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BIOFUEL IN POWER AGRARIAN INDUSTRIAL COMPLEX

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The use of different transport fuels provides an alternative solution to the problem of substitution of petroleum fuels, significantly expanding the resource base, facilitates the issues of the fuel for vehicles and fixed installations. A promising option for producing biodiesel will be automated mini-factory for the production of biodiesel.

Key words: motor fuel, energy, ethanol, biodiesel, oil, product gasoline.

Introduction. Availability of suitable climatic conditions, geographic location, free labor fairly attracts investors to raise capital in promising innovative projects, including the production of alternative energy sources and bioenergy. The stages of the evolution of biofuels: The origin of the idea of the use of biofuels in addition to traditional sources of fuel for that period of time; Conducting research on the effectiveness of the use of biofuels further develop aspects of its production; Implementation of scientific developments in practice and commercialization of biofuel market [1].

Problem. Given the shortage of natural oil one of the most affordable alternatives to traditional fuels are liquid biofuels, concentrated source of energy. The most effective of its varieties are biodiesel (90% of energy fuel oil), ethanol (60%) and methanol (35%). Of these, the most economical to produce and fully compatible with engines and commercial vehicle fuel systems are biofuels [2]. For Ukraine and with considerable natural resources, fertile black soil may not only provide food security and produce first generation biofuels, but also become a serious player in the global agricultural market. Of the total territory of 60.4 million hectares. Agricultural land covers 41.8 million. Ha, including arable land - 32.6 mln. Ha. Natural average yield of grain crops - 26 kg / ha (more than the soils of Europe and most countries) [3].

The purpose of research: Despite the existence of many painful and unresolved issues related to the regulation of biofuel in Ukraine there are still producers, mainly agricultural, working in the area and interested in its further development, improvement, active government support and promotion. The use of biofuels in the agricultural sector of Ukraine should be economically justified. Cost-effectiveness of biofuels is determined by comparing the results of the use of biofuels and costs of their development, implementation, use and sales.

The results of research. The liquid biofuels (bioethanol, biomethanol, butanol fuel, dymetylovny ether, biodiesel, second generation biofuels); Gaseous fuels (biogas, biohydrogen, methane, biofuels 3rd generation) [4]. Directive of the European Parliament and Council Directive 2009/28 / EC on the promotion of the use of energy produced from renewables The European Commission is committed to increase the share of renewable energy to European countries in 2020 to 10%. More analyze current production and consumption Ukraine light oil products

(gasoline and diesel) over the last 7 years in the table 1. multiplicative and cause GDP growth to 1.5 mln. USD. That is, the state loses huge money to import raw materials with enormous potential production and replacing conventional energy sources with biofuels.

Table 1. Production and consumption of light petroleum products in Ukraine for 2010-2016 years.

Years	Production, ths. Tons.	Consumption, ths. Tons.	Share of imports%
2010	6960.1	11449.1	47.55
2011	7229.5	10184.4	37.63
2012	6400.2	9633.4	45.83
2013	5496.8	9450.2	59.84
2014	2994.0	10212.1	70.69
2015	1949.2	9935.2	80.39
2016	1152.9	8424.1	86.31

Let us consider the financial and economic factors that directly poured on the development of bioenergy in the country: At this stage of development in most cases not economically feasible to produce biofuels, so the preferred export of raw materials; The lack of effective financial incentives to support and implementation of biofuels; The high level of risk for potential Ukrainian and foreign investors; Low financial security Ukrainian companies' own funds, high costs and risks of attracting debt capital and bank loans; Low financial support for research and implementation of innovative technologies [6-8]. For the production, development and use of biofuels in Ukraine needs early spring series of the following actions: Viewing, modifying and improving public policy in the field of renewable energy and energy efficiency; Improvement of the legal framework in accordance with the pressing problems of bioenergy; Comparison of bioenergy in Ukraine legislation with EU legislation; Ensure biofuel exports abroad by compliance legislation, technical standards, codes and manufacturing codes corresponding Ukraine export laws and legal acts of the EU and CIS countries; Support implementation of existing biofuels market development strategies and development of new Ukraine; Encouraging the use of biofuels in transport; The introduction of financial incentives in production; Biofuel production from own raw materials and waste to ensure, first and foremost, their own needs AIC Ukraine; Reducing the tax burden on producers of biofuels; Ensuring the highest possible proportion of the total consumption of oil products with biofuels own production; The involvement of foreign experts to improve the industry by foreign experience of countries which occupy leading place in the global market of biofuels; Dispel myths about the negative impact of biofuel production in compliance with the relevant technologies on the environment, food security, the state machinery and equipment, which will be used directly biofuels. Ensuring the highest possible proportion of the total consumption of oil products with biofuels own production; The involvement of foreign experts to improve the industry by foreign experience of countries which

occupy leading place in the global market of biofuels; The legal, organizational, economic and environmental principles of alternative energy sources in Ukraine and the means and methods of promoting their use in the energy sector defines the Law of Ukraine "On alternative energy sources" [6-9]. These include: dependence on weather and other environmental conditions; The need for water resources of small rivers for hydropower equipment; Dependence of the number of annual biomass harvest volumes; Possibility of production and use of geothermal energy from existing sources and geothermal wells; The dependence of the heat emissions from the operation of industrial enterprises; Instability in energy production due to the frequency of natural cycles; The need to harmonize and balance transfer volumes frequency energy produced from alternative sources, including the transmission of electricity in the United Energy System of Ukraine [6-9]. Returning to the determination of the main directions of development of effective alternative for agriculture. To do this, consider the following important factors: 1. Natural resource potential and its structure; 2. Technology generation biofuels; 3. Financial and economic opportunities of implementation and technology development of biofuel production; 4. The environmental component of the production of biofuels. The use of biofuels rather than traditional energy sources, reducing the rate of use of natural resources, that is all the positive aspects. The above aspects should be considered in that order to determine the priorities of biofuel production in Ukraine. The natural resources of Ukraine differ depending on the region, that the resources are unique to a particular area, as part of the same throughout the territory of our country. Priority areas of bioenergy development in Ukraine are given in table 2. Generalize basic methods of promotion of bioenergy technologies and biofuels in Fig. 2. Energy and economic efficiency of biofuel evaluated by calculation method. The basis of the method laid process maps drawn up conditions for intensification of production technology [6-8]. The proper production of raw materials (energy crops) supposed to be used by the traditional system of cultivation with rotation of the reservoir. In the short term, oil consumption is expected to increase at approximately constant volume of production and the growing shortage of motor fuels. Obtained by squeezing vegetable oil cake (cake) is a valuable product that can be used for feeding cattle.

Table 2. Priority areas of bioenergy development in Ukraine.

Raw	Territorial zone				
	North zone	West zone	The central zone	East zone	South zone
Waste and remnants of the wood industry and forestry	Pellets Ethanol Hydrogen	Pellets Ethanol Hydrogen	-	-	-
by-products Agriculture poultry waste	Ethanol Biogas	-	Ethanol Biogas	-	Biogas
Rape	Biodiesel	-	Biodiesel		Biodiesel
CMM	-	-	-	Methane	
Algae biomass	-	-	-		Hydrogen

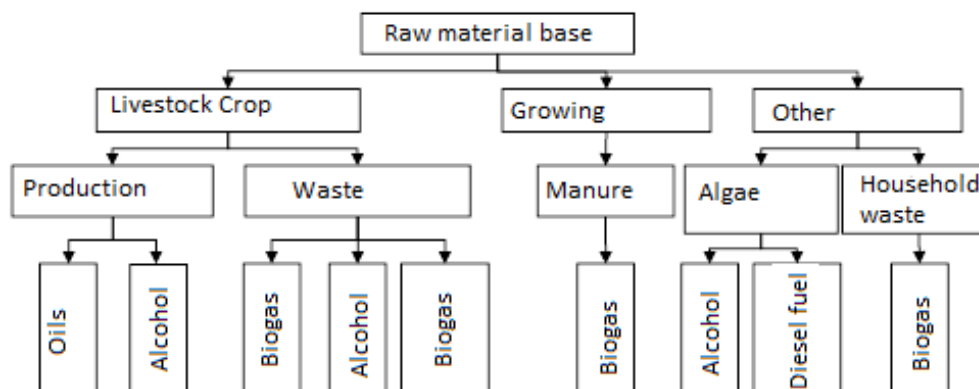


Fig. 1. Possible areas of biofuels based on raw materials of agricultural enterprises. On one hectare of rape crops can be up to 3 tons of oil seeds (about 1 ton of rapeseed oil), to 3.5 tons and 2 tons of straw meal. It should also be noted that in its physical and chemical properties of biofuels closer to diesel fuel than gasoline, it has a relatively high density and viscosity, low volatility. Based on the studies found that a promising option for producing biodiesel will be automated mini-factory for the production of biodiesel [3,6-8]. To ensure full featured mini-plant needed to place equipment for production of biofuels, press 5 tanks of 60 tons each for storing canola oil, 1 tank capacity of 120 tons which will periodically pidvozytysya mineral diesel fuel tank 1 which will defecate biodiesel for a few hours after leaving the reactor, after which it is pumped into a tank capacity of 120 tons of which will be filling the ICC. You also need a small warehouse for temporary storage and rapeseed meal. Schroth planned to sell to other farmers as feed for cattle. Scheme mini-plant is shown in Fig. 3. For example, the mini-plant capacity of 3 tons of biofuel per day (Fig. 4), there is mobility and easily transported (takes two-thirds of the trailer - cabinets) operates automatically, controlled by a microprocessor, requires a small expenditure of time for commissioning [3, 6-8]. The equipment can be mounted on the base plate.

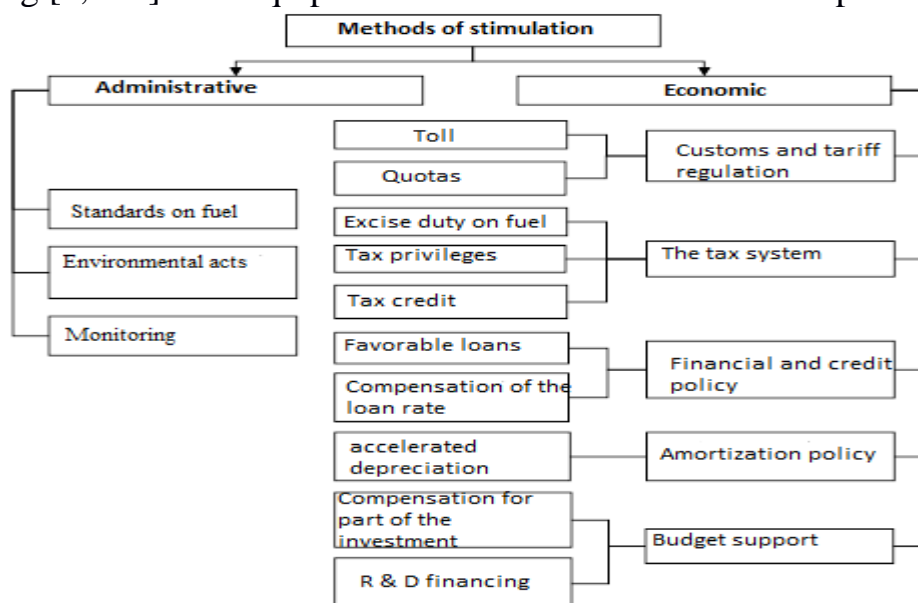


Fig. 2. The main methods to stimulate the use of biofuels.

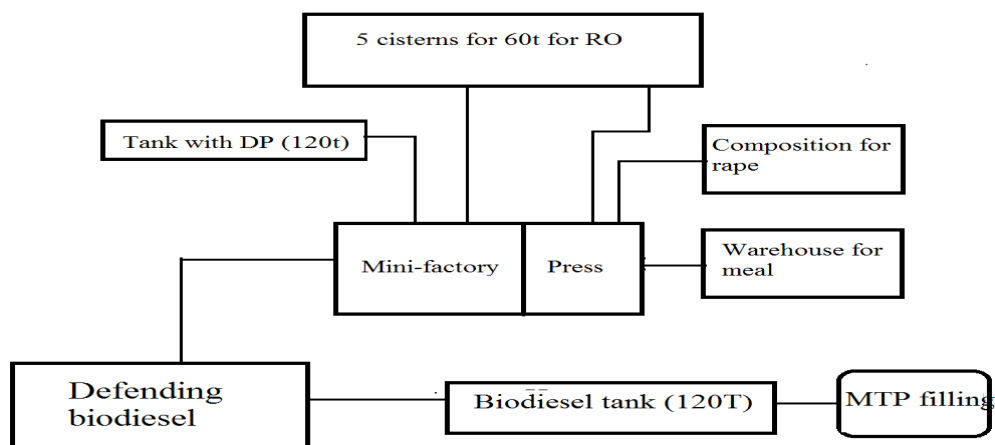


Fig. 3. Scheme mini-factory.

Technical characteristics of plants are listed in table 3.

Table 3. Specifications of small plants for biodiesel production.

Brand factory	Type of plant	Productivity on biofuels tons / day	Dimensions, m	Installed capacity, kW	The utilization for power
MZDP 1	Container modular	1.0-2.0	8,0'2,4'2,9	44.09	0.50
MZDP 2		2.0	9,0'2,4'3,0	48.5	0.65
MZDP 3		3.0	9,5'2,4'3,1	50.2	0.70
MZDP 4		4.0	10,0'2,4'3,2	52.5	0.70
MZDP 5		5.0	12,0'2,4'3,5	55.0	0.75
MZDP 10	Stationary	10.0	12,0'4,8'4,0	85.0	0.80

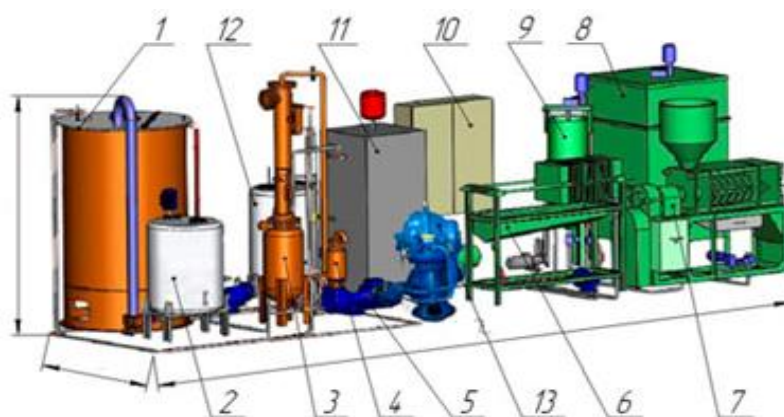


Fig. 4. The general scheme of mini-plant equipment MZDP-3 for biodiesel production: - reactor; 2 - capacity for a mixture of methanol and KOH; 3 - distillation apparatus; 4 - absorber; 5 - the vacuum pump; 6 - filter press; 7 - vidtysknyy press; 8 - capacity to collect oil; 9 - sump; 10 - case management; 11 - water heater; 12 - capacity water; 13 separator.

The process for equipment mini-plant for the production of biodiesel MZDP 3 is as follows: rapeseed automatically by a screw conveyor, served on vidtysknyy press 7, from which oil enters the tank purifier 9 where relieved of sludge (fuzu) that the pump returned for additional vidtyskannya press. Pre-cleared oil from the sump 9 for a complete cleaning of the phosphate fed into the filter press 6, and then in the collection of clean oil 8 which cleared adsorbent "Fosfolisorb" and heated to the desired temperature. Heated and pre-purified oil is pumped into the reactor 1. There is pumped from the container 2 catalyst solution in methanol. With constant

cavitation mixing and heating the reagents by using the heater 11 and the water path in the reactor is a reaction pereesteryfikatsiyi oil thus formed RME (esters), which features similar to petroleum diesel. In the reactor fuel is removed from glycerol (crude glycerol) solution and catalytic residues, using acidic or neutral detergent solution, which is pumped from the tank 12 selected remnants of soap, methanol, surfactants. The resulting oil dried esters in distillation unit 3, and the remaining water and methanol are condensed in absorber 4. recovered methanol can be rotated in a collection 2 or neutralized in absorber. Freed from water and methanol oil esters, passing through the filter system additionally cleared of water and solids in the separator 13 adsorbed sorbent "Amberlayt" and served in the capacity of the national team for further use as biodiesel.

Table 4. **Key quality indicators produced biofuels.**

№ p / p	Indexes	Value
1.	Kinematic viscosity at 40 ° C, mm ² / s	3,50-4,75
2.	Flash point in closed crucible, ° C	165-175
3.	Density at 20 ° C, kg / m ³	875-885
4.	Cetane number	52-54
5.	Acid number, mhKON / g	0,10-0,13
6.	Coking%	0.15-0.25
7.	The content of methanol, lye, water, sulfur and solids	Missing
8.	Compliance with standard EN 14214	Compliant

Thus, the kinematic viscosity at 40 ° C is 4.75 mm² / s, meeting the requirements of (3,5-5,0 mm² / s), the flash point in closed crucible is 175 ° C (according to European standards at least 120 ° C), which positively affect the operation of diesel engines [3,6-8]. Density of fuel at 15 ° C is 883 kg / m³, well within normal limits. Methanol, water, sulfur, glycerin, mechanical impurities and remnants of soap in fuel absent, so it can be considered environmentally friendly and safe to use. Cetane number is 53 (according to the standard of at least 51), ensuring its efficient combustion in the engine, and the acid number not exceeding 0.13 mhKON / g (no more than 0.5 standard).

Conclusions. Given the shortage of natural oil one of the most affordable alternatives to traditional fuels are liquid biofuels, concentrated source of energy. For Ukraine and with considerable natural resources, fertile black soil may not only provide food security and produce first generation biofuels, but also become a serious player in the global agricultural market. The use of biofuels in the agricultural sector of Ukraine should be economically justified. Cost-effectiveness of biofuels is determined by comparing the results of the use of biofuels and costs of their development, implementation, use and sales. The use of different transport fuels provides an alternative solution to the problem of substitution of petroleum fuels, significantly expanding the resource base, facilitates resolving issues of fuel vehicles and fixed installations. A promising option for producing biodiesel will be automated mini-factory for the production of biodiesel.

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БИОТОПЛИВА В ЭНЕРГЕТИКЕ АПК

С.М. Уминский, Е.С. Кислица

Ключевые слова: моторное топливо, биотопливо, биоэтанол, биодизель, нефтепродукты, товарный бензин.

Резюме

Использование на транспорте различных альтернативных топлив обеспечивает решение проблемы замещения нефтяных топлив, значительно расширяет сырьевую базу, облегчает решение вопросов обеспечения топливом транспортных средств и стационарных установок. Перспективным вариантом для производства биодизельного топлива является автоматизированный мини-завод по производству дизельного биотоплива.

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Summary

The use of different transport fuels provides an alternative solution to the problem of substitution of petroleum fuels, significantly expanding the resource base, facilitates the issues of the fuel for vehicles and fixed installations. A promising option for producing biodiesel will be automated mini-factory for the production of biodiesel.