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European Union's energy policy from the sustainability perspective

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Abstract: In this article, the authors present their views on the main issues, objectives and measures in the EU energy policy in the context of increasing relative energy scarcity and sustainable development. Aims of sustainable access to energy seem to focus on increased access to fossil fuels, which may trade-off with the reduction of greenhouse gas emissions and hamper the development of renewable energy resources.

Keywords: EU energy policy, renewable energy sources, sustainable development

1. Introduction

Energy, particularly in its electric and thermal energy forms, stands for an indispensable factor of economic growth and a prerequisite of maintaining the contemporary civilization standards. It belongs to the most important factors determining the national security.¹ It is essential for assuring the appropriate standard of life, particularly in the countries where the temperature can drop below 10°C. A limited access to energy sources restrains or even prevents economic growth. In turn, economic growth together with population growth causes an increasing demand for energy. The demographic prognoses indicate to a more than doubling of the Earth's population by 2100, which combined with economic growth and the improvement of living standards is expected to result in increasing threefold the annual consumption of energy (Rychlicki and Siemek, 1998).

¹ Who has energy, has power, said famous admiral Rickover, the initiator of the US nuclear submarine fleet.

Growing energy consumption in conjunction with its environmental consequences is currently, in authors' opinion, one of the biggest global economic and political problems. Therefore, every country and block of countries, like the European Union, has formed and formulated its energy policy. All over the world, innumerable legal acts and specialised governmental agencies are implementing these policies (e.g., Bureau of Energy Efficiency in India (Bureau... 2010)). The European energy policy is one of the examples of a europeanisation of the member states policies, which is particularly manifesting itself in a series of initiatives connected with the energy security.

The aims of the European policy have been formulated under the influence of factors discussed in this paper, such as:

- quick growth of the global energy consumption which can cause a quick depletion of conventional energy carriers,
- harmful instability of energy carriers prices, mainly the crude oil and gas,
- increasing dependency on raw materials imports, often from politically destabilised regions of the world, combined with a growth of importance of the exporting countries and their tendency to treat the deliveries in not only an economic but also a political context,
- rapid growth of atmospheric pollution caused by carbon dioxide and other gaseous emissions, originating mainly from fuel burning.

The aim of this paper is to shortly discuss the most important issues in the EU energy policy as they appear in the authors' eyes in the context of sustainable development.

2. Problems with energy

2.1. Growing consumption and scarcity

The growing energy use is expressed by increased use per capita (see Table 1) and determined by the economic activity and size of population. The world population rose from 5,277,725,410 in mid-1990 to 6,688,888,440 in mid-2008, i.e. by 26,74% (NPG, 2010). The global energy use increased 1.39 times in 18 years. While the demand for energy is growing, it is questionable whether its supply can increase fast enough. If non-renewable resources will run out

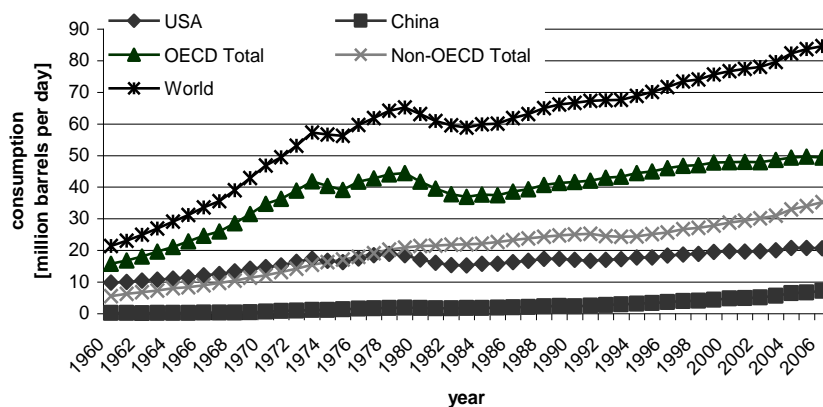
and the technological development in the field of renewable energy resources will be too slow, the sustainability of energy supply is likely to be threatened (see Platje, 2011), while, due to the increasing scarcity, the global competition for this resource is likely to increase.

Table 1. Regional energy use, 1990 and 2008, kWh per capita

Total	Year		Ratio 2008/1990
	1990	2008	
USA	89021	87216	0,98
EU27	40240	40821	1,01
Middle East	19422	34774	1,79
China	8839	18608	2,11
Latin America	11281	14421	1,28
Africa	7094	7792	1,10
India	4419	6280	1,42
The world	19422	21283	1,10

Source: Energiläget..., 2010.

The most popular energy source is still the crude oil, satisfying in 2008 33.5% of demand for energy in the world, while coal counted for 26.8%, gas for 29.8%, other sources (hydropower, peat, solar sources, wind, geothermal power, biofuels) for 12.9%, and nuclear power for 5.8% (World..., 2010). While the growth in demand for crude oil was 27% for the period 1975-1999, the increase of demand for natural gas was 91% (Noreng, 2006). From 1998 on, resulting from a dynamic growth of Chinese demand (which represented in 2006 about 8.5% of the global demand, while this share increased to 10.1% in 2009 (Index..., 2010)), the demand for these resources has grown even quicker (Figure 1).

Figure 1. Average daily consumption of crude oil

Source: EIA, 2008.

The information presented in Table 1 and Figure 1 show that the highest growth of energy consumption can be observed in the group of non-OECD countries. For example, the energy consumption in China almost doubled between 1980 and 2006. In the group of countries with the highest energy consumption (for instance the USA), the rate of total energy consumption growth was close to the rate of population growth. This means that the energy consumption per capita remained at a constant level or even decreased (Table 1).

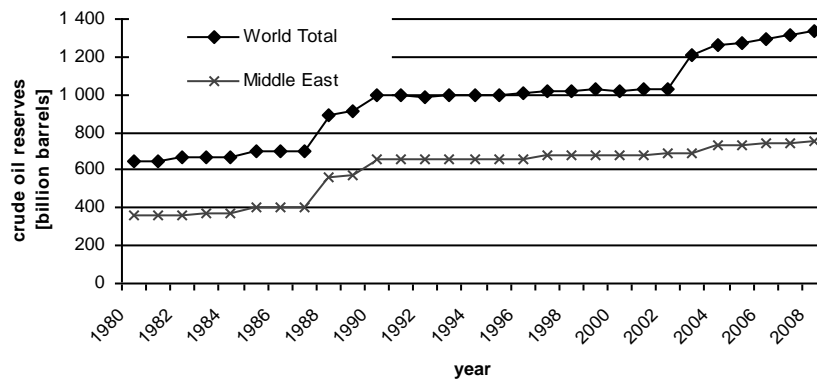
The rate of global energy consumption growth seems to have an exponential character. According to the prognoses presented in the Thirteenth World Energy Council Congress in Cannes in 1986, the energy consumption so far and in the next 50 years can be estimated as follows: 10.7 billion tce in 1980, 28.0 billion tce in 2020 and 47.7 billion tce in 2060 (Bogdanienko, 1989).²

According to official reports, the world reserves of the technologically accessible crude oil, in spite of their intense exploitation, have not been diminishing during the last decades. Quite the opposite, they have even been increasing (Figure 2). Admittedly, some new discoveries took place in this period and thanks to the technological progress some deposits, inaccessible before, have become exploitable, while some of the oil fields previously abandoned for unprofitability of their mining have been returned to exploitation. Nevertheless, these reports are usually treated with some disbelief. In particular in the countries belonging to the OPEC (Oil Producing and

² tce – ton of coal equivalent; equivalent of one metric ton of coal with fuel value of 7,000 kcal/kg.

Exporting Countries), the annual extraction is determined in proportion to the disposable reserves. If a country wants to obtain a permit for a larger extraction volume, it must demonstrate large reserves. As there is a short-term interest in increasing oil production for the sake of increased revenues, the reported volume of reserves and their growth may be the result of creative accounting. When exploitation of non-renewable energy resources increases as a result of such opportunistic behaviour, this may lead to a quicker depletion, and underestimation of the time left for finding renewable substitutes, which in turn threatens the sustainability of energy supply.

Figure 2. World crude oil reserves

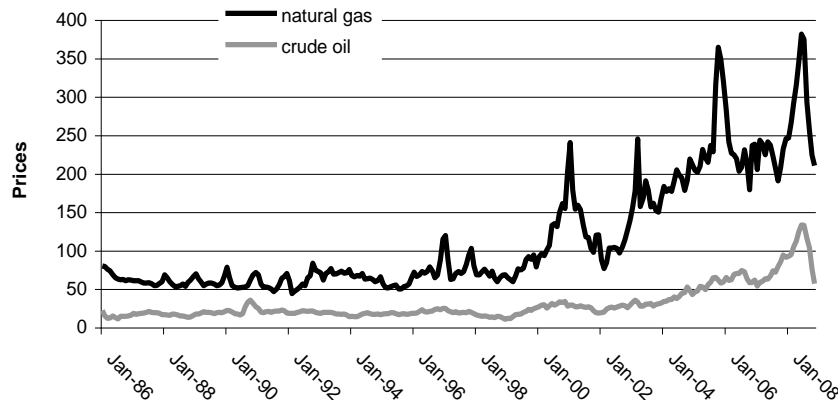


Source: Energy Information..., 2009.

The growth of world crude oil reserves in 2003 (Figure 2) was caused by an addition of 174.8 million barrels of oil in the oil sands in Canada. As opposed to conventional crude oil sources, where oil is extracted from the ground by taking advantage of the natural reservoir pressure, the extra-heavy oil from sands flows very slowly, if at all, and must be extracted by strip mining. These processes use a lot of water and require large energy inputs. That is why their EROEI (Energy Returned on Energy Invested) index is very low, about 3:1 (sometimes even 1.1:1), while in the case of conventional crude oil this index is usually equal to 30:1. The heating value of oil sands is about 10 times lower than the conventional oil. It causes that at present in Canada there are only few commercially significant oil sands industry companies, though expansion of these operations are envisaged (Athabasca..., 2008).

The growth of energy consumption results in the rise of prices of energy carriers, mainly crude oil and gas (Figure 3). It can be seen that, besides the rising trend, the prices have been characterized, especially in the last decade, by a growing volatility. The changes of energy carriers prices can be assigned to the purposeful changes of production volume (OPEC cutbacks in 2001) and some economic (Asian crisis in 1997) and political (Kuwait and Gulf war in 1990-91, Iraqi war which began in 2003) events, reinforced by speculative operations in the global markets. Rising prices and their volatility have consequences for the European energy policy, as will be discussed in section 3.3.

Figure 3. World crude oil (USD per barrel) and natural gas (USD per 1000 m³) prices

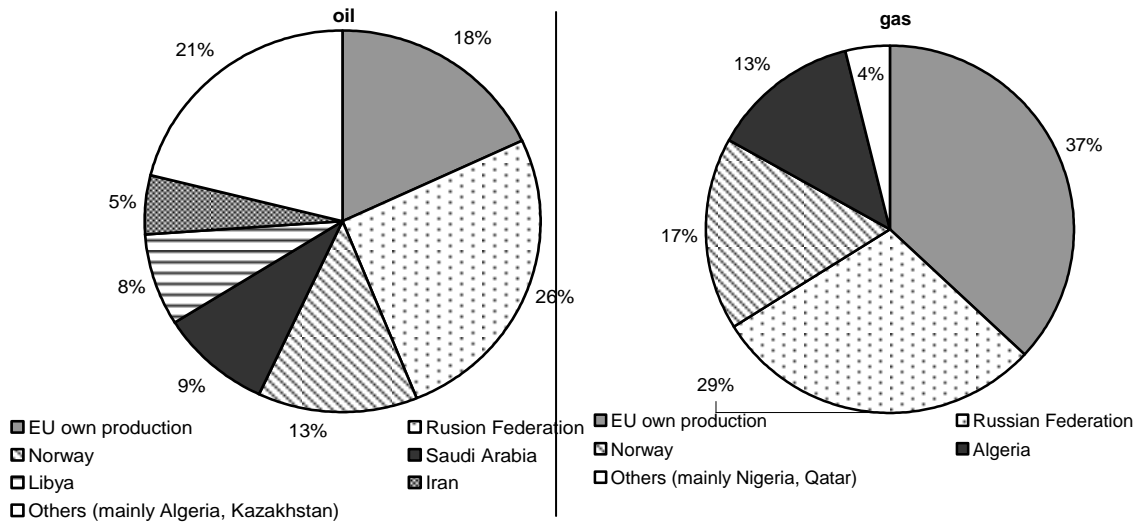


Source: Energy Information ..., 2009.

2.2. Import dependency

For the most part, the EU imports energy carriers from outside its territory (Figure 4). The import dependency in the case of natural gas amounted in 2004 to somewhat above 60% and in the case of crude oil to above 80%. Some prognoses set these numbers for 2030, assuming a continuation of present trends, at 81.4% and 88% respectively (European Commission, 2007a). The expected growth of import dependency does not support the sustainability of energy supply. Not only because the EU is expected to rely on non-renewable energy resources, but also because of the expected increasing competition for energy resources in the world market and the volatility of energy prices (see Section 3.3), posing threats to the stability of economic development.

Figure 4. Origin of crude oil and natural gas in EU-27 in 2004



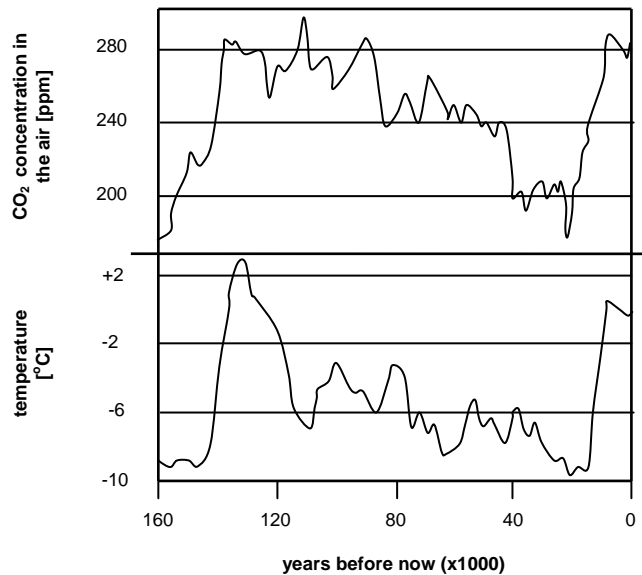
Source: EU energy..., 2007.

2.3. Climate change

The environmental objectives of the energy policy have their grounds in the fear that as a consequence of burning fossil fuels stored underground for millions of years, the concentration of carbon dioxide and other so called greenhouse gases in the atmosphere will increase even more, increasing the threat of global climate change. This climate change, besides waterlogging and inundation of large tracts of land, may have a catastrophic impact on fauna and flora in many parts of the world as well as on many human activities, first of all on agriculture (Global..., 2008). The correlation between the changes of CO₂ concentration in the atmosphere and the changes in long-term average of air temperature is rather conspicuous (Figure 6). A big content of CO₂ in the atmosphere reduces the radiation of spent energy into the outer space in the form of infrared radiation, which causes a permanent rise of air temperature, i.e. the so called greenhouse effect. The main source of pollution is the energy sector. In Poland, 94% of total CO₂ emission in 2006 was accounted for by this sector (GUS, 2008). Polish example is particularly sensitive, because most of the energy output comes from hardcoal and browncoal burning. This technology has a relatively low energy efficiency and therefore the CO₂ emissions per unit of energy output are relatively high. Therefore, the EU policy is favouring the replacement of coal by gas burning. However, since gas has to be imported, this in turn increases the energy dependency, and the

probability of political tension. While the aim is to increase the share of renewable energy resources, the focus in the Polish case still seems to be on coal, while a discussion on the use of nuclear energy has been started by the government.

Figure 6. Interdependence between CO₂ concentration and air temperature, world averages, zero means the present level



Source: Ortega and Costa, 2008.

3. Objectives of the EU energy policies

Based on the problems discussed above, the most important objectives of the EU energy policy can be aggregated into three groups (Pour..., 2006; Lisbon..., 2008):

- improvement in the competitiveness of energy market, thanks to the liberalisation of the electricity and natural gas markets, and ultimately the creation of single markets for these goods, in order to improve their physical and economic accessibility and therefore security of supply for customers,
- assuring the energy security for the Union member states by improving relations with suppliers,

- sustainable development of the energy sector, with respect to the quality of natural environment, and in particular preventing the climate change.

3.1. Liberalization of energy markets

The relative political and economic stability of the Europe's energy supply partners in the 1990s seems to have generated the conviction that most of the energy problems, including those of energy security, can be resolved by the market forces (Wyciszkievicz 2008). In the majority of EU countries energy markets were to a great degree monopolised. One of the first steps on the way to market liberalisation is a separation of ownership and management in energy production and distribution (so called property unbundling, independent system operators (ISO), independent transmission operators (ITO)). This should lead to market de-monopolisation. A complete separation version of unbundling was accepted by the EU parliament in the fall of 2008 (Gazeta Prawna, 2008) and got shape in the EU directives in the form of the so called third energy package ([Directive 2009/72/EC..., 2009; Directive 2009/73/EC..., 2009) and the appropriate regulations.

The liberalisation was supposed to take place gradually. In the so called electricity and gas directives, provisions were made for the third party access (TPA, i.e. access for agents who are neither owners nor operators of the network) to distribution networks and a governmental backing for these provisions was required (Directive 2003/54/EC..., 2003; Directive 2003/55/EC..., 2003).

The Third Party Access (TPA) principle allows final customers to choose their supplier. This principle has also been present in the Polish legal system since 1998, which can be taken as a case study of policy implementation. However, at the beginning this regulation was restrained to but big customers. Since July 1st 2007 it has covered all of 13.5 million household customers purchasing electric energy and 6.5 million households purchasing gas. Nevertheless, the TPA rule that is supposed to pave the way for a competitive market in electricity is still functioning to a very small extent. Only 7.8 % of customers changed their energy supplier in 2007 (URE, 2008). The progress in approaching the competitive market encounters some barriers. Lack of uniform rules and procedures of switching to another electricity supplier, together with a lack of standardised documents available, constitute some of these barriers. An ordinary household

customer, whose energy consumption is not very high, will not be an attractive target for electricity suppliers. The market does not provide such customers with offers attractive enough to give them an incentive for choosing the most competitive supplier.

3.2. Environmental protection in the energy sector

As one of the economic means of environmental protection, the European Union Emission Trading Scheme was introduced at the beginning of 2005 by way of a special directive (Directive 2003/87/EC..., 2003). The scheme applies to 5 industrial branches, including energy production. In short, member states are awarded a certain amount of greenhouse gases emission allowances. The appropriate state agencies distribute these allowances between the domestic emitters for consecutive trading periods (the first ended in 2007) according to their National Allocation Plans. If the allocation is not exhausted by the emitter in a given year, the residue can be sold; if it is overdrawn, an extra permit must be bought in the permit market or a penalty has to be paid by the emitter. In the present trading period this penalty it is 100 euro/tonne CO₂ and it does not exempt the emitter from buying the permit next year.

The interests of the individual EU member states are not unanimous. An example is in their attitude to particular solutions in the system of gaseous emissions permits trade. For example France, where 40% of the total energy consumption comes from nuclear power (European Commission, 2007a) and respectively 80% of electricity production, advocates possibly high penalties for overdrawing the allowance. Poland, which derives 60% of total energy from coal burning, while production from coal accounts for over 90% of electricity production (European Commission, 2007a), is backing possibly low penalties. Higher penalties are proposed by Germany and Italy, which use more gas. The gas burning technology emits less CO₂ than the coal burning technology.

Another instrument of environmental protection in the energy sector is created by the directive on promotion of electricity produced from renewable sources (RES) in the internal market (Directive 2009/28/EC..., 2009). It introduced a procedure of monitoring the activity of states in the field of RES promotion and the obligation of reporting on it, as well as a framework for establishing systems of support for investments and production of energy from RES combined with systems of so called certificates of origin from RES.

The new quantitative aims are a 20% share of energy from renewable sources in the total primary energy consumption in Europe and 10% of biofuels share in the transportation fuels in 2020 (European Commission, 2006; Directive 2009/28/EC ..., 2009). By 2020, emissions of greenhouse gases in the EU as a whole have to be diminished by 20% from the emissions in the base year 1990. This reduction may be enlarged to 30% in the case the other industrialised countries also make additional commitments. An improvement in the energy efficiency is projected to give a 20% decrease in primary energy consumption in 2020 as compared to the continuation of present trends (i.e. so called business as usual). For this reason these quantitative objectives are commonly known as 3 x 20. Decreasing the energy consumption, beside the environmental aspects, would of course have a mitigating impact on import dependency and energy costs connected with rising energy sources prices.

Figure 7. Changes of greenhouse gases (GHG) emissions in the EU countries, year 1997=100%



Source: OpenEurope, 2008.

In spite of the actions taken by the European Union, the emission of CO₂ has not been reduced but increased during the last years (Figure 7). When reduction of emission will not be successful, an option to deal with greenhouse gases in the medium and long term is, besides the development on RES, the carbon dioxide sequestration (CCS, carbon capture and storage) from the flue gases and, more generally, the use of relatively low emission technologies with regard to carbon compounds (CCT, clean carbon technologies). The EU is making some efforts towards development of sequestration technologies. A directive on geological storage of carbon dioxide is being in preparation. It assumes, within a so called flagship programme, the construction, in a public-private partnership, of 12 demonstration plants employing the CCS technology by 2015 as

well as establishing an European Industrial Initiative associating investors and technology owners for the purpose of its development (European Commission, 2007b). Poland attempts to develop two projects within the context of the flagship programme, one in Kędzierzyn-Koźle and another one in Belchatów. The first experimental, but commercial, coal burning power plant with geological storage of the produced CO₂ was officially opened in Schwarze Pumpe in Germany on September the 9th, 2008.

3.3. Energy security

Providing the energy security requires (Chevalier, 2005):

- stability in energy supply, which implies the need for diversification of supply
- reliable transportation networks, creating the need for maintenance and to keep its development in pace with the growth of consumption
- appropriate distribution and deliveries to the final recipients
- socially acceptable stable prices.

Meanwhile, many of the EU countries are strongly dependent on deliveries of natural gas and crude oil from one source, namely Russia. Russia was the European Union's largest energy resources deliverer in 2009, supplying 36% of its total gas imports, 31% of the EU's total crude oil imports, and 30% of the EU's coal imports (EU-Russia ..., 2010). Undoubtedly, the most dependent EU members were the Central and East European countries (Table 2). Potential problems with this dependence became visible during the Ukrainian crises in 2006 and 2009 and the Byelorussian crisis in 2007, when the interruptions in the gas deliveries to these countries resulted in a suspension of transmission to further recipients in the EU (Gromadzki and Konończuk, 2007; Eberhardt, 2007).

The physical access to and the price of energy determines to a large extent the functioning and the competitive position of an economy, but they also translate into the economic condition of enterprises and the well-being of the population. In a wider context they also influence the national security as well as the public order and the possibilities of achieving the objectives of foreign policy and international security (Gallis, 2006).

The proposed means of ensuring the EU energy security comprise:

- efficient response to crises in accordance to the principle of solidarity

- 'speaking with one voice' regarding external energy relations
- diversification of sources of origin, transportation channels and energy carriers
- extension of cooperation in the energy issues with the main producing countries, consuming countries and transit countries
- integration with regard to the energy market with the EU neighbouring countries and developing partnerships with the main energy suppliers.

Table 2. Imports of natural gas and crude oil from Russia in selected European Union countries in 2004(% of total imports)

Country	Natural gas	Crude oil
Slovakia	100	99
Latvia	100	97
Lithuania	100	94
Bulgaria	100	85
Finland	100	77
Romania	100	62
Czech Republic	100	69
Estonia	100	-
Hungary	98	81
Greece	82	30
Austria	82	16
Poland	63	96
Germany	45	33
Italy	37	23
Germany	45	33
France	21	15
Belgium	2	40
Netherlands	0	28
Sweden	0	26
Spain	0	16

Source: European Commission, 2007a.

Strengthening the European solidarity was to be served by a Polish governmental project, from the times of Kazimierz Marcinkiewicz's premiership (2005-2006), which bore the name of the Pact of Musketeers (also called by the name of 'energy NATO'). In the case of a threat to energy security in one of the participating countries it stipulated the rescue by all other participants. The project was presented during the economic forum in Davos on 26 January 2006.

However, it did not receive any backing from the EU countries and fell through. It proved to be a too far reaching attempt to implement the idea of European solidarity in relation with partners from outside the EU.

The diversification of energy sources and transportation channels is supported by the planned construction of international gas pipelines like North Stream, Amber, South Stream, Nabucco, Trans-European Energy Networks (Wyciszkievicz, 2008). The aim of security is also served by numerous multinational treaties such as the Partnership and Cooperation Agreement with Russia, the Euro-Mediterranean Partnership, the Energy Community Treaty with Balkan countries and Turkey, and the TACIS programme with twelve Caucasian and Middle East countries (Wyciszkievicz, 2008).

4. Concluding remarks

The EU energy policy outlined in this paper seems, in authors' opinion, to be based on two main assumptions. Generally optimistic, it assumes that the European Union will be able to manage the problems of dwindling traditional fossil energy resources as well as the increasing concentrations of greenhouse gases in the atmosphere, which when not being reduced would lead to a dramatic global climate change. At the same time it also realistically assumes that the accessible fossil energy sources will soon be exhausted, at an accelerated rate, even when there are attempts by the developed countries' governments to reduce fossil fuels exploitation and to promote the transition to the exploitation of RES. Therefore, the policy aims at increasing the European access to the existing fossil energy sources, competing in this field with other countries or blocks of countries in the world, as long as these sources are cheaper for customers than the renewable ones. Though the world's fossil energy sources are by no means global common goods (having been appropriated either nationally or privately), the well-known rule 'first come, first served' applies to a certain extent to the case and therefore the EU (and its separate members individually) rationally tries to come first by negotiating and signing numerous treaties of cooperation with the owners and the transportation intermediaries of the energy carriers. This cooperation duly concentrates on construction of transportation facilities linking the mining areas with Europe, in this way ensuring its first place in the queue of potential customers.

On the other hand, having in view the growing scarcity of fossil fuels resources and the

accompanying growth of their prices, the policy is preparing the energy consumers for acceptance of higher energy prices, and forcing the energy producers to a gradual transition from fossil fuels to other, possibly renewable, energy sources in order to make the unavoidable complete transition (besides the nuclear power) in the future possibly smooth and painless.

The liberalisation of the energy market in Europe and integrating it into one institution will probably, as it is declared by the policy authors, enhance the energy security in individual countries. However, this security might be rather not so much menaced by some internal disasters, which has not happened on any larger scale so far, as by potential external disturbances which would concern all European countries in the same way.

Concluding, when considering sustainability, it seems that access to energy is still more important than reducing the negative externalities of its use. While this is in contradiction with principles of environmental sustainability, implicitly there seems to exist the belief that when fossil fuels run out, there will be renewable resources available to replace them. This inherent weak sustainability may only create long-term sustainable energy supply when technological advance and development of RES proceed fast enough (Platje, 2011).

Literature

- Athabasca oil sands*. Available at: http://en.wikipedia.org/wiki/Athabasca_oil_sands#Oil_sand_companies. Accessed September 2008.
- Bogdanienko, J. (1989). *Odnawialne źródła energii*. Warsaw: Biblioteka Problemów PWN.
- Bureau of Energy Efficiency (BEE)* (2010). Available at: <http://eco3.org/BEE>. Accessed November 2010.
- Chevalier, J-M. (2005). *Security of Energy Supply For European Union*. Paris: Université Paris-Dauphine.
- Directive 2003/54/EC of the European parliament and of the council of 26 June 2003 concerning common rules for the internal market in electricity and repealing Directive 96/92/EC*. Official Journal of the European Union. L.176/37, 2003.
- Directive 2003/54/EC of the European parliament and of the council of 26 June 2003 concerning common rules for the internal market in natural gas and repealing Directive 98/30/EC*. Official Journal of the European Union. L.176/57, 2003.
- 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*. Official Journal of the European Union. L.275/32, 2003.
- Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC*. Official Journal of the European Union 5.6.2009. L 140/16.
- Directive 2009/72/EC of the European Parliament and of the Council of 13 July 2009 concerning common rules for the internal market in electricity and repealing Directive 2003/54/EC*. Official Journal of the European Union. L 211 vol. 52, 14 August 2009. Available at: <http://eur-lex.europa.eu/JOHtml.do?uri=OJ:L:2009:211:SOM:EN:HTML>. Accessed November 2010.
- Directive 2009/73/EC of the European Parliament and of the Council of 13 July 2009 concerning common rules for the internal market in natural gas and repealing Directive 2003/55/EC*. Official Journal of the European

- Union. L 211 Volume 52, 14 August 2009. Available at: <http://eur-lex.europa.eu/JOHtml.do?uri=OJ:L:2009:211:SOM:EN:HTML>. Accessed November 2010.
- Eberhardt, A. (2007). Konsekwencje rosyjsko-białoruskiego sporu energetycznego. *Biuletyn PISM* 4(418): 1737-1738.
- EIA (2008). *Annual Energy Review 2007*. Report No. DOE/EIA-0384(2007). Energy Information Administration. Table 11.5 World Crude Oil Production, 1960-2007. Available at: <http://www.eia.doe.gov/emeu/aer/pdf/aer.pdf>. Accessed September 2008.
- Energiläget i siffror 2010. Energy in Sweden – facts and figures 2010*. Statens energimyndighet. 2010. Available at: <http://webbshop.cm.se/System/TemplateView.aspx?p=Energimyndigheten&view=default&cat=Broschyrer&id=e0a2619a83294099a16519a0b5edd26f>. Accessed November 2010.
- Energy Information Administration. Available at: <http://www.eia.doe.gov/emeu/international.html>. Accessed September 2009.
- European Commission (2006). *Green Paper on a European Strategy for sustainable, competitive, and secure energy*. COM(2006) 105 final.
- European Commission (2007a). *EU energy policy data*. SEC (2007) 12. Available at: http://ec.europa.eu/energy/energy_policy/doc/02_eu_energy_policy_data_en.pdf. Accessed June 2008.
- European Commission (2007b). *Energy for a Changing World – An Energy Policy for Europe*. COM (2007) 1 final. *EU-Russia Energy Relations*. Available at: http://ec.europa.eu/energy/international/russia/russia_en.htm. Accessed November 2010.
- Gallis, P. (2006). *NATO and Energy Security. CRS Report for the Congress*. Washington. Available at: http://www.usembassy.at/en/download/pdf/nato_energy.pdf. Accessed June 2008.
- Gazeta Prawna (2008). *Europosłowie chcą podziału koncernów energetycznych*. Available at: http://biznes.gazetaprawna.pl/artykuly/16529,europoslowie_chcapedzialu_koncernow_energetycznych.html. Accessed September 2008.
- Global Warming: 5. How could Climate Change affect us in the future?* Available at: www.greefacts.org/studies/climate_change/1_2/global_warming_5.htm. Accessed September 2008.
- Gromadzki, G.; Konończuk, W. (2007). *Energetyczna gra. Ukraina, Mołdawia i Białoruś między Unią i Rosją*. Warsaw: Fundacja im. Stefana Batorego.
- GUS (2009). *Ochrona środowiska 2008*. Warsaw: Wydawnictwo GUS.
- Index mundi*. Available at: <http://www.indexmundi.com/energy.aspx?country=cn&product=oil&graph=consumption>. Accessed November 2010.
- Lisbon Strategy. Europa Glossary*. Available at: http://europa.eu/scadplus/glossary/lisbon_strategy_en.htm. Accessed June 2008.
- Noreng, O. (2006). *Crude Power. Politics and the oil market*. Washington: The Federal Trust for Education & Research.
- NPG (2010). *Total Midyear World Population 1950-2050*. Available at: http://www.npg.org/facts/world_pop_year.htm. Accessed November 2010.
- OpenEurope (2008). *Europe's dirty secret: Why the EU Emissions Trading Scheme isn't working*. Available at: <http://www.openeurope.org.uk/research/etsp2.pdf>. Accessed October 2008.
- Ortega, E.; Costa, A. (2008). *Six degrees to hell or four years to a prosperous future*. In: Schnitzer, H.; Ulgiati, S. (eds.). *Towards a holistic approach based on science and humanity. 6th Biennial International Workshop Advances in Energy Studies*. Graz: Graz University of Technology.
- Platje, J. (2011). *Institutional Capital: creating capacity and capabilities for sustainable development*. Opole: Wydawnictwo Uniwersytetu Opolskiego.
- Pour une politique énergétique de l'Union Européenne. Livret vert de la Commission Européenne*. COM (95) 659 final. *Bulletin UE* 01-1995.
- Rychlicki, S.; Siemek, J. (1998). Analiza trendów energetycznych w świecie i w Europie z uwzględnieniem rynków węgla, ropy naftowej i gazu ziemnego. *Polityka energetyczna* 1-2: 29-54.
- URE (2008). Sprawozdanie z działalności Prezesa URE – 2007. *Biuletyn URE* 3.
- World energy consumption* (2010). Available at: http://en.wikipedia.org/wiki/World_energy_consumption. Accessed November 2010.
- Wyciszkievicz, E. (2008). *EU External Energy Policy - Between Market and Strategic Interests*. Warsaw: PISM. Available at: <http://ghandalf.pism.pl/pokaz/id/205>. Accessed June 2008.

Polityka energetyczna Unii Europejskiej w kontekście zrównoważonego rozwoju

Streszczenie

W niniejszym artykule autor prezentuje swoje poglądy dotyczące głównych kwestii, celów i instrumentów polityki energetycznej w kontekście rosnącej względnej rzadkości energii oraz zrównoważonego rozwoju. Cele zrównoważonego dostępu do energii wydają się koncentrować na zwiększonym dostępie do paliw kopalnych, co może kolidować z ograniczaniem emisji gazów cieplarnianych oraz utrudniać rozwój odnawialnych źródeł energii.

Słowa kluczowe: polityka energetyczna UE, odnawialne źródła energii, zrównoważony rozwój