

Techno-economic comparison of pilot-scale EDI and BWRO for brackish water desalination

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ABSTRACT

In this paper, a pilot-scale electrodeionization (EDI) was designed and operated for brackish water desalination to produce drinking water. Technical and economic feasibility of pilot-scale EDI was investigated and compared to recently installed brackish water reverse osmosis (BWRO) mini-plant with equal production capacity. It was found that EDI could remove more than 98% of salt ions from brackish water at the optimum operating condition (45 V). From an economic point of view, EDI was economically potential as an alternative to the BWRO process which offered a lower capital investment (US\$ 5076) than the existing BWRO plant (US\$ 8447). The specific water production cost of the EDI process was US\$ 0.50/m³ which was comparable to the specific cost of BWRO process, US\$ 0.42/m³. The economic analysis from a long-term perspective shows that EDI is more economical than the BWRO up to around 20 y of operation. These results indicate that EDI is an attractive alternative to BWRO for brackish water desalination.

Keywords: Brackish water; Desalination; Drinking water; Economic; Pilot plant

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