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New challenges of international energy security: between continuation and change. Implications of the COVID-19 pandemic

Nowe wyzwania międzynarodowego bezpieczeństwa energetycznego: między kontynuacją a zmianą. Implikacje pandemii COVID-19

Summary: The main research objective of the presented study is to analyse, in accordance with selected theoretical and methodological assumptions, the main challenges of international energy security. This will be possible thanks to a comprehensive analysis in the explanatory and predictive dimension. Analyses of energy security issues take into account long-term development trends as well as unpredictable events related to the functioning of infrastructure and energy technology. Thus, unexpected, sudden phenomena resulting from the dynamics of the international environment gain in importance. The energy security policy has been narrowly defined so far, and thus the issue of thinking in terms of various development opportunities in the raw materials industry is often overlooked. The dilemma related to "non-linear" thinking often ignores a variety of solutions that, taken together, can cause a radical turn in the energy market and its evolution.

The methodological framework of the conducted research included research methods appropriate to the science of international relations. The factor method was useful in identifying the determinants of energy security redefinition in the contemporary world. The prognostic analysis turned out to be helpful in the part of the thesis on the prospects for the development of energy security.

Keywords: energy security, energy market, energy transformation, VUCA, COVID-19

Streszczenie: Głównym celem poznawczym badań prezentowanego opracowania jest analiza, zgodnie z wybranymi założeniami teoretycznymi i metodologicznymi, głównych wyzwań międzynarodowego bezpieczeństwa energetycznego. Będzie to możliwe dzięki kompleksowej analizie w wymiarze eksplanacyjnym i predyktywnym. Analizy problematyki bezpieczeństwa energetycznego uwzględniają bowiem długookresowe trendy rozwojowe,

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jak również wydarzenia nieprzewidywalne związane z funkcjonowaniem infrastruktury i technologii energetycznej. Tym samym zyskują na znaczeniu zjawiska niespodziewane, nagłe, wynikające z dynamiki środowiska międzynarodowego. Nowe systemy energetyczne i nowe technologie mogą prowadzić świat w kierunku nowych zależności i zagrożeń. Polityka bezpieczeństwa energetycznego była do tej pory wąsko definiowana i tym samym, kwestia myślenia w kategoriach różnorodnych możliwości rozwojowych w branży surowcowej często jest pomijana. Dylemat związany z myśleniem „nielinearnym" często ignoruje różnorodne rozwiązania, które razem mogą powodować radykalny zwrot na rynku energetycznym i jego ewolucję.
Ramy metodologiczne prowadzonych badań objęły metody badań właściwe nauce o stosunkach międzynarodowych. Metoda czynnikowa była przydatna w celu identyfikacji uwarunkowań redefinicji bezpieczeństwa energetycznego we współczesnym świecie. Analiza prognostyczna okazała się pomocna w części pracy dotyczącej perspektyw rozwoju bezpieczeństwa energetycznego.
Słowa kluczowe: bezpieczeństwo energetyczne, rynek energetyczny, transformacja energetyczna, VUCA, COVID-19

Introduction

The research problem of the study is an analysis of the security challenges arising from changes in the international energy market. Energy security is the primary analytical category for the conducted research and its results included in the paper. Within the author's framework, this category defines the scope and the specific nature of the research and its relationship to security studies. It is an important element of the epistemic layer of the conducted research. On the other hand, in terms of social reality and ontology, energy security is a foreign policy objective, an international value, and a dynamic process. As a subjective need, it concerns various types of actors, from individuals to large social groups, institutions, states, nations, and international systems. Therefore, energy security policy aims to protect the state and society against numerous threats, the multitude, unpredictability, and complexity of which result from the polyarchic international environment. Threats to energy security are dynamic, changing, and evolving.

Energy security analyses also take into account future changes in the energy mix, especially in the use of renewable sources and transformation in the social dimension[1]. The literature often views energy transformation as an important factor of social development.

1 S. Heinonen, J. Karjalaien, J. Routsalainen, K. Steinmuller, *Surprise as the normal – implications for energy security*, "European Journal of Futures Research" 2017, no. 5/12, pp. 2-13.

Energy is a sector subject to constant change and political pressure. Energy is not only an economic or technological phenomenon, but also a cultural and social one[2]. Risk is an inevitable part of the energy sector due to economic conditions, and geopolitical and environmental issues. Changes in energy prices can have serious social repercussions on the state. Risk may also arise from possible external factors, such as tsunamis, earthquakes, and other natural disasters[3].

Energy security analyses include unpredictable events related to the functioning of energy infrastructure and technology. So unexpected, sudden events, referred to in the literature as wild cards and black swans, gain importance. Recently, businesses, governments, and international organisations have paid more attention to the risk and vulnerability of energy systems. Problems and distortions in this dimension are the basis for thinking about innovation and economic and social change. Thus, we currently live in times of permanent change caused by the development of technology, the requirements of sustainable development, and unpredictable political and social processes[4]. Concepts such as "megatrends" or "great transformations" were created to describe these phenomena, taking into consideration their specific nature. However, far-fetched interpretations are often formulated.

1. Theoretical dimension

Political science theorists have not developed appropriate research apparatus that could contribute to a deep exploration and explanation of the role and significance of energy policy in the area of international security. The interdisciplinary character of this concept and the changing research approaches justify the conclusion that energy policy can be studied using a variety of theories and research methods. Their multitude proves that energy policy as an explanatory space is very broad. Each research approach seeks to demonstrate differences in the perception of energy policy and identify its most important des-

2 Ibidem.
3 Ibidem.
4 Ibidem.

ignations[5]. In the analysis of energy security, it is difficult to separate the theory of that concept from its practice. Paradoxically, the widespread discourse on this subject, on the one hand, links the concept of energy with security, and, on the other hand, hinders the process of conceptualising and normalising energy security[6].

A very useful theoretical approach in solving the research problem of the study is the concept of securitisation. The Copenhagen Peace Research Institute emphasises the necessity to expand the catalogue of security threats in international relations. It creates a vision of security that addresses both military and non-military threats. In this context, "security involves the survival" of a given actor[7]. Threats may emerge on many levels of the actor's functioning, significantly limiting its development opportunities. The process of securitisation is about defining an activity as belonging to the security sphere. The state has the authority to grant this activity special status. In other words, an issue becomes securitised when political or social leaders begin to talk about it as an existential threat to a given social group[8]. The threat therefore means a phenomenon or disproportion in resources that causes concern and fear. Both security threats and the objects to be secured (*referent objects*) are not given *a priori*, but are created in a social process. What falls under the security domain is defined by the securitising actor. The concept of national security evolved significantly during the Cold War. Since the 1980s, as the likelihood of a conflict breaking out on a global scale has decreased, the importance of the political and military dimension of security has also diminished. At the same time, more and more often two other dimensions of security were taken into account: economic and ecological security. Both of these security sectors correspond with the concept of energy security. Access to energy resources determines the development of a national economy, while their exploitation causes the release of greenhouse gas emissions into the atmosphere, which has

5 T. Hoffmann, D. Magierek, *Polityka energetyczna Unii Europejskiej w wybranych teoriach badawczych*, [in:] *Między ewolucją a rewolucją – w poszukiwaniu strategii energetycznej*, J. Maj, P. Kwiatkiewicz, R. Szczerbowski (eds.), Poznań 2015, p. 181.

6 F. Ciuta, *Conceptual notes on energy security: Total or banal security?*, "Security Dialogue" 2010, vol. 41, no. 2, p. 124.

7 B. Buzan, *Rethinking Security after the Cold War*, "Cooperation and Conflict" 1997, vol. 32, no. 1

8 Ibidem.

a fundamental impact on the condition of the natural environment. The increased importance of economic security (especially regarding energy) in international relations was related to the crisis in the United States due to the lack of oil supply liquidity and substantial dependence on oil imports in the 1970s. The oil crisis linked to the embargo on this raw material imposed by the Arab states on the West can be considered a breakthrough moment in the process of conceptualising the term "energy security". At that time, the term started to appear in national security strategies and in literature. Therefore, one can conclude that the issues related to the energy market have been securitised. Currently, security is becoming multidimensional, having regard to, among other things, the political, cultural, and economic conditions of the activities of both states and non-sovereign actors[9]. "This means that national security interests are integrated into broader structures of the international order"[10]. In the case of energy security, we are dealing with sovereign and non-sovereign actors. The actors in the energy market are states, international organisations, transnational corporations, and individual consumers. Therefore, the analysis of the concept of energy security challenges both the traditional understanding of security and the securitisation theory.

Some researchers speculate that in the next three decades, technological change will be so dynamic that it will change the structure of human history[11]. One thing is certain: the future will be different from the present, but it will not resemble the future we imagine[12]. In this context, the concept of VUCA was born. This is an acronym for four phenomena: volatility, uncertainty, complexity, and ambiguity[13]. The concept concerns the relationship between energy transition and societal transformation:

- **volatility:** describes the growth rate in many areas, characterised by the "variability of the directions of change" and a high frequency of "ups and downs" through disruptions of trends.

9 B. Buzan, O. Wæver, J. de Wilde, *Security: a new framework for analysis*, Boulder 1998.
10 M. Pietraś, *Bezpieczeństwo międzynarodowe*, [in:] *Międzynarodowe stosunki polityczne*, M. Pietraś (eds.), Lublin 2006.
11 S. Heinonen, J. Karjalaien, J. Routsalainen, K. Steinmuller, op. cit., pp. 2-13.
12 Ibidem.
13 Ibidem.

In the energy dimension, volatility manifests itself in new technologies and lifestyle changes in societies. This makes it possible to create radical energy scenarios related to the energy transformation towards renewables[14];

- **uncertainty:** indicates the conditions under which decisions are made in different times. Unpredictability has thus become the norm in recent decades due to the impact of technological innovation. In this context, the multiplicity of actors, the variety of their interests, influences, and theories about changes in the contemporary world cause uncertainty. Even the most advanced research tools for predicting the future have their limitations, mainly due to social conditions[15]. Most future civilisational challenges cannot be predicted;
- **complexity:** indicates that there are many different conditions and elements that interact in different ways. This creates specific systems with different dynamics and structures. Regarding the great energy transformations, various actors, structures, and organisations, both centralised and community-based, play a pivotal role. In recent decades, in the age of globalisation, development of social media, and digitisation of the economy, these connections are becoming even closer and more dynamic;
- **ambiguity:** identifies difficulties in understanding meaning, forming conclusions, and interpreting new, unusual phenomena. Epistemologically, incompatibility between the processes of prediction and explanation can be observed. Understanding the specificity of the system and interpreting how it functions requires simple models, as opposed to the predictive dimension, which is usually based on complex models that include a variety of conditions. "It is possible for something to make sense *ex post* and simultaneously for it to be impossible to predict *ex ante*, as well as possible to predict but not interpretable"[16].

14 Ibidem.
15 Ibidem.
16 Ibidem.

Research on VUCA indicators also addresses the probability of disturbances resulting from extreme events[17]. In this context, the concepts of a "black swan" and a "wild card" or "X event" come into play[18]. They suggest the possibility of sudden, unexpected changes that have profound and radical consequences.

The "black swan" concept refers to events that are difficult or even impossible to predict, and when they do occur, their consequences may be global. Such events may be negative or positive. Although "black swans" are unpredictable, a combination of different indicators can point to the emergence of such phenomena.

"Wild cards" are phenomena or solutions with a very low probability of occurrence, but once they occur, they have a huge impact on the system in which they occur. This impact can be negative or positive. These phenomena appear as a "strategic surprise"[19] and often provoke inadequate, delayed, or incorrect decisions.

While "black swans" are unnamed and unimaginable, "wild cards" can be imagined and even identified. We can thus create a "set" of "wild cards" as potential scenarios. Both "black swans" and "wild cards" have varying risks of occurrence as they are difficult to predict due to the lack of precedent. Thus, it is important to be prepared for such "surprises" by creating action scenarios.

Extreme events, the "X events", are viewed as negative and problematic in the short term. In the long term, they may represent opportunities for changing an ineffective system. In this context, such phenomena cause civilisational progress. This concept stems from a critique of focusing on an analysis of trends, which result from continuity and linearity.

Ariel Colonomos points out that if we want to predict the future, it is important to differentiate between continuation and suddenness of events[20]. "X events", "black swans", and "wild cards" largely reflect the researcher's worldview, knowledge, or faith. All these events are hard to predict but they can be imagined and described according

17 O. Mack, A. Khare, A. Krämer, T. Burgartz, *Managing in a VUCA World*, New York–London 2015, pp. 3-41.
18 S. Heinonen, J. Karjalaien, J. Routsalainen, K. Steinmuller, op. cit., pp. 2-13.
19 Ibidem.
20 A. Colonomos, *Selling the Future. The Perils of Predicting Global Politics*, Hurst 2016.

to the observer's vision. In this context, technological, infrastructural, or economic transformation can have a dramatic impact not only in material terms but also psychologically. "Black swans" in energy transformation will also manifest themselves in the political and social dimension[21].

2. Redefining energy security

Richard Ullman in the article "Redefining Security" declared the need to redefine threats to security. He defined threats to national security as "actions or sequences of events" that: threaten drastically and can degrade the quality of life of a community in a short time; threaten the discretion of governments to shape state policy[22]. Norman Myers pointed out that national security is not just about the military dimension but increasingly relates to access to resources, arable land, forests, biodiversity, climate, and other factors[23].

Energy security is based not only on objective economic premises related to free market principles but is also determined by political and geostrategic issues. "The oil crisis" of the 1970s began a new era when the energy market became an instrument of political competition between states. It showed that a lack of or uncertainty of availability of supplies can threaten the entire world economy[24]. Since then, a serious debate on the energy and resource security of states has begun.

Henry Kissinger pointed out "the necessity of cooperation of the importing states to ensure their energy security because they have a common problem that can only be solved through cooperation"[25]. Energy resources have a huge impact on the evolution of society, economic development, and the state of the economy in the national and global dimensions. He stated that "control of oil resources means control

21 S. Heinonen, J. Karjalaien, J. Routsalainen, K. Steinmuller, op. cit., pp. 2-13.
22 R. Ulman, *Redefining Security,* "International Security" 1983, vol. 8, no. 1, p. 133.
23 N. Myers, *Ultimate Security: The Environmental Basis of Political stability*, London–New York 1993, p. 21.
24 M. Kocon, *Wpływ kultury energetycznej na bezpieczeństwo energetyczne kraju. Rynki energetyczne Litwy, Francji i Niemiec*, [in:] *Bezpieczeństwo energetyczne wyzwaniem XXI wieku*, Z. Lach (ed.), Warsaw 2013, p. 119.
25 H. Kissinger, *Years of upheaval*, Boston 1982, p. 906.

of all continents"[26]. M. Collon went even further, saying that "if you want to control the world, you have to control oil resources on a global scale"[27].

Energy security relates directly to energy carriers in the context of ensuring their availability to specific recipients on acceptable terms. It is a state of no threat of energy supply interruption[28]. Energy security is also defined as the constant availability of affordable energy, which comes from diverse sources and meets the appropriate quality and environmental parameters[29]. Thus, access to raw materials is the focus of the international community. Instability in this dimension may cause serious repercussions in the economy, environment, society, and also in the military and political aspects of security.

According to Daniel Yergin, energy security means the availability of sufficient supplies of resources at an affordable price[30]. He stated that "energy security demands constant commitment and attention – both today and in the future"[31]. At the same time, it should be pointed out that most definitions of energy security are created while considering the viewpoint of energy resource consumers who are largely exposed to various disturbances in the energy market. However, such an approach seems insufficient and fails to take into account the threats to energy security faced by states exporting energy resources. As Michael T. Klare said, energy security is a guaranteed supply of energy resources that ensures the basic needs of a state are met, even in crisis or international conflict[32]. Also Jan H. Kalicki and David L. Goldwyn

26 M.M. Neag, E.E. Halmaghi, P. Cucuiet, *Contributions on the determination of the relationship among globalization, sustainable development and energy security*, "Scientific Bulletin" 2017, no. 1 (43), pp. 24-29.
27 Ibidem, pp. 24-29.
28 R. Riedel, *Bezpieczeństwo energetyczne we współczesnej securitologii*, [in:] *Bezpieczeństwo energetyczne Europy Środkowej*, Toruń 2010, p. 19.
29 K. Pronińska, *Nowe problemy bezpieczeństwa międzynarodowego: bezpieczeństwo energetyczne i ekologiczne*, [in:] *Bezpieczeństwo międzynarodowe*, R. Kuźniar, A. Bieńczyk-Missala, R. Balcerowicz (eds.), Warsaw 2012, p. 306.
30 D. Yergin, *Ensuring Energy Security*, "Foreign Affairs" 2006, vol. 85, no. 2, p. 71.
31 Idem, *Energy security and markets*, [in:] *Energy and Security: Toward a New Foreign Policy Strategy*, D. Goldwyn, J. Kalicki (eds.), Washington 2005, p. 52.
32 M.T. Klare, *Energy Security*, [in:] *Security Studies: an Introduction*, P.D. Williams (ed.), London–New York 2008, pp. 483-496.

defined energy security as the guarantee of a smooth, reliable, and affordable energy supply without any disruptions[33].

Energy security, economic development, and the challenges of climate change are interrelated as the production of energy based on hydrocarbon fuels and the growing consumption of energy resources increase greenhouse gas emissions and environmental pollution[34]. Therefore, the importance of the ecological aspect of security is growing[35]. Defining security in terms of energy and climate security makes it necessary to expand the concept of energy security to include the issue of sustainable development[36]. That is, one where "the civilisation needs of the present generation are met without compromising the opportunities of future generations for development"[37].

Sustainable development has three pillars: environmental, economic, and social. It is development that ensures that current needs are met and that does not hinder future generations' chances to meet theirs. The growth of the world population over the past decades is increasing energy demand, especially in developing countries, which in turn is increasing CO_2 emissions[38]. At the same time, economically developed countries are trying to convince poorer ones of the need to protect the climate and reduce dependence on fossil fuels. This is difficult, given the prospect of having to invest more in environmental protection. Thus, the international climate change regime has become one of the main determinants of energy security policy since the 1990s[39]. Tackling climate change requires the transformation of the energy production structure. Such a situation leads to revaluation of power and strength[40]. Energy security and climate change policy is becoming the subject of a game of competing interests and international negotiations[41].

33 D. Goldwyn, J. Kalicki, op. cit., p. 10.
34 T. Młynarski, op. cit., p. 11.
35 M. Pietraś, *Bezpieczeństwo ekologiczne w Europie: studium politologiczne,* Lublin 2000.
36 M.M. Neag, E.E. Halmaghi, P. Cucuiet, op. cit, pp. 24-30.
37 T. Młynarski, op. cit., p. 11.
38 Ibidem, p. 38.
39 See: M. Pietraś, *Międzynarodowy reżim zmian klimatu*, Toruń 2011.
40 S. Heinonen, J. Karjalaien, J. Routsalainen, K. Steinmuller, op. cit., pp. 2-13.
41 M.M. Neag, E.E. Halmaghi, P. Cucuiet, op. cit.

Until now, the main issues shaping energy security have been access to energy resources, continuity of supply, and stable prices. Currently, in the face of the necessity to counteract global warming, the assumptions states make in defining energy policy are increasingly influenced by environmental aspects, i.e. climate policy, which increasingly conditions their energy mixes[42]. States increasingly attach importance to the need to increase investment in green technologies. Thus, the importance of the environmental dimension of energy security is growing. It includes the reduction of negative environmental impacts at all levels of energy management: from raw materials extraction, through processing, transport, and consumption.

Energy production is one of the most environmentally damaging industries. It accounts for 80% of global greenhouse gas emissions[43]. Increased greenhouse gas emissions started in Europe, and then the US, and have been steadily increasing since the industrial revolution in the 18th and 19th centuries due to the increased demand for fossil fuels[44]. The largest increases in CO2 emissions can be observed in the Middle East and China[45].

There is a contradiction between energy security and environmental security. Energy is fundamental to the functioning of modern industrial and post-industrial societies[46]. Security of raw materials supply and energy production is a guarantee of the prosperity and development of societies. Environmental safety, in turn, is associated with threats that are mainly of a forward-looking nature[47].

At the turn of the 20th and 21st centuries, environmental protection became one of the main challenges in international cooperation and scientific research[48]. The catalogue of threats in security research has been expanded. Thus, the so-called Copenhagen School included environmental problems in its broadened definition of security[49]. Energy

42 T. Młynarski, op. cit., p. 30.
43 Ibidem, p. 31.
44 Ibidem, p. 33.
45 Ibidem, p. 35.
46 L. Hughes, *The Politics of Energy and Climate Change*, [in:] *The Oxford Handbook of Energy Politics*, K.J. Hancock, J.E. Allison (eds.), Oxford 2019.
47 T. Młynarski, op. cit., p. 63.
48 L. Hughes, op. cit.
49 T. Młynarski, op. cit., p. 64; B. Buzan, *Rethinking Security after the Cold War*, "Cooperation and Conflict" 1997, vol. 32, no. 1, p. 13.

and climate security is a non-military dimension of state security. On the other hand, environmental challenges were recognised as sources of threats in strategic documents of many security organisations and institutions, for example in the 2010 NATO Strategic Concept[50].

Energy transformation means a change in the way energy is generated and the transition from the current energy system using non-renewable energy sources to a system based on renewable sources. This means a wider use of alternative energy sources and the development of new industries based on long-term strategies involving innovative technologies[51]. Energy transformation is a process that includes not only the replacement of fossil fuels with renewable energy but also socio-economic changes, such as the development of new technologies, increasing energy efficiency, improved waste management, and changing the consumer's approach to energy use. The effect of this process is a reduction of the negative impact of the energy sector on climate, and in particular a reduction in greenhouse gas emissions from energy production. The effectiveness of the energy transformation depends on the structural reconstruction of the economy and changes in many sectors – from the production of energy from renewable sources to improvements in energy efficiency, waste recycling, ecological reclamation, energy-saving technologies, modernisation of transport, to increasing the awareness of societies of the field of energy saving and consumption.

Currently, while energy transformation is a challenge, it also creates great opportunities for the development of the energy sector. Increasing the share of RES (Renewable Energy Sources) in the overall energy balance of states helps improve energy security through diversification of energy sources and is associated with economic benefits[52]. Thus, energy security is no longer just about ensuring the supply of raw materials but is a political and economic issue that must be considered in the context of the socio-economic changes taking place internationally and reflecting the progress of civilisation globally[53]. There-

50 T. Młynarski, op. cit., p. 65.
51 Ibidem, p. 75.
52 L. Hughes, op. cit.
53 T. Młynarski, op. cit., p. 77.

fore, the 21st century will be a test for the development of the global, sustainable energy security system.

Energy transformation has three goals: improving energy security (stability of supplies), enhancing energy efficiency (reducing costs), and technological modernisation (improving the competitiveness of the economy). It is a process connected with the development of civilisation from the industrial revolution to sustainable societies[54]. According to a declaration of the International Energy Agency, the world needs a green energy revolution to become independent from fossil fuels[55]. Such a revolution would increase global energy security and aid sustainable economic growth as well as foster solutions to environmental problems[56].

The process of energy transformation will take various forms, depending on the state's energy potential, the degree of access to low-carbon technologies, and social expectations. The result of energy transformation lays the foundations for low-carbon, resource-efficient economies, economic growth, increased business competitiveness, and energy security by reducing dependence on hydrocarbon imports[57].

In this context, the complexity, which refers to the social structure and the change in its organisation and behaviour, is gaining importance. An increase in energy supply boosts the operational possibilities of various actors in the technological and social dimensions[58]. Energy transformation towards renewable sources has multidimensional and complex consequences.

Thus, climate change is challenging the traditional understanding of energy security, which has hitherto been associated with a shortage of resources. The concept of energy security must be redefined and expanded to include climate security.

54 Ibidem, p. 78.
55 Clean Energy Technologies, OECD/IEA 2016, as cited in: ibidem.
56 Clean Energy Progress Report, OECD/IEA 2011, as cited in: ibidem.
57 T. Młynarski, op. cit., p. 79.
58 S. Heinonen, J. Karjalaien, J. Routsalainen, K. Steinmuller, op. cit., pp. 2-13.

3. The international energy market in the era of the COVID-19 pandemic as a system of "discontinuity"

Lack of continuity is a feature of complex systems. A system is complex when it is connected to many other systems and when the effects of these relationships are not linear[59]. The global economy is an example of such a system. Each phenomenon in international relations affects the world economic system. In a situation where the world becomes more and more complex due to more interdependencies between states, we will observe an increase in discontinuity and therefore instability[60].

Thus, more attention should be paid to the "black swans", "wild cards", and "weak signals". Weak signals are events, new technologies, and practices that indicate that specific events will occur. They are the first symptoms of significant discontinuities. These may be threatening signals or signals indicative of new opportunities.

Satisfying the needs of producers and consumers is an enormous challenge for the global energy market due to the fact that the global demand for energy has risen significantly since the 1970s. because of urbanisation and industrialisation processes as well as the increase in consumption in the automotive industry[61]. However, in the context of the global COVID-19 pandemic, this situation has changed dramatically as the global economy has been adversely affected (global GDP has fallen by around 6%). Demand for energy decreased by 3.8% in the first quarter of 2020[62]. The transport industry showed a 50% drop in activity compared to 2019, and the airline industry up to a 60% decrease[63]. Energy demand in this period declined steadily, especially for oil and coal (Figure 1, 2)[64]. Global energy demand in the first quar-

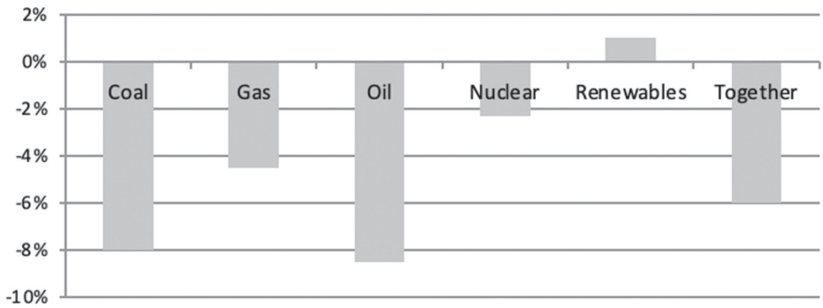
59 Ibidem.
60 Ibidem.
61 M.T. Klare, op. cit., pp. 483-496.
62 *The impacts of the Covid-19 crisis on global energy demand and CO2 emissions*, Global Energy Review 2020, https://www.iea.org/topics/world-energy-outlook [22.09.2020].
63 Ibidem.
64 The demand for coal fell by 8% compared to 2019 data, oil saw a clear decrease in demand by about 5%, and only RES saw an uptake in demand. The demand for renewable energy sources will rise due to low operating costs and preferential access to many electricity systems. Recent increase in efficiency, some new projects coming online in 2020 would also increase production: *The impacts of the Covid-19 crisis…*

ter of 2020 fell by 150 million tonnes of oil equivalent (Mtoe)[65] compared to the first quarter of 2019[66].

With the pandemic and the associated economic slowdown, oil demand declined and the price of oil plummeted. This was a consequence of the breaking of the OPEC+ agreement, which was supposed to stabilise the market, and the competition between Saudi Arabia and Russia for market share. As a result, oil prices dropped to "record low levels, which – apart from the oversupply of raw material and the economic crisis – was a serious challenge for the largest producers and states dependent on oil exports"[67]. The first factor behind the oil price drop was the decline in economic activity related to the pandemic. Demand for oil fell due to lower fuel consumption related to transport, among other factors. As a result, the average price of a barrel of Brent oil fell from USD 64 in early 2020 to USD 55.7 in February[68].

The International Energy Agency even estimated that the impact of the pandemic on energy demand in 2020 would be more than seven times greater than the impact of the 2008 financial crisis in that dimension[69].

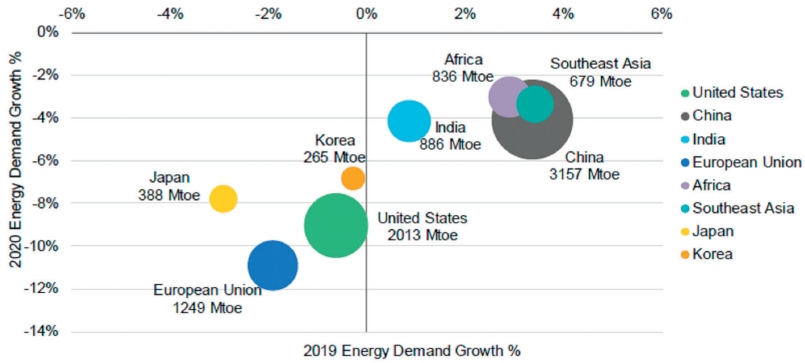
Figure 1. Change in energy demand in 2020



Source: *The impacts of the COVID-19 crisis on global energy demand and CO2 emissions*, Global Energy Review 2020, https://www.iea.org/topics/world-energy-outlook [12.09.2020].

65 toe – *tons of oil equivalent* – oil equivalent (fuel with a calorific value of 10,000 kcal/kg).
66 *The impacts of the Covid-19 crisis*…
67 B. Bieliszczuk, *Załamanie cen ropy naftowej – konsekwencje gospodarcze i polityczne*, "Biuletyn PISM" 2020, no. 71, pp. 1-2.
68 Ibidem.
69 Ibidem.

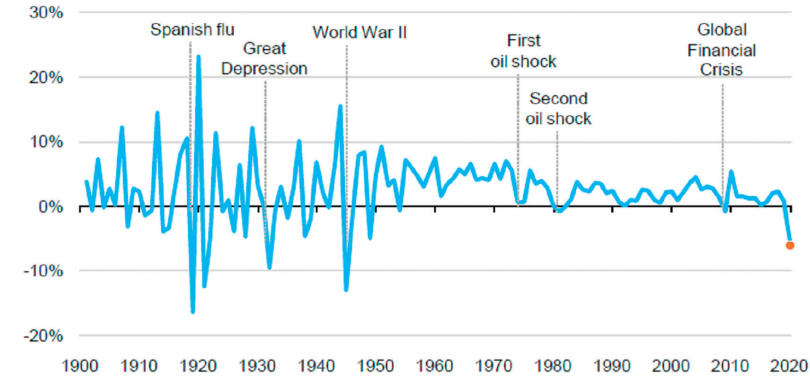
Figure 2. Energy demand by region in 2019 and 2020



Source: *The impacts of the COVID-19 crisis on global energy demand and CO2 emissions*, Global Energy Review 2020, https://www.iea.org/topics/world-energy-outlook [12.09.2020].

Thus, an example of unpredictable events that have a significant impact on the future functioning of the energy market were the consequences of the COVID-19 pandemic. The macroeconomic crisis caused by the pandemic was another turning point in terms of energy market stability. The decline in demand for energy observed in 2020 was the greatest in 70 years (Figure 3). The situation remains uncertain and unstable as there is a prospect of another wave of infections.

Figure 3. Changes in energy demand (1900-2020)

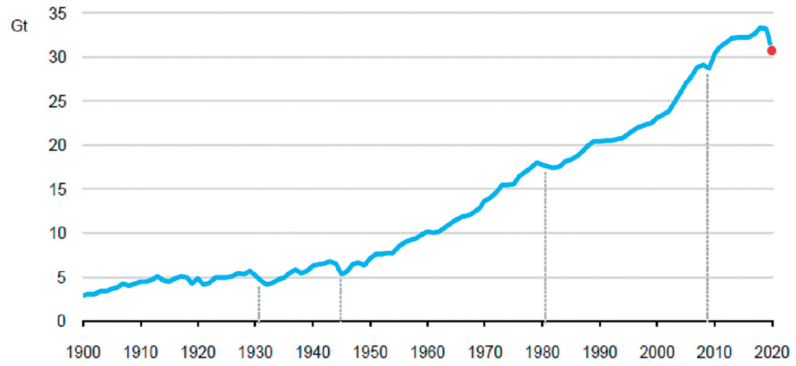


Source: *The impacts of the COVID-19 crisis on global energy demand and CO2 emissions*, Global Energy Review 2020, https://www.iea.org/topics/world-energy-outlook [12.09.2020].

The economic crisis and its consequences, in the form of limiting the use of fossil fuels, has reduced CO2 emissions on a global scale

(Figure 4). Greenhouse gas emissions in 2020 were 5% lower than in the previous year[70].

Figure 4. CO2 emissions from energy sector activities in the years 1900-2020



Source: *The impacts of the COVID-19 crisis on global energy demand and CO2 emissions*, Global Energy Review 2020, https://www.iea.org/topics/world-energy-outlook [12.09.2020].

The dynamic complexity which is a specificity of the international crisis in the COVID-19 pandemic reality ("*dynamity*"), causes rapid, progressive processes and sudden turning points in which the system undergoes fundamental changes. Following Marek Pietraś, we are currently moving from the Westphalian to the Post-Westphalian order. A new international environment, created by globalisation processes, like the COVID-19 pandemic, coexist with the old, Westphalian ones. The technological factor is essential here, as it causes a historical acceleration, societal changes, the reorganisation of the world economy, the evolution of political processes, the possibility of communication and movement[71]. This confirms the hypothesis that we are now living in the age of acceleration, which means innovation, dynamic economic and social change, and accelerated political decision-making. In addition, the international environment is no longer state-centric, and it is distinguished by the heterogeneity of actors. Thus, a sector of transnational actors is emerging, which operate across state bor-

70 *The impacts of the Covid-19 crisis…*

71 M. Pietraś, *Hybrydowość późnowestfalskiego ładu międzynarodowego*, [in:] *Późnowestfalski ład międzynarodowy*, M. Pietraś, K. Marzęda (eds.), Lublin 2008, pp. 57-74.

ders[72]. Another feature of the international system is the simultaneous occurrence of opposing tendencies – processes of decentralisation, fragmentation, and disintegration, as well as centralisation and integration. "Fragmegration" means fragmentation and integration occurring simultaneously; "glocalisation" in turn is the interpenetration and conditioning of what is global and what is local. Local decisions and events thus have global repercussions, and *vice versa*[73]. Thus, the importance of random, non-linear phenomena increases, and a greater number of variables must be taken into account in decision-making processes, which means that the instability of the international environment increases, which we can see in the context of the pandemic[74]. The theory of complex interdependence, also known as the transnational approach, developed by Robert Keohane and Joseph Nye, suggests in this context, that energy security policy is shaped by growing interdependence, transnational processes, and the emergence of new global phenomena[75]. The transnational approach entails loosening of traditional channels of communication between legal or sectoral systems at the intergovernmental or supranational level. The interdependence is evident in the activities of transnational actors that affect the development of energy policy or the energy sector. Interdependencies in energy policy thus determine the dynamics of international relations.

It is logical that the future is always subject to change, and thus the importance of extreme events, "wild cards", and "black swans" increases in this dimension. It's fair to say that the COVID-19 pandemic represents both a "wild card" and a "black swan". As we understand, both concepts refers to events that are difficult or even impossible to predict, and when they do occur, their consequences may be global. They mark future potential changes in the economic or energy system. Therefore, technological development, growing consumption of renewable resources, and changing energy prices are indicators that may herald an unknown future[76]. If we assume that the modern world will

72 Ibidem.
73 Ibidem.
74 Ibidem.
75 R. Keohane, *Power and Governance In a Partially Globalized World*, London 2002.
76 S. Heinonen, J. Karjalaien, J. Routsalainen, K. Steinmuller, op. cit., p. 2-13.

depend on VUCA determinants, weak signals and "black swans" will become more and more significant in the analysis of international interdependencies in the context of the COVID-19 pandemic. However, these indicators are impractical as a method of prediction. Single issues and events that are difficult to foresee are not reliable indicators for predicting the future. In this context, trends are more useful as they address issues that are familiar. If we view unpredictable events as part of "normality", this has implications for the concept of energy security, especially in the context of renewable energy development.

Conclusion

Through successive historical periods, humanity developed at different rates. Until the 17th century, energy needs were met using wood burning, and wind and water power. The first industrial revolution in the 19th century was based on a coal and steam-powered economy. The second, in the 20th century, was the result of the popularisation of the combustion engine. The third one will be based on renewable sources, energy saving, and energy efficiency. In the 21st century, new sources and methods of energy production are gradually reducing the dominant share of fossil fuels[77]. Hydrocarbons will not be eliminated from countries' energy mixes but their share will decline substantially.

In the context of the analysed VUCA method, predicting the future in the energy dimension is gaining importance nowadays. Discontinuities are not sudden events or isolated phenomena. Instead, they are long-term processes consisting of trends, weak signals, or "black swans". When new energy technologies provide more energy than before, it can have a transformational effect on the social dimension. This is especially the case with increased use of renewables. To quote the IEA: "A new energy economy is coming into view, ushered forward by policy action, technology innovation, and the increasing urgency of the need to tackle climate change. There is no guarantee that the emergence of this new energy economy will be smooth, and it is not coming forward quickly enough to avoid severe impacts from a chang-

77 T. Młynarski, op. cit., p. 77.

ing climate. But it is already clear that tomorrow's energy economy promises to be quite different from the one we have today"[78].

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78 World Energy Outlook 2021, p. 29, https://www.iea.org/reports/world-energy-outlook-2021 [12.12.2021].

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