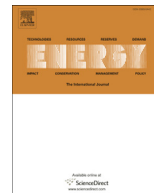




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# Techno-economic performance of biogas-fueled micro gas turbine cogeneration systems in sewage treatment plants: Effect of prime mover generation capacity



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## ABSTRACT

The optimum size of Micro Gas Turbine Cogeneration Systems (MGT-CGSs) in a Sewage Treatment Plant (STP) in terms of its economic performance was investigated. A STP operating in a cold region was adopted as a model and was scaled down to obtain different size ratios. It was also assumed to operate in different regions to obtain different heat demand patterns. MGT-CGSs with power output capacity of 30, 65 and 200 kW were simulated to utilize biogas produced by the STP. Instead of multiple units of the same size of MGT-CGSs, combination of different sizes of MGT-CGSs was also investigated. Life Cycle Cost Analysis was carried out to compare the economic performance of MGT-CGSs. It was found that optimum combination of three types of MGTs (MGT-Combined) stated above had the highest power generated and efficiency. However, MGT-Combined also had larger power generation capacity and low usage ratio, thus resulting in higher capital investment. Although all configurations of MGT-CGSs can generate Net Present Value, optimum configuration was obtained when the rated fuel input of MGT-CGS is approximately equal to the biogas production of the STP. However, when heat demand fluctuates throughout the year smaller size of MGT is preferred.

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