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ENGINEERING SCIENCES

BIOMASS ENERGY POTENTIAL AFTER BEER PRODUCTION

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Biomass has large energy potential, which is presently used worldwide. According to forecasts, in the near future biomass may become one of the main renewable resources of energy in Poland [1].

Brewer's spent grain is a plant-derived product, which is left over from beer production. Its availability and low cost make this type of biomass suitable for use by the power industry. However, relatively high water content (approx. 80 %) is a factor limiting the use of spent grain in this field of industry. There are few publications related to possibilities of using spent grain as a source of renewable energy.

The analysis of the current state of knowledge concerning use of brewer's spent grain for energy purposes and the conducted examinations related to fuel properties of spent grain from different raw materials allowed for the assessment of this material as an alternative source of renewable energy.

In Poland, brewer's spent grain is used to a small extent in farm biogas plants, whereas countries closer to the equator and Western European countries such as Germany have used energy from brewer's spent grain to cover energy needs of the brewery for a long time. Brewer's spent grain usually undergoes mechanical pre-treatment, which involves dewatering.

Biogas is produced from the liquid produced in the process of dewatering, rich in protein, and the remaining mass with water content up to approx. 50 % is combusted in biomass boilers. Another method of utilizing brewer's spent grain for energy purposes is production of bioethanol. Lowering moisture content in spent grain by drying is energy-intensive and less profitable from the economic point of view. Generally, most plant-derived biomass has moisture content above 15%. Therefore, partial drying of biomass is often the only method of making biomass suitable for energy purposes [1,3].

The assessed samples of dry brewer's spent grain were characterized by similar calorific value at the level of approx. 15.6-15.9 MJ/kg, which was comparable to the calorific value of peat, bran, cereal grain, rape and barley straw or wood dust.

The calorific value of wet spent grain, estimated at the level of 1.4-2.0 MJ/kg, does not allow for direct use of spent grain for energy purposes. It is necessary to lower the moisture of spent grain to make it a valuable energy material.

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