

ENERGY EFFICIENCY ECONOMICS OF CONVERSION OF BIOGAS FROM THE FERMENTATION OF SEWAGE SLUDGE TO BIOMETHANE AS A FUEL FOR AUTOMOTIVE VEHICLES

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Abstract

The paper presents the analysis of efficiency and energy economics potential applicability of biomethane as an alternative fuel for powering company owned motor vehicles and public transport vehicles produced by the conversion of surplus biogas generated in municipal sewage treatment plants. Biogas produced at municipal wastewater treatment plants in the process of anaerobic fermentation of sewage sludge is a source of renewable energy used for energy generation. Currently in Poland, the most commonly applied management method of biogas produced from sewage sludge involves the production of energy in a cogeneration system. Having in mind the condition of the natural environment, the search for alternative fuels for motor vehicles is underway. One of the types that can be used is biomethane, produced by the conversion of biogas produced in the fermentation process of organic wastes contained in sewage sludge. The biogas purified to contain about 95% of methane can be used in vehicles designed to burn gaseous fuel. In order to implement the conversion process of biogas to biomethane, it is necessary to work out a balance sheet of biogas produced at the sewage treatment plant, to study its chemical composition and to select the optimal technology to obtain high-energy gas fuel that meets required standards. In the course of the biogas conversion process, carbon dioxide is removed, which is regarded here as the so-called energy bal-last. The technology used for powering motor vehicles by means of biomethane has been successfully implemented in many countries of the European Union. In view of environmental considerations, the proposed solution is generally supported because biomethane-powered engines have lower levels of emissions harmful to people and the environment.

Keywords: Biogas; Biomethane; Biofuel; Emission to the air; Energy Efficiency Economics; Sewage treatment plant; Water scrubber; Biogas treatment.