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FRANCE'S ENERGY SECURITY IN THE LIGHT OF COMMON POLICIES WITHIN THE EUROPEAN UNION

ABSTRACT

Objective: *The aim of the article is to critically assess the energy security of France and to evaluate it from the point of view of the common strategy of France and other countries within the framework of the common policy of the European Union.*

Material and methods: *For the purpose of the article, the basic research method used was a review of the literature. In the article, the authors analyzed France's energy security problem and compared it to other EU countries based on a literature review. The thesis of the article is that France has created its own specific but strong energy security model.*

Results: *The results of the analysis conducted in this article lead to the conclusion that the level of energy security in France is relatively high compared to other EU countries.*

Conclusions:

The basic problem, which affects practically all countries of the world, concerns energy resources and the guarantee of stable supplies. The socio-economic development of the European Union is constantly forcing the need for strategic raw materials such as natural gas and oil. At the heart of the EU's energy policy there are various measures aimed at creating an integrated energy market and ensuring security of supply and a stable energy sector (Bauer-Babef, 2021). Unfortunately, Russia's invasion of Ukraine on February 24, 2022 caused massive market disruptions and forced the EU to revise its energy regulatory framework. In this context, the authors of the article presented the threats to France's and the European Union's energy security, as well as the strategic measures that France and the EU have taken and are planning, were presented.

KEYWORDS: *security, energy, strategy, EU policy, France, renewables, nuclear power*

INTRODUCTION

The subject of the article is the energy security of France in the light of the common policy within the European Union. The main objective of the study presented in the article was to critically assess the energy security of France and to evaluate it from the point of view of the common strategy of France and other countries within the framework of the common policy of the European Union.

The article begins by defining the concept of energy security (an attempt to define this broad and multidimensional concept) and other related concepts

or terms. The next section presents France's energy security according to its main aspects or components, namely:

1. France's energy security related to the use of fossil fuels, including coal, oil and gas,
2. France's energy security related to nuclear power generation,
3. The impact of the growing use of renewable energy sources on France's energy security.

This detailed description of France's energy security is followed by an analysis of France's level of security compared to other European Union countries (Andriosopoulos, K., Doumpos, M., Matsumoto, K. I., 2018, pp. 1737-1748).

The first part of the article presents historical data and the problem situation mainly at the end of 2021 and the beginning of 2022. The article takes into account the changes related to the energy security of France and the European Union after February 24, 2022, the day of Russia's military invasion of Ukraine. Therefore, the last part of the article attempts to describe the energy security situation of France and the European Union at the time of writing this article. On the basis of the most recent sources, this last part will present the threats to the energy security of France and the European Union resulting from the war, the strategic measures already taken and planned by France and the EU, as well as the resulting conclusions.

ENERGY SECURITY – DEFINITION OF THE TERM

The concept of energy security emerged in the aftermath of the oil crisis of the 1970s, when awareness of energy security broadened considerably. The same crisis contributed to the creation of the International Energy Agency (IEA), whose primary goal is to promote the stability of global energy supplies. The definition of energy security has evolved over time, but generally encompasses the basic idea of a relatively cheap and stable supply of energy for the foreseeable future (Donev et al., 2018).

Energy security is often defined as a reliable and adequate supply of energy at reasonable prices. The phrase *reliable and adequate* in the context of energy

supply means that the supply should be uninterrupted and able to meet the needs of a country or region (Bianco, et al., 2022). The concept of energy security often coincides with that of energy independence, which is the ability of a country to be self-sufficient in meeting its energy needs without relying on imports (Ameur, Berrada, El Maakoul, El Mrabet, 2021, pp. 45-73). According to more recent views, energy independence is only one dimension of energy security, since domestic energy sources can also be more or less insecure. This can happen in the case of a country whose energy security is largely based on its own non-renewable energy sources (International Energy Agency, 2022). According to Krikštolaitis et al, there may be problems with the availability and reliability of such energy sources in such states (Bianco, Krikštolaitis, Martišauskas, Urbonienė, 2022).

According to more specific definitions, energy security is the goal of a country (or the global community) to maintain an adequate supply of energy through measures such as:

1. Building sufficient infrastructure for the generation, storage, and transmission of energy supplies;
2. Ensuring access to energy resources; affordable access to energy;
3. Ensuring the secure and rapid flow of information related to energy security management;
4. Investing in the development of energy knowledge and new energy technologies;
5. Leveraging innovative solutions for new energy sources, new energy carriers such as hydrogen;
6. Ensuring enforceable supply contracts;
7. Effective protection of networks and energy supply chains against factors such as terrorist attacks, network failures, extreme weather conditions;
8. Diversification of energy sources and supplies (Donev JM KC, Lyndon G, Hanania J, 2018).

Berrada et al. pay particular attention to the role of diversification in energy security. According to these authors, energy security can be understood first and foremost as the diversification of energy supply, because as diversification

increases, so does energy security. An example of diversification of energy supply could be distributed generation systems based on renewable energy sources, i.e. systems that use different energy resources, such as wind for turbines or sunlight processed by photovoltaic systems (Berrada, A., Ameur A., El Maakoul, A., El Mrabet R., 2021, pp. 45-73).

FRANCE'S ENERGY SECURITY

France's energy security depends primarily on factors related to the production of energy for its own needs, namely energy production and energy imports from other countries. Energy in France is produced from five main sources: nuclear power, natural gas, coal, renewable energy sources, and liquid fuels. Therefore, this article first examines, in turn, the impact of each of these basic energy sources on France's overall energy security (Ahmad, et al., 2021, pp. 88-99).

COAL

The share of coal in the French energy mix is negligible. This is due to global trends away from coal-based energy (Gatto, A., Sadik-Zada, E. R., 2021, pp. 491-514). Since France has its own coal mines, a move away from coal mining in its case could contribute to lower energy security. On the other hand, given current trends, a shift away from coal seems inevitable.

OIL AND GAS

As for oil and gas, analysts predict significant future growth in global consumption of both commodities, and current trends indicate that gas and oil will continue to be important commodities in the global marketplace (Speight, 2019, pp. 45-59). So it seems reasonable that oil and gas should be part of the energy mix, especially if a country has its own sources of these commodities. But the situation in France is different. France imports all of its needs for these two commodities (International Energy Agency, 2022). Dependence on foreign suppliers significantly reduces France's energy security. France's gas and oil industries are adapting to low-carbon fuels, as is the entire infrastructure

associated with energy production (International Energy Agency, 2022). In this process, electrification plays a very important role.

NUCLEAR ENERGY

France has a very low-carbon electricity mix. The reason for this is that France has a very high share of nuclear power in its energy mix, one of the highest in the world (second only to the United States). In 2020, nuclear power accounted for the largest share of electricity generation, at about 78% (Bauer-Babef, 2021).

However, France plans to reduce the share of nuclear power from more than 70 percent to 50 percent of the overall electricity mix by 2035, which could be responsible for reducing France's overall energy security (International Energy Agency, 2022). Currently, a large number of nuclear reactors are in, or rapidly approaching, a state requiring modernization or overhaul (Au, Baikenzhina, Karzhassova, Nukusheva, Rustembekova, 2022, pp. 647-667). Closing them down may prove cheaper than modernizing them. However, it is worth noting that maintaining the security of the electricity system and a low carbon footprint while reducing the share of nuclear power will require serious and long-term investments in renewable energy production, as well as in increasing the level of efficiency and effectiveness of the electricity system.

It is worth adding that the use of nuclear energy as one of the most important energy sources is in line with global trends within the framework of energy security. Rogner points out that at the beginning of the 21st century, attitudes towards the use of nuclear energy changed significantly under the influence of a dramatic increase in the price of fossil fuels caused by the depletion of cheap sources of oil and gas and increased demand. As a result, fossil generation no longer offers the lowest generation costs in many markets. This, in turn, has begun to improve the economics of existing nuclear power plants, but has also created better prospects for investment in new nuclear power plants. According to Rogner, nuclear power offers diversification, but also, and just as importantly, relatively stable and predictable generation costs over the long term, due to the relatively small share of uranium costs in the total cost of operating nuclear power plants (Rogner, 2012, pp. 502-548). The

development of nuclear power in France is also important and beneficial for the rest of the European Union, as French power has a significant impact on the EU's interconnected electricity market and the energy security of neighboring countries, including Belgium and Germany.

RENEWABLE SOURCES OF ENERGY

Renewable energy sources account for 19.1% of energy consumption (Bauer-Babef, 2021). France is one of the world's largest net exporters of electricity generated from renewable sources. France is increasingly investing in renewable energy and has set a target of 32% by 2030 (International Energy Agency, 20220). In the 2019 Energy and Climate Act, France set a goal of zero net emissions by 2050, making it a world leader in setting an ambitious energy transition (Krook-Riekkola, A., Maïzi, N., Millot, A., 2020, p.139). This long-term goal is supported and complemented by a national low-carbon strategy with a multi-year energy investment plan and five-year carbon budgets (International Energy Agency, 2022). Both the current role of renewables in France's energy mix and the country's strategic plans for the future significantly enhance its energy security through increased diversification of energy sources.

FRANCE'S ENERGY SECURITY LEVEL COMPARED TO OTHER EUROPEAN UNION COUNTRIES

Radovanovic et al. used the ESI index in their comparative study of energy security levels (Filipović, et al., 2017, pp. 1020-1032). The Energy Security Index (ESI) was proposed by Wang and Zhou to assess global national energy security (Wang, Q., Zhou, K., 2017, pp. 19-31). The ESI is based on the integrated use of subjective and objective methods of weight allocation of selected parameters. This research shows that among the four European countries that are the most important energy producers, France has a score comparable to Germany, both of which enjoy a higher level of energy security than Italy and Spain (Filipović, S., Pavlović, D., Radovanović, M., 2017, pp. 1020-1032).

Krikštolaitis et al. analyzed the security of electricity and natural gas supply for four EU countries, namely Germany, France, Italy and Spain. A total of 22 indicators were taken for each country and combined into a synthetic indicator, namely the level of energy security, called ESL, which measures a country's overall performance. ESL can be used to analyze what factors affect a country's security level, and its evolution can be seen as a useful indicator for energy policy purposes. The results of the 2006-2018 ESL analysis indicate that, on average, Germany is the best performing country among those analyzed for energy security. The average ESL for Germany and France is 67.17% and 66.65%, respectively, while Spain and Italy recorded 63.92% and 60.58%, respectively (Bianco, V., Krikštolaitis, R., Martišauskas, L., Urbonienė, S., 2022).

Krikštolaitis et al. say that Germany and France performed best between 2006 and 2018 mainly because Germany has a rich energy mix and is not dependent on a single source, while France is clearly dependent on nuclear power. France has a large number of nuclear power plants, which on the one hand makes it immune to external disruptions in the energy supply chain related to imports. On the other hand, France's dependence lowers its security level. This level is also lowered by the fact that a large number of nuclear power plants are approaching the end of their useful life. According to Krikštolaitis et al, France's immediate future is uncertain because the nuclear power plants are outdated and unsafe, and there are no precise plans for their replacement or alternative measures, and this could jeopardize France's future level of energy security. Krikštolaitis et al. note that long-term planning and energy policy choices are essential to ensure France's security levels in the future (Bianco, V., Krikštolaitis, R., Martišauskas, L., Urbonienė, S., 2022).

The results of the study by Krikštolaitis et al. thus confirm the results previously reported by Radovanovic et al. and thus confirm France's relatively high level of energy security compared to other EU countries, while pointing to numerous dangers that France must address in the near future in order to maintain or improve its energy security position (Bianco, V., Krikštolaitis, R., Martišauskas, L., Urbonienė, S., 2022).

THE SECURITY OF ENERGY SUPPLY IN FRANCE AND IN THE EUROPEAN UNION IN THE FACE OF THE LATEST THREATS

The situation related to the energy security of France and the European Union changed radically after February 24, 2022, that is, after Russia's aggression against Ukraine. In this part of the article, we will try to describe the threats to the energy security of France and the European Union resulting from the war, the strategic measures already taken and planned by France and the EU, as well as the resulting conclusions. This will necessarily be an incomplete description, as the war is ongoing and the geopolitical situation in Europe is very uncertain, each day may bring significant changes and new threats. The condemnation of the Russian aggression by the EU countries was accompanied by the adoption of economic sanctions against Russia. In the wake of the Russian military aggression against Ukraine, the European Commission, in a document entitled *Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions. REPowerEU: Joint European Action for more affordable, secure and sustainable energy* March 8, 2022, communicated the need for radical and immediate steps in energy security (European Commission, 2022). According to the Commission, the changes that had taken place in the global energy markets in recent months, and in particular those resulting from the war in Ukraine, required the EU, on the one hand, to accelerate the green transition (i.e. the transition to clean energy) and, on the other hand, to reduce the European energy economy's dependence on the supplies of raw materials and fuels from Russia. These two courses of action should, in the Commission's view, contribute significantly to Europe's energy independence and security. Added to this are new guidelines for gas storage, for the upcoming and subsequent heating seasons. All of this was to be included in a strategic plan tentatively named REPowerEU, to be developed by the Commission in cooperation with all member states. The plan was expected to be completed by the end of spring 2022. In addition, the plan was to include strategies related to improving energy efficiency and increasing the diversification of energy supplies (European Commission, 2022).

The most important issue for the coming years is Europe's dependence on Russian gas. The European Commission estimates that EU countries collectively import up to 90 percent of the gas they consume. As much as 40 percent of the gas consumed in EU countries comes from Russia. Russia's share of coal and oil supplies is also significant: 46 and 27 percent, respectively, of the total consumption by all EU countries (European Commission, 2022). The Commission estimates that if the REPowerEU plan is implemented, EU countries could become independent from Russian gas by the end of the 2020s. Importantly for the French context, the Commission's plan gives priority to projects that aim to complement internal energy markets and are also cross-border in nature, such as the pipeline linking Portugal and Spain to France (European Commission, 2022). As the Washington Post comments, while in recent years Europe's heavy dependence on Russian energy sources has kept its leaders from taking stronger steps against the Kremlin and Putin's aggressive policies, the current Russian-Ukrainian conflict is forcing the European Union to make what could be called a historic shift, forcing the Union to make a permanent break with Russian gas and oil supplies. Birnbaum and Mufson quote Ursula von der Leyen, President of the European Commission, who at a conference on European energy security said that the Union would not be strong if it continued to depend on an energy supplier that uses the threat of armed aggression in Europe as a bogeyman. According to von der Leyen, this state of dangerous dependence on energy supplies from Russia must be abandoned by the Union as soon as possible, using all available means to do so and reckoning with any losses and inconveniences that may result, for states, economic entities, and all energy consumers (Birnbaum, et al., 2022).

Even before the outbreak of the war in Ukraine, but already facing a growing threat, French President Emmanuel Macron announced in February 2022 a new strategic plan for French energy security, which seems to be in line with the new European Commission directives discussed above. According to this plan, France plans to build more than a dozen nuclear power plants on its territory (Macron Announces, 2022). This investment is intended to significantly reduce the volume of Russian natural gas imports for the French energy system (Birnbaum, M. Mufson, S., 2022). However, it should be noted that these are far-reaching intentions and that it could take up to 20 years to implement the plan, i.e. to build a dozen nuclear power plants, although Macron mentioned

a deadline of 15 years in his speech. To speed up the process of reducing demand for Russian energy supplies, Macron's new plan calls for France to simultaneously significantly reduce the level of demand for renewable energy and accelerate the implementation of the green transition. Macron's strategic goal is to quickly reach a situation where renewable energy could significantly replace gas from Russia. According to Macron, the plan he announced is the most economically convenient choice, the cheapest from a financial point of view, and the most correct from an environmental point of view (Macron Announces, 2022).

Macron said that France plans to build at least six new nuclear reactors, and further to begin studying the possibility of building an additional eight reactors (Macron Announces, 2022). Preparatory projects, including, among other things, sending an official request to a national commission to start a public debate, selecting specific sites for the six reactors, were to begin within weeks. In the meantime, operation of all existing reactors is to be extended, if safety concerns permit (Birnbaum, et al., 2022). A broad public consultation on French energy security was scheduled to begin in the second half of 2022. Parliamentary discussions on the revision of the multi-year energy program were scheduled for 2023. Under Macron's plan, construction of the new reactors would begin no later than in 2028, and the first reactor (EPR2) would be commissioned by 2035. Macron also said the French government, in consultation with the European Commission, would introduce a new nuclear decree, which would give French businesses, households and other consumers greater electricity price stability. As for sources of funding, Macron assured that one billion euros would be allocated for the construction of the new reactors as part of the national reindustrialization plan for 2022 to 2030 (Macron Announces 2022).

SUMMARY AND CONCLUSIONS

The results of the analysis conducted in this article lead to the conclusion that the level of energy security in France is relatively high compared to other EU countries. First, in response to the effects of the oil shocks of the 1970s, France successfully implemented a multi-year program of nuclear power development. Thanks to the large amount of electricity generated by its numerous nuclear power plants, France has created its own specific yet strong energy

security model. As a result, France has become the largest exporter of electricity in Europe and one of the world's largest producers of nuclear reactors and complete nuclear power plants, which it installs in many countries. As more and more countries prioritize nuclear power as an important part of their strategy to green their economies, French companies specializing in nuclear power plant construction can expect an increase in supply contracts (Jahangir, et al., 2023).

At the same time, France takes numerous steps to transform its energy industry toward greater and more effective use of renewable energy. It is a driving force behind the EU's climate-energy policy and an active advocate of countering the effects of climate change. Part of France's energy and environmental strategy is to limit its own nuclear power potential.

Nevertheless, France still has much to do to improve its situation. In particular, the lack of adequate diversification of energy sources may be a cause for concern. As Krikštolaitis et al. note, diversification, both in terms of energy generation technologies and fuel supply sources, is key to energy security (Bianco, et al., 2022). A diversified energy mix is much more resilient to changes in relevant conditions, such as market, climate or geopolitical conditions. On the contrary, concentration on one technology or energy source increases the risk of upsetting energy security. In the case of France, there is currently an over-reliance on a single source of energy, nuclear power. However, France plans to change this by reducing the share of nuclear energy from more than 70 percent today to 50 percent by 2050 and developing other sources, primarily renewables. If this plan succeeds, France will significantly increase its diversification of energy sources and thus its level of energy security. France's high level of energy security contributes to the overall security of the entire EU.

This was the situation regarding the level of energy security of France and the European Union until February 24, 2022. Due to the Russian military aggression against Ukraine, this situation has changed in a very serious way. The European Commission announced the need to immediately take radical steps in the field of energy security. According to the Commission, the changes that have taken place in the global energy markets in recent months, and especially those resulting from the war in Ukraine, require the EU, on the one hand, to accelerate the green transition (i.e. the transition to clean energy) and, on the other hand, to reduce the European energy economy's dependence on

the supply of raw materials and fuels from Russia. The EU is also preparing new gas storage guidelines for the upcoming and subsequent heating seasons. It is expected that these intentions, included in the strategic plan tentatively named REPowerEU, if successfully implemented, will contribute significantly to Europe's energy independence and security (Fernández-Blanco R., Giaccaria S., Costescu A., Bolado-Lavín R., 2023).

France fully supports the European strategic plan REPowerEU, and the directives of the plan are in line with the new strategic plan for French energy security announced by Macron in February 2022. According to this plan, France plans to build more than a dozen nuclear power plants to significantly reduce imports of Russian natural gas into the French energy system. However, these are long-term intentions, as it could take about 15 years to build a dozen nuclear power plants. Consequently, in order to reduce the demand for Russian energy supplies, according to the new plan, France will simultaneously engage in accelerating the green transition so that renewable energy can at least partially replace the demand for Russian gas in the near future.

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