

SUMMARY OF DOCTORAL DISSERTATION

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pt.: „Analysis of the operational properties of internal combustion engines powered by fuels produced in biorefineries”

The subject of the considerations presented in this thesis is analysis of the environmental conditions for the production and use of engine fuels produced in biorefinery installations.

In the current studies, the subject of the exploitation of motor fuels, including fuels of biological origin, in internal combustion engines, also in terms of ecological assessment, and the subject of ecological evaluation of biorefinery installations in the cycle from raw materials to products obtained as a result of biorefinery processes were discussed separately. However, a comprehensive approach to both topics, i.e. the stage of fuel production and then operation in the sense of the ecological assessment of the exploitation of motor fuels produced in biorefineries, has been presented in a much smaller number of studies. Considering the above, the dissertation attempts to solve the task of systematizing the environmental impact issues related to the exploitation of motor fuels, to examine the possibility of using fuels produced in biorefineries to power internal combustion engines, as well as to analyze the ecological properties of internal combustion engines powered by these fuels. In addition, the ecological effects of producing motor fuels in biorefineries were assessed.

In the dissertation, empirical studies of fueling the engine with fuel of gasoline properties obtained from ethanol – EtG fuel (*Ethanol to Gasoline*) were conducted and engine tests of other biofuels carried out in national research units were analyzed. In addition, an indicator analysis was performed in the analyzed case of a biorefinery, in which EtG fuel is produced with the use of waste material, based on the current European regulations.

Based on the work carried out, it was found that the use of fuels obtained in biorefineries to power internal combustion engines allows to reduce the emission of pollutants harmful to the health of living organisms and the emission of greenhouse gases at the stage of fuel production and at the stage of their use in the combustion engines.

Keywords: internal combustion engines, environment protection, biorafinerries, biofuels.

