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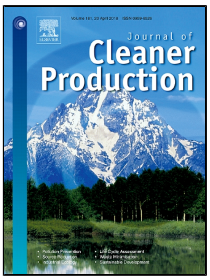

Hybrid Landfill Gas Emissions Modeling and Life Cycle Assessment for Determining the Appropriate Period to Install Biogas System

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Abstract

Municipal solid waste landfills are known as one of the main greenhouse gas resources in the world. One solution to mitigate greenhouse gas emissions from these resources is to install biogas recovery systems. In this regard, determining the appropriate period to install biogas systems becomes important. Meanwhile, methane generation and global warming potential of landfill are important and should be considered as the main indices for determining the appropriate period of biogas production from landfills. Saravan landfill, a black spot, is located in the forests of Northern Iran. In this study, a hybrid landfill gas emissions modeling (LandGEM) and life cycle assessment (LCA) were employed to determine the appropriate period to install biogas recovery project in Saravan landfill in order to capture methane and reduce global warming. The results demonstrated that for the studied period of 140 years, the maximum amount of methane generation will be achieved in 2019 which is equal to 17948 Mg. The LandGEM + LCA results indicated that for a period of 30 years (from 2018 to 2047), the methane generation will be reached to 47% of the total methane emissions from this landfill. Meanwhile, the global warming potential for the same period is equal 47% of the total global warming potential of the landfill. Therefore, it is concluded that the period of 2018-2047 is an appropriate period to install biogas plant in terms of energy generation and mitigation of global warming.

Keywords: Biogas recovery, Greenhouse gas emission, LandGem, Municipal solid waste