

# FORMATION OF THE THERMAL REGIME OF BIOREACTORS OF HOUSEHOLD BIOGAS SYSTEMS

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Among the ways to solve the problem of saving in Ukraine fossil energy resources and replacing them with alternative sources, an important place belongs to the use of biogas as a product of anaerobic fermentation of organic agricultural waste. For the production of biogas in rural areas it is advisable to use household installations of small capacity. Their efficiency, as is known, largely depends on the temperature regime of the bioreactor. The provision of the thermal regime necessary for methane formation is an urgent task, for the implementation of which a number of measures are applied, in particular, additional heating of biomass to compensate for heat losses, its mixing, etc.

The **aim** of the work is to study the characteristics of the biomass heating system in a bioreactor for the processing of agricultural waste.

The paper analyzes the **results** of computational studies of the power of the heating system  $Q$  of bioreactors of household biogas plants during the cold period of the year using organic agricultural waste as raw materials, in particular cattle manure, pig manure, chicken manure and the like. The proposed form of the tank bioreactor, which minimizes the heat loss into the environment. The results of calculations of the change in the power of the heating system  $Q$  with varying external temperature in the range from 0 to  $-25$  °C and the thickness of thermal insulation within 0.05 ... 0.25 m are presented. Computational studies of the thermal state of the bioreactor were performed for different values of the reservoir volume from 1 to 3 m<sup>3</sup>. The temperature of the biomass was maintained at 40 °C.

According to the results of the research performed, it was shown, in particular, that an increase in the thickness of the thermal insulation  $\delta$  of a bioreactor significantly affects the power  $Q$  only in a certain range of  $\delta$  values.

**Conclusions.** The dependence of the power of the biomass heating system in the bioreactor on the thickness of its thermal insulation at various ambient temperatures and reservoir volumes is established.