

TECHNOLOGICAL LINE FOR THE PROCESSING OF HAZARDOUS SEWAGE SLUDGE AS RENUVABLE ENERGY SOURCES

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At present, 9 million tone of sewage sludge are accumulated on the territory of Kyiv wastewater treatment plant (known as Bortnychi station of aeration). The special problem of this waste is heavy metals in its compound. The presence of these pollutants prevents the burial of sewage sludge and substantially limits its use in agriculture and forestry.

The report is devoted to the development of technological line for the processing of hazardous sewage sludge in according with principle Waste to Energy. The heart of the line is a reactor for waste treatment based on plasma-steam-oxygen technology. The reactor is designed in such a way as to ensure its payback through the production of electrical energy through the products of gasification of carbon compounds in the waste. Unlike the most of known developments, the peculiarity of this shaft reactor is the loading of raw materials through its side wall. This will allow, on the one hand, to comply with the operating mode of the reactor, which meets the requirements of the Directive 2000/76/EC for the processing of chlorine-containing waste. On the other hand, the operation of the plasma torch will contribute to the achievement of the temperature regime characteristic for the vitrification of the ash residue, thus solving the problem of handling wastes containing heavy metals. The reactor capacity will be up to 500 kg/h depending on the type of waste. In terms of annual capacity, this will be up to 4 thousand tons per year, based on the 11-month cycle of work.

The main problem with regard to the sewage sludge processing efficiency is the relatively low calorific value (about 20 MJ/kg on dry and free of ash mass) and high ash content, which can reach 60%. To maintain the high calorific value of raw materials for the gasification process it is expedient to mix up high-calorie components to the sewage sludge such as worn out automobile tires. Especially since the problem of their processing remains unresolved. The most important advantages of their application can be considered, at a minimum, very low humidity and ash content and a high calorific value at a level of 40 MJ/kg.

A special cycle of experimental studies and thermodynamic calculations of the gasification process of the mixture of sewage sludge and rubber rubbing of worn-out tires was carried out. As the results obtained show, there are no risks of the raw materials sintering in the reactor, and the process is of high energy efficiency. This is a good precondition for the commercialization of hazardous waste recycling technologies, such as sewage sludge, while at the same time environmentally friendly recycling of worn-out tires.