Description for the general public

Thermal methods of use of biomass for many years gaining importance. The main reason for this is the need to meet EU requirements, according to which the Member States must ensure that already in 2020 min. 15% share of "green" energy in final consumption. Nevertheless, there are a number of restrictions related to the production of biomass, in particular legal solutions concerning the protection of nature and the principles of crop biodiversity. Therefore, for energy purposes should be used locally available waste products from agriculture, agri-food industry, spatial and other biodegradable waste, like the sewage sludge. The use of solar energy for the thermal utilization of biomass will reduce the energy inputs needed to initiate (and the process) and will be an original combination use of various renewable energy carriers without the support of non-renewable resources for energy production. Figure 1 shows the proposed idea.

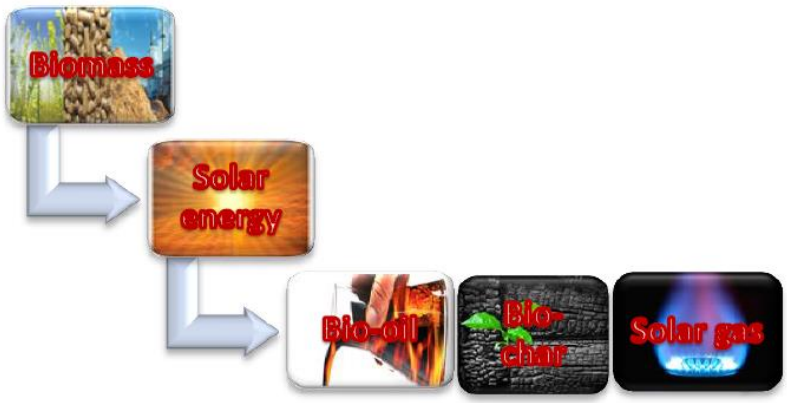

Fig. 1. The proposal idea

The project objectives are as follows:

1. Construction of the original rig, which will conduct research on the impact of the temperature of the solar pyrolysis process of the selected waste biomass feedstock on the composition of the product (bio-oil, bio-char and solar gas) and the yield of them.
2. The pyrolysis product analysis including composition, toxicity, bio-oil purification using selected advanced chemical oxidation methods and determination of bio-char use as a liquid contaminant adsorbent.
3. The determination of the measurement methodology of the waste biomass solar pyrolysis kinetics parameters.
4. Establishing a mathematical model of the solar pyrolysis process and its validation based on experimental data taken from the laboratory installation.
5. The determination of the energy distribution in the pyrolysis products and energy upgrade factor calculation.

The project has been divided into 3 main work packages:

1. WP 1: Multiparameter measurement of the waste biomass solar pyrolysis process.
2. WP 2: Physical - chemical analysis of the products obtained after the process.
3. WP 3: Construction of a mathematical model of the solar pyrolysis process.

The proposed project will be combination experimental methods with mathematical modeling in addition to the measurement of reaction kinetics parameters and physical properties of the modeling process. Such fusion will lead to the proved mathematical model which is a synthesis of experimental work carried out. This model will be an excellent tool for the simulation and optimization of solar thermal pyrolysis process, which could be the answer to some of the most important problems of civilization in the context of the need to produce energy from renewable sources, on the one hand due to the endless resources of fossil fuels and - on the other - environmental impact of these fuel.