SUSTAINABILITY ASSESSMENT OF BIOENERGY PROJECTS ON UNDERUTILIZED LANDS IN UKRAINE

Oleksandra Tryboi
Institute of Engineering Thermophysics NASU, SEC "Biomass"
tel. (044) 223 55 86, e-mail: tryboi@biomass.kiev.ua

Purpose of the work is to assess the sustainability of bioenergy projects that use biomass feedstock of energy crops grown on underutilized lands in Ukraine.

On the way to obtaining energy independence, one of the main goals of Ukraine is to reduce the consumption of fossil fuels and increase the share of renewable sources in the country's energy balance. The achievement of these goals is possible only by attracting the biomass of energy crops, the potential of cultivation of which in Ukraine is about 12-25 million toe subject to cultivation on 3-4 million ha of underutilized land.

The sustainability assessment was carried out for the value chain of lignocellulose bioethanol production from willow Salix Viminalis L. grown on the underutilized lands of Ivankiv region of the Kyiv oblast using an adapted set of sustainability indicators of the Global Bioenergy Partnership (GBEP).

The results of the assessment showed that in the Ivankiv region, there are 16720 hectares of underutilized agricultural land available for growing biomass feedstock (167200 dry tons/year) for a potential bio-ethanol plant with a capacity of 33400 tons/year. Self-cost of willow chips at a plant gate (50 km) is 28,7 euro/dry ton (10 years payback), which is 1/5 of the cost for producing 1 ton of bioethanol (720 euro/ton). Implementation of the project of the lignocellulose bioethanol production and use will reduce the level of greenhouse gas emissions in the target area by 57% compared to the baseline scenario of using gasoline. Soil quality at willow cultivation will improve increasing by 314 kg of soil organic matter per hectare annually, compared to the scenario of growing grain crops on these lands. The creation of gross value added in the region is carried out through the sale of bioethanol, an excess of electricity and heat produced. International prices for ethanol significantly affect the economic feasibility of a project for the production of second-generation bioethanol (in June 2017 the gross value added amounts to 16871952 euros/year; in June 2018 the gross value added is 9457152 euros/year).

Conclusion: Sustainability assessment of the bioenergy project for the production of bioethanol from biomass grown on underutilized lands showed that production costs are low, and favourable support schemes make the production of second-generation bioethanol in Ukraine economically sustainable, subject to long-term incentives.