

10th World Congress and Expo on Recycling

July 26-27, 2018 | Amsterdam, Netherlands

Comparison of different methods (digestion, combustion, gasification and pyrolysis) for sludge energy recovery: a case study for Ekbatan's municipal treatment plant

Azadeh Hemmati

Islamic Azad University, Iran

Different methods of urban sewage sludge energy recovery such as burning, gasification, pyrolysis and digestion based on the net energy production efficiency, advantages and disadvantages and complexity of these processes have been investigated in this article. The best method for energy production from sludge was selected among different methods according to energy and the amount of the greenhouse gas production. The capacity of the constructed power plant was calculated and investigated economically for each scenario. Quantitative and qualitative information on sludge was required to carry out this research so Ekbatan wastewater treatment sludge was analyzed. The results showed that, the sludge of this treatment plant has 5.7% solids, containing 65.7% volatiles and the dry heat value is about 15100 kJ/kg. It was found that the best scenario for sludge energy production in this treatment plant is a digestion process with pure net energy production of 73.2×10^7 kJ/d. The energy recovery in an anaerobic digester can prevent the emission of 16,680 tons of CO₂ annually and release about 1,460 tons of CO₂ per year. The chemical analysis shows that the selected sludge has a potential production of 25 m³ of CH₄ for each m³ of sludge. The annual amount of biogas that can be recovered from municipal treatment plant is 836543 m³. The heat value of this biogas is equal to 475.514 kJ/m³. Therefore, with a typical treatment plant, annual consumption of 475.514 m³ of natural gas will be saved. On the other hand, the biogas can be used to generate electricity. The power of the plant is about 216.8 kW that with the construction of this power plant, an annual saving of 1.5 million dollars will occur.

azadehemmati@srbiau.ac.ir

Notes: