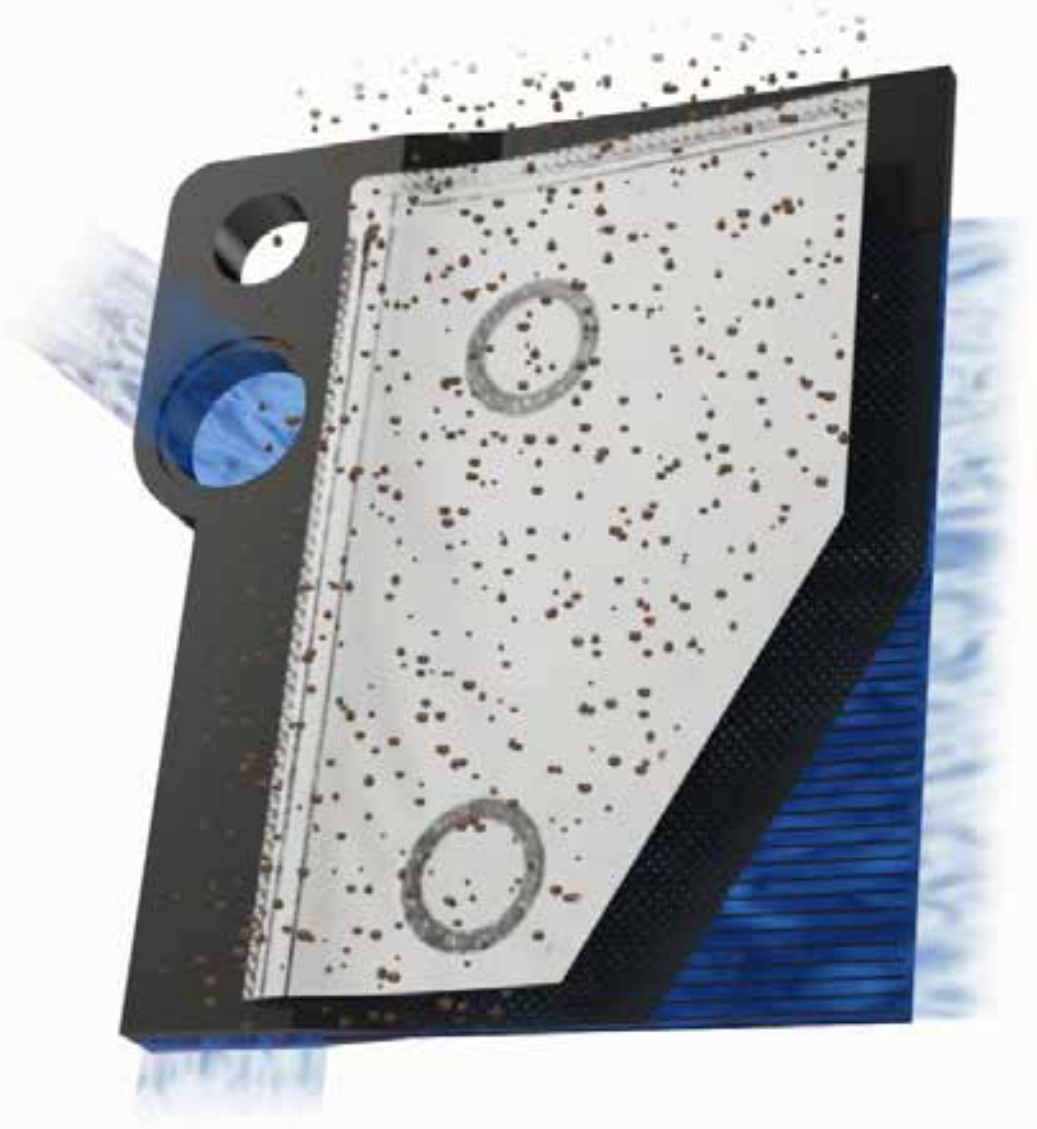
What if we combine the best of both worlds?

What if we combine the best of both worlds?

Then you get the Alfa Laval Hollow Sheet.

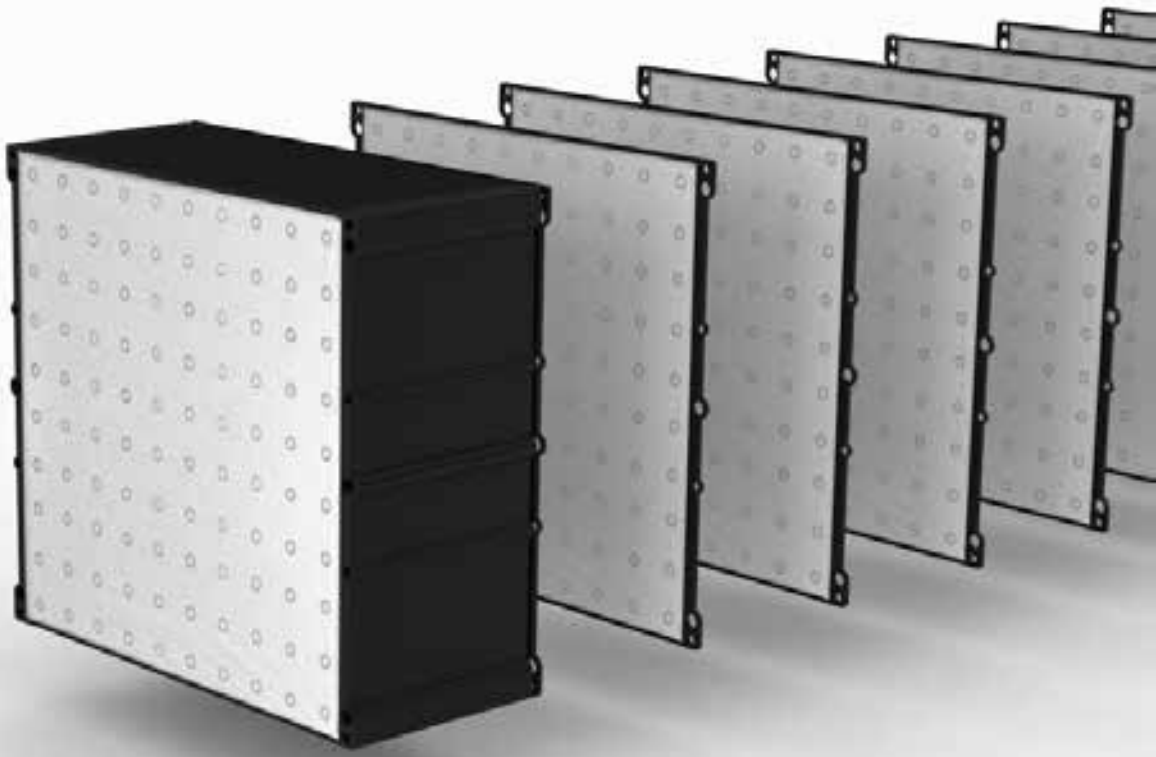


Hollow spacer



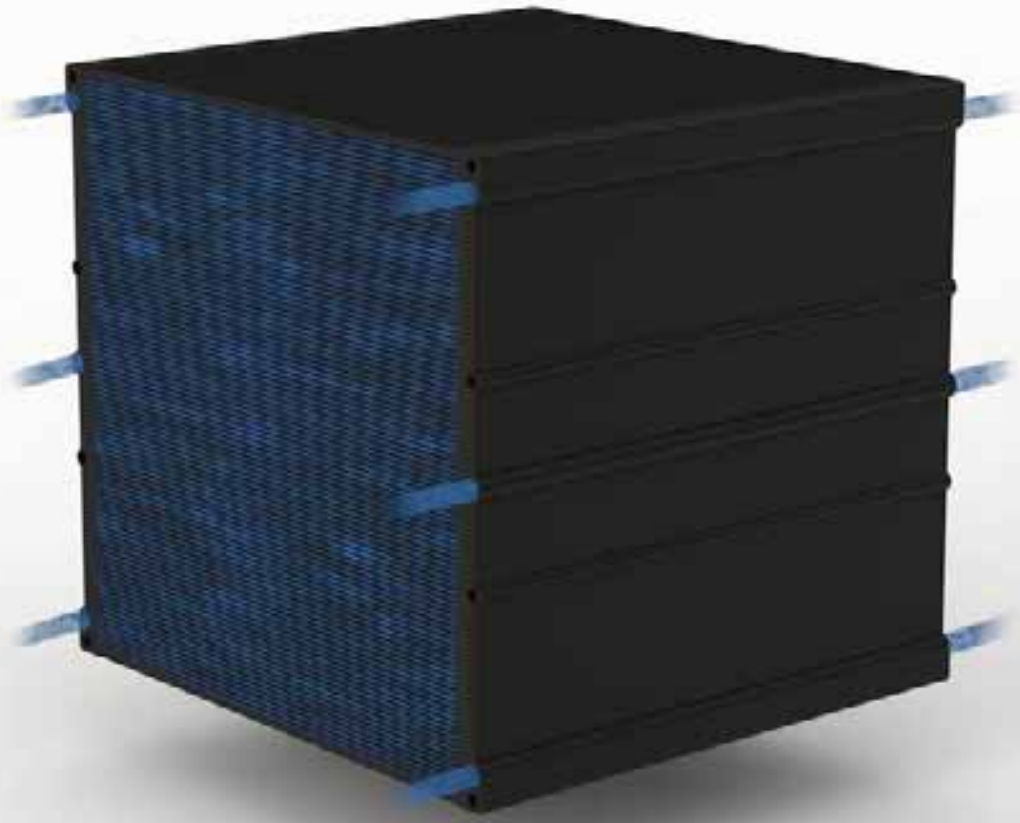
Working principle

Open permeate system



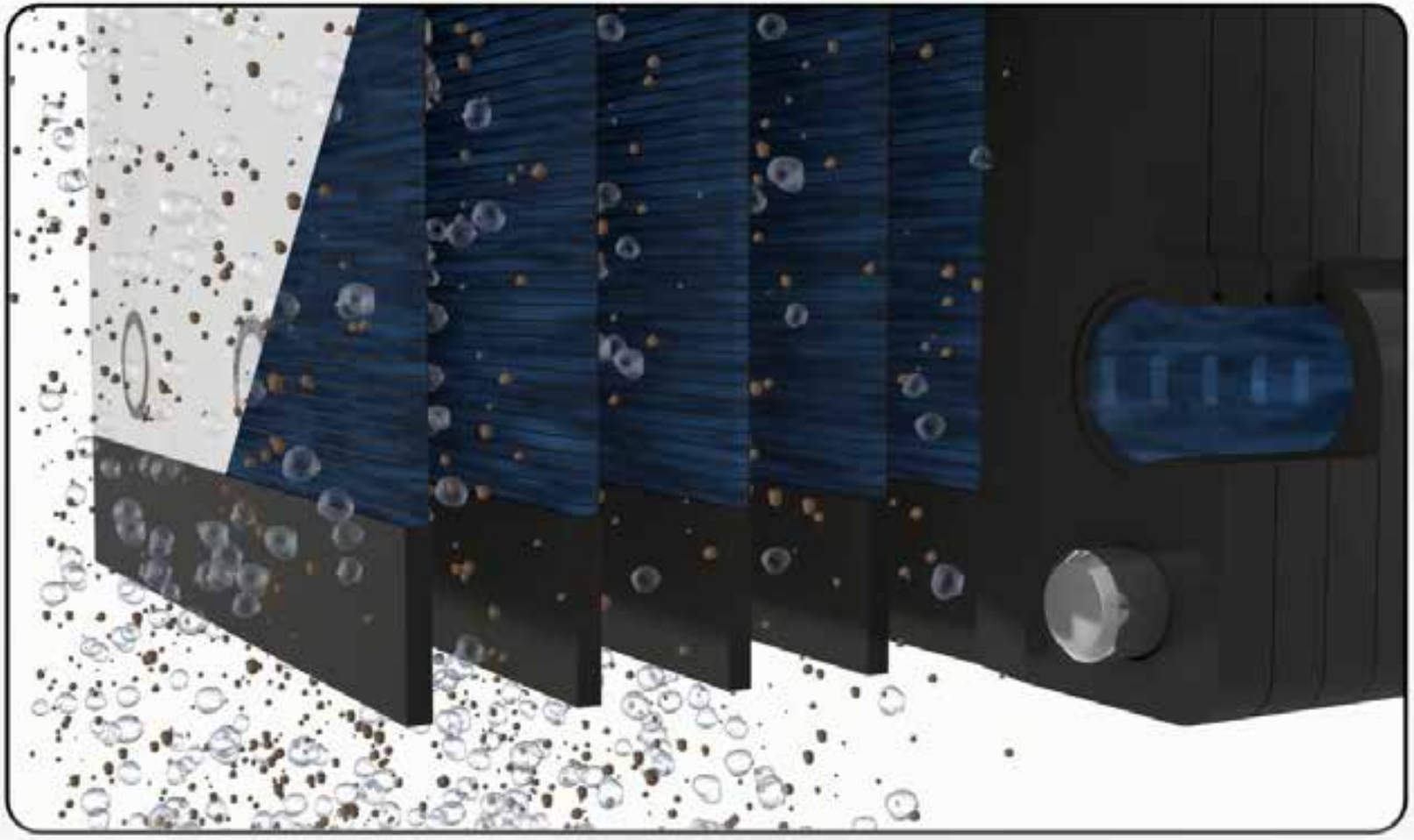
Working principle

Open permeate system



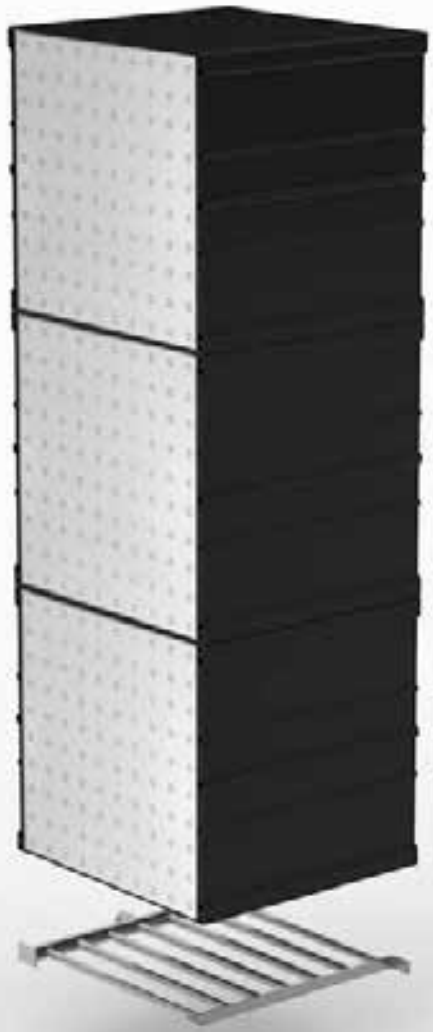
Working principle

Even flux distribution



Same footprint

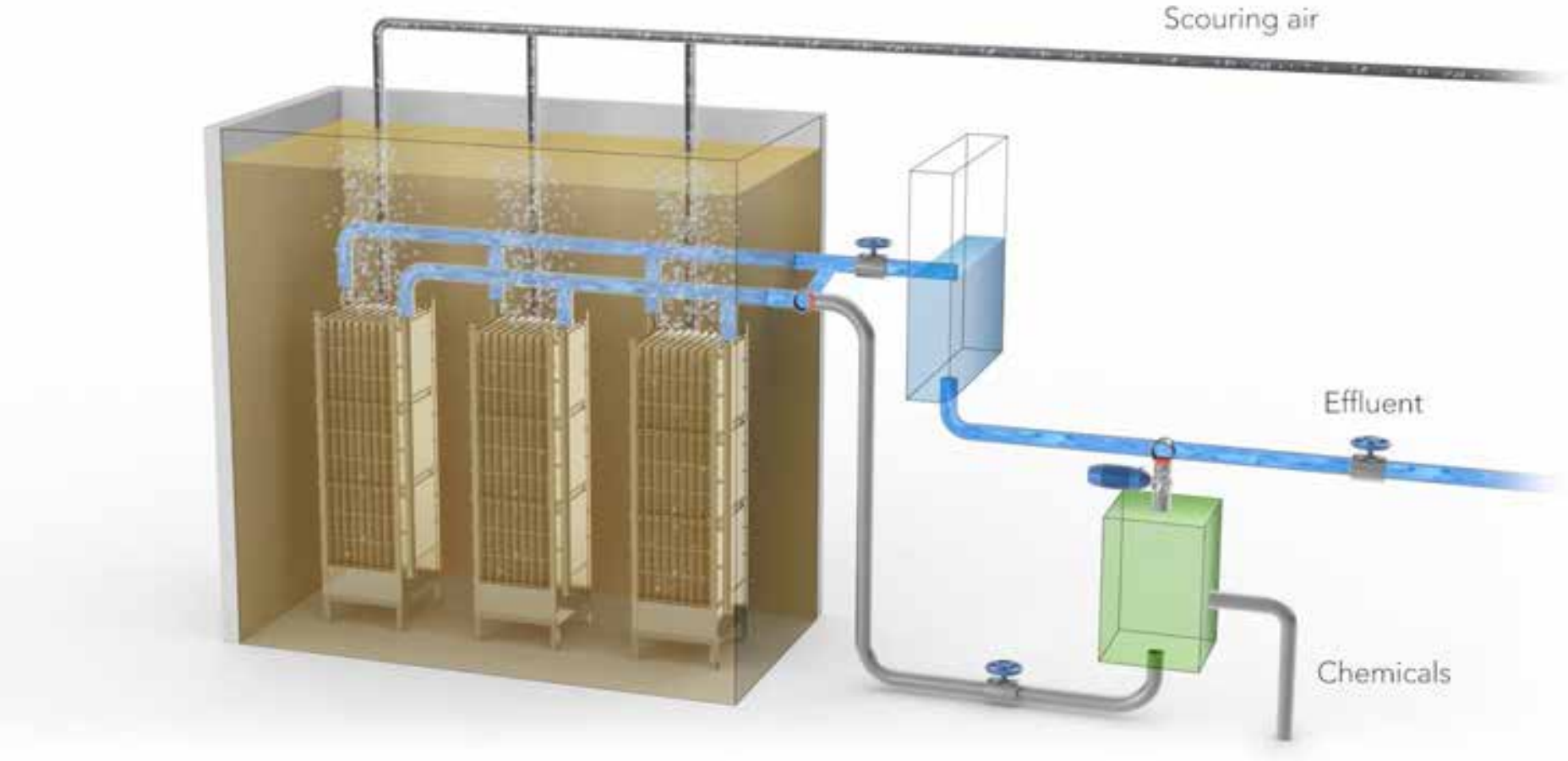
Triple capacity



Three configurations

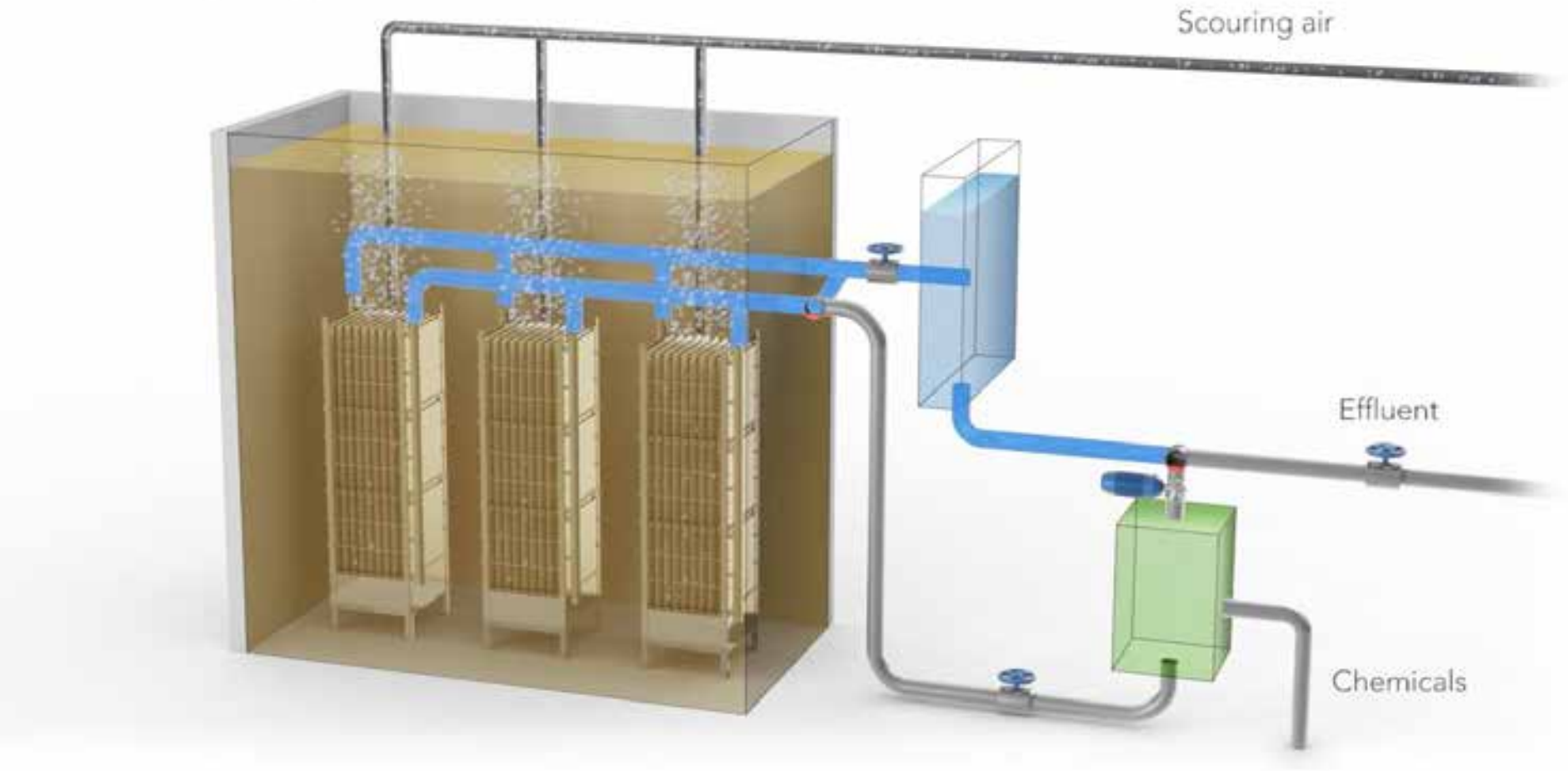
Operation modes

Working (10 min)



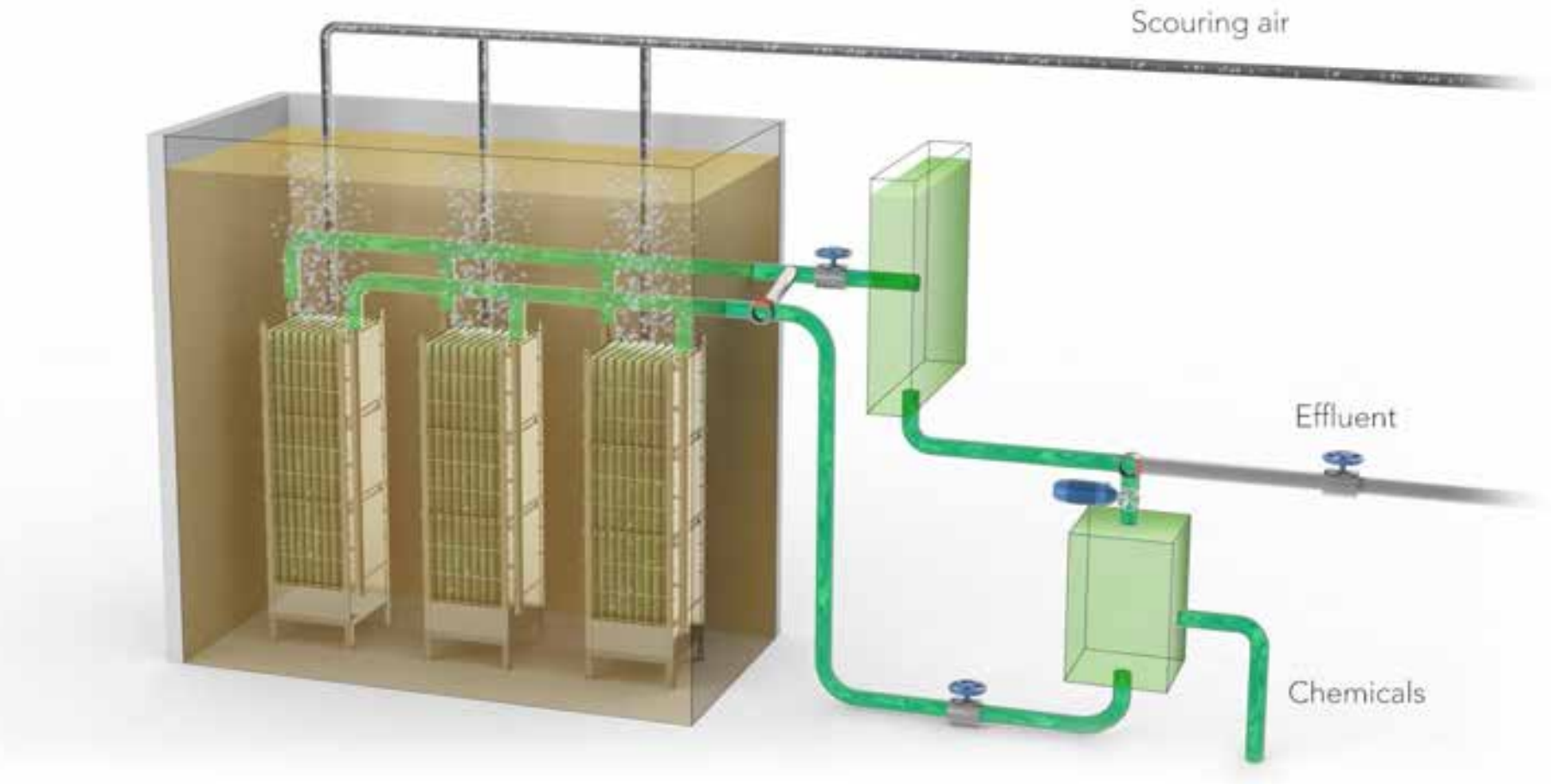
Operation modes

Relaxation (2 min)



Operation modes

CIP (4-6 times/year)



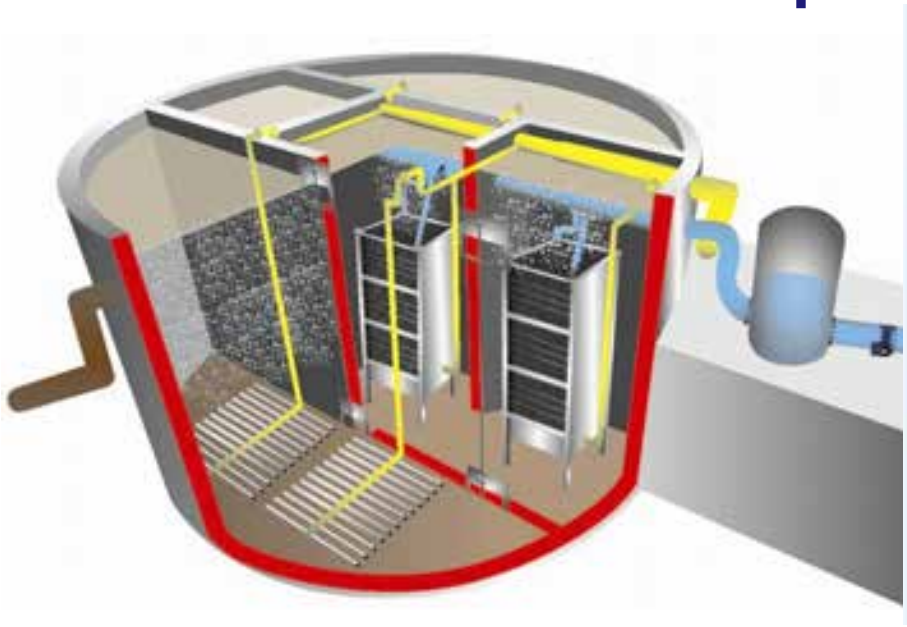
Air Lift MLSS recycle

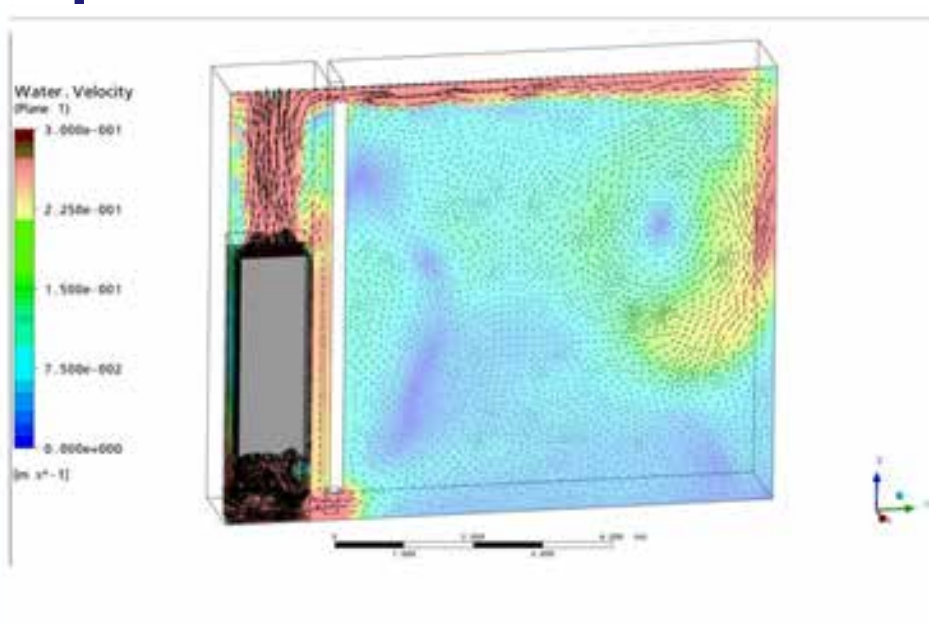
Higher recycle rate and higher DO while reducing energy consumption

Conventional Design

Alfa Laval Design

Alfa Laval ”0-pump MBR”





With no pumps (CAPEX savings)

- **Higher recirculation rate -> from 4 to 8-10**

  ✓**Save 10% aeration volume**

- **Highest permeability in the market -> 1,5-4 times higher than competitors**

  ✓**Work by gravity**

Illustration – Air lift principle

No need for pumps with Alfa Laval MFM Modules !

Recirculation pumps

- **Ensure recirculation rate at normally 4Q**
  - ➢ **20% concentration difference in MBR and aeration tank**
- **Energy, Maintenance & spare parts**
  - ➢ **Energy , man-hours & stock expenses**

Permeate extraction pumps

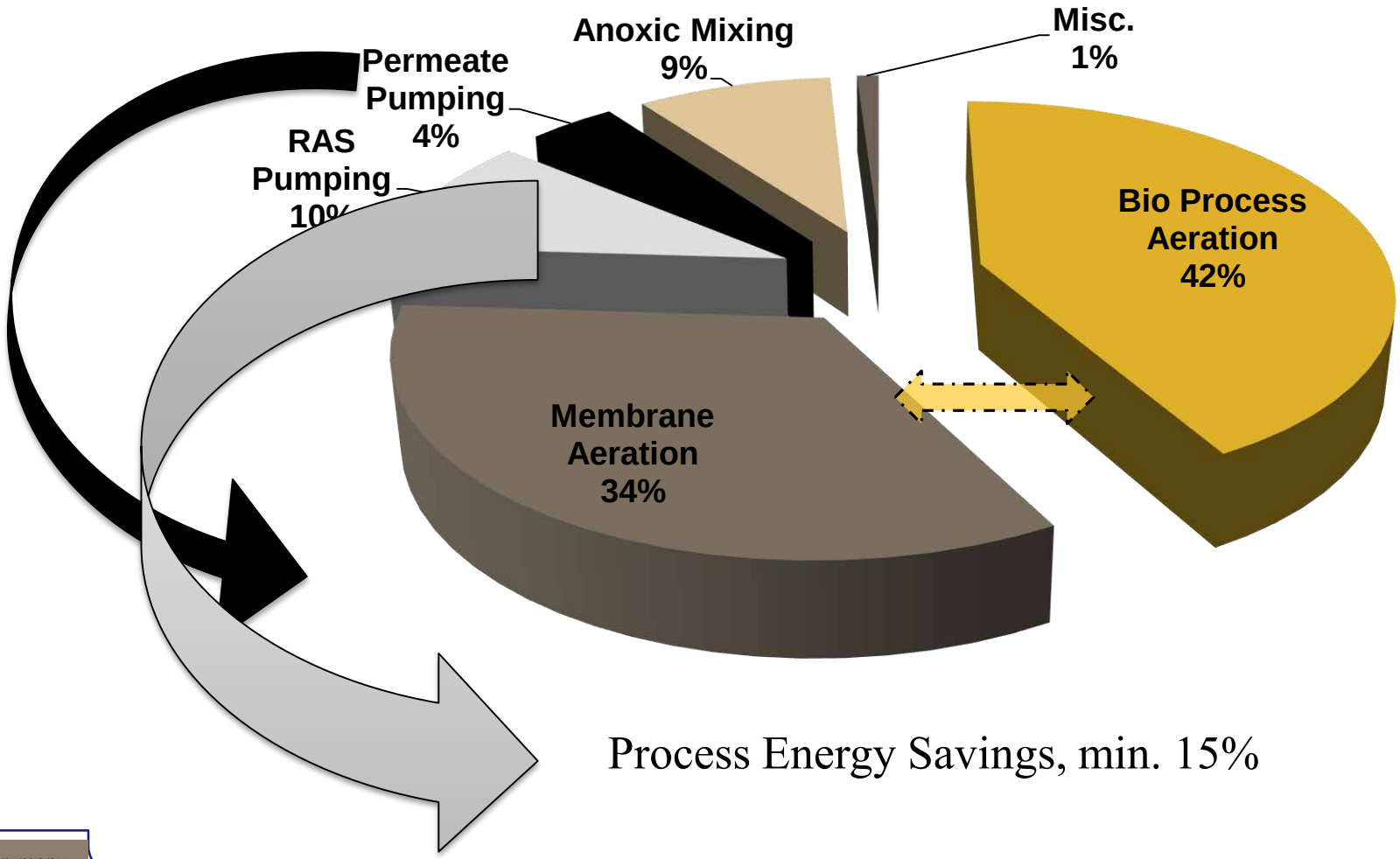
- **Robust to sustain air bubbles**
  - ➢ **High cost and high failure risk**
- **Energy, Maintenance & spare parts**
  - ➢ **Energy , man-hours & stock expenses**

”0 pump” MBR, how?

Alfa Laval Low TMP – MBR module:

- High permeability membrane – same effluent quality
- No pressure loss in the module– lower fouling
- Very good control of the aeration flow pattern
  - ➢ Maximum air lift effect – increase the recirculation

”0 pump” MBR, save energy



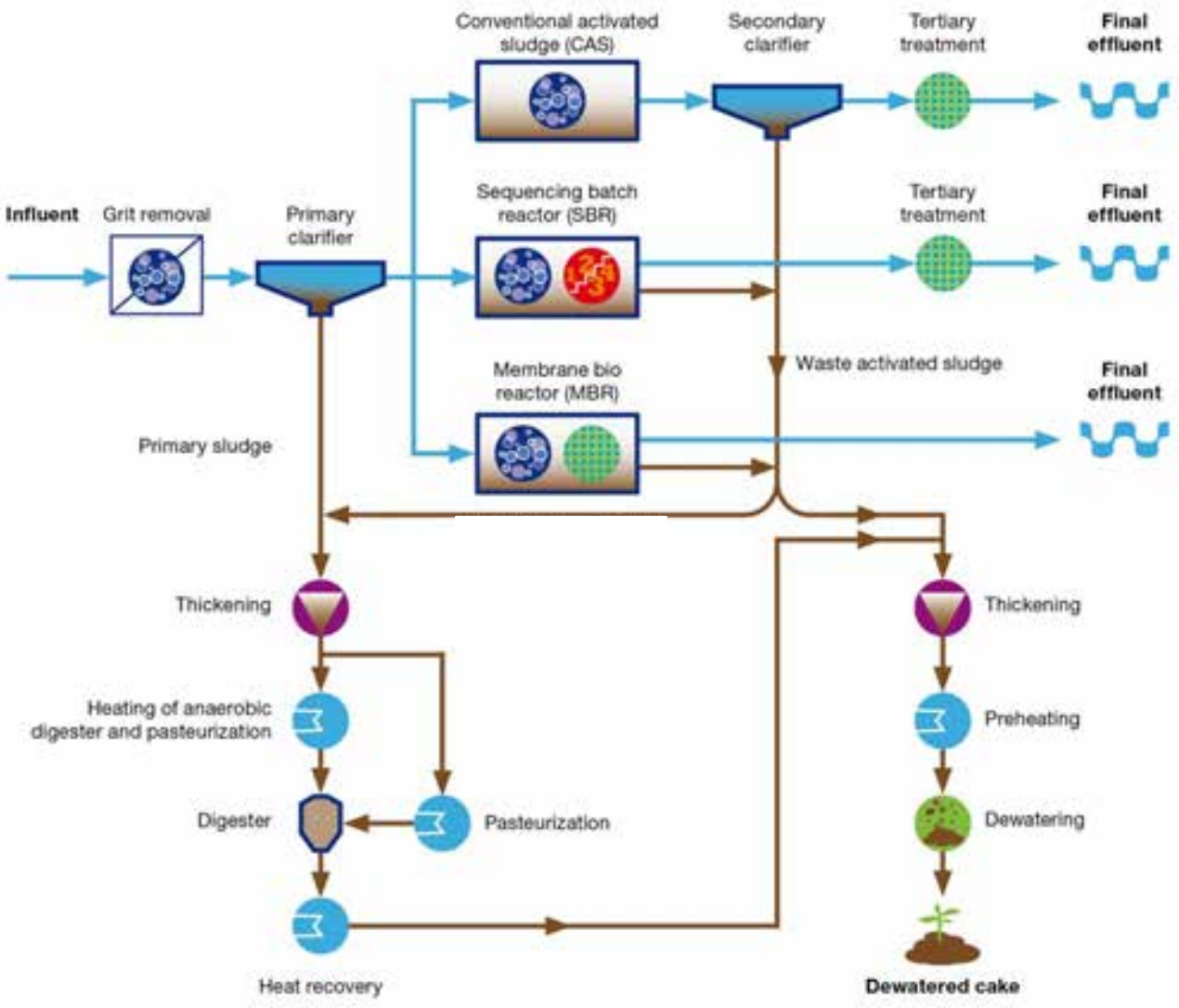
Process Energy Savings, min. 15%

Advantages of the MFM modules

➢ Even utilization of the full membrane surface	=> Less fouling
➢ Ultra low TMP - up to 10 times lower than HF and FS	=> Less fouling
➢ Robust module design	=> Long life time
➢ Gravity - operated MBR	=> Simple system
➢ Fully stackable design - better utilization of scouring air	=> Energy efficiency
➢ Multiple cleaning methods - back flush, circulation, soaking	=> Efficient cleaning
➢ Membrane integrity - PVDF membrane	=> Lifetime, Permeate quality
➢ Compact design	=> High packing density

FULL SPECTRUM PORTFOLIO

Process overview



Alfa Laval equipment

- Diffused aeration
- Filtration
- Sequencing batch reactor
- Thickening
- Dewatering
- Heat exchangers
- Fluid control

Diffused aeration

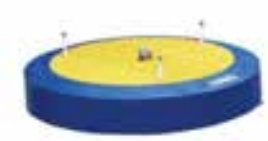
Thickening

Dewatering

Heat exchangers

Filtration

Sequencing batch reactor



Fluid control


ALFA
LAVAL