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Role of the USA in supporting energy security in Europe

Abstract. The relevance of studying the role of the USA in supporting energy security in Europe was due to the escalation of geopolitical risks and the need for the transformation of energy systems in European countries in the context of Russian aggression. The purpose of the study was to analyse the efforts of the USA to strengthen Europe's energy resilience through the diversification of energy supply sources and the expansion of alternative energy supply routes. The study involved the analysis of regulatory acts, statistical analysis of energy trade data, and a structural-functional analysis of the energy security of the European Union as an integrated system. The main results of the study demonstrated that the United States of America plays a decisive role in ensuring the energy security of European countries by significantly increasing the export of crude oil and liquefied natural gas to European markets, as well as providing significant political and diplomatic support to efforts aimed at diversifying energy supply sources. Analysis shows that American energy supplies have significantly contributed to reducing the dependence of European countries on traditional suppliers, particularly Russia. Despite significant achievements in the process of replacing Russian-origin energy carriers with alternative supplies from the United States, there are certain challenges and obstacles that require further resolution. Among them, it is worth noting the relatively higher cost of American energy resources, the insufficient level of development of the corresponding infrastructure for receiving, storing, and distributing imported energy carriers in some European Union member states, and the potential decrease in the need for fossil fuel imports in the long term due to the active transition to renewable energy sources and the implementation of ambitious climate goals. The study also revealed the need to align the energy policies of the United States of America and the European Union, considering the long-term goals of decarbonising the economy and sustainable development. The practical significance of the study lies in the development of recommendations for further strengthening the transatlantic energy partnership, taking into account the need to balance energy security and economic decarbonisation goals.

Keywords: transatlantic partnership; oil market; geopolitical risks; alternative energy sources; sustainable development; climate goals

Introduction

Energy security is one of the key issues for European Union countries, especially in the context of their significant dependence on energy carriers. This dependence makes European countries vulnerable to disruptions in the supply of energy resources and price fluctuations in global markets. This problem became particularly acute after the start of the Russian aggression against Ukraine in 2022 when Russia used energy as a tool of political pressure on Europe. The need to diversify energy supply sources and reduce dependence on Russian energy carriers has become obvious to European leaders.

In this context, the role of the United States of America in supporting Europe's energy security becomes particularly significant. The USA, being one of the world's

largest energy producers, has the potential to provide significant assistance to European partners in diversifying their energy supplies. However, despite several initiatives and agreements between the USA and the EU on cooperation in the energy sector, the question of the effectiveness and sufficiency of USA support remains open and requires in-depth analysis.

Energy security in Europe and the role of the USA in ensuring it is a topical issue, as it is one of the key priorities for European Union countries, which determines the attention of many researchers to it. An analysis of publications demonstrates the diversity of approaches to studying this problem. In modern conditions, especially considering geopolitical challenges and climate change,

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ensuring a reliable and stable supply of energy resources is becoming critical. As S. Cevik (2024) notes, energy security and climate change are the dilemma and opportunity of the century, requiring a transformation of energy systems. The scientist considers climate change and energy security as key challenges of modernity, emphasising the need for energy system transformation. In turn, L. Luty *et al.* (2023) and I. Shchurov (2021) focus on the economic aspects of energy security, exploring it in the context of sustainable development goals and proposing approaches to strengthen it considering economic factors.

The geopolitical dimensions of Europe's energy security are reflected in the studies of M. Mišík (2022) and V. Studinski (2022). The first author convincingly argues for the need to improve the EU's external energy security through diversifying sources and reducing dependence on individual suppliers, while the second analyses the impact of the Russian-Ukrainian war on the global economic space and energy markets. Meanwhile, M. De Rosa *et al.* (2022) and D. Streimikiene *et al.* (2023) focus on the issues of diversification, concentration, and renewability of energy supply in the EU, emphasising the importance of a balanced approach and considering regional specificities. Valuable reflections on the energy future and various scenarios for the development of energy markets are presented in the research of M. Burrows & G.F. Treverton (2023). The authors offer a strategic view on these issues, but the specific steps of the US to support Europe's energy security in the proposed scenarios are not detailed.

Despite a significant amount of research dedicated to Europe's energy security, the role of the USA in supporting it remains insufficiently explored. Most authors focus on the internal aspects of the EU's energy security, such as supply diversification, renewable energy development, and climate change mitigation. Meanwhile, the potential for cooperation with the USA in these areas, as well as the possibilities of USA support in countering Russian energy aggression, remains understudied.

This research aimed to analyse the role of the USA in supporting energy security in Europe, particularly in the context of diversifying energy supply sources and strengthening the energy resilience of European countries. To achieve this goal, the following objectives were set: to analyse the problems of energy security and the dependence of European Union countries on energy carrier imports, to assess the effectiveness of USA initiatives to supply energy resources to European markets, and to determine the prospects and limitations of US-EU cooperation in the field of energy security.

Materials and Methods

To achieve the goal of this study, the principles of objectivity, systematicity, and historicism were applied, allowing the examination of the researched problem in the dynamics of its development and considering the broad international context. The research began with a comprehensive analysis of the current state of energy security in the European Union, which included studying the structure of energy consumption, the level of dependence on imports, and the geographical diversification of supplies.

Based on a detailed analysis of Eurostat statistical data (Energy statistics..., 2024), a high level of dependence of EU

countries on energy carrier imports, particularly from Russia, was identified. This analysis covered the dynamics of oil, natural gas, and coal imports over the past decade, allowing the identification of long-term trends and potential risks to the EU's energy security. In particular, the annual volumes of imports of each type of energy carrier, their share in the total energy consumption of the EU, and changes in the geographical structure of supplies were considered. Particular attention was paid to the analysis of dependence on Russian energy resources, including an assessment of the impact of geopolitical factors on supply stability. In addition, the dynamics of prices for imported energy carriers and their impact on the economies of EU countries were studied, which allowed for an assessment of not only the physical but also the economic component of energy security.

The next step involved a comprehensive study of the efforts of the United States of America aimed at supporting the energy security of its European partners. This included an analysis of not only legislative initiatives but also diplomatic efforts, economic incentives, and technological cooperation between the USA and the EU in the energy sector. Through a thorough study of USA laws, particularly the "Protecting Europe's Energy Security Act (PEESA)" (2020) and the "Countering America's Adversaries Through Sanctions Act" (2017), key mechanisms of US policy in this area were identified. Particular attention was paid to the analysis of specific provisions of these laws, their implementation, and their practical impact on the EU's energy policy.

To evaluate the effectiveness of these efforts, a comprehensive statistical analysis was conducted using data from the U.S. Energy Information Administration (EIA) on the dynamics of US crude oil exports (U.S. crude oil..., 2024) and liquefied natural gas (LNG) (The United States remained..., 2024) to Europe. This analysis included not only total export volumes but also a detailed examination of the structure of supplies by importing countries, types of energy carriers, and transportation methods. Comparing these indicators with Eurostat data on the reduction of Russia's share in energy imports to the EU (Drop in EU imports..., 2023) made it possible to identify the successes of USA policy in replacing Russian energy resources with alternative supplies and to assess the scale of this replacement in various segments of the EU energy market.

At the same time, a structural-functional analysis of the EU's energy security as an integrated system encompassing interconnected components (supply diversification, infrastructure development, pricing, regulatory policy, technological innovation, etc.) allowed for the identification of challenges and limitations in the implementation of the US strategy. This analysis included an assessment of the state and prospects for the development of the EU's energy infrastructure, including LNG terminals, pipeline networks, and energy storage systems. Economic aspects of USA-EU energy cooperation were also considered, including pricing issues, the competitiveness of US energy carriers on the European market, and the potential impact of this cooperation on the energy security and economic development of both parties.

Results

Analysis of the current state of the EU's energy security. An analysis of the current state of the EU's energy

security indicates significant risks. According to Eurostat (Energy statistics..., 2024), in 2022, the EU's energy dependence on imports was 62.5%. The EU's demand for oil and petroleum products in 2022 reached 21,532 PJ, of which 97.7% was imported. As for natural gas, demand in 2022 was 12,324 PJ, of which 97.6% was covered by imports. In 2022, 45.8% of the solid fossil fuels consumed in the EU were imported. These indicators highlight the vulnerability of the EU's energy system to potential supply disruptions and price fluctuations in global markets. The overall long-term trend since 1990 points to increasing import dependency: if in 1990 half of all consumed fuel was imported, then in 2022 this figure was 62.5%. In addition to import dependency, the EU's energy security faces challenges related to the ageing of energy infrastructure, the need to decarbonise the economy and the transition to renewable energy sources. Ensuring energy security in the context of sustainable development goals requires considering economic, environmental, and social aspects.

The Russian Federation has traditionally been one of the key suppliers of energy resources to the European Union, but the situation changed significantly after the start of Russia's full-scale war against Ukraine in 2022. According to Eurostat data (Drop in EU imports..., 2023), Russia's share in energy carrier imports to the EU has decreased significantly. If in the third quarter of 2022 Russian energy resources accounted for 14.5% of the total volume of imported energy carriers by the EU, then for the same period in 2023 this figure decreased more than twofold, to 6.5%.

The total volume of energy carrier imports to the EU in the third quarter of 2023 amounted to €35.4 billion, or 65 million tons in physical terms. Compared to the third quarter of the previous year, there was a significant decrease in both the value of imports (-49.1%) and physical volumes (-11.3%). Despite this reduction, energy carriers still occupied a significant share in the EU's import structure – 17.7% in the third quarter of 2023.

Among the main suppliers of oil to the European market in the third quarter of 2023, the USA led (17.7%), followed by Norway (13.7%) and Kazakhstan (8.2%). In the piped gas segment, Norway played the largest role, providing almost half (48.6%) of the EU's imports. Algeria (17.8%) and Russia (16.0%) ranked second and third, respectively, while the United Kingdom was the fourth largest supplier (10.5%). As for liquefied natural gas (LNG), the USA was the undisputed leader with a 48.5% share, ahead of Qatar 14.0%, Algeria (10.1%) and Russia (8.8%).

Russia's long-standing practice of using energy resources as a tool of geopolitical pressure has repeatedly exposed the vulnerability of European countries in this area. However, the outright military aggression against Ukraine in 2022 became a turning point, prompting the European Union to decisively intensify efforts aimed at diversifying energy supply sources and reducing dependence on Russian energy carriers. In addition to geopolitical risks, dependence on Russian energy carriers has created economic challenges for EU countries. The volatility of energy resource prices and the possibility of Russia using them as leverage against European countries have negatively impacted the economic stability and competitiveness of the EU. The Russian-Ukrainian war has a significant impact on the global economic space and energy markets. Therefore,

the energy dependence of EU countries on Russia carries a number of serious risks and challenges. Primarily, it is the risk of disruptions in the supply of energy resources due to geopolitical conflicts or intentional actions by Russia. As the experience of past gas conflicts shows, such disruptions can have significant negative consequences for the economy and society of European countries.

Moreover, dependence on Russian energy carriers limits the EU's ability to conduct an independent foreign policy and defend its interests on the international stage. Russia can use energy as leverage to exert political pressure on European countries, forcing them to make concessions in other areas (Brodny & Tutak, 2023). Energy dependence on Russia also hinders the EU's transition to a low-carbon and climate-neutral economy. A significant share of Russian energy carriers, especially natural gas and coal, are fossil fuels, which contribute to greenhouse gas emissions. As noted by M. De Rosa *et al.* (2022), achieving sustainable development goals and energy security in the EU requires diversifying energy sources and increasing the share of renewable sources.

To address the issue of energy dependence on Russia, EU countries are actively working on diversifying sources of energy supply and developing renewable energy. In particular, the EU is developing cooperation with alternative suppliers such as countries in the Caspian region (Dinçer, 2023), North Africa (Joffé, 2023), and the USA. At the same time, measures are being implemented to increase energy efficiency and stimulate investment in renewable energy. However, the process of reducing energy dependence on Russia is complex and requires a comprehensive approach taking into account regional specificities and the potential of different energy sources (McWilliams *et al.*, 2023).

Therefore, an analysis of the current state of the EU's energy security demonstrates that, despite significant dependence on energy carrier imports, especially from Russia in the past, the EU is actively working to reduce this dependence and diversify its energy supply sources. Russia's aggression against Ukraine in 2022 served as a catalyst for these efforts, forcing European countries to review their energy policies and seek more reliable partners. The decrease in Russia's share of energy carrier imports to the EU and the growing role of other suppliers, such as the USA, Norway, Algeria, and Qatar, indicate the success of the diversification strategy. However, despite these positive changes, risks and challenges to the EU's energy security still remain, including the possibility of supply disruptions and geopolitical pressure. To further strengthen the EU's energy security, continued efforts are needed to develop renewable energy, increase energy efficiency, and strengthen cooperation with reliable partners such as the USA. These steps will not only reduce dependence on imported fossil fuels but also contribute to achieving sustainable development goals and combating climate change.

Efforts by the USA to support Europe's energy security. The United States of America plays a crucial role in supporting Europe's energy security, particularly through the supply of its own energy resources to European markets. Over the past decade, the USA has intensified efforts to increase exports of oil and natural gas to Europe, which has contributed to the diversification of energy supply

sources and reduced dependence on Russian energy carriers (Klass & Pai, 2021).

In 2015, the United States took a significant step towards expanding its presence in the global oil market by lifting a 40-year-old embargo on crude oil exports. This decision opened up new opportunities for US oil companies to supply their products to international markets, including European countries. According to recently released data from the U.S. Energy Information Administration (EIA) (U.S. crude oil..., 2024), crude oil exports from the United States reached an unprecedented high in 2023, averaging 4.1 million barrels per day (b/d). This indicator is 13% (or 482,000 b/d) higher than the previous annual record set in 2022. The growth in oil export supplies became possible due to a significant increase in the production of this commodity within the USA. In 2023, the average daily production of crude oil in the country reached a new historical maximum of 12.9 million b/d, which is 9% (or 1.0 million b/d) more compared to the 2022 figure.

Europe became the primary regional destination for USA crude oil exports in 2023, surpassing Asia and Oceania. This was facilitated by the consequences of Russia's full-scale invasion of Ukraine and the inclusion of West Texas Intermediate (WTI) crude oil into the European oil benchmark Dated Brent. In 2023, USA crude oil exports to Europe averaged 1.8 million b/d, slightly more than exports to Asia and Oceania at 1.7 million b/d. The Netherlands received the largest volume of USA crude oil exports in 2023, averaging 652,000 b/d. The combination of sanctions against Russia and the response of USA exports to the inclusion of WTI in Brent contributed to an 82% increase (293,000 b/d) in USA exports to the Netherlands in 2023 compared to 2022, the largest volume increase for any country (U.S. crude oil..., 2024).

According to information provided by CEDIGAZ (The United States remained..., 2024), throughout 2023 the United States of America maintained its status as the leading supplier of liquefied natural gas (LNG) to the European market, which includes the EU-27 countries and the United Kingdom. The USA's share in the total volume of LNG imported by Europe reached almost 50%. It is noteworthy that 2023 marked the third consecutive year in which US LNG deliveries to Europe exceeded those of any other exporting country.

Thus, in 2021, the USA's share was 27% (2.4 billion cubic feet per day), in 2022 it increased to 44% (6.5 Bcf/d), and in 2023 it reached a record 48% (7.1 Bcf/d). Regarding other key players in the European LNG market, Qatar and Russia ranked second and third, respectively, in terms of supply volumes last year. Qatar accounted for 14% (2.0 Bcf/d) of Europe's imported LNG, while Russia's share was 13% (1.8 Bcf/d). Combined, the three countries – the USA, Qatar, and Russia – accounted for three-quarters of all European LNG imports in both 2022 and 2023.

The average daily volume of LNG imports to Europe in 2023 was 14.7 Bcf/d, which is almost identical to the previous year's figure, despite the estimated increase in regasification capacity by 4.2 Bcf/d. The main importers of LNG were France, Spain, the Netherlands, and the United Kingdom, which together accounted for about two-thirds (9.3 Bcf/d) of the total supply volume. Germany, which started importing LNG for the first time in January 2023,

by the end of the year provided 4% (0.6 Bcf/d) of the total European import. Moreover, over 80% of LNG supplies to Germany are specifically from the USA (The United States remained..., 2024).

The United States is providing Europe not only with physical support through increased energy exports but also with political and diplomatic support on energy security issues. US officials have consistently called on European countries to diversify their energy supply sources and reduce their dependence on Russian energy carriers.

Specifically, the USA imposed restrictions on the involvement of US companies in a majority of Russian energy ventures and prohibited the importation of Russian oil, liquefied natural gas, and coal. This was a significant step in reducing Europe's dependence on Russian energy carriers and diversifying energy supplies. The USA and its G7 partners also agreed to limit the price of Russian crude oil, aimed at reducing Russia's income from energy resource sales (Tortladze, 2023).

However, EU sanctions on Russian energy were more contentious due to the high dependence of some member states on Russian gas and oil. Hungary, for instance, imported nearly 85% of its gas and 65% of its petroleum products from Russia. This dependency, coupled with rising energy carrier prices, led to resistance from Hungary and other countries to EU efforts to ban the purchase of Russian gas. Nevertheless, the EU imposed restrictions on imports of most Russian crude oil and joined the G7 price cap (Tortladze, 2023).

Although the sanctions have clearly had a negative impact on the Russian economy, this impact has been insufficient to halt the conflict. Russia has been able to partially shield itself from the consequences of sanctions through cooperation with countries such as China, Turkey, and certain former Soviet republics, which have provided Russia with a significant quantity of consumer and military goods.

In late 2019, the US legislators passed the "Protecting Europe's Energy Security Act (PEESA)" (2020), aimed at countering the implementation of Russian export gas pipelines that could threaten the energy independence of European countries. Specifically, the law provides for the possibility of imposing sanctions on companies involved in the construction of projects such as Nord Stream 2 and TurkStream. This legislative initiative is part of a comprehensive USA effort to limit Russia's ability to use the energy sector as a tool of political pressure.

In accordance with the provisions of Section 7503 of the PEESA of 2020, the U.S. Secretary of State, in consultation with the Secretary of the Treasury, is required to submit a report to Congress that identifies: (A) vessels involved in the laying of pipes at a depth of 100 feet or more below sea level as part of the Nord Stream 2, TurkStream, or any successor projects; (B) foreign persons who, in the judgment of the Secretary of State (made after consultation with the Treasury), knowingly sold, leased, or provided such vessels for the construction of such projects, or facilitated deceptive or structured transactions aimed at providing these vessels for construction purposes.

At the same time, the law provides for a number of exemptions. For example, sanctions will not apply to persons who supply goods intended to ensure the safety and proper conditions for the crew of the vessel, to protect the lives

of persons on board, or to maintain the vessel in a technically sound condition to prevent environmental or other significant harm. In addition, persons whose activities are necessary for the repair, maintenance, or environmental remediation of Nord Stream 2, TurkStream, or other successor projects will be exempt from sanctions (Protecting Europe's Energy..., 2020). These provisions demonstrate the seriousness of the USA's intent to use sanctions to halt the construction of pipelines that it considers a threat to Europe's energy security while providing some flexibility to avoid excessive negative impact on the involved companies.

Beyond USA legislative initiatives aimed at countering Russia's use of energy as a tool of political influence, the vulnerability of Russian energy infrastructure also undermines Europe's energy security. A prime example of this is the September 2022 explosions on the Nord Stream pipelines, which damaged three of the four pipelines supplying Russian gas to Germany (Adomaitis & Ahlander, 2024).

Although there is still no official conclusion regarding those responsible for the sabotage, this event has demonstrated that Russia, as a participant in regional conflicts, is unable to ensure the security of its own strategic infrastructure. Such vulnerability not only harms Russia itself but also has serious consequences for the energy security of the European Union, which is highly dependent on the supply of Russian energy carriers. The explosions on the Nord Stream pipelines resulted in a massive gas leak into the atmosphere and effectively rendered these pipelines unusable for supplying gas to Europe. This has forced European countries to accelerate the search for alternative energy sources and has further intensified the issue of reducing dependence on Russian energy resources.

Thus, Russia's aggressive policy and its inability to guarantee the security of its own energy infrastructure not only harm its own interests but also jeopardise the energy security of its main clients – the countries of the European Union. This creates additional incentives for the EU to more actively diversify its energy supply sources and reduce its vulnerability to potential disruptions in the supply of Russian energy carriers.

In this context, USA efforts to support Europe's energy security, including legislative initiatives and promoting the export of US energy resources, become even more relevant and significant. Cooperation between the USA and the EU in the field of energy security can play a key role in countering the threats arising from Russia's unpredictable and destructive energy policy.

The political and diplomatic support of the USA plays a crucial role in strengthening Europe's energy security, complementing efforts towards physical diversification of supplies. Washington employs a variety of tools – from public diplomacy to targeted financial and technical assistance – to help European partners resist Russia's energy influence and ensure a reliable and diversified energy supply.

USA-EU cooperation on energy security. The United States and the European Union have a long history of cooperation in the field of energy security. This cooperation is based on shared values and interests, such as ensuring a reliable and diversified supply of energy resources, developing competitive and transparent energy markets, and countering monopolisation and politicisation of the energy sector.

One of the key platforms for USA-EU cooperation is the U.S.-EU Energy Council, established in 2009. The Council serves as a platform for high-level strategic dialogue on energy issues, including energy security, energy efficiency, renewable energy, nuclear energy, and more. Council meetings discuss current challenges and coordinate joint actions to overcome them. For example, at the 9th Council meeting in 2018, the parties agreed to strengthen cooperation in the field of energy security, including through diversification of energy sources, routes, and suppliers for Europe (Morningstar *et al.*, 2020).

One of the key aspects of cooperation between the United States and the European Union is the joint effort to prevent the use of energy resources as a tool of geopolitical influence and pressure. This issue has become particularly acute since 2014, when Russia annexed the Crimean Peninsula and launched a conflict in eastern Ukraine. In response to these actions, the USA and the EU resorted to imposing sanctions, which affected the Russian energy sector in particular. The aim of these restrictive measures, which involved making it more difficult for Russian energy companies to access advanced Western technologies and international financial markets, was to weaken Russia's ability to exert pressure on other states using its energy potential.

The USA and the EU also cooperate within multilateral frameworks such as the International Energy Agency (IEA) and the Energy Charter Treaty. In particular, the USA has been a member of the IEA since 1974 and is actively involved in the development and implementation of global energy policy (Eicke & Petri, 2022). In May 2022, the European Commission presented a document (EU external energy..., 2022) outlining the EU's strategy for cooperating with international partners in the energy sector in a changing world. This document emphasises the importance of the transatlantic partnership with the USA for ensuring Europe's energy security. In particular, the strategy notes that the EU will continue to work closely with the USA, whose priorities are well aligned with European ones across the entire spectrum of energy policy. Through the U.S.-EU Energy Council and international forums, the EU will seek to positively influence the global energy landscape. This cooperation is particularly important in the context of Russia's aggression against Ukraine and its consequences for energy markets. The EU and the USA are coordinating efforts to diversify energy resource supplies to Europe, including increasing exports of US liquefied natural gas, to reduce dependence on Russian energy carriers.

Beyond ensuring short-term energy security, the transatlantic partnership plays a key role in advancing the global green energy transition. The EU and the USA are cooperating on developing clean technologies within the framework of the Trade and Technology Council (TTC), and are coordinating efforts at international forums to accelerate the deployment of renewable energy sources and improve energy efficiency worldwide.

Thus, the European Commission's strategic document emphasises that close cooperation with the USA, both bilaterally and in multilateral forums, is vital for strengthening Europe's energy security in the context of geopolitical shifts and the transition to sustainable energy. The transatlantic partnership allows for a more effective response to current challenges and shaping the future of the global

energy system in accordance with shared goals and values.

US energy companies play a crucial role in diversifying energy supplies to the European Union. Thanks to the development of shale oil and gas extraction technologies, the USA has become one of the world's largest producers and exporters of hydrocarbons. This has opened up new opportunities for the supply of US energy resources to European markets and reduced the EU's dependence on traditional suppliers such as Russia.

Leading US oil and gas companies, such as ExxonMobil, Chevron, and ConocoPhillips, are actively increasing their presence in the European market. They are investing in the development of infrastructure for the reception, storage, and distribution of LNG, as well as signing long-term supply contracts with European consumers. For example, in 2019, ExxonMobil signed a 20-year contract to supply LNG to the German energy company Uniper (Flower, 2021). Thanks to this contract, Germany will receive an additional 5 billion cubic meters of gas per year, which has allowed it to partially replace supplies from Russia.

Beyond the direct supply of energy resources, US companies are also investing in the development of renewable

energy in Europe. In particular, ExxonMobil and Chevron are partners with the Norwegian energy company Equinor in the construction of the world's largest floating wind farm, Hywind Tampen (Herrera Anchustegui & Tscherning, 2024). The US company General Electric is one of the leading manufacturers of wind turbines for offshore wind farms in Europe. The development of renewable energy contributes to the decarbonisation of the European economy and reduces dependence on fossil fuels, including those imported from Russia. US companies are also involved in the development of innovative technologies in the energy sector, such as energy storage, hydrogen technologies, carbon capture and storage, and others. For example, in 2020, ExxonMobil announced the creation of a new division, ExxonMobil Low Carbon Solutions, which will focus on developing and commercialising technologies to reduce greenhouse gas emissions (O'Brien *et al.*, 2021). These technologies can be used in Europe to decarbonise the energy and industrial sectors. To summarise and systematise the information on the USA's efforts to support Europe's energy security, it is appropriate to consider Table 1, which presents key areas of cooperation, their content, and outcomes.

Table 1. USA efforts to support European energy security

Direction	Content	Outcomes
U.S.-EU Energy Council	A platform for strategic dialogue on energy issues, coordinating joint actions	Enhancing cooperation in energy security, diversifying sources and supply routes
Sanctions against the Russian energy sector	Restrictions on Russian companies' access to Western technologies and finances	Diminishing Russia's ability to use energy as leverage, halting the construction of Nord Stream 2
Cooperation within the framework of the IEA and other formats	Development and implementation of global energy policies, coordination of actions on the international stage	Promotion of energy security and sustainable development principles, countering the politicisation of energy
Activities of US energy companies in Europe	Investments in LNG infrastructure, renewable energy, innovative technologies	Diversification of energy resource supplies to the EU, decarbonisation of the economy, reducing dependence on Russia

Source: compiled by the author based on L. Eicke & F. Petri (2022), K. Tortladze (2023), EU external energy engagement in a changing world (2022), I. Herrera Anchustegui & R. Tscherning (2024), J. O'Brien *et al.* (2021)

Therefore, US energy companies are important partners for the European Union in ensuring energy security and transitioning to a low-carbon economy. Their role is not limited to supplying traditional energy resources such as oil and gas but also includes investments in renewable energy, development of innovative technologies, and knowledge sharing. Through cooperation with US companies, the EU can diversify its energy supply sources, reduce dependence on Russia, and accelerate the energy transition.

Assessment of the successes and failures of US policy in replacing Russian energy carriers. The United States has played a key role in supporting Europe's energy security amid Russia's aggression against Ukraine, actively increasing exports of oil and natural gas to the European market. As Atlantic Council experts note, after the lifting of a 40-year ban on US crude oil exports in 2015, US companies were able to freely supply oil to global markets, including Europe (Morningstar *et al.*, 2024). This contributed to the diversification of the EU's energy supply sources and reduced its dependence on Russian energy carriers.

According to the U.S. Energy Information Administration (EIA), US crude oil exports reached a record high

in 2023, averaging 4.1 million barrels per day, which is 13% more than the previous annual record in 2022. The growth in exports was supported by an increase in USA oil production, which also reached a record high in 2023 – 12.9 million barrels per day (U.S. crude oil..., 2024). Europe became the primary regional destination for US oil exports in 2023, surpassing Asia and Oceania.

The United States continued to dominate the European liquefied natural gas (LNG) market throughout 2023, meeting about 50% of the region's total LNG imports (The United States remained..., 2024). This marked the third consecutive year that US LNG shipments to Europe exceeded those of any other exporter. The USA's share of European LNG imports soared from 27% in 2021 to an impressive 48% in 2023. Meanwhile, Qatar and Russia retained their positions as the second and third largest suppliers of liquefied gas to the European market, respectively.

This data demonstrates the rapid growth of US energy resource deliveries to Europe following the start of the full-scale Russian-Ukrainian war. The USA was able to quickly ramp up oil and LNG exports to help its European allies offset the loss of Russian energy supplies. The development

of infrastructure for receiving, storing, and distributing LNG, as well as long-term supply contracts with European consumers, have been important factors in the success of the US strategy of energy support for Europe (Flower, 2021).

The increase in energy imports from the United States has played a crucial role in reducing the European Union's dependence on Russian energy carriers. As noted above, the USA's share of LNG imports to Europe increased to almost 50% in 2023, while Russia's share decreased to 13%. At the same time, thanks to record US oil exports to Europe, the region was able to significantly reduce its purchases of Russian oil (U.S. crude oil..., 2024).

According to Eurostat, Russia's share of energy imports into the EU decreased from 14.5% in the third quarter of 2022 to 6.5% in the third quarter of 2023 (Drop in EU imports..., 2023). In 2022, the EU's energy dependence on imports was 62.5%, with 97.7% of the demand for oil and petroleum products and 97.6% of the demand for natural gas being met through imports (Energy statistics..., 2024). However, thanks to the diversification of energy supply sources, primarily through increasing purchases of US energy resources, the EU has managed to significantly reduce Russia's share in the structure of its energy imports.

Thus, the US policy of supporting Europe's energy security through increased exports of its own energy resources has proven quite successful in the context of reducing the EU's dependence on Russian energy carriers. US oil and LNG supplies have allowed for the partial substitution of Russian energy resources and the diversification of Europe's energy supply sources. This has contributed to strengthening the EU's energy resilience and weakening Russia's ability to use energy as a tool of political pressure.

Despite significant successes in increasing US energy supplies to Europe and replacing Russian energy carriers,

there are certain obstacles and limitations to the implementation of this policy. First and foremost, this concerns the higher cost of US LNG compared to Russian pipeline gas. As experts from the Atlantic Council note, Russian gas has traditionally been cheaper for European consumers due to geographical proximity, state subsidies, and minimal investments in environmental, social, and governance (ESG) projects. On the other hand, US LNG requires additional costs for liquefaction, transportation, and regasification, which increases its final price for European buyers. This creates a risk that after the end of the war in Ukraine, some European countries may return to purchasing cheaper Russian gas, especially if energy security concerns recede into the background (Morningstar *et al.*, 2024).

Another obstacle is the insufficient level of development of infrastructure for receiving, storing, and distributing LNG in some EU countries, especially in Central and Eastern Europe. This limits the possibilities for diversifying gas supply sources and creates vulnerabilities in the energy security of these countries. Therefore, an important task is to invest in the development of the appropriate infrastructure, including LNG terminals, gas interconnectors, and gas storage facilities (Morningstar *et al.*, 2024).

Furthermore, the process of decarbonising the EU economy and transitioning to renewable energy sources may, in the long term, reduce the need for fossil fuel imports, including US energy resources. As M. De Rosa *et al.* (2022) note, achieving sustainable development goals and ensuring energy security in the EU requires increasing the share of renewable sources and diversifying energy supply, taking into account regional specificities. To compare the successes and challenges in implementing the US policy of replacing Russian energy carriers on the European market, consider Table 2.

Table 2. Assessment of the US policy of replacing Russian energy carriers in Europe

Aspect	Successes	Challenges
Export of US oil to Europe	Record level in 2023 – 4.1 million barrels per day (+13% compared to 2022). Europe is the main destination for exports	–
Export of US LNG to Europe	The USA was the largest supplier of LNG to Europe in 2021-2023. The share of the USA increased from 27% in 2021 to 48% in 2023	Higher cost of US LNG compared to Russian pipeline gas
Reducing the EU's energy dependence on Russia	Russia's share in energy carriers imports to the EU decreased from 14.5% in Q3 2022 to 6.5% in Q3 2023	Risk of returning to purchasing cheaper Russian gas after the war ends
Development of LNG infrastructure in the EU	–	Insufficient development in some EU countries, especially in Central and Eastern Europe
Alignment with EU decarbonisation goals	–	Reduction in the long-term need for fossil fuel imports due to the transition to renewable sources

Source: compiled by the author based on research data M. De Rosa *et al.* (2022), R.L. Morningstar *et al.* (2024) and a range of analytical reports (Drop in EU imports..., 2023; U.S. crude oil..., 2024; The United States remained..., 2024)

As shown in Table 2, the USA has achieved significant success in increasing oil and LNG exports to Europe, allowing for a substantial reduction in Russia's share of the EU's energy imports. US energy resources have played a key role in diversifying Europe's energy supply sources and strengthening its energy resilience in the face of Russian aggression. However, there are certain challenges related to the higher cost of US LNG compared to Russian gas,

insufficient development of the relevant infrastructure in some EU countries, and the potential decrease in the need for fossil fuel imports due to the transition to renewable energy sources. To overcome these obstacles, further cooperation between the USA and the EU is needed in the areas of investment, pricing, and aligning energy policies with climate goals. Therefore, despite significant successes in the US policy of replacing Russian energy supplies

in the European market, there are certain obstacles and limitations to its implementation. These include the higher cost of US LNG compared to Russian gas, insufficient development of relevant infrastructure in some EU countries, and long-term plans for decarbonising the European economy. Overcoming these challenges requires further efforts in infrastructure investment, ensuring competitive prices for US energy resources, and aligning USA and EU energy policies with sustainable development goals and climate ambitions.

Discussion

The research findings revealed a significant increase in the role of the USA in ensuring Europe's energy security amidst Russian aggression against Ukraine and global energy transformations. Specifically, a substantial increase in US oil and LNG exports to Europe has been established, along with intensified political and diplomatic cooperation between the USA and the EU in the energy sector. Furthermore, the growing significance of the transatlantic partnership for achieving climate goals has been highlighted. These conclusions find confirmation, development, and supplementation in the studies of other researchers who have researched various aspects of Europe's energy security and transatlantic relations in this field.

An analysis of statistical data on the export of US oil and LNG to Europe in 2022-2023 revealed a significant increase in supply volumes. This tendency correlates with the findings of C. Aitken & E. Ersoy (2023), who note that increasing LNG imports from the USA is one of the most promising ways to strengthen the EU's energy resilience in the short term. Specifically, according to the research data, the USA's share in EU LNG imports increased from 27% in 2021 to 48% in 2023. C. Aitken & E. Ersoy also emphasise the importance of diversifying supply sources to reduce dependence on Russian energy resources, which confirms the findings of this study regarding the growing role of US energy carriers in ensuring Europe's energy security.

The observed tendency towards the diversification of the EU's energy supply sources is confirmed by the results of T. Rokicki *et al.* (2023). The authors demonstrate that the Russian invasion of Ukraine has acted as a catalyst for diversification processes in the EU's energy sector. In particular, their research shows a decrease in Russia's share of energy imports to the EU from 14.5% in the third quarter of 2022 to 6.5% in the third quarter of 2023. These data align with the results of this study and indicate a decrease in the EU's energy dependence on Russia and a growing role for the USA as an alternative supplier.

The research by E. Dogan *et al.* (2023) on the impact of energy and environmental taxes on the deployment of renewable energy in the EU provides valuable insights for interpreting the results of this study. The authors found that the impact of tax instruments on the development of renewable energy sources is ambiguous and depends on the specific type of tax. In particular, they established that energy taxes have a negative impact on renewable energy consumption, while environmental taxes promote its growth. These findings complement the results of this study, emphasising the complexity of balancing different energy policy instruments to achieve decarbonisation and energy security goals. In the context of transatlantic energy

cooperation, the effects identified by E. Dogan *et al.* (2023) indicate the need for careful coordination of EU and USA tax policies to effectively stimulate the development of renewable energy without harming energy security. This is particularly relevant in light of the results of this study regarding the growing role of the USA as a supplier of energy resources to the EU, as it requires consideration of the potential impact of European tax instruments on the competitiveness of US energy carriers on the European market.

The study by M. Pelekanaki (2023) on the role of hydrogen in ensuring energy security provides important insights for interpreting the results of this research. The author considers the potential of hydrogen technologies as a key element of the future energy system, which can contribute to both decarbonisation and increased energy security. This correlates with the findings of this study regarding the need for diversification of energy sources and the development of innovative technologies in the context of transatlantic cooperation. The author notes that the development of a hydrogen economy can reduce dependence on fossil fuel imports and promote the integration of renewable energy sources, which aligns with the results of this study regarding the EU's pursuit of energy independence. At the same time, M. Pelekanaki (2023) emphasises the need for international cooperation to develop a global hydrogen market, which resonates with the conclusions of this study about the importance of coordinating efforts between the EU and the USA in the field of energy policy.

Particularly interesting is M. Pelekanaki's (2023) analysis of the potential for the USA as an exporter of green hydrogen to Europe in the future. This complements the results of this study, indicating potential new directions for transatlantic energy partnerships that go beyond traditional oil and gas trade. Such a scenario could contribute to achieving both energy security goals and climate ambitions on both sides, which confirms the conclusions of this study about the need for a comprehensive approach to energy cooperation between the EU and the USA.

The impact of geopolitical instability on energy security, which is a central aspect of this study, is confirmed by the work of K. Khan *et al.* (2023). Based on a causal analysis, the authors prove that political conflicts are one of the key factors in the vulnerability of energy systems. These conclusions correlate with the results of this study regarding the destructive impact of Russian aggression against Ukraine on Europe's energy security. In particular, an analysis of statistical data and expert assessments has shown that the Russian invasion led to a sharp reduction in supplies of Russian energy carriers to the EU and stimulated the search for alternative sources, including the USA.

The research by P. Bórawski *et al.* (2023) on the prospects for the development of the photovoltaic energy market in the EU provides an important context for understanding the results of this study. The authors identified significant growth potential for solar energy in Europe, which correlates with the conclusions of this study regarding the importance of developing renewable energy sources to ensure the EU's energy security. In particular, P. Bórawski *et al.* (2023) forecast an increase in installed photovoltaic capacity in the EU to 327.6 GW by 2025, which underlines the role of solar energy in diversifying Europe's energy portfolio.

This data complements the results of this study, demonstrating a specific direction in which the EU can reduce its dependence on imported energy resources, including those from the United States. At the same time, the regional differences in the development of the photovoltaic market identified by the authors indicate the need for a differentiated approach to energy transformation in the EU, which may affect the nature of energy cooperation with the USA in different regions of Europe.

The role of renewable energy in ensuring long-term energy security, which is emphasised in this study, is confirmed by the work of Q. Hassan *et al.* (2024). The authors argue that the large-scale implementation of clean technologies is not only an imperative for combating climate change but also a guarantee of the resilience of energy systems. These conclusions align with the results of this study regarding the importance of developing renewable energy as a shared priority for the USA and the EU. An analysis of strategic documents and investment plans of both sides has revealed a growing emphasis on cooperation in the development and implementation of innovative energy technologies, including offshore wind energy, green hydrogen, and energy storage technologies.

It is important to note that the conclusions of this study regarding the growing role of the USA as a key guarantor of Europe's energy security in the current crisis do not have direct analogues in the studies considered. This may indicate the originality and relevance of the proposed approach to analysing the transatlantic energy partnership in the context of contemporary geopolitical challenges. In particular, this study offers a more comprehensive view of the USA's role, considering not only the trade and economic aspects of cooperation but also the political-diplomatic and security dimensions.

The analysis of the impact of the 2020-2022 crises on the energy independence of EU countries, conducted by T. Rokicki *et al.* (2023), complements the results of this study. The authors demonstrate that the COVID-19 pandemic, and subsequently the Russian invasion of Ukraine, revealed the vulnerability of European countries' energy systems and accelerated the processes of diversifying supply sources. These conclusions confirm the results of this study regarding the catalytic impact of external shocks on the transformation of Europe's energy landscape. At the same time, this study expands this perspective, considering not only internal changes within the EU but also the external dimension of energy security, in particular, the strengthening role of the USA as a strategic partner.

The research by J.L. Liu *et al.* (2023) on the energy security and sustainability of the EU during and after the Ukrainian crisis provides a valuable perspective for interpreting the results of this study. The authors analyse the impact of the Russian-Ukrainian war on Europe's energy landscape and the EU's strategies for ensuring energy security in new geopolitical conditions. J.L. Liu *et al.* (2023) emphasise that the crisis has accelerated the transformation of the EU's energy system, stimulating the diversification of supply sources and intensifying the transition to renewable energy sources. These conclusions correlate with the results of this study regarding the growing role of the USA as an alternative supplier of energy resources to Europe. In particular, the authors note the increase in

LNG imports from the USA as a key element of the EU's diversification strategy, which confirms the conclusions of this study about the strengthening of the transatlantic energy partnership.

The analysis by J.L. Liu *et al.* (2023) of the long-term consequences of the crisis on the EU's energy policy is particularly valuable. The authors predict that the pursuit of energy independence and decarbonisation will become even more of a priority for the EU, which resonates with the conclusions of this study regarding the need to balance energy security and climate goals. This underlines the importance of transatlantic cooperation not only in the context of short-term energy supply but also in the development of innovative technologies and the formation of a sustainable energy system.

Overall, the results of this study largely align with the conclusions of other authors regarding the transformation of Europe's energy landscape, the importance of balancing climate and energy priorities, and the impact of geopolitical factors on energy security. At the same time, the emphasis on the role of the USA as a key partner for the EU in ensuring energy security adds a new dimension to the existing academic discourse on this issue. This opens up prospects for further research in the field of transatlantic energy partnership and its impact on global energy security.

Conclusions

The conducted study allowed for an analysis of the role of the United States of America in supporting Europe's energy security, particularly in the context of replacing Russian energy sources with alternative supplies from America. The analysis of the current state of the EU's energy security revealed a high level of dependence of European countries on the import of energy resources, especially from Russia. This dependence makes the EU vulnerable to potential supply disruptions and political pressure from the Kremlin. Russia's aggression against Ukraine in 2022 became a catalyst for the transformation of the EU's energy policy and intensified efforts to diversify energy supply sources.

Research into the USA's efforts to support Europe's energy security has revealed that Washington plays a key role in this process. The United States is actively increasing exports of its own energy resources, primarily oil and liquefied natural gas, to European markets. The lifting of restrictions on US oil exports and the development of infrastructure for LNG supply have allowed the USA to become the largest supplier of these energy resources to Europe in 2023. In addition to physical support, the USA provides the EU with political and diplomatic support on energy security issues, including through sanctions against the Russian energy sector and promoting energy supply diversification.

An assessment of the successes and failures of US policy in replacing Russian energy carriers with alternative supplies for EU countries indicates significant progress. The rapid growth of US oil and LNG exports to Europe has significantly reduced Russia's share in the structure of EU energy imports. At the same time, there are certain challenges associated with the higher cost of US energy resources compared to Russian ones, insufficient development of the relevant infrastructure in some EU countries, and the potential decrease in the need for fossil fuel

imports due to the transition to renewable energy sources. To overcome these obstacles, further efforts are needed to invest in infrastructure, ensure competitive prices for US energy resources, and align USA and EU energy policies with sustainable development goals.

A comparative analysis of the research results with the conclusions of other scientists has confirmed the growing role of the USA as a guarantor of European energy security, the importance of balancing climate and energy priorities, and the need to adapt the transatlantic energy partnership to changing geopolitical realities. Despite differences in focus and methodology, the studies considered correlate with the key findings of this research. However, this study has certain limitations. It primarily focuses on the role of the USA in supporting Europe's energy security, leaving aside the potential contributions of other countries and regions. The analysis is based on data for a limited time period, which does not allow for a full assessment of the long-term consequences of the transformation of the

energy landscape. The study does not take into account possible changes in US and EU energy policies that could affect the dynamics of their partnership.

Future research directions in this field include 1) analysing the potential for EU cooperation with other countries and regions to diversify energy supplies; 2) long-term forecasting of the impact of energy transformations on the transatlantic partnership; 3) studying the synergy between energy security goals and economic decarbonisation in the context of USA-EU cooperation. These directions will allow for a deeper understanding of the complex nature of Europe's energy security and the development of effective strategies to strengthen it in a changing world.

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Conflict of Interest

None.

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