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DEVELOPMENT THE COMPLEX APPROACHES FOR INCREASING THE POSSIBILITIES OF USING PEAT IN THE PROCESS OF IT'S DRYING IN PECO DRYERS

National Energy Strategies are developed in many European countries. The importance of increasing the production of local fuels is described in it. One relevant available energy source is peat briquette. But there are several reasons not allowing to increase its production. Some of them are significant pollution of the atmosphere by peat plants, high cost of production products and in some cases the depletion of the raw material base in the locations of peat plants.

In the report Ireland's 2018 Greenhouse Gas Emissions Projections marked, that "At best, Ireland will only achieve a 1 % reduction by 2020 compared to a target of 20%» provided by Paris climate agreement [1]. This, and the high cost of production were the reasons for the decreasing the productivity of peat plant in Ireland in 2018. That is why finding ways to reduce environmental pollution in peat briquette production is very useful task.

Industrial production data provided by Derinlou plant at Bord na Mona (Ireland) indicates that in an hour this plant with pneumatic steam-water dryer produces only about 18 tons of briquettes from 45 tons of peat. At the same time, at Manevitskyi peat-briquetting plant in Ukraine, for the production 1 ton of peat briquettes is spent 1,7-1,9 ton of peat [2]. At this plant, a pneumatic gas dryer is used. So, a lot of the peat is lost during the drying process in Peco dryers.

Peco dryer consists of five drying enclosures: two water, so-called, II effect and three steam (I effect). The first two enclosures are operated by opened (disjointed) cycle with a single use of a drying agent. The air entering the drying enclosure absorbs moisture evaporated from peat. After the appropriate cleaning in the separation apparatus this air is ejected into the atmosphere. In the enclosures of I effect, a drying agent is recycled. They are operated by a closed cycle [3]. The part of raw materials entering the plant, as well as peat waste obtained during the preparation and pressing the peat, are directed to a mini-CHP for burning into steam boilers. The presence of a mini-CHP creates additional, and, in comparison with the peat-briquetting plant itself, the main emissions of harmful substances into the atmosphere. Among them, the emissions of carbon dioxide CO. Therefore, to improve the process of utilization and recycling of peat production waste, a cyclic, closed drying process using carbon dioxide as a drying agent instead of air is needed. The carbon dioxide produced during the generation of the heat transfer agent (vapor) in the combustion process and from the exhaust gases can be used in a closed cycle for the first stage of drying. This will significantly reduce losses due to heated air and its purification into the environment. In the existing scheme for drying peat in pneumatic steam-water dryer there is a heater that heats the drying agent for the enclosure of I effect. The peat enters the third enclosure and passes through the fourth and fifth consecutively, from which it goes out in a dry state. The air is fed by a fan in the fifth enclosure 1A, and then consecutively passes through the fourth 1B and the third 1C enclosures. After a proper cleaning in dry separators, it is sent to a scrubber. An excess of water is formed in the scrubber due to the condensation of exhausted heat transfer agent. This water together with the deposited dust is taken into the industrial sewage through the hydraulic shutter for further purification.

Researches conducted at the Tuatsi plant (Estonia) also showed a significant amount of sludge water - 36 m^3/ h, and the concentration of peat in it – 9.3 m^3/ h [4]. The chemical analysis of peat of various deposits showed a high content of oxygen, carbon and lignin [5]. Therefore, in order to reduce pollution from peat-briquetting plants, it is necessary to create an additional module with a plasma-catalytic reactor. This reactor should be able to recycle industrial water in suspension (water and peat) and carbon dioxide after further purification into useful energy products - syngas, methane, and methanol. Therefore, based on a new technical and technological base, it is possible to expand the range of marketable products produced in the form of fertilizers and energy carriers such as synthetic (H_2 + CO) gas, methane, methanol and others. If it will be necessary, the production of synthetic liquid fuel can be realized through the Fisher-Tropsch process.

Conclusions. The analysis of the peat drying process in Peco dryers and analysis of the level of peat losses in the process of briquettes production was held. It allowed to identify ways to reduce technological losses of peat, costs for the production of thermal energy.

Reducing the consumption of thermal and electric energy can be greatly achieved by using as a drying agent the carbon dioxide formed during the burning of peat in steam boilers.

It has been found that there are possibilities of reducing pollution of peat by peat briquettes through the gasification of peat and the use of a plasma catalytic reactor for decomposition of carbon dioxide in an electric discharge and the production of new energy products such as synthetic gas, methane, and methanol.

References

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