

Reactors with Effective Mixing as a Solutions for Micro-Biogas Plant

Authors : M. Zielinski, M. Debowski, P. Rusanowska, A. Glowacka-Gil, M. Zielinska, A. Cydzik-Kwiatkowska, J. Kazimierowicz

Abstract : Technologies for the micro-biogas plant with heating and mixing systems are presented as a part of the Research Coordination for a Low-Cost Biomethane Production at Small and Medium Scale Applications (Record Biomap). The main objective of the Record Biomap project is to build a network of operators and scientific institutions interested in cooperation and the development of promising technologies in the sector of small and medium-sized biogas plants. The activities carried out in the project will bridge the gap between research and market and reduce the time of implementation of new, efficient technological and technical solutions. Reactor with simultaneously mixing and heating system is a concrete tank with a rectangular cross-section. In the reactor, heating is integrated with the mixing of substrate and anaerobic sludge. This reactor is solution dedicated for substrates with high solids content, which cannot be introduced to the reactor with pumps, even with positive displacement pumps. Substrates are poured to the reactor and then with a screw pump, they are mixed with anaerobic sludge. The pumped sludge, flowing through the screw pump, is simultaneously heated by a heat exchanger. The level of the fermentation sludge inside the reactor chamber is above the bottom edge of the cover. Cover of the reactor is equipped with the screw pump driver. Inside the reactor, an electric motor is installed that is driving a screw pump. The heated sludge circulates in the digester. The post-fermented sludge is collected using a drain well. The inlet to the drain well is below the level of the sludge in the digester. The biogas is discharged from the reactor by the biogas intake valve located on the cover. The technology is very useful for fermentation of lignocellulosic biomass and substrates with high content of dry mass (organic wastes). The other technology is a reactor for micro-biogas plant with a pressure mixing system. The reactor has a form of plastic or concrete tank with a circular cross-section. The effective mixing of sludge is ensured by profiled at 90° bottom of the tank. Substrates for fermentation are supplied by an inlet well. The inlet well is equipped with a cover that eliminates odour release. The introduction of a new portion of substrates is preceded by pumping of digestate to the disposal well. Optionally, digestate can gravitationally flow to digestate storage tank. The obtained biogas is discharged into the separator. The valve supplies biogas to the blower. The blower presses the biogas from the fermentation chamber in such a way as to facilitate the introduction of a new portion of substrates. Biogas is discharged from the reactor by valve that enables biogas removal but prevents suction from outside the reactor.

Keywords : biogas, digestion, heating system, mixing system

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