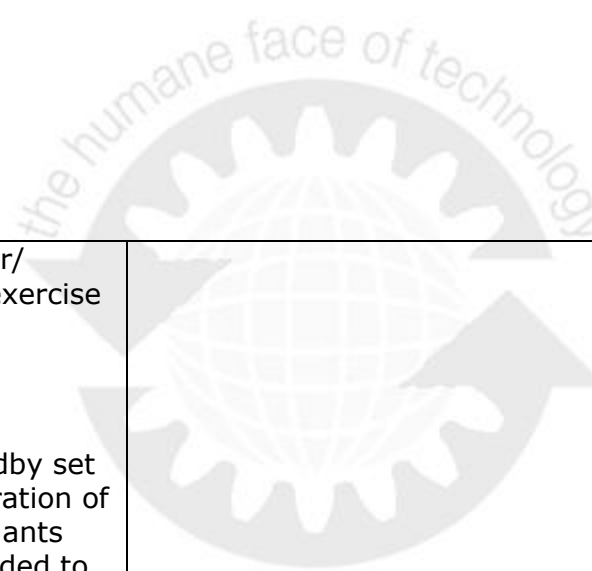




MBR v/s MBBR

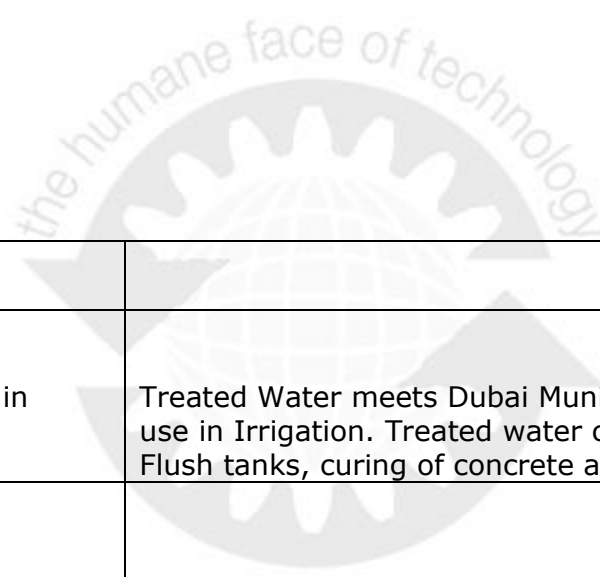
Sr. No.	Membrane Bio- Reactor (MBR) -	GLOBAL ENGINEERING SYSTEMS FZC -Kaldnes Moving Bed Biofilm Reactor(MBBR)
	OPERATION AND MAINTENANCE 1. Power Consumption is more. Will result in significantly high lifecycle cost of the plant. Power : 2. Extra Fine Screening of inlet Sewage absolutely essential for preventing fouling of membranes. Screen failure/ malfunction can severely damage the membranes necessitating replacement. Membrane replacement costs are high and will result in downtime of the plant. 3. Membrane Requirement a) Total dependence on plant supplier and membrane manufacturer for maintenance and replacement as membranes of different manufacturers are not interchangeable. b) Membranes are extremely expensive and customer will have no control on future price increases, remaining at the mercy of equipment supplier. Hard to bind the supplier on warranty because of the strict	Power Consumption is less than half as compared to MBR. Power : Normal Screening as in conventional plants and no requirement of any extra fine screening. Process is unaffected by Screening methods or quality. No Membrane Required a) No proprietary items except the media which is guaranteed for the entire life of the Plant and does not require any replacement. b) Faults can happen only as in case of conventional plants. No chances of plant ever being out of service.



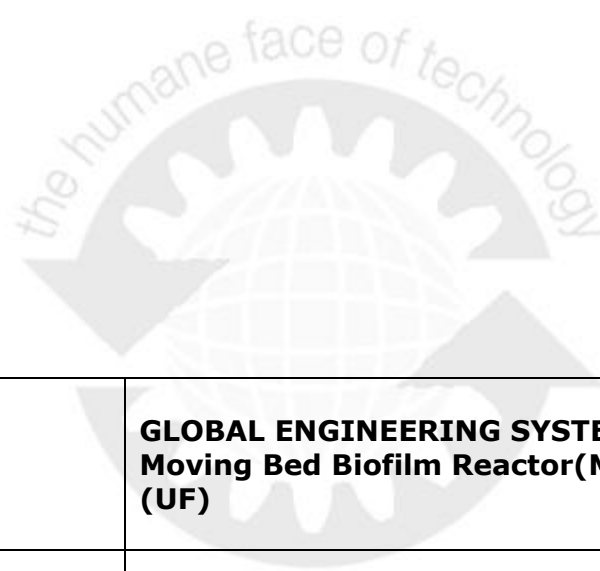
	operating conditions prescribed by the supplier/ membrane manufacturer. Also impossible to exercise warranty after taking over the plant. c) Membranes in the Membrane reactor needs cleaning from time to time to avoid fouling of membranes and reduction of Flux. A live standby set of membranes is essential for continuous operation of the plant which makes it very expensive. In plants where such standby membranes are not provided to keep the initial cost low, the plant will be shut down during every cleaning operation and during break downs.	
5.	d) Closure of operations by membrane manufacturer or plant supplier will render the entire plant inoperable. Even the membrane manufacturer changing the model or the membranes, which is still an evolving technology, can cause the plant to be defunct.	
4.	Membranes have limited guarantee period and hence needs to be replaced	No such replacements. Packing media is guaranteed for life of the plant as it not damageable or perishable.
5.	Highly Skilled Operator required for operation of the plant. Total reliance on plant supplier for any Maintenance job.	Ordinary operators with experience in conventional plants can operate the plant. Any average technician can maintain the plant.
6.	Membranes require frequent cleaning with expensive	No such cleaning is required.



	proprietary chemicals required.	
7.	Aeration is by Fine Bubble Diffusers. Delicate Aeration System with EPDM diffusers warrants periodic replacement of diffusers which demands shut down of plant for atleast 3-4 days. Membrane Diffusers are susceptible to clogging and tearing.	Coarse Bubble Diffusers Required: Simplest form of pipe diffusers consisting of normal SS 304 pipes with holes drilled. No need for maintenance or replacement. No blockages. Never needed to be taken out of the tank for anything.
8.	Very sensitive to shock loads and varying loads. Process gets easily disturbed and takes several days to re-stabilise.	Very high resilience to shock loads and varying loads. In the unlikely event of destabilization, the plant returns to normal in a matter of few hours.
9.	Capacity augmentation will call for full new plants at similar capital investments and long gestation.	Capacity can be increased by 50 to 100% with minimum investment and in a short period of time.
	Capital Cost	
1.	MBR capital cost is double the cost of MBBR. Further, the high operation and maintenance cost makes the lifecycle cost several times more than that of MBBR. Such investment is unjustified if treated water is to be used for applications such as Irrigation, Curing of Concrete, WC Flush Tanks and Cooling Towers).	MBBR is very cost effective and operationally stable where treated water is to be reused for similar applications such as Irrigation, Curing of Concrete, WC Flush Tanks and Cooling Towers).



2.	Treated Water Quality High quality treated water. Ideal if to be used in industrial applications as process water.	Treated Water meets Dubai Municipality standards for re-use in Irrigation. Treated water can also be used in WC Flush tanks, curing of concrete and Cooling Towers.

**MBR v/s MBBR+UF**

Sr. No.	Membrane Bio- Reactor (MBR) -	GLOBAL ENGINEERING SYSTEMS FZC -Kaldnes Moving Bed Biofilm Reactor(MBBR) + Ultra Filtration (UF)
1.	High membrane fouling environment.	Membrane fouling chances are less
2.	Low flux rates	High flux rates
3.	High membrane area required.	Less membrane area required
4.	High energy consumption	Comparatively less energy consumption
5.	Requires high high membrane air scour rates	Air scouring rates are less
6.	Can not take peak flow tolerance	Can tolerate peak flow tolerances.