Scopus

Documents

Khan, M.Z., Nizami, A.S., Rehan, M., Ouda, O.K.M., Sultana, S., Ismail, I.M., Shahzad, K.

Microbial electrolysis cells for hydrogen production and urban wastewater treatment: A case study of Saudi Arabia
(2017) *Applied Energy*, 185, pp. 410-420. Cited 49 times.

Abstract
This paper reviews the status of microbial electrolysis cells (MEC) as a mean for hydrogen (H2) production and urban wastewater treatment method. A case study of the Kingdom of Saudi Arabia (KSA) under MEC concept was developed. KSA is the world's third largest per capita water user country with no lakes and rivers. Every year, around 1.17 and 0.38 billion m3 of domestic and industrial wastewater is generated respectively. The KSA government is seeking sustainable solutions for wastewater treatment and waste-to-energy (WTE) production to bridge the ever increasing water and energy demand-supply gap. However, there is no WTE facility exists to convert the wastewater into energy. Moreover, the potential of wastewater is not examined as an energy recovery substrate. This study, for the first time, estimated that a total electricity of 434 MWe can be produced in 2015 from the KSA's wastewater if MEC technology is employed. Similarly, an estimated total electricity of 612 and 767 MWe can be produced for the years 2025 and 2035 from the domestic and industrial wastewater by using MEC technology. A surplus electricity of 508 and 637 MWe for the years 2025 and 2035 respectively can be added to the national grid after fulfilling the energy requirement of MEC wastewater treatment plants. Collectively, MEC will contribute 20.4% and 25.6% share of the KSA government's WTE target of 3G W in 2025 and 2035 respectively. A number of challenges in MEC such as ohmic and concentration losses, saturation kinetics and competing reactions that lower the H2 production are discussed with their potential solutions including, the improvements in MEC design and the use of appropriate electrolytes, antibiotics and air or oxygen. © 2016 Elsevier Ltd

2-s2.0-84998723956
Document Type: Article
Publication Stage: Final
Source: Scopus