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THE CURRENT STATE OF PRODUCTION AND USE OF BIOETHANOL IN BRAZIL AND IN THE WORLD

The current state of production and use of ethanol in Brazil and the world, which is made from sugar-containing raw materials.

***Keywords**: biofuels, ethanol, gasoline, biomass, sugar cane.*

Statement of the problem and analysis of recent publications. Instability of the production and supply of energy in the world are determine the use of alternative biofuels. The last decade of high demand in the market got liquid biofuels as bioethanol. From 2000 to 2010, world production has increased three times and exceeded 60 million liters of ethanol, and the bulk of this increase occurred in Brazil and the United States. Common industrial production in 2011 amounted to 87.8 % of the world. Global production of biofuels in 2000 increased seven times - from 16 billion liters in 2000 to 110 billion liters in 2012. Thus biofuel is only 2.3% of the total content of used liquid (motor) fuel. This figure is 20.1% in Brazil, the United States and 4.4% in the whole European Union, 4.2% [1,2].

The purpose of research. Study and analysis of the world market production and use of liquid biofuels as bioethanol.

Results. The high growth of investment and rapid growth of financing in the liquid biofuels sector occurred in 2004 and 2007. This contributed to the overall increase in oil prices, favorable tax incentives, production subsidies and tariff fees borderline and legislative increase in the share of ethanol in the fuel in several countries. As a result of the growing global demand, many developing countries,

began to increase the potential of biofuel production [3]. In 2012, the rate of growth of biofuel production has slowed due to high prices of raw materials associated mainly with extreme weather conditions, as the cost of raw materials in the production of biofuels account from 50 % to 80 % of the total cost.

Pict.1. Global production of biofuels in 2000 and forecast to 2015 billion liters. [3]. In 2012, investment in research and development in the field of biofuel amounted to about 1.7 billion dollars. More than 2/ 3 (about 1.1 billion) - the state budget, while investment from the private sector amounted to about $ 500 million. The total investment content was similar to the level of 2011, but at $ 600 million (44 %) less than in 2009. For the production of biofuels in 2012, developed more than 100 types of power plants. The most common crops for the production of liquid biofuels is sugar cane, sugar beets, corn, sorghum and sugar. However, some large-scale projects of using materials based on high-performance energy crops were not implemented due to lack of adequate mechanisms for deployment and high production cost. Brazil, where there is the most successful model of production and use of ethanol from sugar cane , which is considered to be the world leader in sustainable biofuel production [4,5]. History of bioethanol in Brazil dates back to the 70's of the last century, which allowed the country to become the second world's largest producer of ethanol, and the world's largest exporter of it. Sugar cane is grown in Brazil since 1532, and sugar was one of the first goods exported to Europe by Portuguese settlers. The first use of ethanol from sugar cane as fuel in Brazil dates from the late twenties and early thirties of the 20th century, with the advent of automobiles in the country. After the First World War in the Northeastern region of Brazil were initiated retrieval experiments of using ethanol as a motor fuel. The first factory for the production of fuel ethanol was commissioned in 1927, Usina Serra Grande Alagoas (USGA), located in the northeastern state of Alagoas, specializes in producing fuel mixture which contains 75% of ethanol and 25% ethyl ether. As a result, two years in the Northeast region of the country had 500 cars that worked on this type of fuel . During World War II, through military action, which were threatening the supply of oil, must have been the addition of ethanol in fuel blends, at more than 50 percent. That is why,

in 1943 the production of ethanol reached its peak - 77 million liters [6]. The next phase of development took place in response to the 1973 oil crisis, the Brazilian government began the industrial use of ethanol as fuel. National Alcohol Program (National Alcohol Program - PRO-Alcohol) established in 1975 is a nationwide program funded by the government and lies in a phased rejection of gasoline for ethanol produced from sugar cane [7]. The first phase of the program focused on the production of anhydrous ethanol mixed with gasoline in May 1979. The first 16 gas stations began to supply fuel from ethanol to the park of 2000 adapted vehicles. This year was launched on the market car Fiat 147, becoming the first modern commercial vehicle engine which runs on pure ethanol (E100). After about six years, three quarters of Brazilian passenger cars were manufactured with engines running on bio-ethanol [9]. A significant impetus for the development of ethanol made in the years 1976-1992 , when the Brazilian government introduced a mandatory blend of ethanol with gasoline from 10% to 22%. In this regard, pure gasoline (E0) in the country is no longer sold. The federal law that was passed in October 1993, sets mandatory use throughout the country with a mixture of 22% anhydrous ethanol (E22). Since July 2007, must have been a combination of 25% anhydrous ethanol and 75 % gasoline or a mixture of E 25. By the government with effect from the 1st February 2010, the content in the mixture of fuel ethanol decreased from 25 to 20%, and in April 2011 the government lowered the thresholds to 18 percent , leaving the mixture which must range between E18 to E25 [10]. In March 2003, the company introduced the Brazilian market Volkswagen car model Golf 1.6, adaptability to different fuel composition which is achieved through advanced engine design. A car with a flexible choice of fuel - can ride as gasoline and on blends of gasoline with bioethanol, with a flexible proportion (5% to 95%). In 2010 manufacturers that produce cars for universal (hybrid) engines including Chevrolet, Fiat, Ford, Peugeot, Renault, Volkswagen, Honda, Mitsubishi, Toyota, Citroën, Nissan and Kia Motors [11]. Brazil possesses the world's largest industry treatment from sugar cane. The higher numbers of refineries have integrated enterprises producing sugar and ethanol, to regulate the production of a particular product. During the period from 1999 to 2000, the share of

industrial output of sucrose from sugar plant (known in Brazil as "ATR" or Açúcar Total Recuperável), allocated to sugar production ranged between 41 ... 52 % [8] (Table 1).

The level of extraction of sugar from sugar cane by world standards and was considered high for the last 10 years on average 140 kg per tone of raw materials, or 14 percent. Production of sugarcane in the country has doubled in the past decade, but growth rates were approximately 10%, although they suffered great in 2011/ 12, respectively, when production decreased from 620 million tons to 562 million tons - the lowest level in between 2007/08 years.

Table 1

Industrial production of sugar cane in Brazil for the 1999-2012 million tons

Agricultural year total reed	Total output	Average Yield of sucrose (ATR), (mln. tons)	Average Yield of sucrose (ATR), in kg per tonne of cane	.. Fate of ATR, dedicated to the production of sugar (%)	ATR, dedicated to bioethanol production (%)
1999/2000	310,05	43,91	141,61	46,2	53,8
2000/2001	255,90	35,19	137,53	48,0	52,0
200120/02	290,57	39,86	137,18	50,2	49,8
2002/2003	322,37	45,64	141,57	52,1	47,9
200320/04	358,39	51,82	144,59	50,2	49,8
2004/2005	386,74	54,74	141,55	51,1	48,9
2005/2006	386,11	54,59	141,39	49,6	50,4
2006/2007	426,29	62,10	145,69	50,5	49,5
2007/2008	491,43	70,73	143,93	45,3	54,7
2008/2009	572,67	80,33	140,28	41,3	58,7
2009/2010	602,91	78,75	130,62	43,9	56,1
2010/2011	619,53	86,64	139,85	45,9	54,1
2011/2012	562,45	76,96	136,84	48,7	54,3

Source: Yearbook of MOS to ethanol

Brazilian production of ethanol from sugar cane has increased markedly between 1990 and 2010 - from 12 billion liters to 27 billion liters, but the fate of the country in the world production (from 58% in 1990 to 26% in 2010) reduced. This reflects the exceptionally high growth of corn ethanol in the U.S. According to the recent estimates of the Ministry of Agriculture of Brazil (27 February 2012) , at this

time there are 414 factories for the production of sugar / ethanol . 297 plants are integrated enterprises producing sugar / ethanol, ethanol only 104 made and only 11 plants make sugar. Largely reduced demand for ethanol because gasoline (the price of which does not vary by Petrobras for six years) has restored its competitiveness relative to ethanol, the price of which increased mid-2009, partly reflecting higher prices for sugar. When the price of ethanol is more than 70 % of the price of gasoline, bioethanol ceases to be economically feasible to use because of its lower energy value. Domestic consumption of ethanol in Brazil, according to experts declined to 12.50 billion liters in 2011/ 12 years, this decline took place after dropping to 14.50 billion liters in 2010/11 respectively to 15.56 billion liters in 2009 / 10 g (Table 2). The demand for ethanol, which is blended with gasoline at a ratio of 19 % to 25 % for the formation of fuel mixture is somewhat recovered , but it is not enough to offset a significant decline in the consumption of ethanol in the world market [8].

Table 2

Production, consumption and export of ethanol in Brazil (billion liters)

Year	Production	Imports	Exports	Net	Fuel consumption
2006	17,714	0,000	3,429	3,429	1,23
2007	22,243	0,000	3,533	16,204	1,30
2008	27,095	0,000	5,124	19,962	1,35
2009	25,323	0,004	3,296	22,523	1,40
2010	27,970	0,076	1,953	21,951	1,55
2011	23,000	1,150	1,965	20,500	1,80

Source: Yearbook of MOS to ethanol

In the face of declining offers of Brazilian ethanol exports of ethanol in 2011, according to experts, fell to its lowest mark - up to 0.815 billion liters. The usual reaction of the government to the high price of ethanol due to the temporary regulations reducing admixture of anhydrous ethanol to gasoline. That was in October 2011 when the impurity was reduced to 20%. However, the reduction in impurity means that Brazil needs to increase imports of gasoline that is not feasible, because the world market price of oil is high. Increasing domestic price of gasoline was proposed as another alternative, but beware the government inflationary

consequences of such actions. The solution to the problem was more active intervention in the market by increasing the offer of bioethanol. Tax policy includes providing loans of up to 100 billion Brazilian reals to the energy sector over the next decade. An estimated UNICA, Brazil's sugar industry will need 156 billion Brazilian reals to double the production of sugar cane, about 600 million tonnes currently to 1.2 billion tons in 2020, which will need to build 120 new plants. At the same time there is a project of Bioethanol inventory financing through national monetary council, Conselho Monetário Nacional (CMN). Long-term financing policy of stocking ethanol was seen for several years, but she could not manage to implement. Program of funding the reserves of ethanol may require up to 4.5 billion Brazilian reals at an annual interest rate of 8.7 %, which is slightly lower than the current basic annual rate of 9.75 %, which is set by Central Bank. Since April 2012 the Brazilian ethanol distributors will have to enter into contracts for the previous amount of 70 % of total sales expected for the season. Another direction of possible further action policies of the government is taxing ethanol. Over the past 10 years, the government generally provided more tax relief on gasoline than ethanol. According to UNICA in 2002 tax Cide (sales tax) of gasoline was 14 % of the price at the pump, while this level gradually decreased by only 2.7 % today [3]. Cumulative tax on gasoline is now 35 % - is lower than 47% 10 years ago , while aggregate tax ethanol is 31%, unchanged in 10 years. The industry insists that now is the time to lower taxes especially ethanol to reduce VAT, or ICMS, which is still very much varies by region of the country [3].

Conclusions.

1. The world market for the production and consumption of ethanol in the making and has tendensies to increase.

2. Decreased production of ethanol in recent years due to the lack of raw materials and reduction in world oil prices.

3. For a more complete supply by raw materials the processing plants for the production of bioethanol USA, Brazil increased area sown by sugar- highly profitable crops.

4. The introduction of alternative energy sources, based on the experience of Brazil and other leading manufacturers , is one of the most promising ways to overcome the energy dependence on traditional energy sources.

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Анотація

Курило В.Л., Гументик М. Я., Копак О. М.

Сучасний стан виробництва та використання біоетанолу в Бразилії та світі

Проаналізовано сучасний стан виробництва та використання біоетанолу в Бразилії та світі, що виготовляється на основі цукровмісної сировини.

Ключові слова: *біопаливо, біоетанол, бензин, біомаса, цукрова тростина.*

Аннотация

Курило В.Л., Гументик М. Я., Копак О.М.

Современное состояние производства и использования биоетанола в Бразилии и мире

Проанализировано современное состояние производства и использования биоэтанола в Бразилии и мире, который производится на основе сахароносного сырья.

Ключевые слова: *биотопливо, биоэтанол, бензин, биомасса, сахарный тростник.*