

## SELECTED SOCIO-ECONOMIC ASPECTS OF USING BIOFUELS IN POLAND

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Biofuel is considered to be an alternative source of energy, which is supposed to lead to many economic, political, social and environmental benefits. In this article, it is tried to give an assessment of Polish policy for the development of biofuel market. The main conditions for development of the Polish biofuel market are presented and the influence of the government on demand and supply as well as the key results of government policy are discussed. It is shown that while the strong pressure of the government by imposing tough requirements on producers and distributors should lead to fulfillment of EU directives and the creation of a market for biofuel, no real market was created which could survive without government intervention.

**Keywords:** biofuels, biofuel market, sustainable energy supply, Poland.

## ДЕЯКІ СОЦІАЛЬНО-ЕКОНОМІЧНІ АСПЕКТИ ВИКОРИСТУВАННЯ БІОПАЛИВА У ПОЛЬЩІ

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Біопаливо є альтернативним джерелом енергії, використання якого має призводити до значних економічних, політичних, соціальних та екологічних зисків. Проведено оцінку політики Польщі стосовно розвитку ринку біопалива. Обговорюються основні умови створення ринку, розглянуто вплив використання біопалива на формування потреб і пропозицій, проаналізовано основні результати державної політики в цій галузі. Показано, що незважаючи на значний державний тиск щодо формування потреб виробників та постачальників, який має призводити до виконання Директив Європейської Унії і формування ринку біопалива, насправді ринок біопалива, який міг би існувати без державних інтервенцій, в країні досі не створено.

**Ключові слова:** біопалива, ринок біопалива, стале постачання енергії, Польща.

**PROBLEM STATEMENT.** As a consequence of the problems related to the increasing use of energy and the depletion of non-renewable energy resources such as oil, the interest in developing alternative energy resources has been increasing (see for example: [1, 2]). Biofuels,<sup>1</sup> being popular in the USA and the European Union (EU), were for a long time considered as a new type of fuel in particular for transport purposes causing a wide range of beneficial effects.

The EU considered it to be an opportunity for diversification of energy supply and reducing dependence on energy imports. Additionally, biofuels were considered to be advantageous from an environmental perspective,

as they would cause reduced emission of CO<sub>2</sub> compared to oil and coal. A social and economic advantage would be the creation of employment in agriculture, in the food processing industry, increased incomes for farmers and / or reduction of surpluses in food production appearing due to subsidies on production (see: [1, 2]). While these advantages may be questioned (e.g., large scale farming for biofuels may lead to different negative environmental affects, the employment and income effect may be relatively small), the EU documents and Directives created a strong legal basis obliging member countries to increase the production and use of biofuels.

The aim of this article is to present main economic and social aspects of the production and use of first generation biofuels in Poland in the first decade of the 21<sup>st</sup> century. First, the general conditions for the development of the Polish biofuel market will be discussed. Then, the main incentives regarding increasing demand and supply and fulfilling EU requirements are elaborated. Finally, conclusions regarding the socio-economic effects related to the use of biofuels in Poland are drawn..

**EXPERIMENTAL PART AND RESULTS OBTAINED.** *Conditions for the development of the biofuel market in Poland*. The interest in production and use of biofuels in Poland is directly related to processes of European integration. As was mentioned, the EU undertook intensive legislative action in order to stimulate the use of bio components in the transport sector. In accordance with the *Directive 2003/30/WE on the promotion*

<sup>1</sup> According to the *Directive 2003/30/EC* “biofuels means liquid or gaseous fuel for transport produced from biomass” and “biomass means the biodegradable fraction of products, waste and residues from agriculture (including vegetal and animal substances), forestry and related industries, as well as the biodegradable fraction of industrial and municipal waste.” With the development in production technology for biofuels, these fuels were divided in so-called generations having different characteristics. While first generation biofuels are produced mainly from agricultural raw materials which can also be used for food production (often leading to an increase of food prices), second generation biofuels use waste products from agriculture (straw, wood, etc.), industry and households (see: [2–4]). Biofuels of the second are not commonly used yet due to unsolved technological challenges, significantly limiting the opportunities for commercial use (see: [5, pp. 18–21]).

of the use of biofuels or other renewable fuels for transport [1] all EU member countries were obliged to reach a minimum of 5,75 % share of bio components in fuel (counted according to the caloric value).<sup>2</sup> The policy of the Polish government was very ambitious. In 2007 two laws passed in August 2006 came into force: the law on bio components and liquid biofuels (Dz. U. z 2006 r. Nr 169, poz. 1199 with later changes)<sup>3</sup> and the law on the monitoring and controlling system for fuels (Dz. U. Nr 169, poz. 1200 with later changes). Both legal acts aimed at adjusting Polish law to EU requirements, the creation of a legal basis for a biofuel market and the facilitation of the achievement of the so-called National Indicative Targets (NIT).<sup>4</sup> Additionally, the Polish Council of Ministers accepted the *Long-term Program of Promotion of Biofuels or other Renewable Fuels for 2008–2014* [8]. While demand issues were considered, this program mainly aimed at supporting supply of biofuels.

The documents were an expression of strong political pressure directed at creating a market for biofuels. This was not only related with the aim of increasing the developmental opportunities for the country's farmers, producers and distributors of biofuels,<sup>5</sup> but most of all to the will to fulfill EU requirements. This is confirmed by the ambitious NIT in the *Long-term Program*, one of the highest among all EU member states.<sup>6</sup> There were high expectations from the side of Polish farmers as well as potential producers and investors regarding government support. However, government policy turned out to rely mainly on a system of obligations and fines, instead of subsidies and "positive" incentives. This issue is discussed in more detail below. What is more, the changes introduced in the legal acts discussed above did often neither increase transparency, nor create a law that fulfilled the expectations of biofuel producers and distribu-

tors. They rather created the obligation for them to adjust to EU directives and regulations.<sup>7</sup>

*Supply side factors in the Polish biofuel market.* The incentives aiming at stimulating supply in the Polish biofuel market should be directed at a wide range of economic entities in the logistic chain, including farmers, producers of bio components and companies responsible for the distribution of fuel.

The system of incentives for farmers is mainly determined by the EU Common Agricultural Policy (CAP). National policy seems to be of little importance here. The main incentives provided are subsidies for growing crops for energy purposes on areas that are obliged to lie fallow or subsidies for agricultural production for energy purposes [5, pp. 65–68]. In Poland, such subsidies and payments for farmers were introduced in 2007. The Polish government declared to co-finance long-term investment in land cultivation for growing crops for energy production by 50 % of the costs of investment [8, p. 15].

Support for developmental opportunities for the producers of bio components and biofuels in Poland mainly concerns financial means for research and development, loans and subsidies for investments in technology, machinery and equipment, as well as excise tax reductions. Research and development and investment is supported by the EU as well as by national programmes and initiatives.

<sup>8</sup> However, the reduction in excise taxes for fuels with at least 2 % bio components and "pure" biofuel seem to play a more important role in the development of the Polish biofuel market [11]. The elimination of such tax reductions by 1st May 2011 significantly hampered further development.

Another important instrument influencing the supply of biofuel is the so-called quota system. This system relies on the obligation for producers, importers and traders of biofuel to guarantee a minimum share of bio components in the fuel, in accordance with the NIT [5, p. 83]. Failure to fulfill the obligations may lead to large financial penalties. Financial penalties are also one of the basic instruments of enforcement in the monitoring and control system for the quality of fuels and liquid biofuels on Poland [12].

*Demand for biofuel for transport in Poland.* While the supply side is supported by the EU and the Polish government, support for increasing demand for biofuels hardly exists.

Although the *Long-term Program* ... declares the introduction of instruments such as the exemption from parking fees for vehicles functioning on biofuel, exemption from environmental fees or financial advantages in public procurement of vehicles or machines having an

<sup>2</sup> According to the European Commission this indicator should increase to at least 10% by 2020 [6].

<sup>3</sup> This law replaced the Law from 2 October 2003 on bio components used in liquid fuels and liquid biofuels [7].

<sup>4</sup> In accordance with EU law, each country is obliged to accept so-called National Indicative Targets, i.e., set an initial level of the share of biofuel in total fuel use in transport, and increase this level each year in order to achieve the indicators set for 2010 and 2020.

<sup>5</sup> Even though the political and economic system have transformed significantly since 1990, the share of agriculture is still relatively large compared to most of the EU member states. One of the expected benefits of the development of a market for biofuels is the improvement of the economic situation in rural areas by way of increasing agricultural output for energy purposes (see: [8, p. 2]).

<sup>6</sup> The Polish government assumed an increase in NIT from 2,3 % in 2007, to 3,45 % in 2008, 4,6 % in 2009, 5,75 % in 2010, 6,2 % in 2011, 6,65 % in 2012 and 7,1 % in 2012 (see: [8, p. 2] [9]).

<sup>7</sup> An example is the liquidation of excise tax reductions in 2011 and the planned changes in the law on the monitoring and controlling system for fuels in order to adjust this law to the Directive 2009/30/WE (see: [10]).

<sup>8</sup> Among others in the framework of the 6th and 7th Framework Programme of the EU, the Programme for Intelligent Europa, the initiative CIVITAS, etc.

engine allowing for the use of liquid biofuels [8, pp. 19–22], in reality there are no incentives for the individual user.

Local authorities responsible for public transport rather choose other alternative energy sources, such as LPG and CNG. In particular smaller cities resign from “green public transport” because of a lack of financial resources. However, a positive example from the point of view of the use of biofuel is the city of Gdańsk.<sup>9</sup>

*Results of policy for stimulating production and use of biofuel in Poland.* Although there is strong pressure from the side of Polish national public authorities in order to develop a market for biofuels, the results may be considered to be dissatisfactory and insufficient. The effects can be analyzed from the point of view of supply, demand, the expected environmental and socio-economic effects, energy safety and independence in supply from other countries.

One of the expected socio-economic benefits of the development of the market for biofuels was an improvement in farmer incomes, the creation of employment in the countryside and the development of rural areas. Since 2000, the production of rape seed increased 2.5 times [14], in particular because of the increased demand due to the need to fulfill NIT. The returns on rapes is likely to have improved the level and stability of incomes for many farmers, among other things because of becoming less vulnerable to the large fluctuations in the price of farming output. However, the increased production and income did not go in pair with increased employment, rural development or innovation and change in the structure of Polish agriculture [5].

The benefits of the development of the biofuel market for producers of biofuel are even more difficult to assess. While the production increased during the first decade of the twenty first century, concentration in production structures took place allowing for economies of scale [5, pp. 40–44], since 2011 serious problems have appeared. First of all, biofuels have been criticized more and more for its negative environmental, social and economic impact.<sup>10</sup> As a consequence, the EU has started to change its policy (see: [18], concentrating more and more on the production of second and third generation biofuels. Secondly, national regulations are often unclear and do not really support producers. However, the largest challenge seems to be foreign competition, in particular the import of cheap bio components from developing countries. Decreasing or lack of profitability in the face of declining demand (among other

things due to the elimination of excise tax reductions) has decreased the activity in the biofuel market of some of the largest Polish investors [19].

Although until 2011 the percentage of bio components in fuel was above NIT, the difficult situation is also characteristic for the largest fuel distributors in Poland. The obligation to increase the share of bio components according to the increasing NIT created problems, as costs were incurred, while demand for biofuel remained behind due to its low attractiveness compared to traditional fuel (little price advantage, perceived higher cost of car maintenance). The producers accepted the loss in the face of financial punishment in case of not achieving the NIT.<sup>11</sup> The losses incurred amounted to 1 billion PLN in 2011 [21]. In order to prevent the continuation of such a distortion of the market, the Polish government plans to change the law on biofuels. It is aimed to create the possibility to reduce NIT when a certificate of origin of at least 70 % of the bio components used can be shown. This, in turn, may also support domestic producers and producers from other EU member states. Furthermore, regulations regarding the introduction of new biofuel admixtures should become more supportive [21].

Producers as well as distributors oppose the policy of the Polish government, imposing many obligations, while legal regulations are not really beneficial and often unclearly formulated. A sign of this is petitions to the government and declarations in yearly reports (see: [20, 22–24]).

The crisis in the Polish biofuel market, which became visible in 2011, is similar to European and global trends. The crisis was worsened by the discussed government policy of increasing supply by putting costly obligations on producers and distributors, while no real policy regarding increasing demand existed. The mentioned elimination of excise tax exemptions had as a consequence that half 2011 the demand for biofuel among individual buyers was almost zero. The expected positive effects of the development of the biofuel market turned out to be insignificant, while negative effects have become stronger.

While it is often argued that the relation between increased use of biofuel and the price of food rather appears on a global level, there are also some indications that this relation has become visible in Poland (see, e.g.: [25, 26]). The influence of the production of biofuel is ambiguous. Even when employment was created, the difficulties for producers and their withdrawal from the market eliminates this positive effect. The negative PR of this effect should not be underestimated. Furthermore, investments that have been made are now useless, while the invested resources could have been used for other well-being improving activities. Also the environmental effects of the production and use of biofuels of the first generation are doubtful. However, this effect

<sup>9</sup> With financial support from the EU initiative CIVITAS (see: [13]).

<sup>10</sup> The production of biomass requires large amounts of water and energy. This leads to CO<sub>2</sub> emissions and deforestation in less developed countries due to export of wood. Production and export of agricultural produce for biofuels may lead to reduced food production and increased food prices on the world market, engraving the problem with lack of food in many parts of the world (see: [15, 16]). For negative effects on the regional level, see: [17].

<sup>11</sup> Insufficient for the achievement of NIT was the legally guaranteed possibility to add 5 % bio components to traditional fuels [20].

is likely to be more visible on a global scale than in Poland itself.<sup>12</sup>

**CONCLUSION.** The current crisis in the Polish market for biofuels is caused by different factors. While the crisis follows international trends, it is improper government policy deepening the problem. While the strong pressure of the government by imposing tough requirements on producers and distributors should lead to fulfillment of EU directives, no real market was created which could survive without government intervention.

While the decline of interest in biofuels of the first generation can be observed on a global scale, the socio-economic losses related to the strong aspirations for the development of a market seem to be more visible in Poland than in other EU member countries. Already in 2008 a report from the Joint Research Centre Institute for Energy on the costs and benefits of production and use of biofuels in the EU [17] indicated that the costs of biofuel of the first generation are larger than the benefits. This makes the introduction of second and third generation biofuels necessary. However, due to the need for technological improvements, issues of commercialization and market creation are not high on the policy agenda yet [5, pp. 18–21].

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<sup>12</sup> However, the possibility of quicker depreciation of car engines and other elements should be taken into consideration, increasing exploitation and maintenance costs, and may lead to problems with recycling of worn out cars.

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### НЕКОТОРЫЕ СОЦИАЛЬНО-ЭКОНОМИЧЕСКИЕ АСПЕКТЫ ИСПОЛЬЗОВАНИЯ БИОТОПЛИВА В ПОЛЬШЕ

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Биотопливо является альтернативным источником энергии, использование которого дает значительные экономические, политические, социальные и экологические выгоды. Приведена оценка политики Польши и области развития рынка биотоплива. Обсуждаются основные условия развития рынка, рассмотрено влияние различных факторов на формирование спроса и предложения, проанализированы основные результаты государственной политики в этой отрасли. Показано, что несмотря на сильное государственное давление в части формирования потребностей производителей и снабженцев, направленное на выполнение Директив Европейского Союза и формирование рынка биотоплива, в действительности рынок биотоплива, который мог бы существовать без государственных интервенций, до сих пор не создан.

**Ключевые слова:** биотопливо, рынок биотоплива, устойчивое энергоснабжение, Польша.

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