

Energy security and implementation of renewable energy in the European Union

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Abstract

In the light of the deepening climate crisis and global challenges, the issue of energy security is discussed more broadly. The growing fears of the European Union characterised as a region that is highly dependent on energy import from non-EU countries, lead to the modernisation of the European energy sector. The EU is actively promoting the implementation of renewable energy and investments in a sustainable economy to ensure energy security. In this essay, the author analyses a research on the impact of renewable energy efficiency on the gradual reduction of dependence on energy supplies, that was carried out by Turkish scientists, F. Gökgöz and M.T. Güvercin, in 2018. In order to obtain a comprehensive perspective on this issue, the author confronts this publication with other scientific articles in the field of EU energy security.

Keywords: energy security, renewable energy, European Union

Bezpieczeństwo energetyczne a wdrażanie energii odnawialnej w Unii Europejskiej

Streszczenie

W świetle postępującego kryzysu klimatycznego oraz współczesnych wyzwań o charakterze globalnym, problematyka bezpieczeństwa energetycznego staje się coraz szerzej dyskutowana. Rosnące obawy Unii Europejskiej jako regionu silnie uzależnionego od dostaw energii importowanej spoza granic państw członkowskich, skłaniają do modernizacji sektora energetycznego. W celu zapewnienia bezpieczeństwa energetycznego UE aktywnie promuje wdrażanie odnawialnych źródeł energii oraz inwestycje w zrównoważoną gospodarkę w Europie. W niniejszym eseju autorka poddaje analizie badanie dotyczące wpływu efektywności niskoemisyjnej energii odnawialnej na stopniowe zmniejszanie zależności od dostaw energii, przeprowadzone przez Tureckich uczonych, F. Gökgöza i M.T. Güvercina, w 2018 roku. W celu uzyskania kompleksowej perspektywy analizowanego zagadnienia, autorka konfrontuje powyższą wskazaną publikację z innymi artykułami naukowymi z zakresu bezpieczeństwa energetycznego UE.

Słowa kluczowe: bezpieczeństwo energetyczne, energia odnawialna, Unia Europejska

The European Union, as an association of 27 democratic countries, is characterised by a shortage of energy reserves. Furthermore, it is classified as a region that is highly dependent on energy import (Gökgöz, Güvercin 2018: p. 238). Within academic research, much attention has been given to the relationship between energy supply and national security. Nevertheless, it should be emphasised that the literature has evolved in recent years. Thus, the discourse on energy security has been expanded to include the concept of sustainable development. In response to the growing concerns about energy security, as well as the deepening climate crisis, the European Union as a subject of international relations is rooting awareness in the field of renewable energy. Hence, the question arises, why the commitment to progressively increase the efficiency of renewable energy in the EU is noticeable, and how this affects energy and climate security? The purpose of the essay is to conduct substantive analysis of this issue based on the thesis created by Gökgöz and Güvercin (2018), who argue that the dependence on energy supplies is characterised by a downward trend due to increased use of renewable energy. The analysis of data on renewable energy efficiency in the years 2004–2014 in selected EU Member States, presented by these scientists, is a source of knowledge that sheds light within the research. Moreover, it constitutes an interesting point of reference for comparing it with other studies published by different scholars in this field.

The academic literature presents a wide spectrum of deliberations on the synergy that takes place between the issue of energy production and climate change. Some researchers investigated the relationship between energy and climate security. The results of a study conducted by Fazil Gökgöz¹ and Mustafa Taylan Güvercin², emphasise the convergence of common EU objectives in the field of renewable energy and energy security, as well as the dissemination of technological innovations. This research can be used as a *road sign* and the foundation for both, Member States and non-EU countries, in identifying the inefficiency of using renewable energy sources, that is crucial from the perspective of current pressure to secure energy sources and, on the other hand, to slow down the climate crisis. Nevertheless, it should be noted that the methodology used in the research, as well as the model of super-efficiency *data envelope analysis* (DEA) applied only to selected, the so-called nuclear EU countries³, implies that it leaves many questions about the countries of Central and Eastern Europe, where the dependence on energy import is relatively higher than in West European countries. Energy security is a term commonly referred to in public discourse; however, the lack of consensus on the international stage regarding the significance and methods of achieving the goal of energy security is still valid. This essay reflects on Gökgöz's and Güvercin's article, analyses the research outcomes, and considers the possible ways, in which it could be introduced into public debate by confronting it with the publications of other researchers.

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³ The EU countries with nuclear power plants: Belgium, Bulgaria, Czech Rep., Finland, France, Germany, Hungary, Netherlands, Romania, Slovakia, Slovenia, Spain, Sweden, United Kingdom.

Analysis and evaluation

The analysis of statistical data collected by Gökgöz and Güvercin (2018) confirmed the relationship between the distribution of renewable energy and energy security in the EU. Moreover, it sheds light on the reflection of the following questions:

- How does the renewable energy efficiency affect EU energy security?
- Are the EU countries pursuing common energy goals?
- What are the main reasons for implementing innovations and is there an evidence of the spread of technology between the EU countries?

The areas of energy production and consumption are characterised by geographic discrepancy. It should be emphasised that unequal distribution of natural resources affects both importing and exporting countries. Energy markets are vulnerable to risks and threats arising from financial crises, political tensions, acts of terrorism or extreme weather conditions. Therefore, increasing tendency in the use of renewable energy and its efficiency is identified as a foundation in EU's energy policy (Directive 2009/28/EC). As Gökgöz and Güvercin (2018) noted, the share of renewable sources reduces the dependence on import of conventional fuels from non-EU countries. Hence, the Member States strengthen their autonomy and independence, which makes the EU as a region less exposed to possible shocks in energy supplies. According to Pereira et al. (2020), the replacement of traditional fossil fuels reduces the exposure of national economies to fluctuations in energy prices on international markets, and moreover, facilitates the implementation of *Sustainable Development Goals*. The modernisation of the energy sector towards sustainability has been identified by Scott Victor Valentine (2011) as an initiative to achieve energy security. Furthermore, Bengt Johansson (2013) argue that the share of renewable energy sources improves energy diversity in the short term, which is significant from the perspective of the analysed issue. Thus, the thesis presented by Gökgöz and Güvercin (2018) is consistent with the research of other scholars.

Based on the technique of *data envelope analysis* (DEA) and the Malmquist Productivity Index (MPI), the authors compared the renewable energy performance of the nuclear EU countries in the context of energy security.

According to Charles and Kumar (2012: p. 1), the introduction of the DEA concept has had a massive impact on the shape of management science and performance assessment in various fields of study. The innovation of this method is associated with the possibility of wide inference. Gökgöz and Güvercin (2018: p. 230) emphasise that both the average efficiency of renewable energy use and Total Factor Productivity (TFP) in nuclear EU countries are characterised by an upward trend. Countries such as Sweden, Germany, Spain and Belgium are becoming more and more independent from energy imports as the efficiency of using renewable sources in these countries is increasing. On the other hand, the share of renewable energy in the energy mix is limited in France and Great Britain (Gökgöz, Güvercin 2018: p. 238).

While the EU imports 54% of all energy consumed, investments in renewable energy are necessary to reduce this dependency (Gökgöz, Güvercin 2018: p. 227). Additionally,

the results of the Malmquist-Luenberger Index analysis indicate that technological innovations are crucial to the EU's energy security. Gökgöz and Güvercin (2018: p. 227) have analysed global renewable energy financing data, which increased from USD 39.5 billion to USD 241.6 billion over a 12-year period since 2004. Accordingly, total installed capacity of renewable energy increased from 98.9 GW to 921 GW between 2004–2016. This value is estimated at 30% of the global production capacity. Furthermore, conscious EU policy brings positive results, as the authors of the article have proved empirically. Energy produced from renewable sources reached 16.7% of gross final energy consumption in 2015, moreover, primary energy production from fossil fuels was reduced from 19.2% in 2005 to 14.4% in 2015. As researchers emphasised (Gökgöz, Güvercin 2018: p. 227), the EU has initiated an increase in the rate of renewable energy use to 27% by 2030. Thus, the modernisation of the Member States' energy sector is a significant component of a sustainable transformation that affects the region's energy security, which has been emphasised recently by other researchers (Saygin et. al. 2015).

It should be noted that investing in renewable energy, implementing innovations and, subsequently, the spreading of technologies between the EU countries, is determined by climate-related security risks. Global warming driven by, among others, the use of fossil fuels is recognised as a threat multiplier. Therefore, this issue is considered as a pressing security concern. As Hugh Dyer (2001) argued, the international discussion on climate issue changed the logic and practice of traditional approach to security. The Critical Security Studies, developed in recent years, provide the opportunity to explore security issues that go beyond the military sphere. According to B. Buzan, O. Wæver and J. de Wilde (1998: p. 24): "Security is thus a self-referential practice [...] not necessarily because a real existential threat exists, but because the issue is presented as such a threat." The EU's climate change approach has become more unified over time, and the new securitised *status quo* has been established around 2000 (Dupont 2019: p. 369).

Increasing the share of renewable energy in the EU reduces greenhouse gas emissions. As the scientists explain (Gökgöz, Güvercin 2018), renewable energy has been one of the first elements of the global macroeconomic and strategic agenda that was indicated in the context of energy and climate security. According to Anthony Giddens (*The Politics...* 2011) and Zauner et al. (2020), the only way to reduce the risk of climate change is to improve technological innovation. As the authors (see: Zauner et al. 2020) argue, the recovery of waste heat and its reuse in production has a key meaning for reducing CO₂ emission in the industry sector. Furthermore, the researchers emphasise that improving energy efficiency should take place in all regions of the world, such as the US and China, Asia and the Pacific, Australia and the EU. Importantly, since 2016, 176 countries have implemented renewable energy policy targets (Gökgöz, Güvercin 2018: p. 227). Hence, a well-organised implementation of the energy efficiency scenario, including the use of renewable energy, as well as the stimulating technological innovation is necessary to counteract the climate crisis. Additionally, it is worth emphasising that the expansion of conventional energy sources, including natural gas, limits research on innovations in energy technologies. Two years after the publication of the article

discussed in this essay, the authors decided to expand their research, contributing to the extension of the energy security discourse. In the publication entitled *Energy Security and Efficiency Analysis of Renewable Technologies* (see: Gökgöz, Güvercin 2020), scholars referred to the issue of boosting innovation and increasing investment in implementation of renewable energy as a response to global conflicts in the field of energy security and climate change over the past two decades. According to the scientists (Gökgöz, Güvercin 2020), the consequence of this process is the increasing risk of countries being unable to maintain energy security status.

Even though the study by Gökgöz and Güvercin (2018) presents a holistic picture of the issues analysed in this essay, their article leaves some research gaps. The authors narrowed down the definition of energy security, therefore, the question arises, what factors affect this phenomenon? According to Tucki et al. (2019: p. 2), energy security is based not only on the diversification of supplies and independence from energy import, but also on several fundamental pillars, such as the accurate quality of the network infrastructure in the country, the right amount of production capacity, properly developed energy storage installations, as well as the sector coupling, which improves energy efficiency.

Furthermore, it should be noted that the methodology presented in the Gökgöz's and Güvercin's article enables the analysis of EU nuclear countries and their efficiency in renewable energy. There is still a question about the energy security of Central and Eastern Europe, especially within post-Soviet countries. On the other hand, the results presented in the research paper can be a driving force of innovation for countries that still use conventional energy sources⁴.

Since the purpose of the essay is to analyse the issue of energy security based on the thesis presented by Gökgöz and Güvercin (2018), attention should be paid to the phenomenon that was not discussed by these scholars. Acceleration of the process of technological innovation in the field of renewable energy will cause raw materials to become as competitive as fossil fuels over the years. Consequently, the importance of energy resources such as coal will be characterised by a visible downward trend, and will be replaced by minerals such as lithium and cobalt. According to Adam Myślicki (2019), these changes may redefine the significance of energy security and have an impact on the configuration of the geopolitical map of the world. Therefore, it is interesting to analyse, whether the use of unconventional energy will ensure energy security, or will it only reduce dependence on the exporting countries and create new geopolitical reality and thus new difficulties? Undoubtedly, the confrontation of the Gökgöz's and Güvercin's research (2018) with the Myślicki's article (2019) would create an interesting debate on the issue of energy security.

Conclusions

The analysis of the data presented by Gökgöz and Güvercin (2018) and confronting their research with the existing scholar literature results in the identification of the answer

⁴ A non-renewable resource (also called a finite / conventional / traditional resource). An example is carbon-based fossil fuel.

to the question: why the commitment to progressively increase the efficiency of renewable energy in the EU is noticeable, and how this affects energy and climate security? It can be concluded that increasing the share of renewable energy in the Member States' energy mix leads to strengthening the integrity and independence of the EU as a region. Additionally, the process of transforming the energy sector towards a sustainable one increases investment, stimulates innovation, as well as the spread of knowledge and technology. Importantly, replacing the consumption of conventional fossil fuels with renewable raw materials has a positive effect on slowing down the progressing climate crisis due to the reduction of greenhouse gases. Consequently, sustainable energy development affects both energy and climate security.

Energy is the foundation of all human beings, as well as the essence of every production process. Therefore, states secure energy supplies in order to stimulate economic growth and maintain the security of citizens. In recent years, fears about the security of supplies have been crucial to debates about the development of the EU energy policy. Renewable energy sources are partly the answer to this challenge, but also an integral part of climate issues, which undoubtedly has become a real threat to humanity. The globalisation process contributes to increasing interdependence between entities on the international scene, but also to linking issues and strengthening their closed circulation. In this context, the article written by Gökgöz and Güvercin (2018) refers to the current global issues, and it introduces empirical knowledge to various scientific disciplines, such as political and social sciences, economy, energy law and technological innovations. It should be noted that the article has been indicated in at least 17 scientific publications and can be used as a topic for discussion in the future.

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