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# SECOND GENERATION BIOFUEL PRODUCTION VIA BIOMASS PYROLYSIS

## OTRĀS PAAUDZES BIODEGVIELAS IEGŪŠANA AR BIOMASAS PIROLĪZI

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### Introduction

Strong dependence on imported energy sources, growth of fossil fuel and electricity prices, and environmental concern are the main reasons for the increased use of the new renewable energy technologies in the Latvian energy sector. The collective target that is set for the member states of the European Union for renewable energy usage is defined in Directive 2009/28/EC. The Directive states that the Latvian goal for the share of renewable energy sources in the transport end-use is 10 % by the year 2020. Fast pyrolysis is one of the most perspective route for production of liquid fuel from solid biomass. The aim of the study is to understand which steps of biomass pyrolysis resulted in the highest energy or mass conversion losses.

### Methods of research of fast biomass pyrolysis

The research was done base on the theoretical mass and energy transfer process for 1 kg of wood biomass conversion during biomass drying, fast pyrolysis and bio-oil improvement process.

### Results

The results show (see Fig. 1) that obtained biofuel mass is 5.4 times smaller than the mass of process feed materials. The same calculation of energy balance (see Fig. 1) shows that decrease of energy value is small.

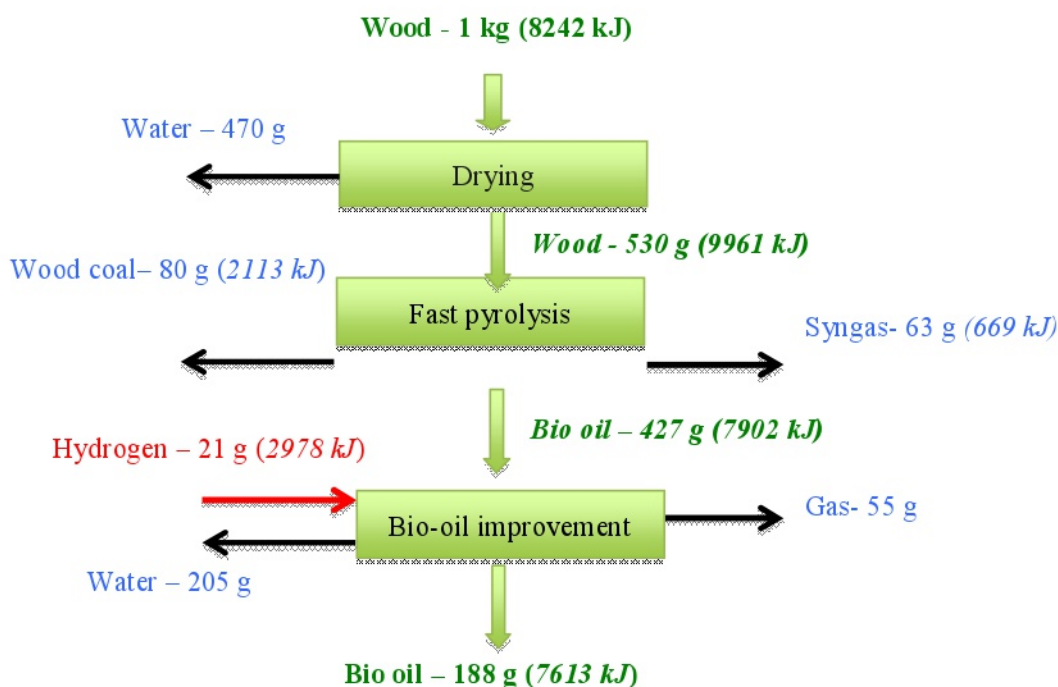


Figure 1. Mass and energy flows of wood fast pyrolysis process

These results are based on the fact, that fast pyrolysis process is a physical state change process with mass decrease and in the same time with energy density increase in biofuel. By analyzing the energy supplied on each process step, the biggest energy consumption is found on hydroprocess (41%). Energy requirement in the drying process is the second biggest (21%), and fast pyrolysis processes have the smallest energy consumption (13% accordingly).

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*Strong dependence on imported energy sources, growth of fossil fuel and environmental concern are the main reasons for increase of use of new renewable energy. In case of second-generation liquid biofuel production, lignin biomass is used as a raw material, which helps to avoid use of food products for the biofuel production needs. The study was made for 1 kg wood to define both the energy and mass conversion efficiencies during the fast pyrolysis process. According to results, 1 kg bio-oil heating value is approximately 5 times higher as incoming wood heating value. It means that energy density of bio-oil is higher than for the wood. Biomass fast pyrolysis helps to reach a higher quality liquid biofuel.*