BIOWAMET – Biomethane production from urban organic matter

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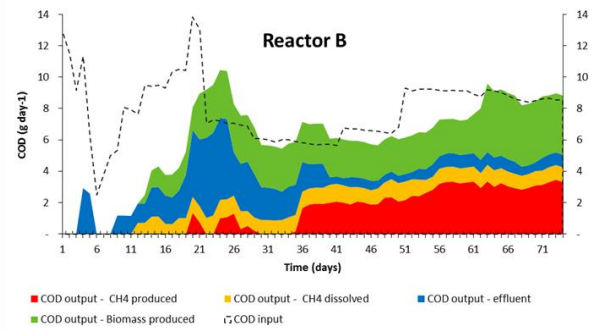
A new generation of wastewater treatment technologies is using anaerobic systems which not only consume less energy in operation but can also produce surplus energy by converting the polluting material in the water to biogas (a mixture of methane and carbon dioxide).
Although anaerobic process technologies have been around for a long time, recent advances in materials, control systems and a better understanding of the biological process are leading to new applications and to a surge in their popularity. One of the most interesting results to emerge from research is that immobilised cell anaerobic bioreactors can adapt to low temperatures without loss of functionality and still give a performance similar to that of their aerobic counterparts.



COD mass balance during acclimatisation of an ambient temperature anaerobic membrane bioreactor

Laboratory scale anaerobic membrane bioreactor

Of course, the more energy that can be saved in operating the process the more surplus there is for export and sale, and this is one aspect of current research in optimisation of these anaerobic systems. The availability of high performance membranes and reductions in their cost is also presenting opportunities to use these as a means of retaining the slow-growing anaerobic biomass in the system, and further enhancing the process compared to other cell immobilisation systems. Use of these membranes does, however, pose some challenges in keeping them clean so that they can operate at high flux rates with the minimum of maintenance. Methods to reduce membrane fouling

include gas recirculation and back-flushing, both of which consume energy and in the case of gas scouring may not be completely effective, making it necessary periodically to remove the membrane for chemical cleaning. A key aspect of the current research is therefore to develop and test alternative methods of membrane cleaning, including:

- Development and use of support particles which encourage the growth of microbial biomass while also cleaning the membrane.
- pplication of low-intensity ultrasound, based on adaptation of the award-winning StarStream technology developed at the University which uses low-intensity ultrasound and micro-bubbles in a stream of low-pressure water, and is effective at in-situ cleaning of a variety of surface and fouling types.

Prototype of the award winning low energy Starstream cleaning technology

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