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## **PROSPECTS OF BIOGAS PRODUCTION ON VINNYTSIA REGION DISTILLERIES**

*This article analyzes the potential economic benefits of biogas production from alcohol industry waste in Vinnitsa region, investigates other positive aspects of this type of fuel in the region's economy.*

**Keywords:** *biofuel, biogas production, alternative energy, waste, efficiency.*

**Introduction.** Alcohol industry waste can be seen as one of the most promising components of bioenergy in Ukraine. Bioenergy is based on the use of organic vegetable matter such as wood, straw, agricultural crop residues, manure, municipal solid waste, etc. Alcohol industry waste products can be mainly used for getting biogas.

The results of current research indicate that the production of biodiesel and bioethanol are controversial because the technologies of production are expensive and the use of biomass resources has some ecological and economic consequences. Thus, it is actual to produce biogas from bioenergy utilization organic waste received from the economic activity of APC.

**Analysis of recent research and publications.** Problems and prospects of biogas production as an alternative source of energy are examined by such researchers and scientists as Kaletnik G.M., Sereda L.P., Geletukha G.G., Demchak I.M., Dolinsky A.A., Zhelyezna T .A. , Zhovmir M.M., Kernasyuk Y., Kobets M.I., Konenchenkov A.E., Kuznetsov A.V., Lisnychyi V.M. and others. However, this subject is so topical that requires global system research.

**The aim of the article** is to study the prospects and problems of biogas production as an alternative energy source on the distilleries of Vinnitsa region.

**Research Results.** Biogas is gas obtained from methane fermentation of biomass. Decomposition of biomass is influenced by three types of bacteria. In the supply chain, next bacteria feed by the products of vital activity of the previous ones. The first type of bacteria is hydrolysis bacteria; the second type is acid forming bacteria, and the third type – methane generating bacteria. The production of biogas involves not only methane generating bacteria, but all three types. Biogas production enables to prevent methane emission into the atmosphere. Methane influences the greenhouse effect 21 times more than carbon dioxide and is blocked in the atmosphere for 12 years.

"Capture" of methane is the best short-term way to prevent global warming. Processed manure, distillery refuse and other wastes are used as fertilizer in agriculture. This allows to reduce the use of chemical fertilizers, reduces the load on the groundwater.

Biogas units are installed both as sewage treatment plants on farms, poultry farms, distilleries, sugar processing plants, meat processing plants .

In distilleries which process grain after alcohol distillery refuse is formed and contains almost all components of outgoing raw materials with the exception of starch. In addition, distillery refuse are enriched with residual alcohol by yeast, which increases its feeding value . The chemical composition of fresh grain bard is very nutritious food, it is still used in large fattening complexes. However, in recent years these systems in many regions eliminated a significant number of bards is used. In-kind distillery bard more or less effectively be used mostly for feeding cattle. In dried range of use extends to pigs, poultry, small livestock and fish. Moreover, due to rising fuel transportation bards liquid (containing 5.5-7.0 % of dry matter) over long distances is uneconomic.

Alcohol industry of Ukraine - one of the leading sectors for waste and wastewater. In Ukraine there are over 80 Distilleries , which is formed during the year about 4 million m<sup>3</sup> of molasses and grain 3,6-3,8 million m<sup>3</sup> bards , and about 8

million m<sup>3</sup> of wastewater semitrash. This wastewater cannot be discharged without treatment into water bodies. Molasses bard on most plants is not utilized without purification together with sewage discharged into settling tanks where the rot polluting groundwater and air. It should be noted that the distilleries most favorable conditions for production of biogas: available raw materials (waste) with a temperature of 40-50 ° C and the secondary heat source (condensates lyuterna water, etc.). All this makes it possible to organize the production of biogas at no cost derived bioenergy fuels for heating medium in methane tanks. Out of biogas fermentation with 1 m<sup>3</sup> of waste is 45-50 m<sup>3</sup>. One Distilleries average power can be obtained by day 44 thousand m<sup>3</sup> of gas, per year - about 8 million m<sup>3</sup>. Limiting factor in the organization of biogas technology is the high cost of typical methane tanks made of reinforced concrete reaches their value at U.S. \$ 140 with capacity of 60 m<sup>3</sup>/day. The combination of anaerobic and aerobic methods you can purify wastewater to the indicators that will allow them to drop into the water. Thus addressed multiple issues: energy, environmental and waste management.

Industrial biogas plant - is building the facility in which the share of the equipment is 70-80 %. This - closed reactors, fermenters, or, dyhestery, digesters, biorektory made of reinforced concrete or steel coated. On heating bards funds almost do not need as raw material enters the heated kind. To manage the entire system need only one employee for 2 hours per day.

According to the data table. 1 in Vinnytsia region attended by about 10 factories for the production of alcohol overall output of which is 7988.5 thousand dal., representing 88.3 % of total capacity.

Table 1

**Power alcohol industry Vinnitsa region, 2012**

Factory	Type of material may	produced %	but the actual	but the actual	load percentage of production
SE "Barsky distillery "	3,7	molasses	1350,5	93,9	7%
SE "Bershad distillery"	1,8	Grain	657	666,9	100,1%
SE "Martynivskyy distillery"	23	Grain	839,5	251	30%
SE " Nemirovsky distillery"	23	Grain	839,5	1886,5	224%
SE "Ovechachskyy Distillery"	1,3	Grain	474,5	391,1	82%
SE "Bdzhilnyanskyy Distillery"	1,3	Grain	474,5	663	13%
SE "Trostyanetsky Distillery"	4,5	molasses	1642,5	444,8	27%
SE "Uladvivskyy Distillery"	2,3	molasses	839,5	3243	39%
SE "Chechelnitsky Distillery"	1,5.	molasses	547,5	100,8	18%
SE "Yurkivetsky Distillery"	1,6	molasses	584	247,5	42%
Total	66,2	X	9052	7988,5	88,3%

Distilleries region produced about 124 mln . grain and molasses bards only a mall portion of which is used to feed ( Table 2).

Table 2

**Production bards to distilleries Vinnitsa region Enterprise Daily**

Factory	capacity (thousand dal.)	Type of material	actually	produced
SE "Barsky distillery "	62,9	molasses	22958,5	1596,3
SE "Bershad distillery"	23,4	Grain	8541	8669,7
SE "Martynivskyy distillery"	299	Grain	10913,5	3263
SE " Nemirovsky distillery"	299	Grain	10913,5	24524,5
SE "Ovechachskyy Distillery"	16,9	Grain	6168,5	5084,3
SE "Bdzhilnyanskyy Distillery"	16,9	Grain	6168,5	8619
SE "Trostyanetsky Distillery"	76,5	molasses	27922,5	7561,6
SE "Uladvivskyy Distillery"	39,1	molasses	14271,5	55131
SE "Chechelnsky Distillery"	19,5	molasses	7117,5	1310,4
SE "Yurkivetsky Distillery"	27,2	molasses	9928	4207,5
Total	880,4	X	124903	119967

Cost of biogas plants run at distilleries region will reach 2.1 million (Table 3).

With all of the cost of production cost of 1 m<sup>3</sup> of biogas will reach 0.85 USD.

Which compared to the average price for a 4 grn/m<sup>3</sup> industry is extremely profitable. And given the fact that remains after this process can be used for animal feed is one of the most promising ways to develop the industry.

Table 3

**The economic efficiency of biogas production at distilleries in Vinnitsa region**

**The daily power production of the alcohol industry bards (thousand dal. )**

Volume of bards	thousand dal Number	Number of units	Production costs , mln	Year Cost of biogas production , mln. / Year
880,4	119967	15	2,1	54,0
Cost of 1 thous. hal. bards	of units total cost installations million	Biogas million m <sup>3</sup> / year	brads total cost UAH mln	cost of 1 m <sup>3</sup> of gas, USD
150	18	45	63	0,85

So on one plant , capacity of 3000 gave ethanol a day , can be obtained within one year 1.8 million m3 of biogas and 6,000 tons of protein feed. The use of biogas in the boiler plant saves 1500 tons of fuel per year. Aerobic purification of liquid phase, which was anaerobic pre-treatment , along with other less contaminated wastewater is carried out in biotank immobilized on a stationary carrier microorganisms.

This technological method allows you to mount media on a large number of microorganisms degrading organic matter, thereby increasing productivity aerobic wastewater treatment eliminates the need for disposal of excess sludge because of its growth effectively dead.

Biogas for distilleries is appropriate in terms of increasing the efficiency of the enterprise as is quite unprofitable, although this caused primarily ineffective management (Table 4).

*Table 4*

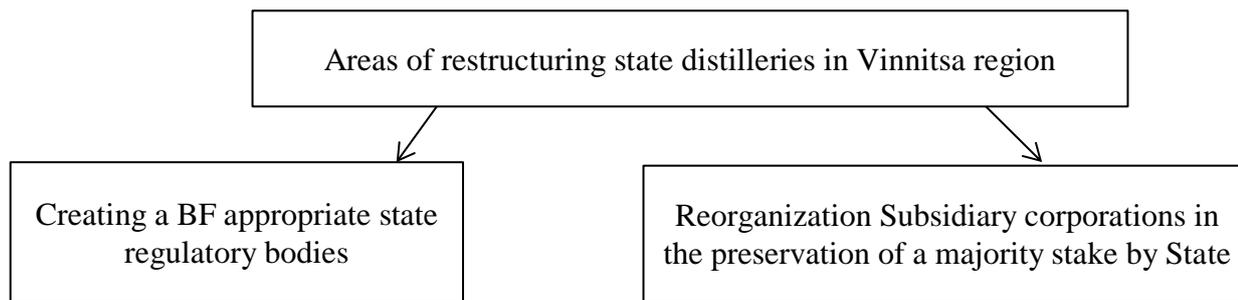
**The financial results of the food industry as received damage from ordinary activities before tax**

Company name	Name of loss for January-December 2012.	Profit, loss (- ) for January - December 2011
STATE ENTERPRISE Nemirovsky DISTILLERY	1662,0	7,0
STATE ENTERPRISE Barsky ethanol	1546,0	0,0
State Enterprise "Gaysinsky DISTILLERY "	869,0	0,0
STATE ENTERPRISE ULADIVSKYY DISTILLERY	712,0	-386,0
State Enterprise " YURKOVETSKYY DISTILLERY "	653,0	0,0

Source: Department of agroindustrial Vinnitsa Regional State Administration

At present, we are witnessing economic nonsense while distillery huge profits state distilleries at a loss. This is due to abuse by their leadership and imperfect system of governance. Therefore, for production of biogas and improved efficiency of public primary distilleries appropriate to their restructuring.

A number of restructuring will improve the efficiency of the alcohol industry area , including:



**Figure . 1. Directions alcohol industry restructuring in Vinnitsa region**

1. Reorganization Subsidiary of JSC will allow to avoid the practice of concealing earnings guidance because shareholders will disinterested of concealing profits;

2. Creation of regulatory authorities to allow distilleries to avoid sales for shady schemes alcohol.

**Conclusions.** Restructuring alcohol industry Vinnitsa Region is an urgent issue for the strategic development of the region. The proposed measures will enable us:

1. Avoid the practice of hiding profits in the business ;
2. The increase in revenues to the state budget from the state enterprises of the industry ;
3. The growth of foreign investment in the sector ;
4. Improve management practices in the food industry;
5. Increase the gross regional product and the profitability of the industry as a whole.

At the same time the production of biogas at distilleries region can give the following effect on the regional economy:

1. To increase the energy independence of the region;
2. Reduce the cost of energy distilleries ;
3. To improve the ecological status of water resources of the region ;
4. Reduce greenhouse gas emissions.

Ensure animal protein foods industry. The main limiting factor for the development of biogas production distillery area is especially high profitability of this sector (owners consider it inappropriate to develop this area of activity). By public promotion of renewable energy and increased penalties for emissions of waste alcohol industry may stimulate this process.

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### **Анотація**

**Мазур А.Г., Ціхановська В.М., Гонтарук Я.В**

***Перспективи виробництва біогазу на спиртових заводах Вінницької області***

*У даній статті проаналізовано можливий економічний ефект виробництва біогазу з відходів спиртової галузі регіону, досліджено інші позитивні сторони виробництва даного виду палива для економіки області.*

**Ключові слова:** біопаливо, біогаз, виробництво, альтернативна енергетика, відходи, ефективність.

## *Аннотация*

*Мазур А.Г., Цихановська В.М., Гонтарук Я.В.*

*Перспективы производства биогаза на спиртзаводах Винницкой области*

*В данной статье проанализированы возможный экономический эффект производства биогаза из отходов спиртовой отрасли региона, исследованы другие положительные стороны производства данного вида топлива для экономики области.*

*Ключевые слова:* биотопливо, биогаз, производство, альтернативная энергетика, отходы, эффективность.