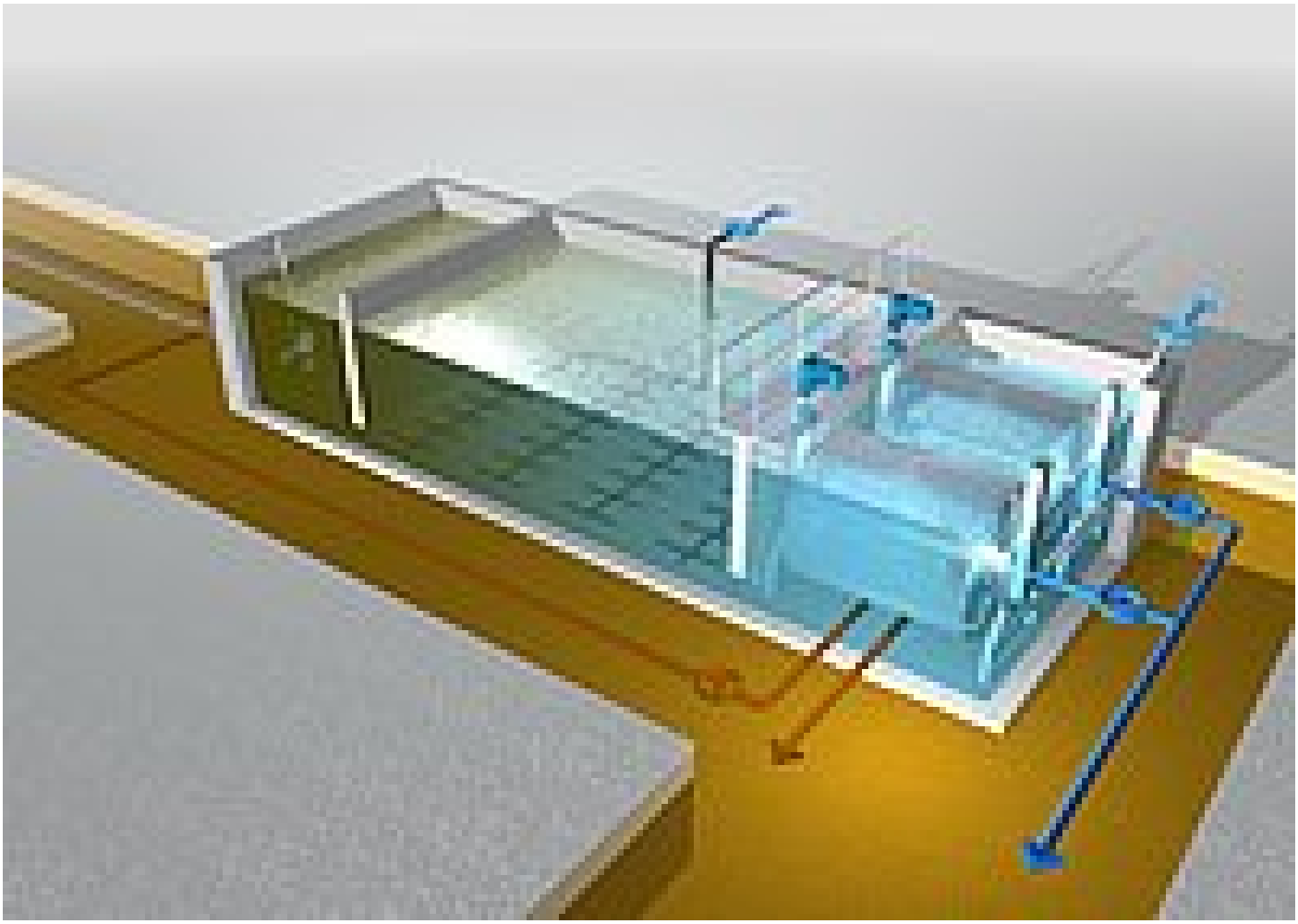
HUBER Technology, UK

Home ■ Solutions ■ Energy Efficiency ■ Wastewater Collection and Treatment ■ Membrane Bio-Reactors

Energy-Efficient Membrane Bio-Reactors



Membrane bio-reactors (MBR) are modified activated sludge systems, whereby secondary clarifiers are replaced by membrane filters.

- MBR systems combine biological wastewater treatment with membrane filtration and disinfection.
- Mixed-liquor solids concentration is increased by a factor of 3 - 5 and tank volume reduced to 20 – 35 %.
- Ultra-filtration membranes retain all solids and bacteria; effluents are of excellent quality.
- Power consumption of MBR-systems is 40 – 80 kWh/(PE•a), whereof about 50 % is consumed by membrane filter operation.
- Membrane scouring air introduces some oxygen into the wastewater so that oxygen supply by fine bubble aeration can be reduced.
- Increased mixed-liquor concentration lowers aeration alpha-factors (e.g. from 0.7 to 0.5) and thus aeration efficiency.
- These two effects approximately cancel each other out.
- MBR-systems increase power consumption by around 10 % in comparison with conventional biological treatment + sand filtration + disinfection.
- MBR-systems should be used where plant footprint is limited and/or where excellent effluent quality is required.

Since membrane filters are major power consumers, installation of energy-efficient units is very important.

The table shows power consumption of a HUBER Vacuum Rotation Membrane VRM® Bioreactor for a 20,000 PT plant in comparison with those of competitors.

Effluent Flow	HUBER VRM	Competition
Q_{av} = 140 m³/h	0,32 kWh/m³	0,45 kWh/m³

Q_{max} = 220 m³/h	0,23 kWh/m³	0,40 kWh/m³
Q_{min} = 30 m³/h	0,31 kWh/m³	0,43 kWh/m³

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