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DEVELOPMENT OF “GREEN ENERGY” IN COAL-BASED ENERGY CULTURE – IMPLICATIONS FOR POLAND’S ENERGY SECURITY

Keywords:

*energy security, energy culture, energy policy, renewable energy
sources, fossil fuels*

Introduction

Ensuring energy security – that is availability of energy at affordable prices at all times – is currently one of the top political priorities in Poland. How to achieve this goal in the conditions of dynamically changing security environment? What are the best methods for guaranteeing stable supplies of energy in the future? Considering high unpredictability of the global supply-demand trends and the emergence of new asymmetric, economic, technological and environmental threats to energy security, one of the greatest global challenges is to find the right way of developing the energy sector in the future.

Countries play different roles in global and regional energy markets and share different experiences regarding a model of energy consumption. The variety of attitudes towards the energy sector and one’s position in energy supply-demand chain influence the perception of energy security. In a comparative European perspective, Poland is one of the major energy consumers and has relatively high levels of energy self-sufficiency. Polish energy sector bases on domestic and imported fossil fuels. Hydrocarbons are imported almost exclusively from Russia. The importance of coal, high energy intensity and the poorly diversified energy mix as well as oil and gas import routes briefly characterize Poland’s energy security situation and energy culture. These remains of the communist times in the Polish

energy sector influence contemporary thinking of how energy security should be achieved and Poland's attitudes towards the EU's energy and climate policy.

The EU is struggling to ensure a more competitive, secure and sustainable energy future. Among different priorities, the EU's "20:20:20" energy policy target¹ deserves special attention as its implementation will influence the dynamics of the European energy market and the structure of energy consumption across the European Union. Implementation of the target requires, on the one hand, further technological developments, especially in the field of "green energy" and on the other hand, the political will. In the conditions of economic downturn, many countries have been questioning the rationality of a climate change focused energy policy of the EU. Poland has been among states strongly reluctant to the EU's energy-climate package. Social, economic, structural but also cultural factors make a transformation of Polish coal-dominated energy sector and energy intensive economy particularly difficult. In a public discourse, renewable energy sources are often presented as threatening Poland's energy security in its economic and geostrategic dimension.

This paper surveys the key features of Poland's energy culture and energy security situation and discusses how they influence its attitudes towards environmental dimensions of energy policy. It looks at the obstacles and prospects for development of renewable energy sources (RES) in Poland. On the one hand, it deals with mechanisms and reasons behind disregarding in a public discourse a potential role of RES in securing future energy needs of the Polish society. On the other hand, it examines a potential contribution of green energy to Poland's energy security.

¹ "20:20:20" formula refers to three binding targets for 2020 of the EU's energy and climate package. They include a 20% reduction in the greenhouse gases emissions from 1990 levels; an increase of renewable resources' share in the energy consumption up to 20%; a 20% improvement in the EU's energy efficiency.

Poland's energy culture and energy security

Energy culture can be defined as a system of behaviors in relation to energy system and energy consumption which are characteristic of a society. It is also a typical way of thinking about energy security, which represents country's experiences. As result, although for most countries energy security means availability of energy in all forms at affordable prices, they may perceive threats to this security define methods of ensuring it differently². Perception of energy security depends on one's position in energy supply chain but to a large extent also on a context of the energy market and specific experiences that shape an energy culture.

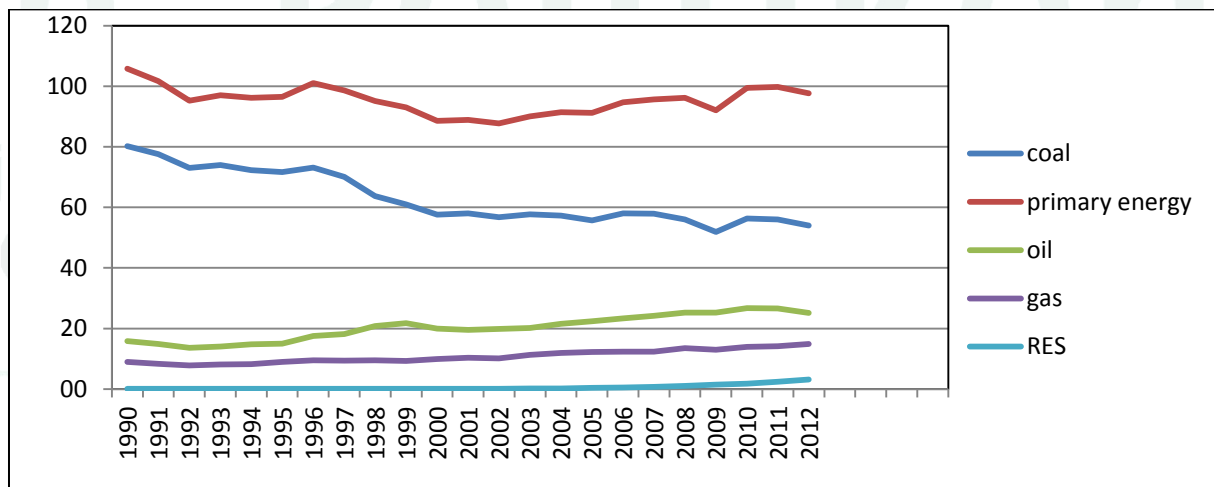
Poland's energy culture is rooted in its experiences of a socialist economic management system, several years of economic transformation and the current position of an importer and a transit state for Russian oil and gas. For Poland and other former socialist states energy security equated to a high level of energy self-sufficiency within the Eastern Block. Historically, the former socialist countries invested in energy and carbon-intensive heavy industries and based their energy security on cheaply available fossil fuels which were produced and exported under preferential tariffs across the communist bloc. For these reasons, Poland relied on ingenious coal and imported Soviet oil and gas. In Poland, in the eyes of the general public cheap energy resources and cheap final energy were perceived as a public good provided by the state. This way of thinking was not conducive to developing approaches to and promulgating energy savings. Instead, it supported energy waste.

Years of the economic transformation and integration with the Western institutions have changed to some extent the concept and understanding of energy security and the strategies of ensuring stable supplies of energy. Poland has restructured its energy sector, upgraded infrastructure and invested in some energy-efficient technologies. It has also officially declared the following goals of the energy policy: improvement of energy efficiency; enhancement of security of supply; diversification of electricity mix; development of renewable energy; development of

² I discuss this subject in: *Energy and Security – regional and global dimensions*, SIPRI Yearbook 2007, pp. 215-240.

competitive energy markets supplies; and reduction of the negative environmental impact of the energy industry³. However, despite such official statements, heritage of the socialist times remains visible in the energy sector. Poorly diversified energy mix, one-directional gas and oil interconnections with Russia, old, underinvested infrastructure⁴, high level of energy intensity still characterize Poland's energy sector and remind of the past system. Interestingly, the years of communism have also left a lasting impact on the perception of energy security in a sovereign Poland. All these historical antecedents influence the present behavior and opinions in relation to the energy sector and issues such as security of supply, liberalization of the energy market and sustainable development. These are the core principles of the EU energy policy. As result, energy policy in practice diverges from the goals declared in the official documents.

Fig. 1. Dynamics of primary energy consumption by sources in Poland [Mtoe]



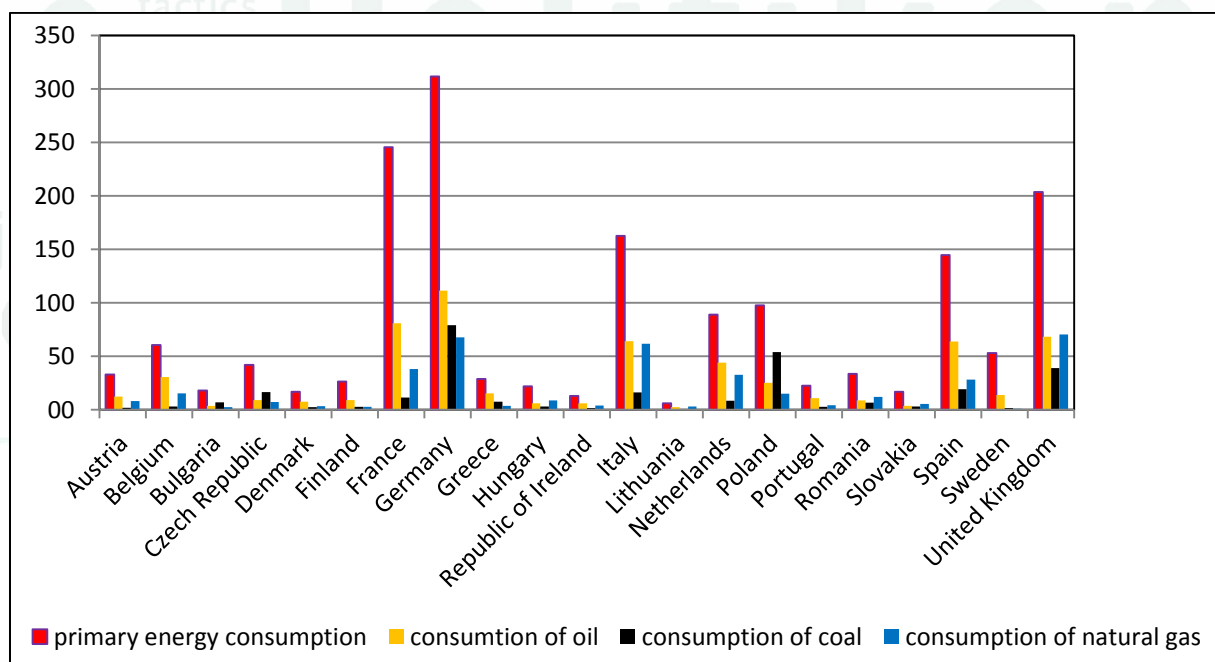
Source: Author. Data: BP Statistical Review of World Energy 2013, June 2013.

³ *Polityka energetyczna Polski do 2030 roku*, Załączniki do uchwały nr 202/2009 Rady Ministrów z dnia 10 listopada 2009 r., pp. 4-5.

⁴ It is estimated that around 55% of all power plants are over 30 years old. Only around 25% of power plants are less than 20 years old. From 2014 up to 2017 Poland will have to shut down power plants of total production capacity of around 4.4 GW. Such a situation creates a serious risk of power deficit in the market. According to the governmental sources, Poland may face electricity shortage already in 2015-2017. Without adequate investments in new facilities power deficit in 2015 and 2016 will reach 95 MW and 800 MW, respectively. Ministerstwo Gospodarki, *Sprawozdanie z wyników monitorowania bezpieczeństwa dostaw energii elektrycznej*, Warszawa 2013 p. 43-55.

One of the greatest challenges identified in the official Polish energy security strategies is the diversification of the energy and electricity mix⁵. The energy mix remains dominated by coal though its importance has been decreasing since the beginning of the political and economic transformation (See: Fig. 1). Coal's share in Poland's primary energy consumption is 58%, and it accounts for more than 88% of electricity output (See: Fig. 2). As far as Poland's energy culture is concerned, high dependency on ingenious coal is perceived as the key method of ensuring Poland's energy security. Thinking of energy security in terms of high energy self-sufficiency is a repeating theme in national expert and political debates, where coal is not only presented as an ingenious, but also the most stable and a relatively cheap source of energy.

Fig. 2. Primary energy consumption in selected EU's countries in 2012 [Mtoe]



Source: Author. Data: BP Statistical Review of World Energy 2013, June 2013.

As seen in Fig. 2, the second and third most important primary energy sources for Poland are hydrocarbons. The demand for hydrocarbons and their share in the

⁵ Ministerstwo Gospodarki i Pracy, *Polityka energetyczna Polski do 2025 r.*, Dokument przyjęty przez Radę Ministrów 4 stycznia 2005 r., p. 5; *Polityka energetyczna Polski do 2030 r.*, Ministerstwo Gospodarki, Załącznik do uchwały nr 202/2009 Rady Ministrów z dnia 10 listopada 2009 r., p. 4.

energy mix have increased since early 1990s. Nonetheless, in comparison to other EU countries, natural gas plays a minor role in the Polish economy. Poland's consumption of natural gas per capita is one of the lowest in Europe, and the share of gas in the energy mix is just 13%, though it has been rising over the recent years. Almost 40% of natural gas consumed in Poland comes from domestic sources. Supplies from Russia cover over 90% and 60% of oil and gas consumption in Poland, respectively. In the gas sector, Poland lacks access to alternative suppliers and European gas hubs. The LNG terminal and bi-directional gas interconnectors are recent on-going investment projects. In the oil sector, although Poland's oil terminal has enough capacity to substitute supplies from Russia, Polish refineries are technologically dependent on the Russian crude supplies.

Russia has many times used its dominating position in the Central-Eastern European oil and gas market. It has conducted tough power negotiations, successfully binding the region with long-term contracts including non-flexible price, delivery and destination clauses, it has also used the delivery of its oil and gas supplies to achieve political and economic goals. A consequence is that former satellite-states, such as Poland, often pay higher prices for Russian resources than their Western neighbours. They have also faced gas or oil supply cut-offs (recall the Russia-Ukraine gas crisis of 2006 and 2009, when cut-offs stroked importers of Russian gas from Western Europe, too or the case of Lithuanian refinery complex Możejki Nafta, when several times Russian Transneft cut supplies of oil after this strategic Lithuanian complex was taken over first by American and later Polish companies). Dependency on Russia together with the little changed Russian rhetoric and behaviour in relation to the countries without real supply alternatives make Polish energy policy focused on strategic issues of security of supply. Diversification away from Russia has been perceived as one of important methods of enhancing energy security, though until recently progress in this field had been hardly noticeable. Taking into account "the Russian factor" in shaping Poland's energy policy and energy security concept helps

to understand why high import dependency is perceived as a threat and domestic coal as an important tool of managing level of import dependencies.

Strong reliance of Poland's electricity and heat sector on coal has, however, wider and deeper social and economic explanations. The availability and affordability of coal in comparison to other primary energy sources has been a key factor in maintaining its position and significance for the society and the economy. In a wider social context, the coal and lignite mining industry provides over 120 000 jobs (4.2% of the persons employed in the industry⁶), though the employment rate in the mining sector continues to shrink. The significance of the coal industry for the economy has diminished – the share of mining in the GDP decreased from 3.71% in 1995 to 2.60% in 2011⁷, which is typical for the developed countries – but it is still an important industrial base for Poland's economic growth. Not surprisingly, the coal industry-lobby plays a strong role in influencing energy policy-making process. For security as well as social reasons, the government claims that coal will remain the base of the country's energy security. How will it then adjust to the EU law? The Tusk government wants to fully involve coal in the debate on environmental issues and opts for development of the clean coal technologies. Polish high officials prove to be not ready for far-reaching changes in the way energy is produced⁸.

Reduction of green-house emissions and improvement of energy efficiency are among the toughest task that Poland has to face up. Despite relatively low energy consumption per capita, Poland's economy is characterized by high levels of greenhouse emissions and high energy intensity. These two relics of communist times constitute a challenge to energy security, especially in its economic and technological dimension. Between 1990 and 2007, energy intensity in Poland dropped by 49%, which has been a spectacular decrease among the Central European countries. Yet, it still uses more than twice as much energy to produce a unit of economic output as

⁶ Central Statistical Office, *Statistical Yearbook of Industry - Poland*, Warsaw 2012, p. 217.

⁷ Ibidem.

⁸ According to the Prime Minister: *Poland's economy will continue to be based on coal, but in a more modern way (...) Poland will invest in CO₂ reductions, but not in the limitation of the use of coal*. The government emphasises that future of energy security is coal and shale gas. *Tusk: będziemy dalej stawiać na węgiel*, Polish Press Agency, 10th September 2013.

Western Europe and the supremacy of the coal-energy sector makes the level of CO₂ emissions highly unsatisfactory. Total CO₂ emissions in Poland fell by about 11% while carbon intensity of energy use declined by just 9%. It's not enough considering that the neighbouring Czech Republic, also highly dependent on coal, managed to decrease both indexes by 20%. Over this period, Slovakia's carbon intensity of energy use fell by 29% and total emissions by 38%, and Hungary's by 15% and 20%, respectively⁹. Central European countries owe the improvement of the CO₂ emissions indexes first and foremost to the economic transformation processes and decommissioning of many energy-intensive and carbon-intensive factories but also to the investments in energy efficient technologies.

At the sector level, households account for the largest share of Poland's energy consumption, followed by transport (where in contrast to the industrial sector, CO₂ emissions increased by 53% over the past two decades)¹⁰ and industrial sector. Promotion of energy efficiency requires specific regulations and this is the weakest aspect of Poland's energy policy. So far Poland has introduced a system of "white certificates" (on the basis of Energy Efficiency Law of 15th April 2011). The new law puts an obligation on suppliers of electricity, heat and gas to achieve energy saving certificates; this obligation has been in force from the beginning of 2013. Yet, the biggest potential for energy savings seems to be in Polish households and in improvements of energy efficiency in buildings. To achieve better energy efficiency and make energy system less carbon intensive Poland needs to elaborate and introduce the long-term and comprehensive strategies involving governments, companies and households.

High energy intensity and lack of infrastructure that could enable greater diversification and flexibility of the energy system open the catalogue of the most urgent and important challenges to Poland's energy security. However, an understanding of the need to enhance the security of supply contrasts with

⁹ Eurostat, *EU Energy and Transport in Figures. Statistical Pocketbook 2010*, Publications Office of the European Union, 2010.

¹⁰ Ibidem.

incomprehension to the need of bolstering the environmental dimension of energy security. Improvement of environmental performance of the energy sector is not a top priority, though in the official energy strategies this issue has been raised. High green-house emissions are particularly controversial question in this context. Generally, today at the political level climate change is not perceived in Poland as a real future threat to security, at least not for national security. A minority of experts and an even greater minority of politicians present different positions on this issue. As aptly noticed in FIIA study *the idea of sustainable energy security does not resonate particularly well in the Polish public discourse, with none of the major political parties explicitly prioritizing the low carbon transformation of the economy in their policy platforms*¹¹. Observation of the public debate leads to the conclusion that it is the EU's climate change-oriented energy policy that is perceived as a danger to country's security rather than climate change itself. There is also a wide acceptance that Poland has been successful in implementation of the Kyoto Protocol commitments while the EU's progressive reduction targets are detrimental to its economy and energy security.

In the 1990s, Poland took an active part in climate negotiations and the elaboration of the international climate regime-structures (UNFCCC and the Kyoto Protocol¹²) and accepted national documents on climate and environment, yet it is important to note a significant change in its attitudes towards climate issues in recent years. What is the explanation for this noticeable change?

In the 1990s, significant reduction could be achieved as a result of the economic transition process and switching off energy-intensive heavy industry. Economic transformation brought social and economic costs, therefore one can argue that it was neither easy nor cheap to reduce greenhouse emissions. Yet, it was a time

¹¹ T. Spencer, A. Korppoo, K.O. Lang, M. Kremer, *Linking an EU emission reduction target beyond 20% to energy security in Central and Eastern Europe*, "FIIA Working Paper", March 2011, p. 7.

¹² UNFCCC – United Nations Framework Convention on Climate Change is one of a Rio Convention adopted in 1992. Its aim of preventing dangerous human interference with the climate system was widely accepted by majority of states through the process of ratifications. Poland approved the UNFCCC on 28 July 1994. The Protocol to the UNFCCC (The Kyoto Protocol) was adopted on 11 December 1997. Poland ratified the Kyoto Protocol on 13 December 2002.

of rising strategic awareness of the need to reform as well as long-term thinking about security policy directions – in 1992 Poland declared in the security strategy that its strategic goal was access to the Western structures – NATO and European Communities. The post-socialist country had to prove its commitments to the Western values and belonging to the West – not in civilizational dimension, which was rather undeniable, but in political, economic and security terms. The political and economic transformation was therefore the only way that could lead Poland to the Western institutions. It involved the restructuring of heavy industry and the modernization of the energy sector and other industries. A spectacular greenhouse gases reduction was then a product of the changing structure of Poland's economy and not an effect of a strategic action plan or any securitization of climate change. As a result, Poland was able to reduce emissions without affecting the coal-electricity lobby interest¹³. Today political decisions on Poland's role in international politics on global warming and further greenhouse emissions' reductions are taken under different geostrategic and economic conditions.

Firstly, further reductions of CO₂ emissions require significant changes in the structure of energy consumption and production in Poland. Concerning the way of thinking about the energy sector and energy security dominating in Polish political and expert circles, Poland is not ready for any noticeable energy transformation. Coal-fired generation meets the criteria of longevity and scalability – both critical for a stable supplies of energy¹⁴, which is a top priority of Poland's energy policy. Sustainability of the energy sector is of secondary importance.

Secondly, transformation away from coal could trigger social and economic tensions. It is hard to expect that political decision-makers would take such a challenge. Poland's political system makes all governments focused on short-term goals ('from one election to another'), while energy transformation requires long-term strategic vision of development of the energy sector. Political elites do not have

¹³ A. Bokwa, *Climatic issues in Polish Foreign Policy*, in: P.g. Harris (ed.), *Europe and Global Climate Change. Politics, Foreign Policy and Regional Cooperation*, 2007, p. 131.

¹⁴ I.N. Kessides, D.C. Wade, *Towards a sustainable global energy supply infrastructure: net energy balance and density considerations*, EUI Working Papers, RSCAS 2010/72, p. 1.

such a strategic concept and seem to be hostages of the particular interests of different energy lobbies. Energy mix based in fact on two traditional fossil fuels and lack of infrastructure diversifying energy supplies after over 20 years of economic transformation are proof of this state of matter. Existing legislative and institutional barriers to development of renewable energy in Poland are also meaningful evidence of political reluctance to energy transformation.

Thirdly, Poland is today a member of the EU – an institution which plays a leading role in the international efforts to mitigate global warming. This membership has been, in fact, a key driver of Poland's actions on environmental and climate change issues. As one expert notices – *EU may be treated as a <<hegemon>> that made Poland follow its environmental requirements*¹⁵. For a country dependent on carbon-rich energy an implementation and an enforcement of the EU environmental *acquis* is a difficult task for structural, legislative and financial reasons. There are also sociological and psychological explanations of these difficulties, which relate to a weak environmental awareness, a traditional thinking of energy security that neglects environmental dimension and also a widespread feeling that the EU climate-oriented energy policy did not take into account a specific situation of the Polish energy sector – its dependence on fossil fuels, the security of supply needs and energy poverty¹⁶. Poland accepted the *acquis* after long and complicated negotiations, however, regulations on greenhouse gases emissions had never suited its energy culture. Hence, since 2008, Poland has tried to prevent the adoption of more burdensome reduction targets and has become one of the most active players within the EU debate on climate change¹⁷. It has successfully created an image of a country ignoring the problem of climate change, unwilling to transform its energy system and hindering the EU's climate policy¹⁸.

¹⁵ A. Bokwa, *Climatic issues in Polish Foreign Policy*, in: P.g. Harris (ed.), *Europe and Global Climate Change. Politics, Foreign Policy and Regional Cooperation*, 2007, pp. 132-133.

¹⁶ D. Buchan, *Eastern Europe's energy challenge: meeting its EU climate commitments*, OIES, July 2010, p. 44.

¹⁷ Z.M. Karaczun, *Poland and climate change: Analysis of Polish climate policy 1988-2010*, "International Issues & Slovak Foreign Policy Affairs", 01/2011, p. 66.

¹⁸ Karaczun points at two trends dominating in the Polish position on climate change issues: first, unwillingness to take active measures aimed at phasing out fossil fuels and promoting climate protection; second, blaming

Decarbonisation and transformation of the energy system require, on the one hand, a political will, and on the other hand social support. In both cases, it would be easier to implement energy efficiency measures, increase the share of renewable energy sources (RES) in the energy mix as well as decrease carbon intensity of the energy sector if there were greater environmental awareness but also awareness of strategic, social and economic benefits of such a transformation. These issues, however, are usually downgraded in the Polish public discourse, which focuses on the negative economic and security aspects of such a transformation. A transformation towards more diversified and sustainable energy system is a long term and complex process of a strategic significance for the future development of a country. Presenting it as dangerous to economic and physical availability of energy gives a false picture of reality, but corresponding to the interests of particular lobbies. Development of renewable energy sources is an important part of the transformation towards a sustainable energy future but also of a new thinking about energy security. This process has a significant impact on the evolution of energy cultures across the EU and European energy security. In the Polish energy culture, security and economic issues have downgraded environmental problems as a field of action for energy policy and the ideas to move the energy sector forward to an era of innovating renewable and smart technologies have faced strong resistance.

“Green energy” and Poland’s energy security – perspectives and challenges for development of RES in Poland

Observation of contemporary growing share of renewable energy sources (RES) in the energy mix of high-developed countries is perceived as a new revolution in the energy market and global economy itself. Year by year, progress in development of renewable energy technology makes it cheaper and thus more competitive in the energy market and more accessible to final consumers, although greater development of RES still requires special financial support from public

EU climate policy for the lack of modernization in the energy sector and growing energy process. Ibidem, pp. 66-67.

authorities in different forms. Poland has not been keeping up with the recent trends in RES development.

Today, due to a relatively low share of RES in Poland's total primary energy production and consumption, it is difficult to discuss the role of "green energy" in the country's energy security. In 2011, RES constituted for 7.8% of total primary energy production¹⁹. However, most renewable energy came from biomass and was used for heat production. Renewables' role in Poland's electricity mix was hardly noticeable. As a result, although the share of RES in total energy mix is close to the OECD and the EU's average, the share of renewables in electricity production mix is far below it. Poland, in fact, qualifies among OECD countries with the lowest share of RES in electricity production²⁰.

From a dynamic perspective, Poland has been progressing with the use of RES since the 1990s. In 1990, the share of RES in the total energy mix accounted for only 1.3% (1.58 Mtoe), which means that in two decades Poland has made a fivefold increase in the use of RES (up to 8.05 Mtoe). This has not changed significantly the use of different categories of RES – while in 1990 92% of renewables used in Poland were biomass and the rest was hydro energy, in 2011 the share of biomass was even higher (94%) and hydro had fallen to 2.5%. The rest – wind and solar energy accounted for 3% of the RES mix²¹.

The statistical data relating to the last decade show that despite the commitment to implement the EU's directives on the use of RES and an improvement of energy efficiency, Poland does not have an effective system of RES support. It relates in particular to a support of solar and wind technologies. Both of these renewable energy branches were booming across the EU in recent years. In Poland in the years 2000-2012, as shown in Figure 3, only the use of biomass significantly increased. Hydro energy showed variable dynamics during this period,

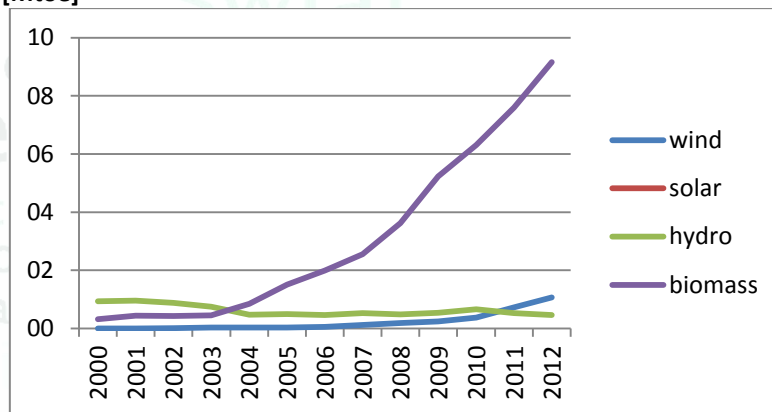
¹⁹ Final use of RES in Poland is very low diversified – 90% of renewables is used for heating, 8% for electricity and 2% in the transport sector. IEA, *Renewables Information 2012*, OECD/IEA 2012.

²⁰ The average share of RES in electricity production for OECD is 19,1%, while for European OECD 24.6%. For comparison, RES account for the following percentage of electricity in the neighboring countries: 8% in Czech Republic, 19.9% in Germany, 17% in Slovakia. IEA, *Renewables Information 2012*, OECD/IEA 2012.

²¹ Ibidem.

but its share in electricity production from RES was the highest. The production of electricity from wind recorded a small increase²². It is the second most important source of renewable electricity production²³.

Fig. 3. The use of renewables in Poland by source, 2000-2012
[Mtoe]



Source: Author. Data: BP 2013.

Development of renewable energy sources (RES) may have a significant impact on energy security. Yet, the scope of influence on both economic and geostrategic dimension of energy security will depend on dynamics of growth in the use of RES in Poland. Challenges to a wider use of RES in the energy system, on the one hand, relate to Poland's energy culture and very traditional approach to energy system, on the other hand, refer to economic and technological barriers and fears of maladjustment and potential destabilization of the energy system.

Concerning an energy culture, RES fit to the concept of energy independency – energy can be generated from the local sources, which decreases the level of import dependency. Yet, the public discourse is rather focused on presenting RES as too expensive and dangerous to the stability of the energy system. It is widely argued that contrary to the coal fired power plants that guarantee stable production of energy at relatively low costs, renewables are not only expensive but also

²² In 2011 3.488 GWh of total 5.152 GWh generated from RES came from hydropower plants, while wind power plants generated 1.664 GWh. IEA, *Renewables Information 2012*, OECD/IEA 2012, pp. 384-392.

²³ Photovoltaics suffered the worst growth rates among RES. In 2011 in Wierchosławice, southern Poland, the first 1 MW PV plant was built.

intermittent sources of energy. This means that their development within the Polish energy system requires not only substantial subsidies but also upgrades and even redesign of the grid infrastructure. Furthermore, RES are less perceived as a solution to Poland's energy security problems and more as an answer to environmental challenges. Poor environmental awareness can be therefore another possible explanation of Poland's attitudes towards development of RES. Concerning both an environmental awareness and an existing discourse, one can argue that if the debate in Poland was focused more on the potential security and social benefits of RES, it would be easier to promote them and achieve society's support for renewable energy development.

Instead of taking a tradeoff approach, which implies a potential conflict between three principles of energy policy or three dimensions of energy security – security of supply (geostrategic dimension), economic costs of energy supplies (economic dimension) and sustainability of energy production and consumption (environmental dimension) – it is useful to ask how RES can contribute to security of supply, affordability of energy and sustainability. Linking RES only to an environmental-soundness brings a false picture of their potential role in ensuring energy security in more traditional terms.

In geostrategic dimension, RES change the energy supply chain and impact on different energy security indexes. More energy is produced from divergent domestic sources improving the energy security situation. On the one hand, RES diversify an energy mix – both primary energy consumption and production mix as well as a portfolio of final energy production technologies. It is important for Poland, whose energy mix, and especially electricity mix, is dominated by coal. In theory, a differentiated and optimized portfolio of energy sources reduces the risk of interruptions in energy supplies and the risk of energy crises. In addition, given that renewables are varied, their use provides a synergistic effect – the energy mix becomes diversified by renewable energy (as a group of primary energy sources) and at the same time by different categories of RES (wind, geothermal, hydro, solar

biomass, though local conditions determine more or less the use of different renewables). It is the key to energy security that makes diversification such an important principle²⁴.

On the other hand, the use of renewables affects the level of import dependency and so vulnerability to external disruptions in energy supplies. Reducing dependence on imports through the use of domestic renewable sources decreases the risk of external geopolitical, technical or economic disruptions. This gives a larger influence on the energy security risk profile of a country, and is especially important if the import of raw materials comes from politically or economically unstable regions. For Poland, the key concerns regarding security of oil and gas supply relate to a question whether Russia is a stable, reliable and predictable exporter. Moreover, high fluctuations of fossil fuels' price in recent years and its growing unpredictability constitutes a great challenge to all importing countries. In the long time perspective, the development of RES will gradually decrease vulnerability of importers to price fluctuations in the global market.

Unquestionably, RES are the most pro-social and pro-environmental solution and a long-term choice. They address perfectly the concept of sustainable development but they can also improve energy security. Together with the traditional methods and non-conventional technologies of energy production, RES can become a tool for increasing the flexibility of the energy system. Today RES are one of many technological options for Poland which instead focuses on the development of clean-coal technologies, shale gas, and is considering introduction of nuclear energy. RES will not substitute for conventional fossil fuels, yet they can be a very useful instrument for an energy security policy. The promotion of RES proves a strategic approach of government which wants to overcome present and future energy and social challenges. This is a long-term solution, but also a new way of thinking about energy security based on the principles of energy democracy and greater energy independence. Development of RES involves, thus, evolution of energy culture based

²⁴ D. Yergin, *Ensuring energy security*, "Foreign Affairs", vol. 85 no 2, p. 70.

on the use of conventional non-renewable sources and traditional approach to the energy sector.

Ensuring security of supply involves not only “secure domestic sources of energy” but also reliable domestic supply chain, including reliable infrastructure, managed demand, preparedness for supply disruption and environmental sustainability²⁵. All of these stages of the supply chain are important to maintaining a stable functioning of the energy system and energy security. Poland needs solutions that are comprehensive and long-term, but also realistic. It is important, therefore, to develop an internal gas market and to make it more flexible thanks to new infrastructure projects. In addition, Poland should take strategic steps towards the promotion of RES. Renewable energy will not stand a chance of widespread development without an adequate and transparent support scheme. Hence, the Polish RES sector keeps on waiting for fundamental legislation on RES, which would encourage their development. The current support scheme based on tradable certificates of origin (so called “green certificates”) is highly ineffective. So far, major beneficiaries of the Polish “support mechanism” have been biomass-coal co-combustion facilities and old hydro power plants. Moreover, it fails to provide a stable investment environment due to high fluctuations in the green certificates’ prices (only in 2012 the prices of green certificates in Poland decreased by over 50%). Creating a new sustainable energy culture based on the conservation of energy, energy prosuments, a dispersed energy system and smart energy networks is a challenge. Adequate legislation that creates a stable and friendly investment environment will offer potential not only for a greater use of RES to meet energy needs but also activate the scientific and industrial potential of the country. From the economic perspective, RES indeed require subsidies, but their promotion and development leads to a new era of innovative energy technologies. Apart from that, RES will become more and more competitive, similarly to any other former “new”

²⁵ Quantitative Assessment of Energy Security Working Group (2011), *Developing an Energy Security Index in Koyama, K. (ed.), Study on the Development of an Energy Security Index and an Assessment of Energy Security for East Asian Countries*, ERIA Research Project Report 2011-13, Jakarta: ERIA, pp.7-8.

and “innovative” non-renewable source, when they scale. The size of the renewable energy industry and its greater operational efficiency will result in further technological improvements and greater affordability of renewable energy in comparison to energy form fossil fuels. Referring to the economies of scale mechanisms, it is worth noticing that renewable industry (except for biomass) will not have one very common limit of economy of scale – raw material supply. Finally, in a country which is forecast to face electricity shortages in the future, RES are the easiest way to find a substantial volume of the new generation capacities.

Conclusion – development of RES and evolution of energy culture?

Thinking about an energy culture –which represents sets of experiences and behaviors relating to the way energy is consumed and produced in a society – as a base for analysis of a country’s energy policy and especially its attitudes towards new technological developments in the energy market can be a useful methodological tool. Yet, in such an analysis it is important to see an energy culture in a dynamic perspective – see its evolution. Energy cultures evolve under the influence of different factors, including global and regional energy supply-demand trends, technological progress, changing energy geopolitics and perception of threats to energy security.

Technological revolution in the energy market brings new challenges and opportunities for energy security. It consists of two trends: the first is the development of clean energy technologies, including smart and renewable energy technologies, and the second is development of the LNG market, off-shore exploration and non-conventional oil and gas production. These technological trends give new options for ensuring energy security in the 21st century but they also influence energy cultures.

Poland represents a traditional approach to energy security, which is usually explained by its complicated energy security situation. This is, however, an oversimplified explanatory perspective. Its approach to development of RES as

an integral part of the EU's energy and climate policy is a perfect example of the interplay of different factors.

One group of factors relates indeed to technical and economic obstacles of a wider integration of RES to the energy system. Obviously these potential problems cannot be neglected. The costs should not outweigh the benefits. Information coming from Germany that RES play havoc with power prices and the grid itself due to their variability needs to be heard and considered. At the same time, however, it is important to see that there are other European countries producing over 50% up to 100% of electricity from renewables and their energy system is well performing. It is then a question of lessons learning and searching for the best solution for RES development for a particular country.

The other group of factors influencing the approach to RES in Poland refers to more societal and psychological factors. There are deep fears of 'diversification away from coal' – a resource that since the industrial revolution has been a driving force of Poland's economy and a core instrument of ensuring energy security. Poland feels more secure and safe with coal as the center of its energy policy. Hence, coal is the most important primary source of energy and it will continue to play this role for Poland's economy for next few decades. It will be used as a source of steady base-load power. Natural gas is a traditional fossil fuel that is perceived as an interim solution in a transformation toward a more sustainable energy future and it receives serious attention in thinking of Poland's future, as far as it is not exclusively Russian gas. Poland is determined to take advantage of the non-conventional gas revolution and develop its own shale gas deposits. There is a common perception that shale gas will provide a lot of economic and geostrategic benefits which will outweigh eventual environmental obstacles. Both coal and gas lobbies are influential as far as Poland's energy policy is concerned.

Perception and development of RES is a different story due to, among other things, a dominating discourse of the debate on energy policy in Poland. The debate on energy policy – the one that reaches Polish society – is mediatized. 'Media-

experts' usually present simplified, 'zero-one' observations – there is no time nor need for a deeper, multidimensional analysis. Moreover, an observer of the Polish debate on RES can easily feel that it is rather flat with one dominating, mainly governmental, narration. It becomes also ideologized – RES (with perhaps one exception of biomass) are associated rather with the green movements and green energy policy of the EU and not Poland's national interests and Poland's energy security. There is hardly any noticeable discussion on positive contribution of RES to energy security. Finally, it is important to emphasize that a dominating negative narration focused on presenting/creating of threats to energy security is shaped under the influence of commercial interests of different energy lobbies. As a result, a democratic Polish society still knows little about renewable energy technologies and the potential role of a greater use of RES on decentralized basis in securing a demand for energy, especially at the local level, and in increasing the quality of life.

Concerning the mainstream discourse, a development of new generation renewable technologies as a part of Poland's energy policy will face resistance. Poland's activity and inactivity in this field of energy policy will depend on two key factors – the interests of different lobbies (coal and gas, shale gas lobby in particular) that strongly influence political decision makers; and the commitments to implement the EU's energy-climate *acquis*. Taking into account, however, previous political and legislative actions – to meet the RES target only old large-scale hydro-power plants and biomass installations (coal-biomass co-fire installations) received greater support – one can expect further manipulations in this area, which will not lead to an effective support of RES.

Energy culture and a dominating discourse on energy security may yet gradually change and influence the behavior in the environmental dimension of energy security. Two variables can determine this evolution. First, a rising awareness of the need to ensure the protection of our environment and of security and social benefits of RES development. Second, global and regional energy market trends in the development of renewable technologies in relation to other energy sources. In

other words, a comparative perspective will be needed – economic, technological, geopolitical and state of natural environmental factors will influence the use of different energy sources. Rising competitiveness and physical availability will give advantage of one source over another.

Today, Poland needs first and foremost a wider openness for discussion and freedom of thinking about energy security. Otherwise it will be locked in a very narrow discourse reflecting the interests of the most influential lobbies and foreclosing development of real strategic long-term vision of ensuring energy security in a sustainable manner. New technological developments give a unique opportunity to become more creative in thinking about the best methods of ensuring energy security not only at a state and national economy level – that is macro-system level, but also at the micro-level of a single Polish commune (gmina) and a single household. Laura Nader – an American professor of anthropology who was invited in the 1980s to a group of experts discussing future directions of the U.S. energy policy (the Committee on Nuclear and Alternative Energy Systems) – wrote: *There are certain pressures, at that laboratory and others like it, **that encourage people to think similarly, that, in fact, punish deviant thinking.** In science, new ideas come from oddball thinking and freedom of expression (...). I was intrigued by how people were working on the project. I noticed the earlier patterns in this group: a good deal of standardized thinking, a lack of respect for diversity, and an absolute taboo on the word solar*²⁶. Her analysis of what was intellectually challenging for a group of experts working on energy issues is live and thought-provoking: *They seem to relish something complicated, hazardous, difficult, and risky, something that requires high technology and big money*²⁷. A call from the 1980s >>*we can no longer entertain obvious solutions*<<²⁸ can be raised also today in relation to Poland and its energy culture.

²⁶ L. Nader, *Barriers of thinking new about energy*, Physics Today, Vol. 34, Issue 2, 1981, reprinted pp. 9.

²⁷ Ibidem, p. 99.

²⁸ Ibidem, p. 104.

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Abstract

This paper surveys key features of Poland's energy culture and energy security situation and how they influence country's attitudes towards environmental dimension of energy policy. It looks in this context at the obstacles and prospects for development of renewable energy in Poland. It deals, on the one hand, with the mechanisms and reasons behind disregarding in a public discourse potential role of RES in securing future energy needs of Polish society, on the other hand, with a potential contribution of green energy to Poland's energy security.

KULTURA ENERGETYCZNA POLSKI, A ROZWÓJ „ZIELONEJ ENERGII” – IMPLIKACJE DLA BEZPIECZEŃSTWA ENERGETYCZNEGO

Abstrakt

Artykuł ma na celu prezentację cech charakteryzujących polską kulturę energetyczną oraz kluczowych problemów bezpieczeństwa energetycznego Polski jako czynników wpływających na podejście kraju do ekologicznego wymiaru polityki energetycznej. W tym kontekście analizowane są bariery i szanse rozwoju produkcji energii ze źródeł odnawialnych w Polsce. Artykuł z jednej strony podejmuje temat mechanizmów i przyczyn niedoceniań w publicznym dyskursie potencjalnej roli OZE w zabezpieczeniu przyszłych potrzeb energetycznych społeczeństwa, z drugiej strony analizuje możliwe korelacje między wykorzystaniem OZE a bezpieczeństwem energetycznym Polski.