

The Effects of Plantation Size and Internal Transport on Energy Efficiency of Biofuel Production

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Abstract : Mathematical model describing energetic efficiency (defined as a ratio of energy obtained in the form of biofuel to the sum of energy inputs necessary to facilitate production) of agricultural subsystem as a function of technological parameters was developed. Production technology is characterized by parameters of machinery, topological characteristics of the plantation as well as transportation routes inside and outside of plantation. The relationship between the energetic efficiency of agricultural and industrial subsystems is also derived. Due to the assumed large area of the individual field, the operations last for several days increasing inter-fields routes because of several returns. The total distance driven outside of the fields is, however, small as compared to the distance driven inside of the fields. This results in small energy consumption during inter-fields transport that, however, causes a substantial decrease of the energetic effectiveness of the whole system.

Keywords : biofuel, energetic efficiency, EROEI, mathematical modelling, production system

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