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ENERGY SUPPLY CHAIN MANAGEMENT AND SECURITY IN PUBLIC-PRIVATE PARTNERSHIP

ABSTRACT: The aim of the article is to identify and analyze how to manage the energy supply chain as part of public-private partnership and to try to answer the question in what direction should the Polish industry go to compete on global markets in the face of many challenges of decarbonisation? Maybe by using green energy produced close to its recipients and supplied bypassing the transmission grid? Maybe through the diversification of installations processing energy from various sources (RES), which would constitute an additional regulatory value for the power system? Could solutions, e.g. based on a direct line system, help in such a difficult technological and regulatory time for the energy market? As a research problem, an attempt was made to answer the question to what extent, for example, a systemic approach based on the model of direct lines can help strategic industry organizations in managing the energy supply chain, especially in situations of energy crisis? What actions can be taken to keep a secure energy supply chain management system operational or how to deal with threats affecting the functioning of the energy supply chain?

The essence is to emphasize the role of the energy supply chain management system, based on specific requirements or innovative solutions, e.g. a sharing system or direct lines, in maintaining an appropriate level of energy supply security, especially during an energy crisis. To what extent can the requirements of reference documents focusing on operational control and process control ensure the security of the energy supply chain?

With regard to the research problems defined in this way, the working hypothesis was formulated as follows: Searching for innovative solutions in the energy sector, and in particular the implementation of direct systems, can effectively counteract or at least reduce the effects of the recent electricity crisis and increase economic attractiveness for the industry.

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The article uses theoretical and empirical research methods adapted to the problems posed and the purpose of the article. These include: analysis of the literature, normative and legal documents and internal system documentation of sample organizations, the audit method using direct interview and observation of processes and activities.

KEYWORDS: supply chain, risk, crisis, security, system, energy, energy management, direct lines

INTRODUCTION

The article identifies the needs and analyzes the possibility of using new system and organizational solutions in the power industry for more effective energy management and maintaining an appropriate level of energy supply security, especially during the energy crisis. An attempt was made to answer many research questions. What direction should the Polish power industry take to compete on global markets in the face of many global decarbonisation challenges? Could new system business models, e.g. direct lines for RES or based on the requirements of ISO 50001, EMAS, help in such a difficult time of technological, financial and regulatory changes for the power market? To what extent, for example, the introduction of direct lines could meet the challenges of organizing strategic industries in managing the energy supply chain, especially in situations of energy crisis? What actions can be taken to keep a secure energy supply chain management system operational or how to deal with threats affecting the functioning of the energy supply chain? Currently, the industry is facing challenges regarding the need to systematically increase the capacity of photovoltaic and wind installations, develop biogas plants, and perhaps nuclear power plants in the future. The most serious energy crisis in the last 70 years has caused many countries around the world to ask the same questions as in Poland, how to ensure energy and raw material security while moving towards climate neutrality?

Organizational and technical systems such as cable pooling or direct lines could contribute to the effective management of the energy supply chain. Searching for innovative systemic solutions could effectively prevent or at least reduce the effects of the electricity crisis of recent years and increase the economic attractiveness of organizations or structures based on public-private partnership. The article uses theoretical and empirical research methods adapted to the problems posed and the purpose of the article. These include: analysis of the subject literature, normative and legal documents and systemic internal documentation of exemplary

organizations, system modeling, audit method using interviews and direct observation of processes and activities.

CONTEXT OF FACTORS AFFECTING ENERGY MANAGEMENT IN THE SUPPLY CHAIN

In 2011, the European Council set a goal and started the process of creating a common energy market in the EU. On March 3, 2011, the so-called the third energy package, comprising market directives, transmission regulations and the regulation establishing the Agency for the Cooperation of Energy Regulators. The determination of a specific time perspective in these documents for achieving the energy target influenced the pace and direction of the EU's activities in the area of energy. Although in 2022, 175.2 TWh of electricity was produced in Poland, almost 1% more than in 2021, the demand for energy from the industry will increase, among others due to the progressing electrification, computerization, robotization, the growing demand for technological cooling or, in the perspective of 2040, the development of hydrogen systems. The demand of the energy-intensive industry in Poland in 2022 is summarized in Table 1.

Table 1

Energy-intensive industry in Poland in numbers in 2022

ENERGY-INTENSIVE AREAS	SECTORS/INDUSTRIES	NUMBER/VALUE
Industrial factories	steel mills, cement plants, mines, paper mills	16 tys.
Workplaces	Direct, indirect and induced employment	ok. 1,3 mln
Potential	Direct, indirect value and induced	168 mld PLN
Impact on public finances	Tax revenue	ok. 88 mld PLN

Source: own study based on: Poland in figures 2022, DOS GUS, Warsaw 2022.

Currently, there is talk of the need to transform the Polish energy sector due to global regulatory requirements, e.g. related to the 2030 Agenda.

According to the study: "Forecast of covering the peak demand for power in the years 2016 - 2035", in which emphasis was placed on learning the directions of development of the power

sector, ensuring the security of electricity supply until 2035 requires the construction of new generation sources[1].

In the updated assumptions of the Polish Energy Policy until 2040, it is assumed that 50% of electricity production by 2040 will come from renewable sources. The document was also supplemented with the fourth pillar on energy sovereignty, which is part of the implementation of the main goal of the state policy, which is the competitiveness of the economy and reducing the impact of the energy sector on the environment[2].

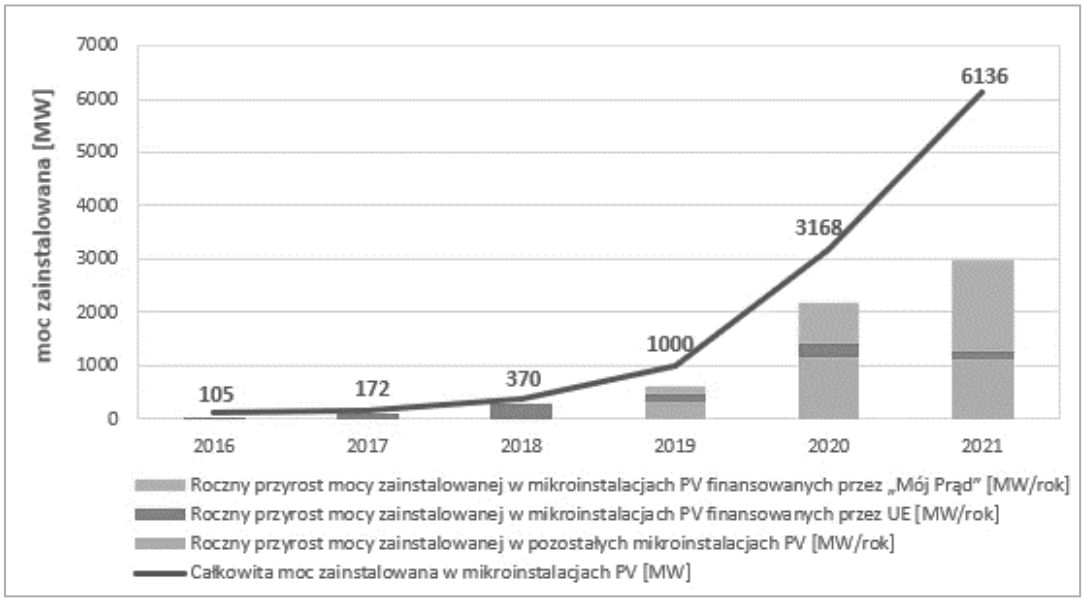
For many years, Poland has been, for example, one of the largest photovoltaic markets in Europe. At the end of 2021, the total capacity of photovoltaic farms in Poland amounted to approx. 7.7 thousand. MW, and at the end of 2022 it increased to almost 11.9 thousand. MW . Regular solar farms and prosumer installations in 2022 recorded an increase in production at the level of 5 TWh.

Figure 1 presents the dynamic growth of the photovoltaic market in Poland in a comprehensive manner. According to the latest IEO database containing a list of all photovoltaic projects under development, at the end of the first quarter of this year there were 12.5 GW of projects on the market with guaranteed grid connection conditions. This number includes approx. 5 GW of capacity not yet built and contracted in project auctions. The forecast assumes that the capacity of 20 GW in photovoltaics will be reached already in 2025, and in 2030 the cumulative installed capacity may even amount to 28.5 GW [3].

[1] Analysis of the impact of wind generation on the level of power reserve in the national power system, Lublin University of Technology, Lublin 2016, p. 3.
[2]Wind energy in Poland 2022. Offshore special supplement, TPA Poland. Baker Tilly TPA.
[3] Electricity generation in Poland in small RES installations Report of the President of the Energy Regulatory Office for 2021, Energy Regulatory Office, Warsaw 2022.

Figure 1

Annual increase in installed capacity in photovoltaic micro-installations in Poland in 2016-2021



Source: Photovoltaic market in Poland, IEO, Warsaw 2021.

The challenges of supply chain constraints and rising prices, the energy crisis, and the introduction of PV into an uncertain energy market with grid constraints will require the industry to develop new business models. Also, of course, the development of other renewable technologies is planned all the time. In 2023, there should be changes in the regulations of onshore wind energy, which could accelerate the development of this sector. The parliament is to deal with draft amendments to the so-called windmill act, including in order to liberalize the 10 H rule, which blocks the development of onshore wind energy. However, in the update of the assumptions of the Polish Energy Policy until 2040, it is assumed that approx. 50% of electricity production by 2040 will come from from renewable sources. The document was also supplemented with a pillar on sovereignty and energy independence, which concerns the implementation of the main goal of the state policy, which is the competitiveness of the economy and reducing the impact of the energy sector on the environment.

The analysis and monitoring of indicators was indicated as one of the methods of monitoring the implementation of the Energy Policy of Poland until 2040. There are 7 indexes for assessing the implementation of the goals of the state energy policy, set out in Art. 13 of the Energy Law[4], i.e. energy security, competitiveness and environmental protection. One of

[4] Energy Law Act, Journal of Laws of 2012, item 1059 with later died.

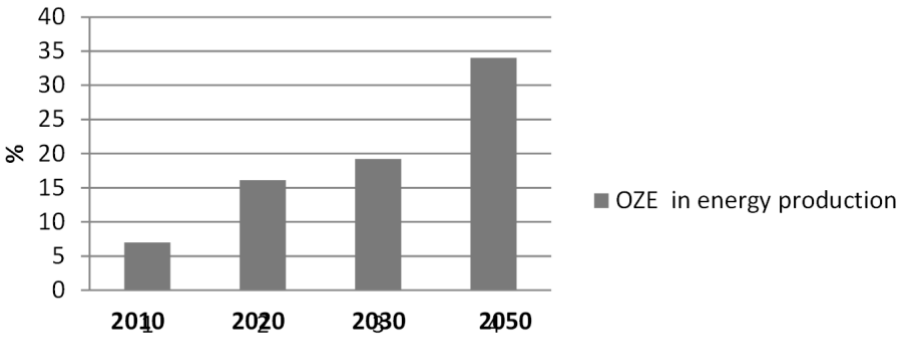
the indexes concerns the share of energy from renewable sources in the final energy consumption.

In connection with the implementation of the objective set out in Directive 2009/28/EC[5], during the implementation of the Polish Energy Policy 2040, the share of energy from renewable sources in the final energy consumption is systematically increasing. The assumptions show that the level of renewable sources in the structure of domestic net electricity consumption by 2030 is to amount to at least 32%.

Figure 2 presents the assumed increase in the share of energy from renewable sources from the base value in 2007, for selected years, which was to allow the achievement of the 15% target in 2020 [6].

Figure 2

Share of energy from renewable sources in final energy consumption in selected years in Poland from the base value (%)



Source: own study based on: Assessment of the implementation of the Polish Energy Policy until 2040, Annex 1 to the Polish Energy Policy until 2050, Ministry of Economy, version 05, Warsaw 2015; Principles for the update of the Energy Policy of Poland until 2040 (EPP2040), MKiŚ, Warsaw 2022; GUS report: Energy from renewable sources in 2020, Warsaw 2021.

[5] 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, amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC (Official Journal EU L 140 of 05/06/2009, p. 16).

[6] *REMP 2030 Prospects for the development of renewable energy in Poland*, International Renewable Energy Agency, Warsaw 2015, p. 49.

According to the data of the Central Statistical Office, in 2020 the share of energy from renewable sources in gross final energy consumption was 16.13%. Poland has reached the 15% target, in line with the 2009 RED directive [7].

The key assumptions of the "Energy Policy of Poland until 2040" is the development of RES. An important element in the implementation of the RES development policy was the adoption by the Ministry of State Assets, after inter-ministerial consultations, of the National Plan for Energy and Climate for 2021-2030[8]. This document presented activities aimed at achieving a 32% share of RES in the generation of final energy in Poland, broken down into electricity, heat and cold, and renewable energy in transport by 2030.

For the coming years, RES will be present in the country's energy balance, and the goals set for 2030 will be maintained until 2050, without further deepening them. A possible increase in the share of renewable sources in the energy balance after 2020 results from the competitive advantages of a given technology on the market, and not from the launch of additional support tools [9].

To achieve the required levels, the sources for the production of energy in renewable energy technology are important, as well as how these supply chains are managed. Generally, we distinguish two groups [10]:

- Complete Supply Chain Management (CSCM) for solid biomass and liquid as a source of energy,
- Partial Supply Chain Management (PSCM) with solar, wind, geothermal, tidal/wave, hydropower.

Table 2 Lists the elements of the supply chain of both management groups.

Table 2.

Summary of elements of the supply chain in the renewable energy technologies RES

Elements of the supply chain	CSCM	PSCM
Supply	Yes	limited
Production,	Yes	yes
Distribution,	Yes	yes
Energy source	biomass	sun, wind, geothermal, others

[7] *Statistical Yearbook of the Republic of Poland,* Central Statistical Office, Warsaw 2021.
[8] *National plan for energy and climate for 2021-2030,* version 4.1 of December 18, 2019, MAP, Warsaw 2019.
[9] J. Wisz, A. Matwiejew, *Biomass - tests in the laboratory in terms of suitability for energetic combustion,* Energopomiar Sp. z o.o., Central Laboratory 1, Power Engineering – September 2005.
[10] L. Węcław-Solny*, Reducing CO2 emissions in the energy sector,* Ecomanager 5, 2012, 26.

Source: own study based on: Logistics management in the renewable energy sector, e-Kurs, Elompres LdV Transfer of Innovation, Lifelong Learning, iSpring Suite 8.1, bsw.edu.pl.

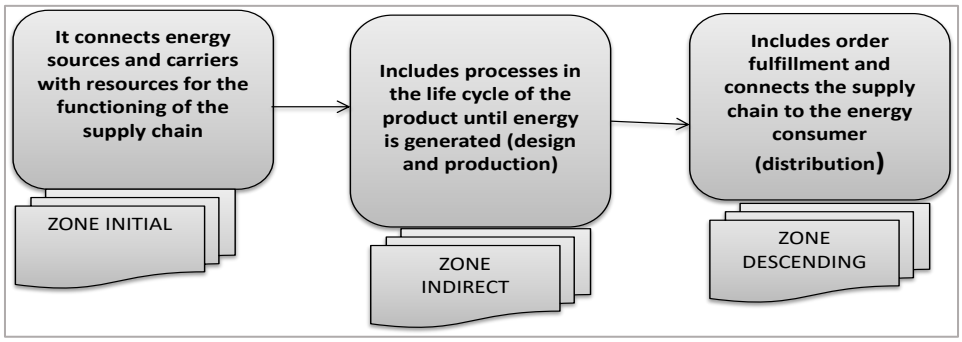
The complete supply chain (CSCM) includes the procurement process, i.e. the supply of raw materials and materials for energy production and its maintenance, the energy production process and the energy distribution process. Constrained Supply Chain (PSCM) is a limited sourcing process to the supply of parts and materials to maintain production.

Energy products, e.g. RES, are final products supplied to meet energy demand. From the point of view of logistics processes, it is important that energy is a basic mass product, i.e. it is supplied in a continuous manner. Therefore, complete supply chain management applies to all chain integration processes, including the supplier-customer relationship[11].

The architecture of the supply chain, taking into account the basic zones that are interconnected to create added value, has been illustrated in the figure 3.

Figure 3.

List of supply chain zones for RES products



Source: own study.

The structure of the supply chain depends on the type of renewable energy source and technology used to produce energy. In the case of biomass, the initial zone includes the processing and preparation of raw materials to a more usable form (e.g. grinding, drying). In the intermediate zone, the raw materials are converted into the final product (energy). In the downstream zone, the network operator or network distributor fulfills the customer's demand.

[11] L. Węcław-Solny, *op.cit.*

Purpose of supply chain management is to increase efficiency while reducing storage and operating costs and adapting energy production to customer needs. This management includes four main elements[12]:

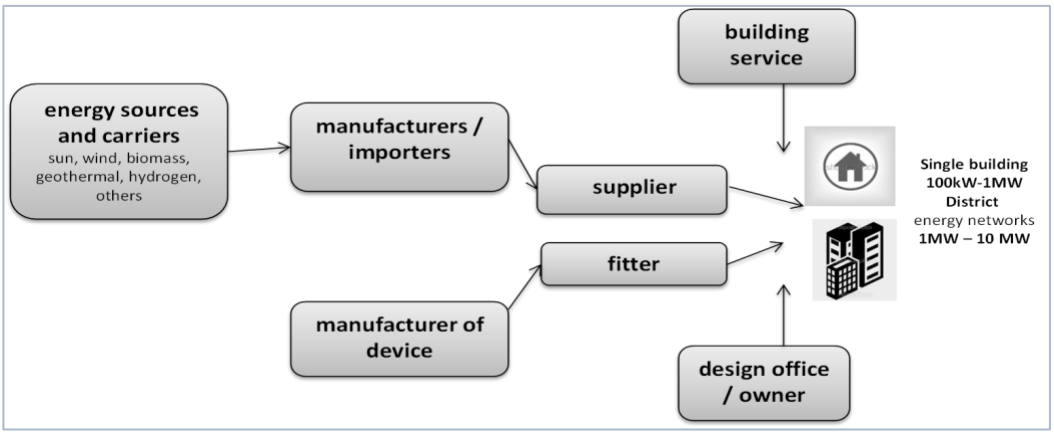
- deliveries (management of raw material deliveries, relations with suppliers, supplier databases),
- operations (request management, inventory management, production process),
- logistics (design of supply/distribution networks, relationship management with clients)
- integration (risk management, measurement, performance, environmental protection).

Logistics processes support the ability to deliver energy with the right parameters, in the right amount, in the right condition, to the right place, for the right customer, at the right price. A typical diagram of the renewable energy supply chain with regard to business relationships is shown in Figure 4.

[12] Ibidem.

Figure 4.

Scheme of the main business relationships within the supply chain



Source: own study *based on* Krupnik D., *Security of biomass supply chain management,* Zeszyty Naukowe SGGW w Warszawie, Economics and Organization of Logistics, 4/2019, pp. 41-59.

Legal facilitations, financial incentives, assistance programs and effective flow of products, services and information on individual links of the supply chain can be a guarantee and motivation for the development of this industry.

Bearing in mind the directions of development of the energy sector set out in the Energy Policy of Poland until 2040, which includes the promotion of the use of energy from renewable sources, more and more attention is paid to energy management based on standardized systems, e.g. the requirements of ISO 50001 (2018), PN- EN 15234-1 (2012), PN-EN 14961-1 (2010)[13] and many others. They are aimed at supporting the implementation of quality and sustainable development, which can be assessed based on specific requirements and process effectiveness criteria included in the standardization, notification and certification systems.

PRACTICAL CHANGES IN THE WAYS OF ENERGY MANAGEMENT AFFECTING THE OPERATIONS OF THE POWER SYSTEM IN POLAND

It was assumed that Poland would meet the target of 21% share of renewable energy sources in gross final energy consumption in 20302 - as a contribution to the EU-wide target of 32%. It has been estimated that in order to achieve the 21%3 target, the share of RES in electricity generation in 2030 should amount to approx. 27% net. Without the assumed target, based solely on cost optimization (i.e. without additional measures to support the development

[13] Guide to Biomass Heating Standards. Ensuring the quality and reliability of biomass supplies used for energy purposes, FOREST Programme, Intelligent Energy Europe (IEE), pp. 11-28.

of RES), the share of RES in the power sector in the perspective of 2030 would amount to approx. 14% net [14].

The model selection of RES sources to ensure the 27% share of RES in the power industry is the result of cost optimization. Due to technical limitations, the maximum level of annual capacity increase in the system was set at 1 GW for photovoltaic sources and 1.2 GW for net offshore wind farms (taking into account the technical development possibility from 2022 and 2025, respectively).

The problem that makes it very difficult to develop renewable energy systems in Poland is the frequent refusal of operators to issue conditions for connecting RES installations to the grid. The decisions are based on the lack of technical connection possibilities and network congestion. The solution could be diversification of energy distribution methods, eg cable pooling or direct lines[15]. For example, the Energy Regulatory Office does not always look favorably on new business models in energy management.

The biggest barrier to the development of RES in Poland is the so-called the wind farm act, which blocks the development of new wind farms. This is due to the application of the 10H principle, i.e. the possibility of placing windmills at a distance of not less than 10 times the height of the power plant at the maximum height of the rotor blade. This means that for modern wind farms with a peak height of 150-180 m, the minimum distance from residential buildings is approx. 1500-1800 m.

At the same time, the renewable energy sector has two other demands, the fulfillment of which would accelerate the development of RES. The first is to enable the construction of direct lines between industrial consumers and producers of renewable energy. The second solution is cable pooling, i.e. allowing the sharing of energy infrastructure between different generation sources, e.g. supplementing the wind farm with additional photovoltaics, which would allow the existing connection capacities to be used to build new capacities.

The first solution is energy-intensive industries that would like to use green energy produced in the vicinity of plants and supplied without the use of transmission grids.

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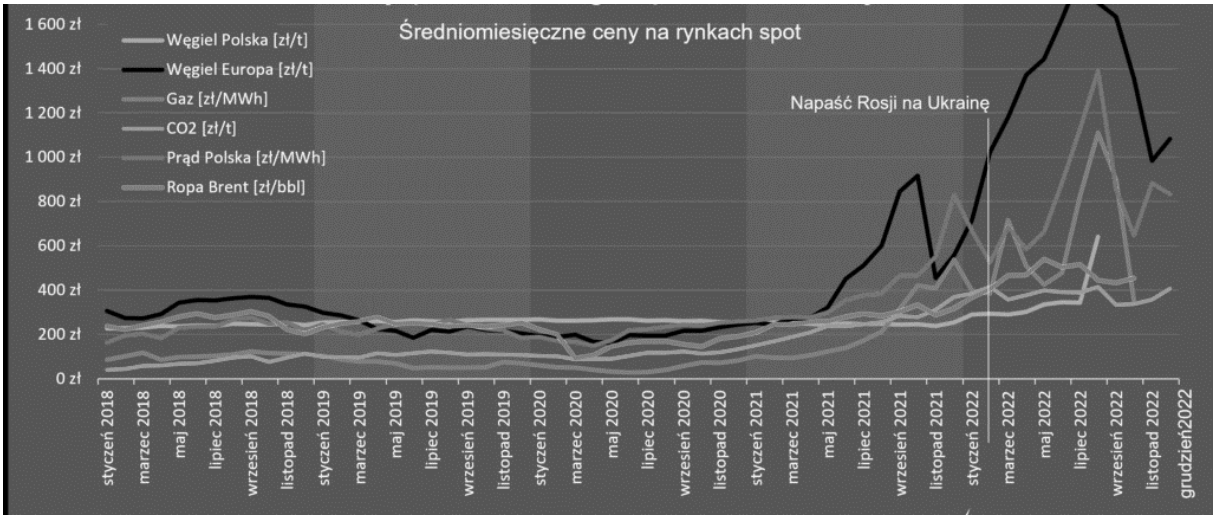
[14] *World Energy Outlook 2017 (WEO 2017)*, International Energy Agency, 2017. The share of RES consumption in gross final energy consists of the share of RES in the consumption of electricity, heat and cooling, and for transport purposes. The share of these sectors in achieving the RES target depends on the technical potential and economic conditions.

[15] J. Spiller, *Practically impossible to convert, in: Wind energy in Poland 2022 - economy, business, environment,* Warsaw 2022, pp. 28-30.

The analysis of the currently functioning energy-intensive industry in Poland (see Table 1) indicates that enabling the use of a direct transmission line between an industrial consumer and a RES producer may increase the possibilities of connecting renewable sources of green energy, which is not burdened with the cost of CO_2 emission allowances. The energy-intensive industry needs such solutions to be able to maintain the competitiveness of production. Otherwise, with constantly increasing prices of CO_2 allowances, as presented in Figure 5, the future of the industry, and consequently of energy users, may be very difficult.

Figure 5.

Prices of fuels, energy and emissions trading in 2018-2022



Source: based on enerace.online, december 2022 for: Polish energy sector in infographics, high voltage.pl (31.12.2022).

Many energy-intensive industries in Poland are already experiencing difficulties. For example, the steel industry consumes about 5-6 TWh of electricity annually, which is about 3.5 percent. domestic electricity consumption . Figure 6 on the map of Poland shows examples of industries (construction, food, chemical, metallurgy) which, due to energy and gas prices, had to introduce often far-reaching restrictions and changes in planned production.

Table 2.

Examples of restrictions in enterprises of energy-intensive industries in Poland in 2022

Industry	enterprises	Examples of threats in supply chains
construction	Cerrad Starachowice	stopped work on 3 out of 7 production lines
grocery	Carlsberg Szczecin	hreat of stopping beer production due to lack of CO_2
	Carlsberg Sierpc	hreat of stopping beer production due to lack of CO_2
	Carlsberg Brzesko	hreat of stopping beer production due to lack of CO_2

	Ambra Biłgoraj	suspension of the production of carbonated non-alcoholic beverages
	Polska Federacja Artykułów Spozywczych	threat to food production due to lack of CO_2 and dry ice
chemical	AirProduct Włocławek	suspended the production of CO_2 and dry ice
	Anwil Włocławek	stopped the production of nitrogen fertilizers
	Azoty Puławy	stoppage of melaminę production, reducing ammonia production to 10% of capacity, stopping production in the Agro and Plastics segments, stopping the installation for the production of nitrogen fertilisers, caprolactam and polyamide 6.
	AirProduct Tarnów	suspension of CO_2 and dry ice production
	Azoty Tarnów	reducing the production of nitrogen fertilizers
	Azoty Kędzierzyn-Koźle	reduction to 43% of fertilizer production
metallurgical	ArcelorMittal Dabrowa Gornicza	stopped the work of one of the two furnaces in Dąbrowa Górnicza

Source: own study based on enerace.online, december 2022 for: Polish energy sector in infographics, high voltage.pl (31.12.2022).

As the analysis of the data contained in the table shows, the energy crisis that has been going on in Europe since autumn 2022 has made high energy prices a problem for many sectors of the energy-intensive industry.

In the face of such a situation, the question becomes important whether the Polish energy-intensive industry will maintain its competitiveness on global markets in the face of the global decarbonization policy? What actions should be taken so that the industry can count on access to cheaper energy? Certainly, further development of RES, including direct lines, would be a good direction to support the loaded power grids. However, the analysis of the energy sector market shows that such solutions, for example, are considered by the Energy Regulatory Office as seeking ways to avoid incurring the costs of maintaining the power system of the existing network through the National Power System. Direct lines are to support and not replace the currently functioning system. The more so that the progressing electrification (computerization) towards 5G, 6G systems, e.g. due to the electromobility program, the Internet of Things, the planned Internet of people [16], the development of automation, robotics, artificial intelligence as part of Industry 4.0, and many other activities increase the demand for energy.

It would be advisable to adapt Polish law to the provisions of the EU RED II directive, which allows the use of, for example, direct lines.

[16] Cryptocurrency System Using Body Activity Data, Publication Number WO/2020/060606 z 26.03.2020 International Application No.PCT/US2019/038084 MICROSOFT TECHNOLOGY LICENSING, LLC [US]/[US].

Article 22 of the Directive states that Member States should ensure that renewable energy communities have the right to access, in a non-discriminatory manner, all relevant energy markets, both directly and through concentrations[17]. Moreover, they establish a framework to promote and facilitate the development of renewable energy communities in order to remove unjustified regulatory and administrative barriers, while the operator of a given distribution system should cooperate with renewable energy communities to facilitate energy transfers. EU law explicitly encourages the development of direct lines[18], characterizing active customers as those who can generate electricity on their own. This does not mean that such lines should not fit into the entire context of the functioning of the power system, but it is important that the law clearly defines the functions and role of the direct line in the national power system[19].

According to Art. 7 sec. 1 lit. Pursuant to Articles (a) and (b) of Directive 2019/944, Member States are required to take the necessary measures to enable all electricity generators and electricity supply companies in their territory to supply their own premises, subsidiaries and customers via a direct line without being subjected to disproportionate administrative procedures or costs, and to supply , individually or jointly, through a direct line to all customers in their territory by electricity generators and supply undertakings. The current practice of the market regulator shows that the provisions on the direct line in the current wording are not sufficient to achieve the objectives provided for in Directive 2019/944.

Already in the justification to the draft act - Energy Law of April 30, 2021, it was emphasized that the main problems identified in the course of work on the implementation of the directive include the understanding of the direct line as an installation operating in an island system, as well as the approach according to which Obtaining a permit for the construction of a line is possible, as a rule, only if it is not possible to connect the recipient to the power grid [20].

The intention of the legislator is to resolve the existing interpretation doubts as to the function and role of the direct line in the national power system. The understanding of a direct

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[17] DIRECTIVE (EU) 2018/2001 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 11 December 2018 on the promotion of the use of energy from renewable sources (recast) (Text with EEA relevance) (RED II), Official Journal of the European Union, Article 22 , L 328/121-122.

[18] Directive (EU) 2019/944 of the European Parliament and of the Council of 5 June 2019 on common rules for the internal market in electricity, art. 2 point 41, art. 7.

[19] The draft act amending the Energy Law Act and the Act on Renewable Energy Sources (UC 74) includes, in particular, proposals for provisions implementing Directive (EU) 2019/944 of the European Parliament and of the Council of 5 June 2019 on common principles into the Polish legal order internal market for electricity and amending Directive 2012/27/EU, hereinafter referred to as "Directive 2019/944" or "the Directive".

[20] Draft Act amending the Energy Law Act and the Renewable Energy Sources Act, April 30, 2021 Justification - Changes in the area of direct lines.

line presented so far as an alternative to the inability to connect to the local power grid does not meet the assumptions of Directive 2019/944. The construction of the direct line is primarily to help in the development of distributed energy and the construction of a system of incentives to invest in small generation units based primarily on renewable energy, which will be supplied locally. It is intended to improve the competitiveness of entities on the market by providing an alternative source of energy supply and a real opportunity to reduce the costs of business activity. Taking into account the above analyses, it is necessary in the current legislative and coordinating works,[21] introducing the planned changes aimed at developing the market in this area and ways of incorporating direct lines into the functioning of the power system due to incurring the costs of system maintenance and security of supply[22].

CONCLUSIONS

Additional business models in the energy sector based, for example, on a system of direct lines are aimed at effective and efficient management, setting the goal of efficient energy management in every form. They define the requirements for an energy management system that will allow companies to systematically strive to improve the efficiency of energy use, taking into account legal conditions and other requirements.

An energy management system is particularly important in an energy-intensive industry or when it is necessary to meet the requirements and regulations regarding greenhouse gas emissions. Such a system should be integrated with the National Power System. According to the Association of Entrepreneurs and Employers, the act on direct lines is an extremely important part of the legislation regarding the Polish energy transformation, which can reduce the deficit of green energy for the entire Polish economy. It will ensure a market impact on the entire Polish energy sector, without depriving the professional power industry of its position as the basic supplier of electricity.

Direct lines are dedicated power lines connecting the recipient with the energy generating installation, e.g. a photovoltaic farm. Energy supply based on such a line can contribute to savings. As a result, the construction of direct lines can effectively protect entrepreneurs (including large industrial plants) against abrupt increases in energy prices, increase in

[21] Date of last modification 02/03/2023, Legistacja.gov.pl/projekt/12365500/katalog/12921252#12921252.
[22] Discussion on the Act on direct lines, i.e. on connections between generation units and customers of September 30, 2022, Ministry of Development and Technology.

production costs and, as a result, loss of competitiveness. What's more, investing in own production means allows us to reduce the emissivity of the power system and better protect the climate.

What benefits can you expect from an integrated energy management system based on different business models?

It can definitely be:

- improvement of energy efficiency,
- reduction of energy costs (reduction of energy consumption), - introduction of proper supervision over the energy management system in the organization,
- compliance with legal requirements related to EU energy efficiency and achievement of commitments set out in the energy policy,
- possibility of integration with other management systems and support for innovation in the energy sector.

It is important that the draft act supports innovation in the energy sector, e.g. through administrative facilitations in the construction of direct lines, thanks to which investments in the development of distributed generation sources will be even more beneficial.

There is a need to develop a reasonable proposal taking into account:

- economic attractiveness for energy users,
- security of the power system, taking into account the diversification of access to RES.

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