# Energy policy and the energy market in the EU states: a retrospective view

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**Abstract:** The aim of the article is to present the most important goals in energy policy to be achieved in the near term in the context of sustainable development. The starting point for the analysis is the assessment of the condition of the energy sector, as goals and tasks result from a number of circumstances and conditions of the energy supply sector. The strategic goals of climate and energy policies presented in the study show the necessary challenges for the implementation of sustainable development within the analyzed sector, which is the driving force
world economies.

**Keywords:** European policy, energy management, governance, society

In recent years in the European Union countries much attention was paid to the development of concepts and strategies of energy policy. At the same time a special place was given to the issues of transformational transition from traditional hydrocarbon energy to alternative, green energy.

It is quite obvious that a number of methodological provisions of the industry 4.0 paradigm were used as a basis for the formation of conceptual approaches to energy security policy, both in the EU energy system as a whole, and in individual countries. One of such provisions assumes the development of the economy of the XXI century on the creative concepts of energy and economic security [15].

*The European Energy Security Strategy* adopted by the European Commission in 2014 and *the Framework Strategy for a Sustainable Energy Union through a Forward-looking Climate Policy* (2015 ) [2, p. 15; 6, p. 8] emphasize that despite the EU's achievements in this area, the EU remains vulnerable to energy crises, requiring measures to ensure resilience to supply shocks and disruptions in the short term and reduce dependence on individual fuels in the long term.

Among the issues that are crucial for taking action to address energy security challenges, the documents mention the creation of a well-functioning and fully integrated internal market, stating that Europe's internal energy market is crucial to energy security and is the mechanism for its cost-effective achievement.

In the last decade the so-called Third Energy Package was the basis for the regulation of the natural gas market at EU level**,** which consists of three main legislative acts: 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 [7, p. 94-136], Directive (EC) No 715/2009 of the European Parliament and of the Council of 13 July 2009 on conditions of access to natural gas transmission networks and repealing Directive (EC) No 1775/2005 [7, p. 36] and Directive (EC) No 713/2009 of the European Parliament and of the Council of 13 July 2009 establishing the Energy Regulators Cooperation Agency [7, p. 54].

On the basis of the above-mentioned legal acts, in the following years, in the form of implementing acts within the Comitology procedure, the European Commission adopted a number of regulations defining the third energy package. Their objective is to remove barriers to access to transmission networks within the EU, thereby increasing opportunities for cross-border exchanges and harmonisation of national gas markets. More recently, the Commission has adopted implementing rules on congestion management in transmission networks (guidelines annexed to Regulation 715/2009), transmission capacity allocation mechanisms and additional capacity (CAM Directive) [7, p. 5].

The integration of national natural gas markets has played a significant role in EU energy

policy. To this end, in 2011. ACER prepared an analytical paper on the Gas Target Model [6] , in which it outlined a vision for the structure of the EU internal gas market, emphasizing the role of liquefied gas nodes forming separate zones: tariff and balance, linked by infrastructure elements guaranteeing uninterrupted gas transportation, as the main building block of the future market. In 2015. ACER published an updated model [6] greater focus on well-functioning gas hubs, which is fundamental to energy security. In the 2011 European Council conclusions, the EU internal market for natural gas should be completed by 2014 [7]. Nevertheless, the implementation of further EU executive directives was planned even in 2019. nevertheless, the electricity sector has attracted the interest of the European Commission, which prepared legislation at EU level in the field of natural gas.

However, the natural gas sector has not yet fallen completely out of the European Commission's radar. According to the conclusions of the XXIX Natural Gas Market Regulatory Forum, held in Madrid [7] in October 2016, European gas markets are currently in a dynamic phase of adjustment to the new EU rules. European stakeholders stressed that the preparation of a set of new rules similar to the currently discussed electricity package is premature for the gas sector.

The main points of the policy briefs focused on the following issues: the future of supply and demand in the European gas market, the function of wholesale markets and gas price convergence in the EU, regulatory aspects, the future and structure of member states' tariff systems, the future of gas infrastructure and new investments, ways to further integrate markets at EU level and security of supply.

There were difficulties in estimating the volume of gas in the European energy mix. Against this background, high expectations were formulated related to declining oil prices and the growing importance of imported gas and LNG due to declining production within the EU [7] need to increase competition between traditional pipeline and LNG supply routes was highlighted, as well as the need to globalise the gas market and move from regional to global markets, the growing role of contracts based on price indices rather than on oil prices and the pressure for lower gas prices due to the current geopolitical situation.[7]

The operation of European hubs was also noted, it was pointed out that Europe is not ready for several or more hubs, the number of which would lead to low market liquidity, and the prospects for hub development in Central and Eastern Europe were noted [10], although at the same time the high dependence of this region on gas, from a single supplier, was noted [4]. It was highlighted that ACER is already seeing positive effects from price convergence in Europe. In the context of low flexibility and a large number of hubs, it was noted that the key point is effective interconnection of neighbouring markets, which, however, is not possible without detailed

regulation and analysis of possible negative consequences for individual transport system operators. [9]

Regional integration has been identified as a major challenge for operators. [10, p. 11]

In order to increase competition in EU markets, the authors of the papers have analysed how the costs of transporting gas between individual countries can be reduced so that the infrastructure is used as optimally as possible, for example by shifting payments exclusively to the external EU borders or at least eliminating interconnection charges between EU member states. [4]

According to Polish respondents, the documents submitted for analysis did not fully reflect both the current state of market development and the direction of action to be taken to achieve a truly competitive, diversified and secure market at EU level. [1]

It was emphasized that access to new sources should be supported by regulatory and financial support. Without such support and the creation of new opportunities, integration will be a facade. It was stressed that only such measures would ultimately benefit EU consumers. [1, p.8]

For many decades, Polish producers supplied hard coal to the domestic market. Imports of hard coal were small and only special grades of coking coal needed for coke production were imported to Poland. For many years Poland was a significant exporter of hard coal, and in the 1970s the share of Polish hard coal in the international market was about 19%. In 2011-2018, the export of hard coal decreased from 10.6 million tonnes to 3.9 million tonnes, and accounted for 6-10% of Polish hard coal production.

Domestic hard coal production in Poland has decreased and demand has been supplemented by imported coal. Between 2011 and 2018, hard coal imports to Poland changed from 8.3 million tonnes to 19.7 million tonnes.

With the exception of 2013, 2015 and 2016. Poland has consistently been a net importer of hard coal. Poland's hard coal imports consist mainly of steam coal (68%-85% in 2011-2018). Poland mainly imports hard coal from Russia (33-90% in 2011-2018).

The main buyer of imported steam coal was a group of other domestic consumers. This group included: individual consumers (households), agricultural and horticultural farms, small industry, public administration, health care, and a number of other consumers. During 2012-2018, this group purchased 42-56% of imported thermal coal. The total share of sales to the electricity sector (the electricity sector includes power plants and combined heat and power plants) and the industrial electricity sector was 10-20%, and the share of sales to public and non-public heating plants (in total) was 2-11% in the structure of fuel consumption for electricity generation in Poland in 2011-2018.

Hard coal (55%-59%, 796-908 PJ) and lignite (33%-35%, 466-539 PJ) accounted for the largest share. In volume terms, hard coal consumption ranged from 37.0 to 42.6 million tonnes and lignite from 58.0 to 63.3 million tonnes. It is noteworthy that Polish hard coal-fired power plants use steam coal to generate electricity.

Between 2011 and 2018, Polish hard coal exports decreased and were supplemented by imported coal. At the same time, Poland became a net importer of hard coal (except for 2013).

A significant place in the energy policy of the EU countries at the beginning of the XXI century was given to the formation of innovation policy in the field of development of the European fuel and energy complex system. At the same time, the policy was based on such key imperatives as turbulence, temporality, desynchronization, delocalization of innovation processes, etc. [13, p. 36]

Poland's future energy policy is described in the Draft Polish Energy Policy until 2040 and the Draft National Energy and Climate Plan 2021-2030. The former, among other things, envisages the construction of new combined heat and power units based on technologies: coal, gas and biomass.

In addition, local governments will play a special role in the implementation of the state policy in the field of district heating. The National Energy and Climate Plan 2030 explicitly recognizes that some heating systems in Poland will be energy inefficient. In the light of current legal regulations, these systems will either have to cease operation or adapt to CO $_2$emission standards .

Given the rising price of $CO_2$ emission allowances, one solution would be to substitute energy sources. Coal could be replaced by renewables or natural gas, for example. In 2040, the consumption of renewables (and waste) as an input fuel in thermal power plants will increase to 568 toe[1](compared to the base year 2015, an increase of 13.5 times).

One of the most important problems of the energy sector in Poland is its profitability (high operating costs of the mining sector, high CO emissions$_2$, problems with generating capacities of power plants, fear of so called blackouts and lack of self-sufficiency), which requires diversification of supply directions, especially in case of crude oil and natural gas supplies and liquefied gas.

Innovative energy development projects of individual countries of the Union play a significant role in the modern energy policy and energy security policy of the EU countries. The development of such projects, as a rule, is based on the paradigm of the concept of creative development of the innovation economy. [11, p. 77]

[1] Designation for tonnes of oil equivalent

Based on the conceptual provisions of this methodology, in order to meet the European objectives and bring the energy policy of Poland in line with European standards, in March 2015 the President of Poland signed a special law dedicated to renewable energy sources. The law regulates such issues as: improvement of energy security and environmental protection, rational use of renewable energy sources as well as optimal and sustainable energy procurement for final consumers. Some of the regulations entered into force in mid-April 2015, others - including ways to support renewable energy producers - in January 2016.

Thanks to this law, it was assumed that by 2020 there will be about 250 thousand consumers in Poland, and energy consumption from renewable sources will account for 19% (currently about 12%) of the final annual energy consumption. It was also assumed that the number of household renewable energy systems would grow due to - among other things mentioned above - easier access to credit for consumers. In addition, according to the scenario adopted by the Polish government, in 2020. Poland was supposed to rank fifth in the ranking of EU countries in terms of the number (area) of installed solar panels (after Germany, Italy, France and Spain).

The Polish Wind Energy Association estimates the potential for onshore wind power in Poland at more than 12 GW. On the other hand, 12-14 GW could be created in the Baltic Sea after redevelopment of the offshore plan. The energy generated by wind power plants on land, and in the future also on sea, can cover part of the deficit created after the disconnection of consumed traditional electricity. This will increase the country's energy security and reduce the need for energy imports.

Biomass is widely available in Poland and has a great potential for development due to the surplus of straw, which is a by-product of the developed agricultural industry. In Poland, about 60% of all land is agricultural land, of which 40% is arable land (almost 14 million ha). This means a high supply of biomass. Of great interest is the production of energy from the combustion of solid fuels such as wood and straw. Energy biomass resources in Poland are estimated at about 30 million tons per year: 9 million tons are wood and wood residues from forests and orchards, 8 million tons are straw stalks, 6 million tons are different types of biowaste and other materials (not commonly used). Thus, it is obvious that the biofuel has certain perspectives for the development of the energy sector in Poland. [13]

The Renewable Energy Law was adopted by the Sejm on 20 February 2015 and signed by the President of Poland on 11 March 2015. The law entered into force on 4 May 2015. The Act defines, among other things, such terms as: biogas, agricultural biogas, biomass, and bioliquids. The act also defined: - principles and conditions for conducting activities in the field of electricity production from renewable energy sources in micro and small plants, principles and conditions for

conducting activities in the field of electricity production from agricultural biogas or bioliquids, - mechanisms and instruments that ensure electricity production from renewable energy sources.

In addition, the amendment to the Act introduced a definition:

- a consumer "i.e. an end user who buys electricity under an integrated contract, producing electricity exclusively from renewable energy sources in a micro-installation for his own consumption".
- energy cluster - "a civil law contract, which may include natural and legal persons, scientific institutions, research institutes or local authorities, concerning the production and balancing of demand, distribution or trade of energy from renewable energy sources or from other sources and fuels, within a distribution network with a rated voltage of less than 110 kV";
- energy cooperative - "the object of activity is the production of (a) electricity in renewable energy installations with a total installed electric capacity not exceeding 10 MW, or (b) biogas in renewable energy installations with an annual capacity not exceeding 40 million meters$^3$, or (c) heat in renewable energy installations with a total cogeneration capacity not exceeding 30 MW, - and balancing demand, distribution or turnover of electricity, biogas or heat for the energy cooperative's own needs and for the needs of e.

Since 2015, a programme in support of dispersed renewable energy sources, called "consumer - line subsidy for the purchase and installation of micro-renewable energy installations", has been implemented. It is a continuation of the programme completed in 2014. - "Support for dispersed, renewable energy sources". It offers financial support for:

- projects related to the purchase and installation of small or micro RES units to generate electricity for single or multi-family buildings under construction;

- of installations that produce electricity;

- for the purchase and installation of installations using more than one renewable energy source in parallel.

Other segments of energy market support in Poland in 2014-2020 are: - Regional Operational Programmes - ROP, - National Operational Programmes - NOP31. Within the national programmes the following should be pointed out: Infrastructure and Environment Programme, Intellectual Development Programme, Knowledge, Education, Development Programme, Digital Poland Programme, Eastern Poland Programme, Technical Assistance Programme. For the discussed issue the most important is the Infrastructure and Environment Programme whose priorities are, among others, low-carbon economy, environmental protection, infrastructure development and energy security. The aim of the national regional programmes is to promote sustainable development in all 16 voivodships. The source of financing is the European Regional Development Fund.

The commune is the basic unit of local government in Poland. This makes its task to carry out activities of local character, not reserved for poviats and voivodeships. It follows that the commune's tasks include supplying the local population in its area with electricity, heat and gas.

The municipality can act as: local market regulator, consumer, supplier, investor and producer of energy. It should be added that the municipality can also play the role of a strategist in this area of the economy.

The commune municipality may be the producer and supplier of energy from RES installations. According to Art. 166 par. 1 of the Constitution of the Republic of Poland public tasks serving the needs of the local government community are performed by the local government as its own tasks. Meeting the energy needs of the local community is undoubtedly a public task listed in the Constitution of the Republic of Poland, which is confirmed by the aforementioned Article 7.1 of the Municipal Self-Government Act (hereinafter - m.s.).

In accordance with Article 18 of the Energy Act of 10 April 1997. (hereinafter - Z.E.) the municipality's own energy related tasks include - planning and organisation of heat, electricity and gas supply in the municipality, - planning and organisation of activities aimed at improving energy efficiency, - promotion of solutions to reduce energy consumption in the municipality.

The activities of the municipality in the area of supplying the local population with electricity belong to this area of necessary energy security related to energy security and are the task of the municipality, whose objective is to meet the collective needs of the population on a continuous and continuous basis by providing universal and accessible services.

Pursuant to Article 2, the municipality may carry out the tasks remaining within its scope by establishing commercial companies as well as a budget institution. The municipality may, within the framework of the tasks of planning and organisation of gas and energy supply, establish economic entities, the economic activity of which is based on the production and sale of energy from RES.

A municipality can be a producer and supplier of energy from RES installations.

The municipality may, as part of its tasks of planning and organising the supply of gaseous fuels and energy, establish economic entities whose economic activities are based on the production and sale of energy from RES. It should be added that the municipality can become both distributor and supplier of energy. The activities of the municipality in the field of RES energy generation should be considered as belonging to its own utility tasks in the field of electricity supply. The energy cluster allows the municipality to fulfil its role as an energy consumer and an active participant in the energy market.

The term "*energy cluster*" contained in the RES Law is defined as a civil law contract, which may include natural and legal persons, scientific institutions, research institutes or local governments.

It is about creating and balancing the demand for distribution or trade of energy from renewable energy sources or other sources or fuel in the distribution network with nominal voltage of less than 110 kV within the area of this cluster, not exceeding the borders of one poviat or 5 communes within the meaning of the Municipal Government Act.

As the study of experience of a number of countries in the field of energy management and innovation management shows, this problem is quite solvable. The existing management tools and methods allow for effective management of innovation development processes in various regions.

One such tool is the methodology for managing the implementation of innovation policy based on the application of the KPI system.

The methodology for selecting KPIs as a tool for managing the implementation of innovation policy in the energy sector is usually based on the decomposition method (a method for building a tree of goals of the system of key performance indicators of innovative activities in the fuel and energy sector).

Binding of KPIs (key performance indicators) to general indicators, criteria and performance indicators of innovative activities in the field of energy is carried out on the basis of expert assessments using the methods of the performance indicator construction tree. [14]

Thus, the development of innovative strategies of energy policy of the organization should ensure the implementation of modern trends and trends in STI.

Built on the basis of this methodology, the strategies of innovative development of FEC will be able to provide opportunities for cooperation in the energy cluster of local governments with other entities, both scientific and business, the chances of business success increase, as each of the participants brings to the enterprise a unique set of features, experiences and tools for improving productivity, innovation and entrepreneurship, which are favorable factors for the creation and development of new businesses.

**Bibliography**


1. Contribution of the Ministry of Energy of the Republic of Poland to the de bale on Study on Quo vadis gas market regulatory framework, 16.01.2017, s. 1, https://ec.europa.eu/energy/sites/ ener/files/documents/quo_vadis stakeholder_responses_jan_2017_v2.zip (dostęp: 10.07.2017).
2. European Energy Security Strategy, Communication from the Commission to the Europe- an Parliament and the Council, SWD(2014)330 finał, COM(2014) 330 finał, Brussels 28.5.2014, s. 15.

3. European Gas Target Model Review and Update, January 2015, http://www.acer.europa.eu/Events/Presentation-of-ACER-Gas-Target-Model-/Documents/European%20Gas%20Target%20Model%20Review%20and%20Update.pdf.
4. Frontier proposal, s. 2, https://ec.europa.eu/energy/sites/ener/files/documents/quo vadis_ stakeholder responscs jan 2017_v2.zip (dostęp: 10.07.2017).
5. Gas Target Model - ACER, http://www.acer.europa.eu/sk/Gas/Gas-Target-Model/Stranky/ Background.aspx (dostęp: 10.07.2017).
6. Komunikat Komisji do Parlamentu Europejskiego, Rady, Europejskiego Komitetu Ekonomiczno-Społecznego, Komitetu Regionów i Europejskiego Banku Inwestycyjnego. Strategia ramowa na rzecz stabilnej unii energetycznej opartej na przyszłościowej polityce w dziedzinie klimatu, COM(2015) 80 finał, Bruksela, 25.02.2015, s. 8.
7. Konkluzje Rady Europejskiej, EUCO 2/1/11 REV 1,08.03.2011 r., https://www.consilium. europa.eu/uedocs/cms data/docs/pressdata/en/ec/119175.pdf (dostęp: 10.07.2017).
8. Konkluzje XXIX Forum Regulacyjnego Rynku Gazu Ziemnego w Madrycie, https://ec.euro- pa.eu/energy/sites/ener/files/documents/29th_mf_conchisionsadopted.pdf (dostęp: 10.07.2017).
9. Proposal: Administrative and Technical Parts - CEPA, s. 10, https://ec.europa.eu/energy/sites/ener/files/documents/quo vadis stakeholder resp<>nses jan 2017_v2.zip (dostęp: 10.07.2017).
10. Quo Vadis EU Gas Market Regulatory Framework. Study on a Gas Market Design in Europę - Ref-e, s. 4, https://ec.europa.eu/energy/sites/ener/files/documents/quo_vadis_stakeholder_responses_jan_2017_v2.zip (dostęp: 10.07.2017).
11. Savina, M.V, Solodukha, P.V. , Stepanov, I.A. , Khominich, I.P. , Novichkov, A.V. Essence, place and role of creative economy in innovation development paradigm//Review of EuropeanStudiesthislink is disabled, 2015, 7(6), pp. 77-85
12. Soboń J., Soboń D., Przychodzka I., Rodzaje biopaliw, Międzynarodowa Konferencja "Odnawialne źródła energii jako wyjście z kryzysu ekonomicznego państwa i regiony", Uniwersytet Ekonomiczny w Bratysławie, Presov, 2009
13. Soboń D., Rogozinska-Mitrud I., Stasiak J. Imperatives of Innovation Policy Implementation in the Concept
14. Stepanov I.A., Korniiko U.V., Shcherbakova M.A. Key performance indicators of regional innovation development // Management of economic systems. Electronic scientific journal. (121) UEKS, 3/2019
15. Stepanova I.A., Savina M.V., Stepanov A.A. Problems and strategies of creative class development in the concept of economic security of the Russian Federation / In Proceedings of the XI International Scientific Conference "Modern problems of sea and coastal areas potential use" March 26, 2015. Part 2.Moscow: Publishing house of Private Educational Institution "MU named after S.Yu.
16. Digital transformation: monograph / Edited by Doctor of Economics, Professor A.A. Stepanov. - MOSCOW: RUINS, 2020. - C.36.