

Forward osmosis harvests clean water

Forward osmosis membranes used in a sewer mining project promise to significantly reduce sewage waste, energy consumption, and groundwater use. **Walter Schultz**, CEO of Hydration Technology Innovations, LLC, explains.

Forward osmosis (FO) technology is being used to harvest clean water from sewage in an innovative project involving the US company Hydration Technology Innovations, LLC (HTI) and its Netherland-based partners: KWR Watercycle Research Institute, Delft University of Technology, Waternet, DELTA Triqua, and Barea Duurzame Technologie. HTI is the first and only company worldwide that supplies commercial FO membranes needed for sewer mining, according to Emile Cornelissen, senior scientific researcher at KWR. Sewer mining is a revolutionary process that could make huge strides in reducing sewage waste and saving energy and groundwater.

In late 2009, Cornelissen and Kees Roest of KWR initiated the Sewer Mining Project. They enlisted the help of numerous technology partners, including HTI as the developer and supplier of the forward osmosis membranes, DELTA Triqua as the system constructor, Barea Duurzame Technologie for the high-pressure fermentation, TU Delft as a university partner, and Waternet to manage and control the whole water cycle relevant to the project. The US\$2.1-million joint project will run through 2013.

HTI's FO membranes filter the heavily polluted sewage to produce clean water. Osmosis is a natural process in which two liquids separated by a special proprietary membrane seek equilibrium. The permeate side of the membrane contains a salt "draw" solution, which has a higher osmotic potential than the dirty feedwater side. This naturally pulls the water from the dirty feed side through the membrane, which rejects organics, minerals, and other solids. The result is only clean water moving through the membrane. FO allows for a high degree of separation using relatively little energy. HTI technology is combined with high-pressure digestion, which is necessary to recover the leftover salt after the FO process. The combination of these technologies

is the basis for forward osmosis sewer mining.

The key benefit of the sewer mining project will be the ability to create decentralized industrial water from sewage so that fresh groundwater is maintained exclusively for drinking water. In addition, local energy is recovered from the high-pressure digestion process because of fermentation. The quality of the influent water entering the sewage treatment plants will be improved and the processes results will show large savings in reduced sewage capacity along with the ecological benefits of the reduced effluent discharge.

In October 2010, HTI signed an international distribution, services, and cooperation agreement for FO technology with Tri-Tech Holding Inc., a Chinese company that provides turnkey



A sewer mining forward osmosis pilot unit manufactured by Hydration Technology Innovations, LLC

solutions in China for water resources, water and wastewater treatment, industrial safety, and the pollution control markets.

According to the agreement, Tri-Tech Holding will sell and integrate HTI's FO technology in China.



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