

Analysis of energy efficiency and energy consumption costs: a case study for regional wastewater treatment plant in Malaysia

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Abstract

The objective of this study is to analyze the possibilities of increasing energy efficiency in the central region wastewater treatment plant by focusing on two aspects: biogas production and prediction of energy production. The analysis is based on one of the biggest central region wastewater treatment plant in Malaysia. After studying the energy efficiency, which consists of optimization of energy consumption and enhancing gas generation, the prediction of power consumption is performed using an autoregressive integrated moving average (ARIMA) model. The prediction results are compared with the linear regression method. Comparison shows that even though the total cost of savings is greater by using linear regression, the prediction through ARIMA is more accurate and has smaller root mean square error. The implementation of these two aspects managed to increase energy efficiency by 10% of energy recovery that could further reduce electricity cost and reduction of sludge cake disposal off site. The study recommends other aspects, such as modification in setting up the frequency of variable speed drive for aerators and blowers and optimizing number of feeds into train unit processes within aeration tanks in increasing energy efficiency.

Keywords: Wastewater treatment process, energy production cost, ARIMA, energy optimization, energy efficiency