

**Borowski F. P.,  
Golisz E.,  
Izdebski W.**

## **CHANGES IN THE LEGAL CONDITIONS OF TRANSPORT BIOFUELS IN POLAND ON THE BACKGROUND OF THE EUROPEAN UNION**

*У статті проаналізовані нормативно-правова база і умови розвитку транспортного біопалива. Автори також провели дослідження біопалива 1-го та 2-го покоління. Великі надії пов'язані з біопаливом 2-го покоління, яке виробляється з рослин або відходів, так як воно має кращі можливості для скорочення викидів парникових газів, ніж біопаливо 1-го покоління.*

**Ключові слова:** транспортні біопалива, скорочення викидів CO<sub>2</sub>, законодавча і нормативно-правова база, директиви ЄС.

### **1. History of transport biofuels sectors**

The first world's car engines were based on plant production. However, due to the high cost of biofuels, at the beginning the fossil fuel dominated at the market and biofuels were seriously addressed after the global energy crises in the 70-ies of last century. The transport biofuels market began to develop and shape intensely after the entry of the Directive 2003/30/EC (non-compulsory).

Before the World War II in Poland, 10 million liters of ethanol were added into petrol. In the post-war period, the share of bioethanol in gasoline exceeded even 20 %. In 2004, before the Polish accession to the EU, it talked about the enormous opportunities associated with the biofuels potential of our country and the possibilities of export to the western market. At the time of entry into the EU, in Poland there was vanishingly small use of bio-components, which grew from 2007 up to 5,75 % in 2010, under high level of excise duty exemption. Since the turn of 2004/2005 Trzebinia (PKN Orlen Group) as the first in Poland, began to produce esters (next to previously developed bioethanol industry). Thus, in 2005, Poland produced transport biofuels from food crops, bioethanol (from cereals and molasses) and esters (based on rapeseed oil) [1]. The transport sector is one of the fastest growing energy demand of the branches of the worldwide economy. Reducing the emission of CO<sub>2</sub> is a global priority [2].

Excise and legal exemptions encouraged domestic investors to the further investments in the Biofuels industry. In the year 2008, within the EU it was planned to increase production capacity and generation of biofuels (from food crops) to 3.2 billion liters (including small amounts of second generation – from raw materials inedible). A rapid increase in production capacity was observed at that time, currently in Poland there is approximately 2 billion liters/year (ability declared), 40 % of which is bioethanol and 60 % – methyl esters. Biocomponents are produced not only from food crops, but also trials of their production from waste materials were undertaken.

Due to the attractiveness of the market, large quantities of bio-components, at the end of the previous decade, flowed to Poland from distant countries such as the Americas and Asia. In the face of the growing import, capacity of domestic manufacturers of bio-components were used in recent years in an amount of from 20 % to 60 %, which negatively affected the Polish market. Dissatisfied suppliers

of raw materials – semi-finished products for the biofuels production – also shifted into protests in front of the head offices of fuel producers [3]. A number of tools to combat the import, especially in the gray market (unofficial market) were launched [4].

### **2. Legal framework of the EU renewable energy (including transport biofuels)**

The legal environment is one of the key components of the macro-environment, creating companies, functioning in all sectors, including transport biofuels. It can be stimulating or inhibiting tool to develop new technologies, demand and supply.

In the EU, the first steps towards renewable energy have been observed in the 70-ies of XX century, after the energy crises. In the last decade of the present century, there were two important directives for renewable energy: 2001/77/EC and 2003/30/EC.

However, due to the low efficiency of the Union's action for energy (including renewable energy), the Council of Europe and the European Parliament noted the need to develop a new European Energy Policy and asked the European Commission to create a proposal of new regulation, presented on 10 January, 2007 in the form of Climate and energy package (called 3 × 20). The kick-off point of a new energy policy is the reduction of greenhouse gas emissions in the EU by 20 % by 2020 in relation to 1990. This unilaterally adopted reduction should be seen in the context of the need for international action to prevent negative climate change.

Increasing the production of energy from renewable sources – another area of the new policy – is an important condition for achieving objectives in the energy area. The Commission proposes in this range the commitment to increase the level of energy from renewable sources in the EU by 20 % by the 2020. Within this framework, countries should have the flexibility to decide about the use of different types of energy: electricity from renewable energy sources, biomass for heating and cooling and biofuels. It became necessary to introduce the minimum universal target requirement for 10 % of transport biofuels (in terms of energy) for all Member States by 2020.

On April 23, 2009 the European Commission adopted Directive 2009/28/EC on the promotion of the use of energy from renewable sources [5]. The directive points

out quantitative targets for the share of renewable energy in energy consumption of individual member states in 2020. Polish goal is 15 % (In the package has been adopted 20 %, than for Poland, was reduced to 15 %), and according to realized research study it was close to achieve [6, 7]. Currently, these realities have changed slightly – in many sectors of the RES there are delays in achieving the objectives of the indicator, changed the law, or there is no (there is no awaited Law on RES in Poland).

Tabl. 1 shows the planned share of renewable energy in total energy consumption for the EU member states in 2020.

**Table 1**

Planned and actual share of renewable energy in energy consumption of individual member states in 2005 and 2020

Country	The share of renewable energy sources (RES) in the consumption of primary energy in 2005 (%)	The share of renewable energy sources (RES) in the consumption of primary energy in 2020 (%)
Belgium	2,2	13,0
Bulgaria	9,4	16,0
Czech Republic	6,1	13,0
Denmark	17,0	30,0
Germany	5,8	18,0
Estonia	18,0	25,0
Ireland	3,1	16,0
Greece	6,9	18,0
Spain	8,7	20,0
France	10,3	23,0
Italy	5,2	17,0
Cyprus	2,9	13,0
Latvia	34,9	42,0
Lithuania	15,0	23,0
Luxemburg	0,9	11,0
Hungary	4,3	13,0
Malta	0,0	10,0
Nederlands	2,4	14,0
Austria	23,3	34,0
Poland	7,2	15,0
Portugal	20,5	31,0
Romania	17,8	24,0
Slovenia	16,0	25,0
Slovakia	6,7	14,0
Finland	28,5	38,0
Sweden	39,8	49,0
UK	1,3	15,0

**Source:** Directive 2009/28/EC of the European Parliament and the Council on the promotion of the use of energy from renewable sources. 23.01.2008.

This document, in order to intensify the development of renewable energy sector in Europe, contains a number of mechanisms, among others, possibility to trade certificates of origin on the Community market.

Articles 15 and 16 of this Directive focus on environmental sustainability by identifying the criteria including e. g. biofuels. They concern the types of fields, on which activity of energy crops can not function, among them the areas to be protected (eg, landscape parks, nature reserves, etc.) due to the valuable natural assets.

Great hopes are connected with the 2 generation transport biofuels, which are produced from plants: non-energy

or waste (e. g. FT-diesel, bio-DME spirit lignocellulosic bio-SNG). The 2 generation has better features for the reduction of greenhouse gas emissions than biofuels of the 1 generation (i. e.: bioethanol formed by alcohol fermentation of esterification and biodiesel from rapeseed oil).

This generation, however, requires a strong support from external environment. Biofuels of the 2 generation can be produced in greater diversification of raw materials (raw non-food agricultural residues and municipal plants of food processing) and in the future they can be produced at a lower cost, can bring benefits in terms of GHG reduction. The 2 generation should reduce the use of energy crops for food [8]. Tabl. 2, 3 show typical values of saving in greenhouse gas emissions for transport biofuels.

**Table 2**

Typical and default value for biofuels if produced with no net carbon emissions from land-use change [5]

Biofuel production pathway	Typical greenhouse gas emission saving	Default greenhouse gas emission saving
Sugar beet ethanol	61 %	52 %
Wheat ethanol (process fuel not specified)	32 %	16 %
Wheat ethanol (lignite as process fuel in CHP plant)	32 %	16 %
Wheat ethanol (natural gas as process fuel in conventional boiler )	45 %	34 %
Wheat ethanol (natural gas as process fuel in CHP plant)	53 %	47 %
Wheat ethanol (straw as process fuel in CHP plant)	69 %	69 %
Corn (maize) ethanol, Community produced (natural gas as process fuel in CHP plant)	56 %	49 %
Sugar cane ethanol	71 %	71 %
The part from renewable sources of ethyl-tertio-butyl-ether (ETBE)	Equal to that of the ethanol production pathway used	
The part from renewable sources of tertiary-amyl-ethyl-ether (TAEE)	Equal to that of the ethanol production pathway used	
Rape seed biodiesel	45 %	38 %
Sunflower biodiesel	58 %	51 %
Soybean biodiesel	40 %	31 %
Palm oil biodiesel (process not specified)	36 %	19 %
Palm oil biodiesel (process with methane capture at oil mill)	62 %	56 %
Waste vegetable or animal (*) oil biodiesel	88 %	83 %
Hydrotreated vegetable oil from rape seed	51 %	47 %
Hydrotreated vegetable oil from sunflower	65 %	62 %
Hydrotreated vegetable oil from palm oil (process not specified)	40 %	26 %
Hydrotreated vegetable oil from palm oil (process with methane capture at oil mill)	68 %	65 %
Pure vegetable oil from rape seed	58 %	57 %
Biogas from municipal organic waste as compressed natural gas	80 %	73 %
Biogas from wet manure as compressed natural gas	84 %	81 %
Biogas from dry manure as compressed natural gas	86 %	82 %

\* Not including animal oil produced from animal by-products classified as category 3 material in accordance with Regulation (EC) No 1774/2002 of the European Parliament and of the Council of 3 October 2002 laying down health rules on animal by-products not intended for human consumption [1]

**Table 3**

Estimated typical and default values for future biofuels that were not on the market or were on the market only in negligible quantities in January 2008, if produced with no net carbon emissions from land-use change [5]

Biofuel production pathway	Typical greenhouse gas emission saving	Default greenhouse gas emission saving
Wheat straw ethanol	87 %	85 %
Waste wood ethanol	80 %	74 %
Farmed wood ethanol	76 %	70 %
Waste wood Fischer-Tropsch diesel	95 %	95 %
Farmed wood Fischer-Tropsch diesel	93 %	93 %
Waste wood dimethylether (DME)	95 %	95 %
Farmed wood DME	92 %	92 %
Waste wood methanol	94 %	94 %
Farmed wood methanol	91 %	91 %
The part from renewable sources of methyl-tertio-butyl-ether (MTBE)	Equal to that of the methanol production pathway used	

Europe's energy policy known as « $3 \times 20$ » (or  $30 \times 20+10$ ) is presented in the document [9] which is the «flagship» of the first of a series of three EC energy-climate packages from the years 2007 to 2008. The objective of the Union's action in the current and subsequent decades is the verification of the basic document – the Lisbon Strategy – which aims to create structural solutions capable of managing the crisis and promoting sustainable development, job creation, innovation and competitiveness.

By 2012, EU Member States have to prepare a report on the progress of national improvement of the EU biofuel policy with regard to sustainability criteria for biofuels. By 2014, the European Commission has to review policy on the CO<sub>2</sub> savings thresholds taking into consideration the available technologies. These thresholds are particularly important for biofuel producers, for example, biodiesel produced from rapeseed oil has a rate of «saving» 38 %, it means that it could be counted as «green» energy source until 2017. Later, manufacturers will have to improve production technology, or to introduce new calculation, which prove that their biofuels contribute in the reduction of carbon dioxide and will achieve the required degree (minimum of 50 % from 2017). Much greater demands will be dedicated to imported biofuels, such as from other continents, where there is a likelihood that energy crops for fuel transport damage forests (tropical), and biofuel is transported to the EU on tankers with non-renewable-fuel engine.

New European Union legislation favors biofuel 2 generation. They have to be doubly favored by introducing the «Double Bonus», which would promote biofuels from non-food raw materials. This bonus (converter) can also be fourfold. However, there is no final agreement in this subject, but nevertheless it is a clear signal to support next-generation transport biofuels.

On June 10<sup>th</sup> 2010, guidelines for sustainable package including criteria for biofuels were described, which means that biofuels produced in the EU and imported will not contribute to environmental devastation.

The package provides for:

1. Quality certificates, confirming that biofuels are fuels, characteristic of «sustainability». The Commission encourages industry, governments and NGOs to establish a voluntary scheme for certifying biofuels, and standards must be recognized by the EC. One of the key criteria

is the establishment of an independent audit, which would control the production cycle of the agricultural producer by converting trade to fuel suppliers at petrol stations. The audit should be fair and independent. Certificate of quality is to be granted for a maximum period of five years subject to conduct annual audits.

2. Protecting untouched nature. Biofuels should not be made from raw materials from tropical forests or recently grubbed areas, drained peatlands, wetland or areas characterized by biodiversity.
3. Only biofuels provide high saving CO<sub>2</sub> emissions will be promoted. Member States should implement national goals of renewable energy using biofuels – saving CO<sub>2</sub> emissions. By 2016, including savings in CO<sub>2</sub> emissions 35 % from 2017 – 50, from 2018 – 60 %.

Only certified biofuels will be able to be taken into account for the calculation of national biofuel consumption (NIT – National Indicative Target) in transport in particular Union countries, and only this kind of biofuels will be able to receive public support. It should be emphasized that this certification scheme is the most rigorous in the world and provide the highest standards of environmental protection and will have a positive impact on the regions of the world from which the raw materials for the production of biofuels are imported. On the other hand, it will provide the protective mechanism of the European fuel market.

New legal element of biofuels is ILUC «indirect land use change» – it means indirect change in land use as a result of development of crops for biofuels. ILUC – indirect effects of changes in land use intended for the cultivation of raw materials for the production of biofuels, which relate to the unintended consequences of increasing greenhouse carbon dioxide due to changes in land use around the world, caused by the expansion of crops for bioethanol production of methyl esters of fatty acids in response to increased global demand for biofuels.

The production of biofuels (biocomponents) can indirectly affect deforestation and conversion of areas, including changes in fragile ecosystems. When existing agricultural lands are managed in the cultivation of energy crops, agricultural production for other purposes may be moved to another location at the expense of forests, grassland, peatland or entire ecosystems, representing organic carbon storage. This may contribute to a significant increase of greenhouse gas emissions from soil and vegetation deleted but to increase the risk of food security and food safety dispose of indigenous peoples.

The remarkable fact is that ILUC is not only subject of bio-fuels and bio-components to which the raw materials are grown on about 2 % of the acreage at global scale. The increase in the effect of ILUC may also be observed in such field as: non-agricultural land use, development of urban infrastructure, the development of road infrastructure and many other activities. Thus it is preferred using global and systemic approach to mitigating the effects of ILUC.

### 3. Evaluation of the legal aspects in Poland

Aspects related to the certification and quality of bio-components begin to play a role also in Poland. These aspects were very widely described at recent conferences RENEXPO (2012, 2013) [10].

As mentioned earlier in EU, RED Directive 2009/28/EC operates (and accompanying directives, regulations), while

in Poland the Act of 25 August 2006 on components and liquid biofuels operates, which will be reapproved [1].

Delays in the amendment are significant. However, the bridging document between the law and the directive, submitted to the European Commission, is a National Action Plan for RES.

Thus, Poland is on a transitional stage in which adaptation to Directive 2009/28/EC (also, amended) is a foregone conclusion. The rules of Directive 2009/28/EC, operating for three years, will be implemented into the Polish legal rules of the Polish Law on the strength of amending the Law on components and liquid biofuels that 17 May 2013 was acclaimed by the Committee for European Affairs. It was expected that its rules would come into force in the second half of 2013. It is not known whether this deadline will be met. For example, RES Act waiting another year for approval by the Parliament and can not wait to see what more all the time is the subject of emotions and lively discussions (the cost of implementing the directive was initially estimated at several billion zł/year, in the following variants decreased significantly).

In some countries, the EU Directive 2009/28/EC was already almost fully implemented and indicators included as a guideline were achieved or even exceeded.

It is planned that to the Law of components and liquid biofuels will be introduced new chapters, which rules will be related to the implementation of Directive 2009/28/EC in the context of transport. The rules will be concerned both the principles and mechanisms of reviewing the criteria for sustainable development. In addition, the system will be introduced for recognition and control (monitoring) certification systems and certification bodies operating under a recognized certification systems. Supervision of certification systems and certification bodies will be performed by the Agricultural Market Agency [11].

For the implementation of National Indicative Target and the granting of any form of support for biofuels, it will be necessary to prove the fulfillment of criteria for Sustainable Development.

#### 4. Conclusion

It should be noted that the environment, including the legal conditions relating to transport biofuels are complicated and dynamically changing. With such variability the sectors attractiveness of transport biofuels from food crops is not high and continues decreasing. It is not conducive to invest in new generations and exposes the current biofuel producers of 1st generation on unrest and loss. The proposed National Reduction Target (NRT) is another legal requirement, generating an increase in operating costs of fuel producers in Poland. There is no bio components of next generations, dual and quad mechanisms of accounting, implementation of the NIT and the introduction of ILUC may prevent from completing this goal. There is no in the world and in Poland modern manufacturing which implemented a large— scale plants operating in the second generation transport biofuels. It was proposed in Poland, that companies which would not achieve the goals will pay penalty. High penalties for failure obligation to reduce GHG, even in the case of small deviations. These penalties assessed from several years as a high (NIT), in the future will become even higher (NRT). The reporting system (certification) of the raw materials used in the manufacture

of each batch of imported fuel will require growth of the central administration of the Member States, as well as additional jobs in companies for the preparation and verification of reports concerning reduction. Now preference for biofuels with a high reduction of CO<sub>2</sub> emissions produced from non-agricultural, intentional (i. e. perennial), or from crop waste is visible. Lignocellulosic bioethanol in Poland is at the stage of R & D (research and development).

#### 5. Acknowledgement

The project was funded by the National Science Centre on the decision DEC-2011/01/B/HS4/04988 (project entitled «Effect of reduction in CO<sub>2</sub> emissions on the functioning of the sectors of transport biofuels in Poland»).

#### References

1. Kupczyk, A. Biopaliwa transportowe w Polsce, Stan aktualny i perspektywy [Text] / A. Kupczyk, P. Borowski, M. Powalka, D. Ruciński. — Warszawa: WEMA, 2011. — 176 p.
2. Borowski, P. Transportation development towards the energy independence and CO<sub>2</sub> reduction [Text] / P. Borowski // Jordan International Conference. — Amman, 2011. — P. 65–76.
3. Golisz, E. Konieczne zmiany w sektorach biopaliw transportowych w Polsce [Text] / E. Golisz, I. Samson-Bręk, P. Borowski, A. Kupczyk // Gospodarka Materiałowa i Logistyka. — 2013. — Vol. 11. — P. 2–13.
4. Stępień, A. Krajowa Izba Biopaliw, direct information [Text] / Adam Stępień. — 2013.
5. Directive 2009/28/EC of the European Parliament and the Council on the promotion of the use of energy from renewable sources [Text]. — 23.04.2009 r.
6. Wiśniewski, G. Możliwości wykorzystania odnawialnych źródeł energii w Polsce do roku 2020 [Text] / G. Wiśniewski, A. Kupczyk, et al. // IEO ECBREC, Dla Ministerstwa Gospodarki, opracowanie sfinansowane przez NFOŚiGW. — Warszawa, Grudzień, 2007.
7. Kupczyk, A. Biopaliwa transportowe w Polsce [Text] / A. Kupczyk, D. Ruciński. — Raport IEO ECBREC, 2007.
8. Majoch, A. Krajowy system certyfikacji biopaliw KZR INIG [Text] / A. Majoch. — Warszawa: RENEXPO, 2012.
9. Ciach, S. Nowości na rynku certyfikacji: REDcert EU, ISCC EU i sytuacja w Polsce [Text] / S. Ciach. — Warszawa: DEKRA, RENEXPO, 2012.
10. Pańczyszyn, T. Praktyczne aspekty nowelizacji ustawy z dnia 25 sierpnia 2006 r. o biokomponentach i biopaliwach ciekłych w kontekście implementacji Dyrektywy 2009/28/WE [Text] / T. Pańczyszyn // 2-ga Konferencja na temat biopaliw, 17.10.2013, Warszawa.
11. Opis i diagnoza stanu istniejącego. Sektor biokomponentów [Text]: draft. — MG, czerwiec, 2013.

#### ИЗМЕНЕНИЯ В ПРАВОВОМ ПОЛОЖЕНИИ ТРАНСПОРТНОГО БИОТОПЛИВА В ПОЛЬШЕ НА ФОНЕ ЕВРОПЕЙСКОГО СОЮЗА

В статье проанализированы нормативно-правовая база и условия развития транспортного биотоплива. Авторы также провели исследования биотоплива 1-го и 2-го поколения. Большие надежды связаны с биотопливом 2-го поколения, которое производится из растений или отходов, так как оно имеет лучшие возможности для сокращения выбросов парниковых газов, чем биотопливо 1-го поколения.

**Ключевые слова:** транспортные биотоплива, сокращение выбросов CO<sub>2</sub>, законодательная и нормативно-правовая база, директивы ЕС.

**Borowski F. Piotr**, PhD, Associate Professor, Visiting Professor of Akdeniz University, Department of Production Management and Engineering, Faculty of Production Engineering, Warsaw University of Life Sciences, Poland.

**Golisz Ewa**, PhD, Associate Professor, Department of Fundamental Engineering, Faculty of Production Engineering, Warsaw University of Life Sciences, Poland.

**Izdebski Waldemar**, Doctor of Sciences, Professor, Head of the Department of Production Management, Faculty of Management, Warsaw University of Technology, Poland,  
e-mail: W.Izdebski@wz.pw.edu.pl