



## Turn-key wastewater solutions for smaller communities

Meeting EU regulations in the sphere of wastewater treatment in an efficient, feasible and reliable manner poses a great challenge for many communities. Especially if the protection of bathing environments is the primary goal.

When wastewater treatment is taking place at the point source of pollution by placing compact stations in small communities, the local environment is the prime beneficiary. Compact stations are delivered as turn-key plants which are flexible and can be expanded with capacity increase. This secures the longevity of the treatment plant.

At the core of the compact stations lies MBR technology. With MBR technology it is possible to achieve better treatment quality compared with conventionally activated sludge processes or SBR. This is possible due to the use of ultra filtration membrane processes. Membrane technology serves as an absolute barrier against loss of sludge, small particles and bacteria to the environment, ensuring that strict effluent

requirements can be met. At the same time MBR plants are very compact and modular.

The superior treatment quality allows for water reuse and recycling for irrigation of recreational areas or as technical water. This can reduce fresh water consumption in geographical areas where water is scarce.

Grundfos BioBooster's MBR technology makes it suitable for both small rural communities and within highly dense urban areas. With a treatment capacity of 500 to 5000 PE (100 - 1000 m<sup>3</sup>/day) the BioBooster can offer cost competitive wastewater treatment. By its modular containerised design the plant can be configured and delivered in a very flexible way, enabling easy expansion at any given time. The plant is fully automated and equipped with remote monitoring. This makes the task of decentralised wastewater treatment entirely viable.



Figure 1. - Full-scale modular MBR-based wastewater treatment plant - Bjerregrav, Denmark

**Technology**

Denmark's first MBR-based wastewater treatment plant was set up by Grundfos BioBooster in Bjerregrav, Viborg Municipality (Figure 1). The plant is optimised for municipal wastewater, dimensioned to treat a volume of 1000 PE with an inlet of 10 m<sup>3</sup> per hour. It consists of five 20-foot containers with management facilities, pre-treatment and 16 MBRs. The MBR is configured for removal of organic material, nitrate, phosphor and heavy metals. A single MBR reactor measures Ø 400, with a length of 5.4 metres. Each MBR reactor consists of rotating cross-flow impellers placed between filtration and aeration ceramic membrane discs, which ensure low maintenance. The impellers prevent fouling and enhance the transfer of compressed air to the high sludge concentration in the reactor. Sludge output consists of 4 percent dry matter. The shell of a single MBR reactor is depicted in figure 2. A. Its construction is expanded and shown in Figure 2.B. Nitrification and denitrification processes are achieved by recirculation over an anoxic/anaerobic tank.



Figure 2.A A single MBR reactor

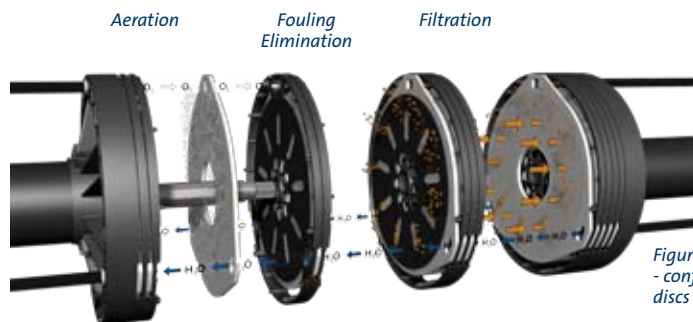


Figure 2.B Ultra filtration - configuration of an MBR with membrane discs and cross flow impellers in reactor

**Conclusions**

Thus compact MBR technology offers a reliable, viable and feasible opportunity to solve local communities' needs for wastewater treatment. Grundfos BioBooster, a containerised, modular and scalable wastewater treatment plant enables wastewater treatment at the point source of pollution; a significant reduction in infrastructure investment, and an overall reduction in wastewater treatment costs. Above all, it is a reliable system with remote process monitoring ensuring superior water quality prior to discharge to receiving waters or for water reuse.

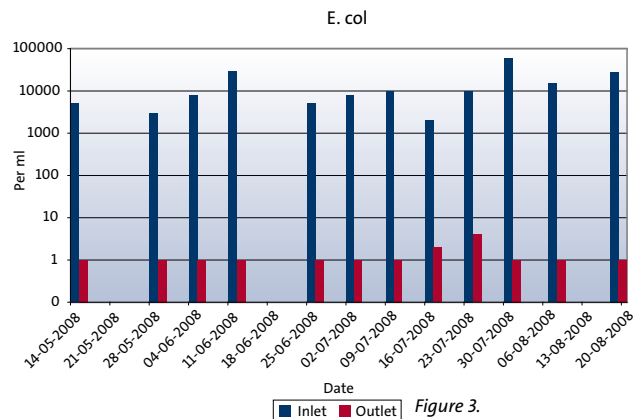


Figure 3. Microbiological results from Grundfos BioBooster MBR operation

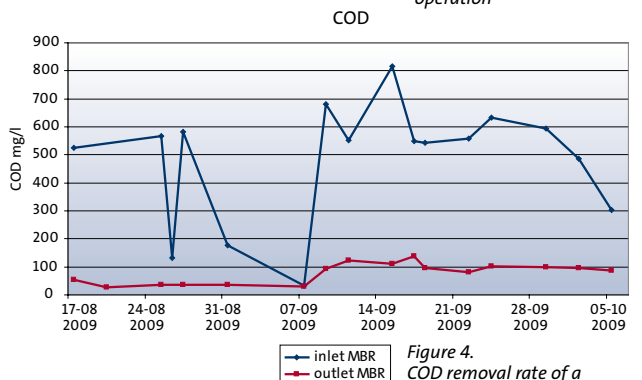


Figure 4. COD removal rate of a Grundfos BioBooster MBR at Bjerregrav municipal treatment plant, Denmark