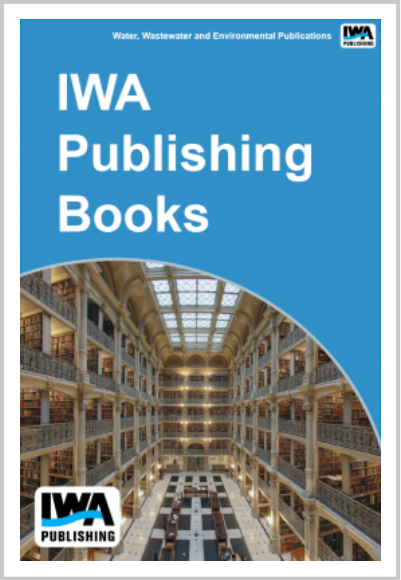
Microbial Desalination Cells for Low Energy Drinking Water



MDCs are based on bio-electro-chemical technology, in which biological wastewater treatment can be coupled to the desalination of a saline stream using ion exchange membranes without external energy input. MDCs simultaneously treat wastewater and perform desalination using the energy contained in the wastewater. In fact, an MDC can produce around 1.8 kWh of bioelectricity from the energy contained in 1 m3 of wastewater. Compared to traditional RO, more than 3 kWh/m3 of electrical energy is saved. With this novel technology, two low-quality water streams (saline stream, wastewater) are transformed into two high-quality streams (desalinated water, treated wastewater) suitable for further uses.

An exhaustive scaling-up process was carried out in which all MIDES partners worked together on nanostructured electrodes, antifouling membranes, electrochemical reactor design and optimization, life cycle assessment, microbial electrochemistry and physiology expertise, and process engineering and control. The roadmap of the lab-MDC upscaling goes through the assembly of a pre-pilot MDC, towards the development of the demonstrator of the MDC technology (patented). Nominal desalination rate between 4-11 Lm-2h-1 is reached with a current efficiency of 40 %. After the scalability success, two MDC pilot plants were designed and constructed consisting of one stack of 15 MDC pilot units with a 0.4 m2 electrode area per unit.

This book presents the information generated throughout the EU funded MIDES project and includes the latest developments related to desalination of sea water and brackish water by applying microbial desalination cells.

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