

INCREASING THE ECOLOGICAL AND ECONOMIC EFFICIENCY OF WASTE RECYCLING: STATE INCENTIVES AND BARRIERS

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Romanchuk S. V. Increasing the Ecological and Economic Efficiency of Waste Recycling: State Incentives and Barriers

The article is aimed to study the ecological and economic efficiency in an inextricable interconnection with the State policy of promoting alternative energy. The essential problem of unprofitableness of sugar factories poses new challenges for the industry as a whole. A large number of sugar factories are now closed, the others are in the process of liquidation. These processes are resulting from inefficient technologies, significant State regulation and lack of transparency of the market. Outdated equipment that is physically and morally worn, dramatically affects the environment. In spite of the fact that enterprises are related to the food industry, the impact of harmful waste almost completely changed the ecosystem of the area: contaminated groundwater, sustained intense smell, unusable soil. All this is a small part of the influence of the sugar factories on the environment. Energy efficiency in sugar factories, though improving, still remains many times lower than in the EU. That is why in the article the current situation of financing and State support for sugar factories to improve the ecological and economic efficiency is studied. Tax benefits that may be granted to a sugar factory, seeking to go to the system of waste recycling intended for the production of biofuels, were analyzed. The main disadvantages and barriers of legislation are indicated, the necessary changes are proposed. An analysis of «green» tariff for sugar factories, seeking to produce biofuels from the waste of production as a major source of energy, is presented.

Key words: ecological and economic efficiency, waste, biofuels, alternative energy sources, incentives, tax benefits, barriers.

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Romanchuk Sergii V. – Postgraduate Student, Department of Environmental Management and Entrepreneurship, Kyiv National University named after T. Shevchenko (vul. Volodymyrska, 60, Kyiv, 01601, Ukraine)

E-mail: sv.romanchuk@gmail.com

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Романчук С. В. Підвищення еколого-економічної ефективності переробки відходів: державне стимулювання та бар'єри

Метою статті є дослідження еколого-економічної ефективності в нерозривному взаємозв'язку з урядовою політикою стимулювання сфери альтернативної енергетики. Суттєва проблема збитковості цукрових заводів ставить нові виклики перед галуззю в цілому. Велика кількість цукрових заводів на даний час закриті, інші знаходяться в процесі ліквідації. Дані процеси зумовлені неефективністю технологій, значним державним регулюванням і непрозорістю ринку. Застаріле обладнання, яке фізично та морально зношене, катастрофічно впливає на довкілля. Незважаючи, що підприємства належать до харчової промисловості, вплив шкідливих відходів практично повністю змінив екосистему місцевості: забруднені підземні води, стійкий насичений запах, непридатні ґрунти. Це все – мала частина впливу діяльності цукрових заводів на довкілля. Енергоефективність на цукрових заводах хоч і поліпшується, але залишається в рази нижчою за аналогічні показники в ЄС. Саме тому у статті досліджується сучасний стан фінансування та державної підтримки цукрових заводів на шляху підвищення еколого-економічної ефективності. Проаналізовано податкові пільги, які можуть надаватися цукровому заводу, який прагне перейти на системи переробки відходів з метою виробництва біопалива. Вказано основні недоліки і бар'єри законодавства та запропоновано необхідні зміни. Надано аналіз «зеленого» тарифу для цукрових заводів, що прагнуть виробляти біопаливо з відходів виробництва як основного джерела енергії.

Ключові слова: еколого-економічна ефективність, відходи, біопаливо, альтернативні джерела енергії, стимулювання, податкові пільги, бар'єри.

Табл.: 1. Бібл.: 19.

Романчук Сергій Володимирович – аспірант, кафедра екологічного менеджменту та підприємництва, Київський національний університет ім. Т. Шевченка (вул. Володимирська, 60, Київ, 01601, Україна)

E-mail: sv.romanchuk@gmail.com

Романчук С. В. Повышение эколого-экономической эффективности переработки отходов: государственное стимулирование и барьеры

Целью статьи является исследование эколого-экономической эффективности в неразрывной взаимосвязи с правительственной политикой стимулирования сферы альтернативной энергетики. Существенная проблема убыточности сахарных заводов ставит новые вызовы перед отраслью в целом. Большое количество сахарных заводов в настоящее время закрыты, остальные находятся в процессе ликвидации. Данные процессы обусловлены неэффективностью технологий, значительным государственным регулированием и непрозрачностью рынка. Устаревшее оборудование, которое физически и морально изношено, катастрофически воздействует на окружающую среду. Несмотря на то, что предприятия относятся к пищевой промышленности, влияние вредных отходов практически полностью изменило экосистему местности: загрязненные подземные воды, устойчивый насыщенный запах, непригодные почвы. Это все – малая часть влияния деятельности сахарных заводов на окружающую среду. Энергоэффективность на сахарных заводах хотя и улучшается, но остается в разы ниже аналогичных показателей в ЕС. Именно поэтому в статье исследовано современное состояние финансирования и государственной поддержки сахарных заводов на пути повышения эколого-экономической эффективности. Проанализированы налоговые льготы, которые могут предоставляться сахарному заводу, стремящемуся перейти на системы переработки отходов с целью производства биотоплива. Указаны основные недостатки и барьеры законодательства, предложены необходимые изменения. Представлен анализ «зеленого» тарифа для сахарных заводов, которые стремятся производить биотопливо из отходов производства как основного источника энергии.

Ключевые слова: эколого-экономическая эффективность, отходы, биотопливо, альтернативные источники энергии, стимулирование, налоговые льготы, барьеры.

Табл.: 1. Библ.: 19.

Романчук Сергей Владимирович – аспирант, кафедра экологического менеджмента и предпринимательства, Киевский национальный университет им. Т. Шевченко (ул. Владимирская, 60, Киев, 01601, Украина)

E-mail: sv.romanchuk@gmail.com

The deficit of the domestic energy resources and high risks of economic threats sharply raise the question of introducing new environmental projects. Among the current issues is effectiveness of the governmental re-

forms in stimulating recycling and overcoming the energy crisis. This article investigates the government stimulus of increasing the ecological and economic efficiency of the sugar plants and overcoming existing barriers of recycling

development. In addition, the author defines the ways of implementing the environment and economic projects on recycling at the sugar plants.

Despite the high topicality of these problems, they remain largely unexamined by the Ukrainian scientists. The reforms in the economy, in particular, the problem of the efficiency in economy, have been studied by many Ukrainian experts, but these studies are inappropriate in times of “energy war” and “military invasion”. A number of leading Ukrainian economists and scientists, namely V. Bazylevych, V. Heyets, A. Buhutskyy, D. Chervanyov, A. Chukhno, conducted fundamental studies of the government stimulation, including stimulation of the different branches of national economy.

Despite the wide range of research by the scientists and professionals, the current situation in Ukraine appears unique. The deficit and high demand for energy resources in the national economy are problems of high importance for Ukraine, due to the current global trends and significant dependence on the import of natural energy. The scientific approach to define government incentives and the reduction of the market barriers could open possibilities to many industries to reduce their energy consumption and become more efficient.

This paper examines ways to improve the environmental and economic efficiency of recycling through the government stimulation and reduction of the government barriers in the production of renewable (alternative) energy.

Currently the stimulating and developing mechanisms of industries, spheres of economy or private companies, which perform recycling and produce bioenergy, can be divided into three categories:

- 1) tax (fiscal) benefits;
- 2) “preferential tariff” for the electricity generated from renewable sources;
- 3) development strategies and programs.

International experience shows that the fiscal incentives are based on the basic fiscal instruments of the government policy. The stimulation of the structural models’ changes can be performed through seven fiscal instruments, namely:

- 1) an increase in governmental consumption expenditures;
- 2) an increase in governmental investment expenditures;
- 3) an increase in general lump sum transfers;
- 4) an increase in lump sum transfers targeted to hand-to-mouth households;
- 5) a decrease in labor tax rate;
- 6) a decrease in consumption tax rate;
- 7) a decrease in corporate income tax rate [16, p.11].

The fiscal stimulus of recycling in order to get fuel or electricity is present in the Tax Code of Ukraine [11]. It provides tax benefits on import of energy-efficient equipment, i.e. the equipment that works on renewable energy sources, materials for the production of alternative fuels or production of such materials, etc. Consequently, the goods mentioned earlier that are acquired for the purpose of recycling are free from VAT and customs duties, which is stimulating for the development of domestic market of renewable (alternative) energy business.

Equally important is the fact that Ukrainian recycling companies are free from paying 80% Income Tax from the sale of the next categories of products:

- 1) equipment for producing the biofuel;
- 2) materials, raw materials, equipment and components that are to be used in producing renewable energy;
- 3) equipment for the production of alternative fuels.

In order to further stimulate renewable energy business, the sugar plants are free from paying Income Tax received from recycling aimed at producing biofuel until 2020. In addition, the sugar plants do not pay Income Tax received from the production of electricity and thermal energy from biomass, bagasse, and molasses.

Due to the Law of Ukraine “On alternative fuels” [12], the producers of machinery and equipment for the manufacture and reconstruction of vehicles, which will work on biofuel and produced in Ukraine, are free of Income Tax; in addition, the supply operations for the technology and equipment, as well as the import of machinery and equipment used for the reconstruction of the existing machinery and equipment are free from VAT until 2019; creating of new companies for the production of biofuel, if such goods are not produced in Ukraine. Therefore, these rules act as the direct government incentives for the producers, as well as for the consumers of biofuel. Consequently, sugar plants that invest in recycling will receive additional economic output.

That is why electricity produced by a sugar plant through burning biofuel (biodiesel or biogas) is free from mandatory fee as a surcharge to the current tariff for electricity and thermal energy. The existing surplus is also free from Income Tax. These conditions are quite favorable for the sugar and ethanol plants, because of their high energy consumption. In terms of increasing property taxes and taxes on land, one of the fiscal stimuli is a reduction of a 25% tax on land to accommodate companies’ which produce electricity from biofuel.

“Green tariff” is a special preferential tariff, for the purchase of electricity generated from alternative sources on the Wholesale Electricity Market [18, p.521].

The definition of “green tariff” for electricity produced from renewable energy was introduced in the Ukrainian legislation in 2008 [15], while the procedure of its calculation appeared in 2009 [14]. The legislative basics of “green tariff” are defined by the Law of Ukraine “On Electricity” [13]. According to this law, the value of “green tariff” for the entities that generate electricity from biomass is set as retail tariff for consumers of 2nd class voltage on January 2009 (0,5846 UAH / KWh) multiplied by “green tariff” coefficient for the electricity produced from biomass. This law defined biomass products as such that consist wholly or partly of vegetable matter; this rule is suitable for the sugar plants’ production technology, as the main product of recycling is pulp, beet tops and molasses. These ingredients could be used to produce biofuel, which can be used as a fuel for the purpose of energy producing. In Ukraine the rate of “green tariff” is currently set at level of 2.3 for the electricity produced from biomass. The “green tariff” is approved by the National Commission for State Energy and Public Utilities

Regulation of Ukraine. Due to the energy and financial crisis the government had to reduce the rate, because of the negative reaction of economic community, as the investment projects to produce biofuel were becoming non-profitable. These projects were calculated and designed for the long-term time horizon and did not consider the political risk.

The lowest "green tariff" for the electricity produced from biomass is fixed at 0,13446 UAH / KWh (12.39 euro-cent / kWh). It cannot be reduced, but may increase if the UAH depreciates against the euro to the FX rate, which fixed on January 01, 2009 at 1085.5460 hryvnias for 100 euro. Nowadays the difference is rather high, due to the significant depreciation of the hryvnia, and needs to be reduced or eliminated. The government is ready to for such a measure, but this will probably worsen the investment climate in this sector.

Existing "green tariff" for the biomass in Ukraine is higher than in EU countries, especially in Germany, where renewable energy is well-developed. The EU countries' governments use different approaches to identify and stimulate the production of renewable energy, but the mechanism is built on the basic principles: tender schemes, quota obligations, preferential tariffs [17, p. 36 – 40]. It should also be noted that in Ukraine "green tariff" is not differentiated and is the same for all types of entities, while Germany has very detailed grading by types of biomass facilities, installations, technologies, etc. The differentiated "green tariff" is also common in other EU countries, and a higher effectiveness of such approaches in Ukraine should be expected.

The analysis of consumer tariffs dynamics in retail electricity for consumers and "green" tariff" for electricity from biomass showed that retail prices are rising almost monthly, with "green tariff" being dependent on the euro dynamics. Consequently, the general trend is a gradual leveling of the retail tariffs and "green tariff". As a result, now it is practically impossible for the sugar plants to benefit from the renewable energy because of the sharp depreciation of the hryvnia and the increased costs of importing equipment.

As is the case with the many of the European green taxes that have been both politically successful and acceptable, a key feature of the U.K. climate change levy, for example, is the rebate. To reduce impacts on competition, revenues from the levy are returned to industry in the form of funding for energy efficiency and renewable energy research programs, a three percent reduction in the rate of employee National Insurance Contributions (NICs), and enhanced capital allowances to be applied to investments in energy saving technology. However, while the reinvestment scheme is revenue-neutral for industry as a whole, it is not revenue neutral for each facility. Facilities that are able to take advantage of tax breaks provided through the enhanced capital allowances program, and those that are able to make the transition to renewable energy sources or install more efficient technology, will benefit from the CCL scheme [19, p. 20].

Ukrainian government developed a number of programs and strategies for promoting long-term development of the recycling sector in order to obtain renewable energy. Some of them are active, others are at the draft stage. Such strategies were designed and implemented in practice in

most developed countries. The important and effective measures of these strategies should be mentioned, e.g. an expansion of the energy recovery and waste recycling. This means an expansion of the facilities for the energy recovery from waste, including pre-treatment facilities, refuse-derived fuel (RDF) boilers, bio-energy gasification facilities from food waste water, which, in turn, will expand electricity generation through the heat recovery and utilization of landfill gas electricity of existing incinerator and heat supply. Disseminate related facilities on providing waste energy efficiency and secure economic feasibility. Promote installation of waste resources-energy facility and pre-treatment facilities that can recovery at least 40% of energy of combustible and organic waste through comprehensive environment and energy complex in pilot metropolitan towns. Indicator is Ratio of resources recovered to energy (%) [8, p. 124].

We propose to analyze a number of the documents, that were already adopted in Ukraine.

Firstly, we will analyze "The concept of target scientific and technical program of the production and use of biofuel" [1]. According to the concept, the program goals are:

- 1) to establish more than 70 thousand units of modern energy efficient boilers with a total heat output of 9180 MW to replace 5 billionm per year of natural gas;
- 2) increase the volume of biogas derived from manure to 130 millionm;
- 3) reduce the amount of carbon dioxide emissions by 9 million tons per year; and methane emissions by 3 million tons per year.

The Program was to be implemented in 2010 – 2014 and was to be financed from the expenditures of state and local budgets, investments and other sources. The approximate amount of funds needed to implement the program is 7478.19 million UAH. Unfortunately, the state budgets in 2014 and 2015 had no funds for the implementation of this concept due to the financial and further political crisis.

Another program is "State Targeted Economic Program for energy efficiency and the development of energy production from renewable energy sources and alternative fuels 2010 – 2015" (adopted by Ukrainian government in 2010) [2].

The target is to optimize the structure of energy resources and increase the share of renewable energy at least to 10% until 2015 in order to reduce the share of imported energy resources, including natural gas, and its replacement by alternative energy. Among the other measures, the program provides the implementation of projects on construction of facilities for solid biofuel (791 MW), biogas (111 MW); construction of facilities for the electricity generation using biomass (461.5 MW).

The final document that is to be analyzed is "The Concept of the State target scientific and technical program of development and use of renewable energy sources in Ukraine until 2030 (developed by the State Agency for Energy Efficiency and Energy Saving of Ukraine)", which remains only adraft.

In addition, the Ukrainian government updates the Energy Strategy of Ukraine until 2030.

Tariffs for thermal energy that is generated through recycling in sugar plants, using renewable energy sources, including biofuel, are set by the National Commission for State Energy and Public Utilities Regulation [9].

The procedure for calculating tariffs for electricity and thermal energy produced from biofuel in sugar plants is adopted by the National Commission for State Energy and Public Utilities Regulation [6]. This procedure is used to set tariffs or its revising and applies to entities engaged in business activities for the production of electricity and thermal energy, both by traditional and renewable sources. The owner of a sugar plant has to apply to the National Commission for State Energy and Public Utilities Regulation to calculate tariffs. In particular, these materials include:

- ✦ calculation of tariffs for electricity and thermal energy in sugar plants;
- ✦ calculation of costs per unit based on the total production costs of biofuel;
- ✦ an explanatory note with details about sugar plant, methodology of production and justification of tariffs;
- ✦ calculation of tariff for each month of a billing period;
- ✦ calculation of specific fuel consumption for electricity and thermal energy in accordance with the applicable regulatory and technical documents [4, 5];
- ✦ calculation of biofuel needs for the future period.

If submitted documents are correct, the sugar plant got approved tariffs for electricity and thermal energy for at least one year. In such a way the production of electricity from biomass is stimulated by the “green tariff” in Ukraine

[7]. “Green tariff” is used in Ukraine since 2009 and is set until January 1, 2030.

As it was mentioned earlier, the level of “green tariff” depends on euro FX-dynamic. The National Commission for State Energy and Public Utilities Regulation has to review it for each entity monthly, because of significant depreciation of the UAH in 2014. Moreover, currently the government prepares immediate measures of economy, which can negatively impact on the attractiveness of investments in projects of recycling at sugar plants. The government procurement of all electricity generated by renewable power facilities for the period of the “green tariff” application, but not sold to consumers through the direct contracts, is guaranteed by the state law. In addition, there are guarantees for the full payment for electricity.

There are no special “green tariffs” for the thermal energy produced from biomass in Ukraine, which negatively impacts on the investment climate in the sector.

One of the main problems of bioenergy projects implementation is the issue of attracting investments. Hence, it is necessary to use special financing instruments. These instruments can be proposed by the European Bank for Reconstruction and Development (EBRD), International Finance Corporation and other financial institutions, as well as the Kyoto Protocol projects.

Despite the existing governmental incentives and measures for use of biomass at sugar plants for the purpose of recycling and biogas for energy production, there are also many of barriers that significantly complicate the processes. A list of these barriers and possible ways to overcome them are presented in *Table 1*.

Table 1

The Barriers and the Methods of Regulation

Barriers	Methods
1	2
1. Gaps in existing legislation in bioenergy. No “green tariff” for electricity generated from biogas and electricity produced in co-combustion of biomass with fossil fuels. No financial incentives for the production of energy from biomass	Changes and improvement of Ukrainian laws and its harmonization with EU legislation in bioenergy
2. A significant differentiation in natural gas prices for different categories of consumers. Artificially low gas prices for households and utilities have negative impact on implementation of bioenergy technologies in different sectors of economy	Setting reasonable market prices for all consumers. Currently it is a condition of the IMF loans
3. Lack of clear and reasonable targets of the share of biomass in total energy consumption. Strategic goals for bioenergy only fixed in the Energy Strategy of Ukraine until 2030 [10] at 3% of total energy consumption in 2030	Changes to the Energy Strategy of Ukraine and put more realistic target at 10% of energy from biomass in the total energy consumption of Ukraine in 2030 and ensure its implementation by Government
4. Due the share of bioenergy already achieved in EU countries and renewable energy mandatory targets set out in the Roadmap for EU [3], targets defined in the Energy Strategy of Ukraine seem too low	Creation and agreement government programs for the implementation of EU programs in Ukraine to increase the involvement of trust funds financing
5. Lack of the practically applicable (not declarative) government program. Over the past 10 years, the state has developed and adopted number of developing programs and strategies for renewables and other types of biofuel. The objectives set by them were not agreed with each other. Most programs are practically unrealistic; some programs were not implemented or implemented with no success	Developing a realistic state program with reasonable targets for biomass share in total energy consumption, clearly defined measures to achieve the targets and financing instruments. The responsible state agency should enhance the creating and adoption this program, control and coordinate its implementation

1	2
6. Lack of financial incentives for implementation bioenergy projects. Most draft projects are supported in Ukraine only by foreign foundations and programs. Successful project should be "replicated" to demonstrate its results	Development and introduction of mechanisms for implementation of the new bioenergy projects and earlier successful projects
7. Low financial liquidity of Ukrainian companies and the high costs of bank loans. High value and tight conditions of lending	Proposing an effective mechanism to support domestic consumers
8. Weakly developed market of biomass as fuel in Ukraine. Use of the companies' residues and production waste. There are some biomass trading, yet it is not permanent. Moreover, no practice and experience of long-term biomass supply contracts	Following the example of the EU to introducing the practice of long-term contracts that will provide a reliable supply of biomass with the desired characteristics
9. Insufficient R&D financing. The current level of financing allows only short-term projects	Significant increase of the R&D level

CONCLUSIONS

The results of the research give the author a possibility to make a number of conclusions. An increase of the environmental and economic efficiency of recycling at sugar plants is almost impossible, because of the financial and structural crisis in the Ukrainian economy, legislative barriers and political obstacles for stimulation of the sugar industry. Removing barriers, strict implementation of the EU legislation and creation of the new government strategy for stimulating renewable energy business will prevent a number of practical problems.

First of all, the government needs to improve the procedure of obtaining "green tariffs". Nowadays, it is overcomplicated and bureaucratic. In addition, recent changes and government measures will probably have negative impact on foreign investments in the industry. Nowadays, the "green tariffs" concern only existing renewable energy business in Ukraine, lacking the measures to stimulate the new one. We believe that providing "green tariff" on the first stage of the project implementation should encourage and become an additional incentive for the investors. ■

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