Biomass self-heating energy using to increase the torrefaction process efficiency

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Agricultural, wood and woodworking waste utilization is an urgent problem, the solution of which is capable of protecting the environment, as well as a significant increase in the profitability of production in related economic sectors. Low-temperature pyrolysis (torrefaction) of biomass waste allows to produce high-quality solid hydrocarbon biofuel, which has higher rates of combustion heat value and hydrophobicity, which significantly reduces the cost of its transportation and storage. In addition, biofuels, being CO2-neutral, do not upset the ecological balance. Torrefied product can be used as a fuel (either partially replacing coal, or completely as an independent fuel) in existing coal-fired boilers. However, despite the positive properties of the torrefied product noted above, its widespread industrial production is currently not implemented. The main reason for the lack of commercialization is the dearth of a competitive torrefaction technology, the availability of which would justify the high energy costs of producing a torrefied product. In the temperature range of 250-300 °C, typical for torrefaction, the main output is made by exothermic reactions associated with the decomposition of hemicellulose. An experimental quasi-continuous operating mode unit for low-temperature pyrolysis of granular biomass with increased productivity has been designed at the JIHT RAS. The unit makes it possible to partially use the heat of exothermic reactions occurring during the pyrolysis of plant biomass, which reduces energy consumption for torrefaction by a factor of 4–6 in comparison with the traditional approach.