

HARNESSING THE BIOECONOMY POTENTIAL OF UKRAINE

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Under current conditions, economic activity of a human is mostly aimed at satisfying their own needs without proper awareness of the consequences for the environment. This leads to the emergence of global problems which create imbalance in the ecological and economic system

and endanger the lives and health of the population. Solution to these problems requires the integration of efforts in various sectors and fields of activity in order to create the preconditions for harnessing of the bioeconomic system as a key determinant for further development of society.

Domestic research of the conceptual foundations for harnessing the bioeconomic direction and prospects for its development is at the initial stage. Issues of harnessing the bioeconomy in Ukraine are considered by such scientists as V. V. Baidala, O. M. Vashchenko, G. M. Makedon, A. M. Proshchalykina, M. P. Talavyria, O. Shubravska and others. However, the issue of functioning of economic and legal environment as well as regulatory and legislative control of bioeconomic production in Ukraine remains underinvestigated, which determines the necessity to conduct the research.

A retrospective analysis of the problem shows that by 1920 a significant part of industrial products had been made on a biological basis with the use of renewable raw materials. In the next decades, chemical technologies and oil encouraged the replacement of such products with products based on petrochemical processing. This led to the development of new branches of industry and the economy growth, but at the same time greatly worsened the environmental situation in general, which stimulated the search for new ideas. The latest achievements in biotechnology became attractive to the economy and environmental protection, as the innovative bioeconomic direction involves the production of fuel, chemical products and biomaterials based on the residuals of agriculture and fisheries, the forest industry, organic solid and domestic wastes and energy crops. The formation of such type of economy presupposes simultaneous realization of production, social, ecological and demographic aspects.

The bioeconomic direction is rapidly developing in the vast majority of developed countries of the world, such as Finland, USA, Italy, France, Germany, Norway, Australia and others. The preconditions for its formation, both at the international and national levels, are the availability of natural resource and intellectual potential of the country. Human capital has a key role in the formation of an economy of this type. Thus, in 2016 there were 659 higher educational establishments in Ukraine with 1.4 million students, in particular, these were students of the speciality "Biotechnology" – 3.5 thousand [2]. In 2011, as a result of the activity of scientific organizations, 8849 applications for the issuance of copyright protection were filed with the domestic patent office, 3667 of them in the field of natural sciences, which include biological, medical, pharmaceutical, agricultural, technical etc. 68 applications were submitted to patent offices of other countries, which is by 39.3% less than in 2010. In the same period, by 13% more copyright protection documents were received in Ukraine,

while in other countries it was by 14.3% less. Among the received copyright protection documents 30.4% were patents for inventions [1]. This is the evidence of availability of a sufficient number of scientific personnel capable of creating innovative ideas for the development of bioeconomic production in Ukraine.

Favorable geographical location along with kindly natural and climatic conditions for agriculture, a considerable amount of agricultural land, and the availability of forest resources, which occupy 16% of the country's territory, contribute to the bioeconomic development in Ukraine. Ukraine has every opportunity to use its own biological renewable resources, that is, the raw materials of plant and animal origin that are easily renewed, the residuals of agricultural production and the forest processing industry, household solid and food waste for the transformation of innovative ideas into newly created products. At present, the volume of energy use of biomass is increasing, which, accordingly, indicates the high potential of developing the bioeconomic system in Ukraine (Fig. 1).

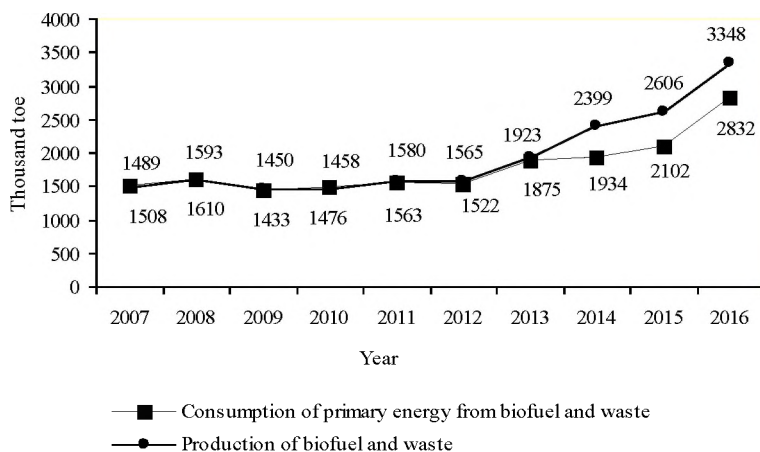


Fig. 1. Dynamics of energy use of biomass in Ukraine
Source: calculated according to [2].

Thus, the amount of biofuel and waste production in 2016 amounted to 3348 thousand toe, which is 742 thousand toe more than in 2015 and by 2.2 times more than in 2007. The amount of energy consumed in 2016 is 2832 thousand toe, which is 730 thousand toe more than in 2015 and by 1.9 times more than in 2007. The difference between the production and consumption indicators corresponds to exports of biofuels – 553 thousand toe in 2016 (539 thousand tons in 2015). At the same time, it is important to

note that the supply of primary energy from biofuels and waste in the amount of 2832 thousand toe is equivalent to replacing about 3.7 b m³ of natural gas in 2016. A gradual increase in the production output of bioenergy shows a significant potential for the development of bioeconomic direction in Ukraine.

In the total supply of primary energy, biomass amounts to 1.6%, but has the potential to provide about 7–9%, which allows to generate energy through the combustion of organic materials, including fast-growing energy crops. Nowadays in Ukraine more than 20 types of energy crops are being investigated; these crops can be used for producing plant biomass. There are several dozens of companies involved in their commercial cultivation and these companies plan to increase the area of the land. In Ukraine, there are more than 4 million hectares of land withdrawn from crop rotation due to their low fertility, the propensity to erosion. Cultivating fast-growing high-yielding energy crops on these lands will preserve the soil from erosion, increase the capacity of the humus layer and, in general, improve the ecological and energy condition of the country. Also, the low-productivity soil contaminated with radionuclides and pesticides in the Chernobyl exclusion zone is ideally suited for cultivating energy crops. Thus, the main leader in growing energy willow in Ukraine is Salix Energy, which owns a complete set of scientific and production cycle. Its plantation area is 1700 hectares. Since 2011, the company Bioproject has been engaged in the cultivation of energy poplars in Ukraine. The area of its plantations occupies 350 hectares in Lviv oblast and 50 hectares in Zhytomyr oblast.

The development of a bioeconomic direction in Ukraine requires the formation of a favorable investment climate in order to attract additional financial resources and to implement modern innovative technologies into production. At present, innovative processes in the Ukrainian economy have not gained significant proportions. The number of enterprises introducing innovations decreases each year and amounts to 12–14%, which is by 3–4 times less than in the developed countries of the world. Almost a third of the funds spent on innovation activity are allocated for purchasing equipment, while the expenses for the purchase of rights to a new intellectual property or for research and development are next smaller. About half of the innovation enterprises do not finance research activities to the benefit of their production [6].

The success and profitability of bioeconomic production is primarily related to the formation of the appropriate legislative and institutional foundations for developing appropriate state support measures in the form of state subsidies to initiate the producers of bioproducts, stimulate innovation programs related to developing a bioeconomic system, optimize

and regulate the risks of implementing innovative projects, establish a legal tool for regulating market instruments in order to provide efficient economic activity in bioproduction in general.

Relationships between enterprises and educational institutions require integration changes and structural adjustment, since any innovative knowledge should work for the benefit of the country's economy. One should initiate Ukraine's transition to a new business model that has an integrated character and complementary interconnection regarding the research of innovative bio- and nanotechnologies and their introduction into production in order to form new realities and create innovative bioproducts for the benefit of modern society, which will promote the implementation of ideas of socially oriented economy.

Under the conditions of the ecological, economic and social crisis, bioeconomy becomes of particular importance. It is based on the integrating relationships between humans and nature in the process of transforming the factors of production into a newly created product. The development of the bioeconomic direction in Ukraine will make it possible to reduce dependence on non-renewable resources, improve product quality and life expectancy, increase the level of food supply of the country and minimize the consequences of the ecological catastrophe.

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