

UDC 504+339.9

THE RELATIONS BETWEEN EUROPEAN UNION ENERGY POLICY, BIOFUELS OF THE SECOND GENERATION AND SUSTAINABLE DEVELOPMENT

B. Fortuński

Opole University

str. Ozimska, 46a, Opole, 45–058, Poland. E-mail: b.fortunski@uni.opole.pl

Currently, the European Union is a leader in the application of principles of sustainable development into various policy areas. This is also visible in EU energy policy and approach provided towards the development of biofuels. Overview of sustainable development policy, energy policy, and biofuels policy within EU with the stress on second generation biofuels is done. The relation between EU energy policy and the development of second generation biofuels in the context of sustainable development is analyzed. Both potentially positive and negative effects for elements of sustainable development and second generation biofuels are discussed.

Key words: European Union energy policy, sustainable development, second generation biofuel.

ВЗАЄМОЗВ'ЯЗОК МІЖ ЕНЕРГЕТИЧНОЮ ПОЛІТИКОЮ ЄВРОПЕЙСЬКОГО СОЮЗУ, БІОПАЛИВАМИ ДРУГОЇ ГЕНЕРАЦІЇ ТА СТАЛИМ РОЗВИТКОМ

Б. Фортунські

Університет Ополе

вул. Озимська, 46а, Ополе, 45–058, Польща. E-mail: b.fortunski@uni.opole.pl

На сьогодні Європейський Союз є лідером з упровадження принципів сталого розвитку в різноманітні сфери політичного життя. Це підтверджується енергетичною політикою ЄС і підходом, що застосовується для розвитку біопаливної сфери. Оглянуто політику сталого розвитку ЄС, енергетичну політику та політику в галузі біопалив із наголосом на впровадженні біопалив другої генерації. У контексті сталого розвитку проаналізовано взаємозв'язок між енергетичною політикою ЄС і розвитком біопалив другої генерації. Розглянуто як позитивні, так і негативні аспекти результатів проведеного аналізу.

Ключові слова: енергетична політика ЄС, сталий розвиток, біопалива другої генерації.

PROBLEM STATEMENT. For many years the European Union (EU) has been trying to develop policy in accordance with principles of sustainable development. This is expressed in many of its policy documents [1]. The aspiration to develop more sustainably can also be observed in the field of energy provision and use. In particular, reduction of emissions of pollutants, improvement in the efficiency of production and use of energy as well as the promotion of innovative technological solutions seems to obtain priority [2].

Policy and activities in the field of energy supply are influenced by different actors in the production and distribution chain. In these chains the production, distribution and use of biofuels has different social, economic and environmental impacts, which should be analyzed in relation to EU energy policy in general. In this context, the impact of second generation biofuels on sustainable development is elaborated in this article.

EXPERIMENTAL PART AND RESULTS OBTAINED. *Sustainable Development.* Society's development depends to a large extent on the natural environment. Production processes are rather impossible without access to natural resources. In particular, energy resources rely on access to non-renewable resources such as oil and coal or renewable resources such as wind energy, sun energy and biofuels. The dependence on natural resources in the face of increasing demand due to increasing production and the increasing world population has caused increase in environmental awareness not only within organizations, but also at the government and EU level [3].

The pro-ecological trend in the world economy is the result of the conviction that „*the future economy will rely*

on the so-called economy of design taking into consideration global costs of development as well as environmental problems, which the strategy of industry will rely on the development and application of environmentally-sound technologies” [4]. This approach can also be found in the EU's policy on the development of biofuel in general and second generation biofuel in particular.

Sustainable development, which should be supported by the development of biofuel of the second generation, has been defined in slightly different ways by different authors [5]. The most commonly used definition, according to the Norm PN-ISO 14050, is the one from the so-called „Brundtland Report” (*Our Common Future*) from 1987. According to this definition, the needs of current generations should be fulfilled, not reducing the opportunities and capabilities of future generations to live a life where their own needs are fulfilled [6]. In the context of energy, this brings up the question whether second generation biofuels support inter- and intra-generational equity, and influence the environmental, social and economic aspect of sustainable development positively or negatively.

EU energy policy. The basis for EU energy policy is a wide range of directives, rules, mechanisms and economic-financial instruments. The basic document is *An energy policy for Europe*. The keywords of the EU energy policy that can be found in all policy documents are: energy security, economic competitiveness (low energy prices), environmental protection and energy efficiency [7].

From a global perspective, the EU seems to be most active in promoting sustainable development. The conception is applied to its energy policy, and coherent with the EU

sustainable development strategy, climate policy and environmental policy. EU energy policy mainly focuses on renewable energy and reduction of harmful emissions (in particular CO₂). This explains the interest in biofuels. The realization of principles of sustainable development is visible in most of the documents regarding energy policy. Among the most relevant documents are [8]:

- COM 2007 (1) final – An energy policy for Europe,
- Council Directive 96/61/EC of 24 September 1996 concerning Integrated Pollution Prevention and Control (IPPC).
- Directive 2001/80/EC of the European Parliament and of the Council of 23 October 2001 on the limitation of emissions of certain pollutants into the air from large combustion plants,
- Directive 2003/87/EC of the European Parliament and of the Council of 13 October 2003 establishing a scheme for greenhouse gas emission allowance trading within the Community,
- Directive 2001/77/EC of the European Parliament and of the Council of 27 September 2001 on the promotion of electricity from renewable energy sources in the internal electricity market,
- Directive 2006/32/EC of the European Parliament and of the Council of 5 April 2006 on energy end-use efficiency and energy services,
- Green Paper. A European Strategy for Sustainable, Competitive and Secure Energy, COM(2006) 105, Brussels, 08.03.2006,
- The EU climate and energy package (2007), providing an outline for the new EU energy policy for 2020-2050. In the same year, new aims for reducing certain emissions were set,
- Directive 2009/28/EC on the promotion of the use of energy from renewable sources, among other things indicating methods of collection and storing CO₂,
- COM(2010) 639 final: Energy 2020 – A strategy for competitive, sustainable and secure energy,
- In 2009 the climate package was adjusted, embracing the change of many directive.

All the mentioned directives and documents show that environmental concerns are becoming more and more important in energy policy. The EU seems consciously to enter a path of developing green technology in the energy sector. This is in accordance with the aim to be the global leader in modern technology. A goal of the EU is to develop innovative industries in order to become more competitive on global markets. Thus, the development of green energy, also in the form of biofuels of the first and second generations, should not only support energy security and environmental sustainability (important for the inter-generational aspect of sustainability), but also support sustainable economic growth. The following key elements of EU energy policy can be distinguished:

- Reduction of emission of pollutants,
- Support of renewable energy and new technologies for, among other things, CO₂ storage,
- Increase in efficiency of energy use,

– Energy security – reduced dependency on energy imports.

All elements, except for CO₂ storage, are relevant for the production and use of biofuels.

Regarding the impact on sustainable development, a challenge is that other parts of the world remain behind in policies for sustainable energy supply and use. As CO₂ emission is an example of global pollution where there are many points of emission while the effects are felt almost everywhere [9], its impact on the global level of emissions is limited. In 2009, global emission amounted to 28999,4 million tons, of which 11827,1 tons (about 40%) were emitted by the power engineering industry. The contribution of the EU to the emissions was 1305,8 million tons of CO₂ (about 15 % of global emissions). EU energy policy regarding the reduction of emissions of this greenhouse gas will only have real impact when the rest of the world undertakes similar activities, in particular China and the USA accounting for 41 % of global CO₂ emissions [10].

Biofuels. The increasing number of documents on the issue is a sign that biofuels have increased in importance in EU energy policy. These documents include [11]:

- An EU Strategy for Biofuels COM (2006) 34 final,
- EC Communication on the share of renewable energy in the EU, COM (2004) 366 final,
- Directives: 2001/77/EC on renewable energy resources, 2003/30/EC on the use of biofuels or other renewable energy sources in transport, 2009/28/EC and 2004/8/EC on the promotion of cogeneration of heat and electricity,
- SEC (2011) 130 final – Recent progress in developing renewable energy sources and technical evaluation of the use of biofuels and other renewable fuels in transport in accordance with Article 3 of Directive 2001/77/EC and Article 4(2) of Directive 2003/30/EC,
- Biofuels in the EU a vision for 2030 and beyond (2006),
- Biofuels in the European context: Facts and Uncertainties (2008).

Biofuels are defined as liquid fuels and gas oils which are produced from biomass with the aim to be used in transport. Biomass, in turn, can be defined as (part of) products, waste or other elements of biological origin which are bio-degradable. The source of biomass is not only agriculture, but also fishery, forestry, industrial waste and consumers' waste [12].

The first generation biofuels that were developed, also called conventional biofuels, are directly or indirectly produced from raw food products using conventional methods absorbing relatively small amounts of energy. The use of raw food products, such as corn, which could be used for producing food for human beings or animals, may significantly influence its price and negatively influence household budgets of the poor. For this reason, a new type of biofuel was developed. Second generation biofuels are produced from raw materials containing cellulose (e.g., wood, straw, grass, waste from wood processing industry) and agricultural

waste products. Increased demand for this type of raw materials is unlikely to lead to an increase in food prices or prices of animal fodder. This type of raw material is already being used for heating buildings or as additional energy source in electricity plants [13].

Second generation biofuels. Analysis of important documents of EU energy policy mentioned above show that biofuels are seriously considered in the EU's actual energy policy. The analysis provided below concerns second generation biofuels.

Biofuels are discussed in policy documents on actions proposed, as well as in the context of the development of renewable energy sources and strategic plans regarding energy technology. An important issue is the costs of production and use of second generation biofuels. This type of fuel seems to be most expensive for use in the transport sector. The market price for the equivalent of 1 ton of oils ranges between 898 and 1109 euro, which is more than double the price of gasoline or diesel and four times more than the price of natural gas [14].

In the document *COM(2010) 639 final: Energy 2020 – A strategy for competitive, sustainable and secure energy*, second generation biofuels are discussed in the context of technological breakthroughs and new projects for establishing the global leadership of the EU in the field of energy technology and innovation.

In the *Green Paper. A European Strategy for Sustainable, Competitive and Secure Energy*, second generation biofuels are discussed on the occasion of a strategic overview of the EU energy sector, the increase in use of renewable energy sources and incentives for innovation.

This type of fuel seems to fit very well in the energy policy of the EU. First of all, an increase in its production supports energy security by reducing the need for imports from outside the EU. Secondly, it may increase the competitiveness of the energy sector. Third, it may stimulate the development of an internal energy market. Fourth, it may support innovativeness, and in turn improve the UE's competitiveness on a global scale. However, negative aspects of second generation biofuels are related to greenhouse gas emissions.

Second generation biofuels – sustainable development. In order to assess the impact of second generation biofuels of sustainable development, the economic, social and environmental elements should be separately considered. The analysis provided here is based on documents from the International Energy Agency (IEA), World Bank and the above mentioned EU documents.

As the World Bank indicates, second generation biofuels are supposed to be free from the disadvantages of the first generation biofuels. Advantages of the second generation over the first generation are less area needed for production and lower emission of greenhouse gasses when being burned. However, the costs of production of second generation biofuels are estimated to be three times higher than for gasoline [15].

A document from the *Joint Research Centre European Commission* discusses facts and uncertainties concerning biofuels. It is shown that the direct and indi-

rect greenhouse gas emissions from biofuel use and production are higher than in case of conventional fuels. Employment effects of biofuel production in the EU are estimated to be neutral, or at most insignificant. Also in this report the high production costs are emphasized. While the costs of production are higher than in case of traditional fuel, the total extra costs for the EU related to the introduction of biofuel would range between 33 and 65 billion euro between 2007 and 2020 [16].

Taking into consideration the arguments mentioned above, the following impact of biofuels of different elements of sustainable development can be distinguished [17]:

Economic impact.

– A positive effect is investment in the development of transport, agriculture and reduced import related to increased energy security.

– Innovation and technological development may be stimulated, leading to long-term benefits for the economy.

– A negative aspect is the higher costs of production compared to traditional fuels, the need for subsidies, elimination of subsidies for leaving land without crop as well as more expensive energy and fuel.

Social impact

– New jobs are created. Environmental awareness in society may increase.

– Unemployment may increase due to higher costs of production. The poor may be hit by higher energy and food prices.

Environmental impact.

There are no visible advantages. The research discussed shows that reduction in the emission of greenhouse gasses is unlikely. It may even be that these emissions increase! The reduced areal without crop is likely to create different types of negative environmental effects.

CONCLUSIONS. The development of second generation biofuels is directly and indirectly related to EU energy policy and sustainable development. However, the impact on sustainable development is disputable. Many negative aspects can be prevented when using the possibilities of countries with unused agricultural potential and lower costs of production, such as Ukraine.

Materials were presented at the «Third Vyshegrad Round-Table Discussion on Climate Change» (Banska Bystrica, Slovakia, July 1-2nd, 2012). Publication was supported by Small Alumni Grants Program, Public Affairs Section of the U. S. Embassy in Ukraine, N 12/169.

REFERENCES

1. *Jednolity Akt Europejski (Single European Act)*, eur-lex.europa.eu/pl/treaties/dat/11986U/word/11986U.doc ; [accessed: 08.08.2012]; *Konstytucja Unii Europejskiej (Constitution of the European Union)*, en.euabc.com/upload/rfConstitution_pl.pdf; [accessed: 08.08.2012].
2. *Communication from the commission to the European Council and the European Parliament. An En-*

ergy policy for Europe, COM (2007) 1 final, http://ec.europa.eu/energy/energy_policy/doc/01_energy_policy_for_europe_en.pdf; [accessed: 08.08.2012].

3. Fiedor, B. (ed.); Czaja, S.; Graczyk, A.; Jakubczyk, Z. *Podstawy ekonomii środowiska i zasobów naturalnych (Principles of environmental and natural resource economics)*, C.H. Beck, Warszawa 2002.

4. Czaja S., Fiedor B., *Ekologiczne zarządzanie firmą. Wybrane Elementy (Ecological company management. Selected issues)*, [in:] *Ekologizacja zarządzania firmą – zielone zarządzanie*, S. Czaja (ed.), KEEAE, Wrocław 2000.

5. Rao P.K., *Sustainable Development*, Blackwell, Great Britain 2000.

6. PN-EN ISO 14050:2004.

7. Jeżowski P., *Koszty polityki klimatycznej UE dla polskich przedsiębiorstw energetycznych (The costs of EU climate policy for Polish energy producers)*, http://www.sgh.waw.pl/instytuty/imsg/ccc2011/jezowski_i_paper.pdf; [accessed: 16.03.2012].

8. Borgosz-Koczwara M., Herlender K., *Bezpieczeństwo energetyczne a rozwój odnawialnych energii (Energetical safety and the development of renewable energy)*, „Energetyka”, nr 3, 2008; Kowalska. A. *Nowe dyrektywy UE dla obszaru elektroenergetyki (New EU directives in the field of electroenergetics)*, „Energia Elektryczna”, nr 4, 2008; Malko. J. *Energetyczna Strategia Unii Europejskiej (The European Union's energy strategy)*, „Wokół Energetyki”, nr 6, 2006; *Energy policy for Europe, COM (2007) 1 final*, http://ec.europa.eu/energy/energy_policy/doc/01_energy_policy_for_europe_en.pdf; [accessed: 08.08.2012]; *Council Directive 96/61/EC of 24 September 1996 concerning integrated pollution prevention and control*, <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31996L0061:en:HTML>; [accessed: 08.08.2012]; *Directive 2001/80/EC of the European Parliament and of the Council of 23 October 2001 on the limitation of emissions of certain pollutants into the air from large combustion plants*, <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2001:309:0001:0001:EN:PDF>; [accessed:08.08.2012]; *Directive 2003/87/EC of the European Parliament and of the Council of 13 October 2003 establishing a scheme for greenhouse gas emission allowance trading within the Community, and amending Council Directive 96/61/EC*, <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2003:275:0032:0032:EN:PDF>; [accessed:08.08.2012]; *Directive 2001/77/EC of the European Parliament and of the Council of 27 September 2001 on the promotion of electricity from renewable energy sources in the internal electricity market*, <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2001:283:0033:0033:EN:PDF>; [accessed: 08.08.2012]; *Directive 2006/32/EC of the European Parliament and of the Council of 5 April 2006 on energy end-use effi-*

ciency and energy services and repealing Council Directive 93/76/EEC, <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2006:114:0064:0064:en:pdf>; [accessed: 08.08.2012]; *Energy 2020. A strategy for competitive, sustainable and secure energy, COM(2010) 639 final*, <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2010:0639:FIN:EN:PDF>; [accessed:08.08.2012]; *Green paper. A European Strategy for Sustainable, Competitive and Secure Energy, COM(2006) 105*, http://europa.eu/documents/comm/green_papers/pdf/com2006_105_en.pdf; [accessed: 08.08.2012]; *The EU climate and energy package (2007)*, http://ec.europa.eu/clima/policies/package/index_en.htm; [accessed:08.08.2012].

9. Platje. J. *Institutional Capital – creating capacity and capabilities for sustainable development*, Opole, 2011.

10. EUROSTAT, *Environmental statistic and account in Europe*, Luxemburg 2010; IEA, *CO2 Emission from Fuel Combustion*. Highlands, Paris 2011.

11. *Communication of the European Commission of 26/05/2004 on the share of renewable energy in the EU, COM(2004) 366 final*, <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2004:0366:FIN:PL:PDF>; [accessed: 08.08.2012]; *Directive 2009/28/EC on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC*, <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=Oj:L:2009:140:0016:0062:en:PDF>; [accessed: 08.08.2012]; *Renewable Energy: Progressing towards the 2020 target, SEC(2011) 130 final*, http://ec.europa.eu/energy/renewables/reports/doc/sec_2011_0130.pdf; [accessed: 08.08.2012]; *Second Strategic Energy Review. An EU Energy security and solidarity action plan, COM(2008) 781 final*, <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2008:0781:FIN:EN:PDF>; [accessed:08.08.2012].

12. *Directive 2009/30/EC of the European Parliament and of the council, 2009*, <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:140:0088:0113:EN:PDF>; [accessed: 08.08.2012]

Rostek. E., *Biopaliwa pierwszej i drugiej generacji – metody otrzymywani i własności (Biofuels of the first and second generation – production methods and ownership)*, „Logistyka”,nr 6, 2011; Lis. K., *Biopaliwa drugiej generacji (Second generation biofuels)*, <http://www.drewnozamiastbenzyny.pl/biopaliwa-drugiej-generacji/>; [data dostępu: 08.08.2012]; *Biofuels in the European Vision, a Vision 2030 and Beyond, 2006*, ftp://ftp.cordis.europa.eu/pub/fp7/energy/docs/biofuels_vision_2030_en.pdf; [accessed: 08.08.2012]; Biernat K., *Biopaliwa – definicje i wymagania obowiązujące w Unii Europejskiej (Biofuels – definitions and EU requirements)*, <http://www.e-czytelnia.abrys.pl/?mod=tekst&id=11980>;

[accessed: 08.08.2012]; *Communication from the commission, An EU Strategy for Biofuels, COM(2006) 34 final*; http://eur-lex.europa.eu/LexUriServ/site/en/com/2006/com2006_034en01.pdf; [accessed:08.08.2012]

13. *Communication from the commission to the European Council and the European Parliament. An Energy policy for Europe, COM (2007) 1 final*. http://ec.europa.eu/energy/energy_policy/doc/01_energy_policy_for_europe_en.pdf; [accessed: 08.08.2012]

14. Carriquiry. M. A., Du. X., Timilsina. G.R., *Policy research working paper 5406, Second-Generation Biofuels. Economics and Policies, The World Bank, August 2010*, http://www-wds.worldbank.org/external/default/WDSContentServer/IW3P/IB/2010/08/30/000158349_20100830090558/Rendered/PDF/WPS5406.pdf; [accessed: 08.08.2012].

15. Edwards. R., Szekeres. S., Neuwahal. F., Mahieu. V., *Biofuels in the European Context: Facts and Uncertainties*, JRC European Commission, 2008, http://ec.europa.eu/dgs/jrc/downloads/jrc_biofuels_report.pdf; [accessed: 08.08.2012].

ec.europa.eu/dgs/jrc/downloads/jrc_biofuels_report.pdf; [accessed: 08.08.2012].

16. *Sustainable production of second-generation biofuels. Potential and perspectives in major economies and developing countries*, IEA, February 2010, http://www.iea.org/papers/2009/biofuels_exec_summary.pdf; [accessed: 08.08.2012]; Wielgoński. G., Łechnańska. P., *Emisja zanieczyszczeń z procesu spalania biomasy*, http://www.pzits.not.pl/docs/ksiazki/Pol_2010/Wielgosinski%20391-400.pdf; [accessed: 08.08.2012]; Bień. J., Zabochnicka-Swiątek. M., Sławik. L., *Wady i zalety biopaliw na przykładzie bioetanolu*, <http://www.plan-rozwoju.pcz.pl/dokumenty/konferencja/artykuly/27.pdf>; [accessed: 08.08.2012].

ВЗАИМОСВЯЗЬ МЕЖДУ ЭНЕРГЕТИЧЕСКОЙ ПОЛИТИКОЙ ЕВРОПЕЙСКОГО СОЮЗА, БИОТОПЛИВАМИ ВТОРОЙ ГЕНЕРАЦИИ И УСТОЙЧИВЫМ РАЗВИТИЕМ

Б. Фортуньски

Университет Ополе

ул.Озимская, 46а, Ополе, 45–058, Польша. E-mail: b.fortunski@uni.opole.pl

На сегодняшний день Европейский Союз является лидером по внедрению принципов устойчивого развития в различных сферах политической жизни. Это подтверждается энергетической политикой ЕС и подходом, который используется для развития биотопливной сферы. Рассматривается политика ЕС, направленная на устойчивое развитие, энергетическая политика и политика в области производства биотоплива с упором на использование биотоплива второй генерации. В контексте устойчивого развития проанализирована взаимосвязь между энергетической политикой ЕС и развитием биотоплива второй генерации. Рассмотрены как позитивные, так и негативные аспекты производства биотоплива второй генерации.

Ключевые слова: энергетическая политика ЕС, устойчивое развитие, биотопливо второй генерации.

Стаття надійшла 13.09.2012.

Рекомендовано до друку
д.б.н., проф. Никифоровим В.В.