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## **PRODUCTION OF BIOFUELS AND FOOD SECURITY OF COUNTRY**

A factor which has potential for a substantial increase in food prices is increasing the production of biofuels from agricultural food commodities.

Against aggravation world food problem, a partial solution to global energy problems due to increased biofuels production of "energy" plants does not appear immediately as optimistic as it was in the 90's of the twentieth century. First of all, it should be noted that at present virtually impossible to objectively quantify the impact of biofuel production options in food prices. Since both opponents and supporters of "green fuel" are subjective economic reasons. The former include lobbyists' oil sector of the world economy. To the second belong investors who have made large investments in production capacity of biodiesel and bioethanol. Exploring the arguments of both parties indicates that both are right. Thus, according to the International Monetary Fund, 15 to 30 % increase in food prices is a result of growing crops for biofuel production. On the other hand, the production of ethanol – the main substitute motor fuel allows to restrain rising oil prices. According to Bank of America Merrill Lynch, stopping the production of biofuels will lead to higher prices for oil and gasoline by 15%. These increases in the chain also result in higher prices for agricultural products [1]. Therefore, the energy deadlock formed – on the one hand the oil is exhausted, and therefore higher prices for it is inevitable that increased food prices, on the other – the closest alternative to petroleum products is energy, increase production by reducing food production, which increases food prices.

The problem of the production of biofuels and its impact on the food market, the environment, social services, etc., is reflected in studies of domestic scientists. In particular – there are works of Kashkovskoho V. I., Gavrisha V. I., Kaletnik G. M., Stasinevycha S. A. et al. However, in spite of its relevance, it has not received wide publicity, representing only a topic for scientific discussion within the narrow circles of experts. Analyses of the literature, there are significant gaps in the research costs and benefits of biofuel production, and have identified a promising line of scientific inquiry.

**Research methodology.** The methodological basis of the research is a systematic approach to the study of economic, social, humanitarian, ecological and other aspects of food and energy security. The study used methods such as analysis and synthesis, historical, monographic, deduction, observation and comparison.

**Results.** Researchers from many countries are trying to find out the possibilities of biofuels to replace oil. Kashkovskyy V. I. (Institute of Bioorganic Chemistry and Petro chemistry NAS of Ukraine) gives evidence that cast doubt on such opportunities - if the amount of vegetable oil produced worldwide, remake diesel, it can be replaced in about 3% of the consumption of oil, and if all corn grown for ethanol remake, it will help get 13-15 % of world consumption, which is used for vehicles or replace 25% of oil. But in this situation, nothing left for food and feed purposes.

These figures suggest that the global oil market is so great that biodiesel and ethanol from raw food cannot be an alternative to petroleum products [2].

For Ukraine - this means that all of its potential biofuel production can easily be absorbed by the world market. Thus, given the growing global demand for alternative (vegetable) energy and openness of the national economy of our country can be formed distorted structure of agrarian production, with a predominance of raw materials for the production of biofuels foreign market. One's hopes on market mechanisms regulating the structure of food and bioenergy agrarian production, means deliberately increase the risk of nation food insecurity. In this situation there is a need measurement: 1) the maximum amount of agricultural land that can no threat to national food security, use of raw materials for the production of biofuels, and 2) the structure of the area under energy crops - which share during feedstock for biodiesel production, which share at the raw material for bioethanol production, and 3) a specific set of crops that will ensure the most efficient use for biofuel production, and 4) optimal allocation of production between domestic and foreign markets, etc..

Based on a set of conditions internal and external environment, it can be argued that at this stage the precise definition above sounded production parameters is almost impossible. Because there are difficult to predict or no exposed predict conditions such as:

- 1) the exact amounts of the world's oil reserves;
- 2) real price of oil;
- 3) demand and supply of liquefied natural gas;
- 4) the rate of development and structure of the energy sector;
- 5) the rate of development and share in the overall structure of automobiles, transport and self-propelled machinery with hybrid engines, electric motors, hydrogen engines;
- 6) the rate of introduction of genetically modified plants - the raw material for biofuel production, food.

The list of conditions makes it clear that the problem of choosing between buying petroleum (oil) and domestic production of biofuels in force only as long as oil is used as the dominant energy source.

We now must come from the fact that the current cars, farm machinery and tractors need a motor fuel that can be produced and from oil and from biological materials. Moreover, the oil becomes smaller and it becomes more and more expensive. Based on the fact that food security is inextricably linked to energy security, the actual problem is the study of fuel alternatives.

We agree with formalized approach to determining the appropriateness of biofuel production, the proposed V. I. Gavrish. Scientist rightly believes that the production and use of biofuels would be appropriate if the area of land needed to grow plant material will not exceed the value (if produced several types of biofuels):

$$\sum_{j=1}^k \sum_{i=1}^m \left( \frac{M_j}{\varphi_i \cdot U_i} \cdot \frac{Q_j}{Q_i} \right) \leq K_2 \cdot F,$$

where  $M_j$  - weight of fuel consumed  $j$  species, ton;  
 $\varphi_i$  - output of biofuels by  $i$  agricultural energy crops, ton;

$U_i$  - yield of  $i$  crop, ton/hectare;

$Q_j, Q_i$  - net calorific value of the corresponding  $j$  type of fuel oil and the  $i$  type of biofuel;

$F$  - the total area of land;

$K_2$  - the share of agricultural land used for the purchase of motor fuels:

$$K_2 = \frac{\sum_{j=1}^k (M_j \cdot U_j)}{BBII} ,$$

where  $U_j$  - the price of fuel  $j$  species, UAH/ton;

$BBII$  - gross value of agricultural output, UAH;

$k$  - number of motor fuels.

The economic expediency of biofuel production mainly depends on the ratio of the prices of petroleum fuel and biological materials for biofuels. Therefore, the area under energy crops should not exceed a total area of agricultural land, production of which was used for the purchase of petroleum motor fuels [3]. In the context of our study, it is important to position the scientist on purpose crops power plants - it only needs of agricultural producers in different types of motor fuel. According to Gavrish V. I., the area for growing fuel biological materials not exceed 3 million hectares (about 9.8 % of agricultural land) [3].

According to Kaletnik G. M. to replace 30% of gasoline and diesel fuel consumed by the economy of Ukraine, must engage within of 8-10 % of acreage yield energy crops that reach the company under the terms of the technological parameters of their growth [4].

According to Stasinevych S. A. to meet the needs of Ukraine in bioethanol at 15 million tones (assuming a 5% ethanol additives), the proportion of space for its raw material supply should vary between 5 - 6.1% in the structure of harvested area [5].

According to scientists, in order not to cause damage to national food security and increase energy independence for planting energy crops should be allocated no more than 10% of agricultural land. Potential of this 10%, the current level of agricultural technology is used only in the middle, because their calculations performed on the basis of actual levels of productivity of energy crops. For example, Gavrish V. I. came to the average yield of rapeseed and sugar beet - 20 and 300 hundredweight/hectare, respectively. So, on the condition of potentially possible levels of productivity, the production of biofuels will increase significantly.

Currently there are already enough reasons to reduce optimism about the development of the biofuels sector agrarian production. Thus, the European Commissioner for the Environment Stavros Dimas said that the Commission will review the policy for biofuels, which is used in the transport sector of the European Union, in case it is found that it had an adverse impact on the environment and the food situation in poor countries. The preparedness to develop common measures against global price increases for staple foods, including limiting the production of biofuels, said members of the next summit "Big Eight" (G- 8). English newspaper The Guardian reported that the U.S. government is going to cut 50% of ethanol production, indicating the end of the fight between lobbyists in the Senate. As a result, in September 2008, MEPs vot-

ed to decrease the amount of biofuel that is planned to use in transport by 2020, 5%, although the decision was made about 10% [6].

The problems of price pressure on the market of food, production of biofuels creates no less and possibly more - the environmental problem. Yes, Kashkovskyy V. I. indicates that the process of biodiesel production is accompanied by two phases: obtaining biodiesel and glycerol phase. The glycerol phase contains 50-60% methanol. Currently, the technology and the utilization of glycerol, which is formed during the production of biodiesel in Ukraine does not exist. The only thing we can do – dig it in the ground. One can only imagine how much methanol appears in the groundwater after processing only 100 tons of rapeseed. That is, we make a greater than energy problem - the problem of drinking water. There is no drinking water treatment technology from methanol. This is indicating Datsenko M. S. (Head of Engineering and Technology of the Ministry of Agrarian Policy and Food of Ukraine) - for domestic production of 10 million tons of light oil, the technology should be used at least 5% methanol - a 500 tons carcinogens [2].

Considering all the advantages and disadvantages of biofuel production, we believe that the production of motor fuels from biomass commodity crops, or as it is called - the first generation of biofuels - a forced, temporary measure. His goal - to adapt to the scarcity of oil and acquire technical, scientific, managerial and organizational experience in the production of alternative fuels (renewable) sources of energy. As rightly notes Kaletnik G. M.: "In the field of bioenergy necessary level state government to adopt measures for the gradual development of second-generation biofuels from lignin-cellulosic feedstock and study followed the introduction of integrated processing of biological materials define mutually co-ordination between the major existing production structures and scientific institutions, build an appropriate strategic and tactical implementation framework for problems of second-generation biofuels "[7].

The development of second-generation biofuels is so important for Ukraine, which has found its reflection in the proper state purpose complex program [2].

### **Conclusions.**

1. The level of food security, among other factors, depends on the energy balance of the country - agricultural production and its industrial processing are impossible without a sufficient number of motor fuel.

2. Hydrocarbons as the main source of fuel - running out. This requires finding their replacements.

3. Production of biofuels from food raw materials - forced temporary measure. It cannot be regarded as a complete alternative to refined products because:

a) at the current stage of technological development, food biofuel raw materials cannot fully compensate for the oil;

b) increase the use of biofuel raw food exacerbate the global food problem;

c) the production of biofuels ( biodiesel ) - environmentally dangerous.

4. In order to prevent damage to the country's food security, maximum allowable share of agricultural land allotted for the production of biofuels from food raw material, shall not exceed 10%.

5. The prospective area for biofuel production is the second-generation biofuels from lignin-cellulosic feedstock.

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