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Defining European Union's Energy Security from the Perspective of 4A (Availability, Accessibility, Acceptability, Affordability) as an Impact from Russia-Ukraine's Conflict

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Abstract
Energy issues become one of dilemma of European Union in Rusia invasion to Ukraine. The author of this scientific study analyzes European Union policy using Benjamin Sovacool's idea of energy security, including availability, accessibility, acceptability, and affordability. To explore this phenomenon, the author used qualitative research techniques and internet-based research. This study demonstrates how the European Union is putting numerous policies into practice to reduce energy scarcity by seeking out nations that can cooperate with them in the production of oil and gas, like Algeria, Qatar, and Norway. The European Union is also building a network of infrastructure for the distribution of gas and oil so that people in the area may access and affordably buy energy sources. By maximizing renewable energy, the European Union is diversifying its energy mix and reducing its reliance on imports of gas and oil.

Keywords: European Union, Energy Security, Availability, Accessibility, Acceptability, Affordability.

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INTRODUCTION

Russia is the world's third-largest producer of natural gas, with 34.2 QBTU (EIA, 2023). Furthermore, according to EIA estimates, Russia possessed the world's largest natural gas reserves as of January 1, 2023, reaching 1,688 trillion cubic feet (Tcf). Oil and gas have helped to stabilize the Russian economy and provide revenue for expansion, allowing Russia to be both militarily and economically strong (Hanifah, 2017). As a result, Russia makes aggressive use of its energy resources, particularly gas. It provided Russia with strength and power.

Russia's preferred energy market is the European Union. The graphic below depicts a yearly trend of the growth of Russian energy exports to the European Union.

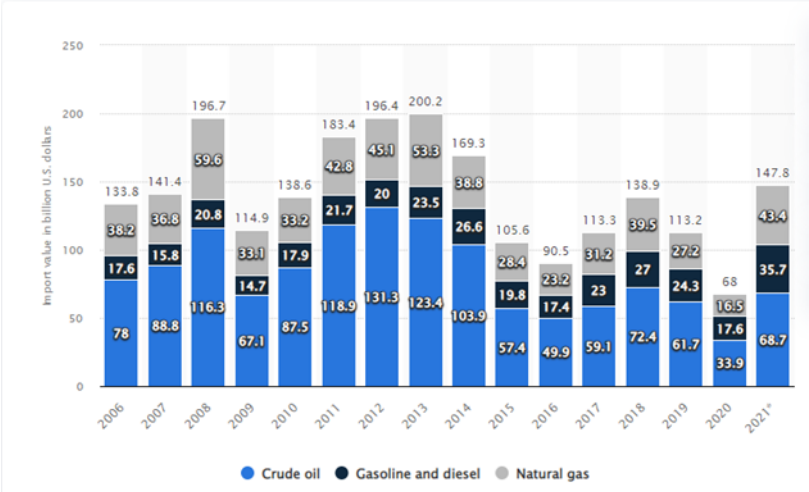

Figure 1 shows Russia's exports of energy commodities to the European Union. Eurostatistic (Eurostatistic, 2023)

According to this calculation, the European Union's energy consumption will fall in 2020. Energy availability in the European Union declined (-8.1%) in 2020 compared to 2019 (European Union, 2020). Despite a long-term decreasing trend, oil (crude oil and petroleum products) is becoming Europe's most important energy source. Meanwhile, natural gas remains the European Union's second-largest energy source. Oil and natural gas prices fell by 12.6% and 2.4%, respectively, in 2020 (European Union, 2020). Renewable energy sources' contribution is increasing. Renewable energy surpassed solid fossil fuels in 2018 and 2019, and this trend is expected to continue in 2020. In 2020, solid fossil fuels fell by 18.4%, reaching their lowest level since 1990 (European Union, 2020).

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From 2017 to 2021, the European Union's energy imports from Russia fluctuated (Pahlevi, 2023). In 2017, the value of Russian product imports into the European Union hit 85 billion euros. The figure then rose to 101.1 billion euros in 2018. The figure then fell to 88 billion euros in 2019. It fell further in 2020, to 52.8 billion euros. This drop was induced by the Covid-19 phenomenon, which reduced energy requirements. Imports from Russia fell again in 2021, to 44.2 billion euros. Oil, worth 24.7 billion euros, coal, costing 2.1 billion euros, and natural gas, worth 15 billion euros, are the types of energy that Russia sends to the European Union.

The graph below depicts the evolution of European Union energy imports from Russia.

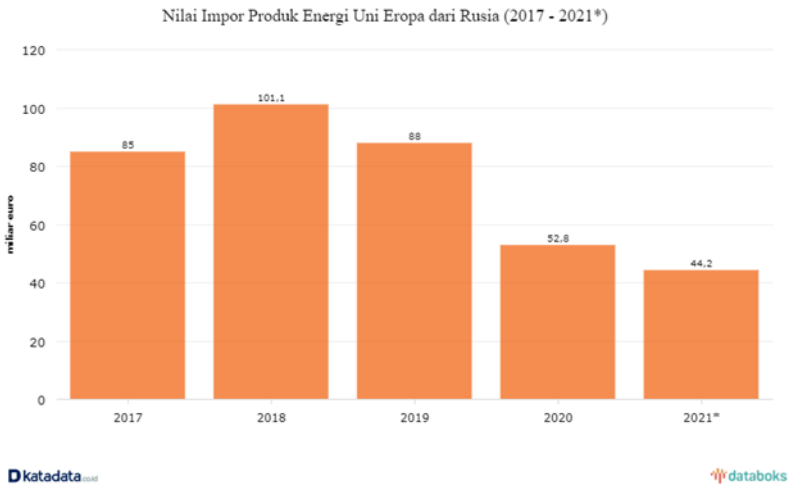

Figure 2 shows the evolution of the value of Russian energy imports into the European Union.
Source. Katadata, 2022

The majority of European Union countries rely on Russian gas for energy. North Macedonia, where Russia exports 100% of its gas energy, is one of several countries that rely heavily on Russia for gas energy. Then Finland receives 94% of its gas energy from Russia. Bulgaria and Slovakia follow, with 77% and 70%, respectively. Germany, Italy, Poland, and France are close behind, accounting for roughly 40% and 24% of total gas energy supply, respectively (Aizarani, 2023).

The graph below depicts the availability of European Union energy supplies from 1990 to 2020.

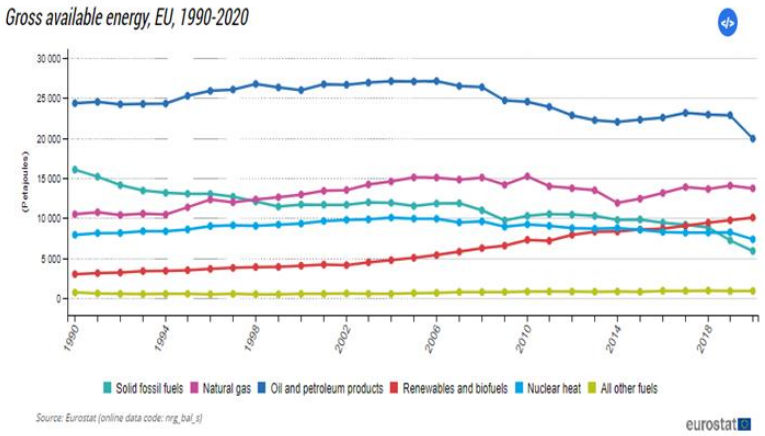

Figure 3 shows the increase in Russian energy exports to the European Union. Eurostat (Eurostat, 2023)

According to the author's illustration, the European Union's energy consumption will decrease in 2020. Energy availability in the European Union declined (-8.1%) in 2020 compared to 2019 (European Union, 2020). Despite a long-term decline, oil (crude oil and petroleum products) remains the most important energy source for the European economy. Meanwhile, natural gas remains the European Union's second-largest energy source. Oil and natural gas prices fell by 12.6% and 2.4%, respectively, in 2020 (European Union, 2020). Renewable energy sources' contribution is increasing. Renewable energy surpassed solid fossil fuels in 2018 and 2019, and this trend is expected to continue in 2020. In 2020, solid fossil fuels fell by 18.4%, reaching their lowest level since 1990 (European Union, 2020).

The disruption of Russian energy supplies to the European Union was caused by Russia's invasion of Ukraine. The Russia-Ukraine conflict in 2022 is an extension of the conflict that began in 2014, when Russia attacked Ukraine from Crimea and backed insurgents in eastern Ukraine. Russia formally launched a large-scale invasion on Ukraine on February 24, 2022, dubbed a "Peace and Security Operation" by the Russian side. This strike occurred following Ukrainian President Volodymyr Zelensky's announcement that Ukraine was ready to join NATO. Russia maintains that this strike was carried out to safeguard Russian people in Ukraine and to protect Russian interests in the region (Mbah & Wasum, 2022).

In response to Russia's invasion of Ukraine, the European Union imposed sanctions. Economic sanctions impose significant consequences on Russia for its

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actions, thereby thwarting Russia's ability to sustain aggression (Hanifah, 2017). Individual sanctions are aimed against those who support, finance, or carry out actions that undermine Ukraine's territorial integrity, sovereignty, and independence, as well as those who benefit from such actions. The European Union made this attempt to diminish Russia's sources of income used to finance the Ukraine conflict.

However, the results did not meet the expectations of the European Union. Sanctions imposed by the European Union on Russia harm the European Union itself. Russia has cut natural gas supplies to European Union countries by up to 75% (Massaguni et al., 2022). Not only that, but Russia also expects European Union countries to pay for gas sold by Russia in Russian rubles. Russia's reduction in gas quantities for European Union countries has a direct influence on the European economy because Russia supplies over 60% of Europe's gas demand (Massaguni et al., 2022).

The energy crisis created by the Russian-Ukrainian conflict drove increased energy costs in the European Union and elsewhere, as Russia banned fossil fuel exports in order to put pressure on the EU to withdraw its support for Ukraine (Massaguni et al., 2022). Gas costs are now around ten times what they were a decade ago. Europe avoided a crisis as a result of the conflict by using less gas. According to the IEA (2023), EU gas consumption in 2022 was 13%, or 55 bcm, lower than in 2021, the biggest fall in direct gas use in EU history. As a result, the European Union must reduce its reliance on Russian energy supplies and strengthen energy supply security through supply diversification and renewable energy development (Albrecht & Riecke, 2022).

Literature Review

In this scientific essay, the author employs the notion of energy security. Sovacool (2013) defines energy security as the availability, accessibility, acceptability, and affordability of energy supply to meet long-term energy needs. Energy security is a notion that refers to efforts to reduce the dangers connected with consuming energy, which is critical for human survival. Energy security, according to Sovacool, could comprise energy reserves, diversification of energy supply, energy infrastructure, energy supply reliability, and technological innovation. Energy reserves include long-term supply of fossil fuels and renewable energy sources. Diversification of energy supply entails less reliance on certain energy sources and more usage of alternative energy sources. Energy infrastructure encompasses systems for energy transmission, storage, and distribution. The capacity of an energy system to maintain a constant and reliable energy supply is referred to as

energy supply reliability. Technological innovation includes the development of more efficient and environmentally friendly energy technology. Energy security is also linked to social and environmental factors, such as the social and environmental consequences of energy use. It addresses public health and safety concerns, as well as environmental issues like as air pollution, global warming, and climate change. As a result, Sovacool highlights the significance of a holistic approach to understanding and managing energy security.

Sovacool (2013) defines the energy security conceptual framework as having four dimensions: (1) availability, (2) accessibility, (3) acceptability, and (4) affordability. These four dimensions are interconnected and impact each other within the scope of the energy security concept. If one dimension is not reached, it can have an effect on the others. As a result, in order to establish sustainable energy policies and efficiently meet society's needs, the government, business, and society must pay attention to these four factors.

According to Sovacool (2013), the first dimension, availability, is determined by numerous elements such as available energy reserves, infrastructure and technologies utilised, and government rules and regulations. The number and type of energy sources that may be produced are factors that can be influenced by natural circumstances, geology, technology, and production costs. Energy availability is dependent on infrastructure and technologies such as electricity networks, gas pipelines, and LNG terminals. Furthermore, energy should focus on diversifying energy sources in order to lessen reliance on a single sort of energy source. Diversification can be accomplished by the development of renewable, nuclear, and other energy sources (Hunko, 2022).

According to Sovacool (2013), the second component, accessibility, addresses the community's physical and financial access to energy sources. Infrastructure, technology, and low energy rates all contribute to this accessibility. According to Sovacool (2013), proper infrastructure is critical to providing effective energy security accessible. The infrastructure in concern consists of a dependable and secure energy distribution network, as well as suitable storage and transit facilities. Furthermore, technology plays an important part in energy security accessibility. Effective technology can aid in the optimization of energy resources and the reduction of losses during use.

Acceptability, a conceptual framework for energy security connected to public acceptability of energy technology, energy sources, and energy infrastructure, is the

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third dimension. Acceptance refers to how much society supports the usage of specific energy technology and energy sources, as well as how much society is at ease with the present energy infrastructure. In this scenario, revenue can influence the success of energy policy and energy investment. Social, cultural, political, economic, and environmental considerations, as well as community participation in energy-related decision-making processes, can all impact acceptance (Sovacool, 2013). Because the community feels it has a voice in decision-making, community participation can improve acceptance. It is possible to achieve this through offering open and transparent information and engagement channels, such as public consultations or discussion forums. Apart from that, acceptance might be impacted by psychological factors such as perceived risks and advantages (Sovacool, 2013).

The fourth component, affordability, is related to people's ability to pay sufficient energy prices to meet their daily demands, according to Sovacool (2013). As a result, the government must ensure that energy prices remain affordable to the general public. However, energy affordability must be considered in the context of a comprehensive sustainable energy strategy. Furthermore, Sovacool (2013) underlines the issue of justice in energy affordability, stating that people with lower incomes must have equal access to affordable energy as those with higher incomes. It is possible to do this through various energy subsidy schemes and regulations that prioritize low-income people.

The author attempts to map prior research connected to the Russia-Ukraine war by referring to earlier research. By downloading research data from the Dimensions data center, the author employs a bibliographic technique. The author then utilized the VosViewer tool to map the study by looking at keywords commonly used in Russia-Ukraine studies. The author selected a time range of 2022 to 2023 for earlier study. The author discovered at least 625 previous research that addressed this issue. The following image shows the VosViewer mapping results:

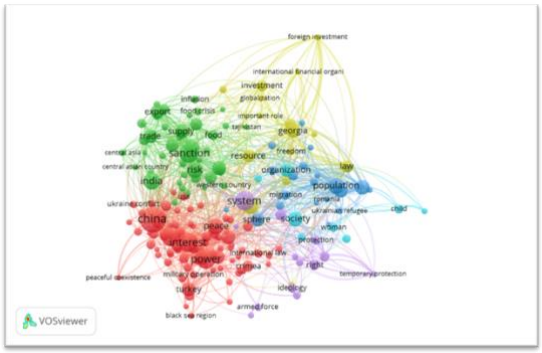

Figure 4. Mapping of Previous Research
Source: (VosViewer processing results)

Based on the data processing results presented above, the author discovered that around 625 previous publications generally examined the Russia-Ukraine conflict in terms of interests and power. Aside from that, previous study has focused on how this conflict overlaps with China. Another discovery was made by the author: many earlier research looked at this conflict through the lens of sanctions. Meanwhile, relatively few people have discussed energy difficulties in the above maps. As a result, the author raises the issue of how the European Union responds to the Russian-Ukrainian crisis from the standpoint of energy security.

METHOD

This study's research method is a literature review with a qualitative approach. Data and information about the European Union's response to energy security threats coming from the impact of the Russian-Ukrainian conflict were gathered through literature studies. To study the data and information gathered, a qualitative method is applied, with a focus on explaining and understanding complex social phenomena. A qualitative approach, according to Creswell (2013), is a method of comprehending an issue in which all sorts of information are gathered and presented in sentences or text (non-numerical).

The authors gather data and information about energy policy and foreign relations from a variety of literary sources, including novels, journals, papers, and official European Union documents. As the principal secondary data source, researchers employ internet-based research to search for data originating from internet sources such as electronic books, journal articles, and the official website of the European Union. The author searches the internet using terms such as European Union response, EU and Russia-Ukraine war, EU energy strategy, and EU energy security.

Following data collection, the researcher identified and classified information pertinent to the research topic. Analyze data and information using a qualitative technique, such as content analysis and narrative analysis, to uncover themes and patterns in the European Union's response to the impact of the Russian-Ukrainian conflict on energy security. The author examines data by reading sources and then focusing on the key issues of the European Union's energy in relation to the Russia-Ukraine conflict, its response, and policies. These points are then paraphrased and recast in the discussion, which is subsequently assessed using the author's theory. The authors then evaluate the findings to draw conclusions and make recommendations for the European Union's response to the impact of the Russia-Ukraine war on energy security.

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ANALYSIS

Availability

According to Sovacool (2013), energy reserves, infrastructure, technology, laws, and government regulations all have an impact on energy availability. To address this situation, the European Union has made important initiatives. They acknowledge the need to lessen reliance on a single type of energy source that creates a supply risk. As a result, the European Union has taken tangible steps to promote the development of diverse types of energy, including renewable energy, nuclear energy, and other energy sources (Wolfson, 2015). The European Union continues to rely on Russian energy sources. However, the European Union is also seeking for ways to minimize its reliance on Russian energy imports. Following Russia's invasion on Ukraine, the European Union made significant measures to guarantee its energy supplies. One method is to diversify your sources. The European Union increases energy imports from other suppliers while decreasing energy consumption. At the same time, they are decreasing Russia's energy supply.

The European Union is doing the following steps to sustain energy availability :

1. Diversification of energy sources

The importance of diversifying energy sources is reflected in the European Union's Renewable Energy Directive, which focuses on increasing the contribution of renewable energy to overall energy consumption. They have supported investment in renewable energy infrastructure like as solar, wind, and biomass power plants with this strategy. Furthermore, the European Union recognized nuclear energy's important role in ensuring a steady and sustainable supply (Murarasu, 2023). They have established strong nuclear safety standards and encouraged member countries to work together to create safe and efficient nuclear technologies. It demonstrates the European Union's commitment to ensuring energy security while also supporting the use of more sustainable energy sources.

2. Infrastructure

To strengthen gas infrastructure, the European Union has committed to investing financing for gas pipelines and LNG terminals. The European Union intends to enhance this infrastructure in order to provide a more stable and flexible gas supply

across its entire area. Gas pipelines connect member countries via cross-border interconnectivity, minimizing reliance on a single gas supply source. Meanwhile, LNG terminals and cutting-edge energy technologies are reducing the European Union's reliance on restricted natural gas supplies delivered by pipeline. Through the Horizon 2020 program, the European Union also actively supports research and development in several elements of energy (Murarasu, 2023). Improving renewable energy technologies for efficiency and cheaper production costs, as well as creating critical energy storage technologies to overcome swings in energy supply, are among the priorities.

To ensure adequate energy availability, the European Union invests in strengthening energy infrastructure and technology. These efforts include enhancements to the integrated power system, modifications to the gas infrastructure, and a drive for innovative energy technology. All of this is aimed at making energy more reliable, efficient, and sustainable. The European Union's energy policy also reacts to swings in energy costs and market demand, with the goal of creating a stable and predictable environment for energy investment. The European Union's energy policy is founded on a solid political and economic foundation. They include member states and attempt to develop agreements that take mutual interests into account. Better comprehension requires dialogue and active discussion (Murarasu, 2023). All of this is part of the European Union's efforts to reduce risk and uncertainty in infrastructure and energy investments through legal clarity and clear laws, as well as by establishing incentives for energy corporations to invest in energy production, development, and distribution.

3. Investigating alternate energy sources in other nations

The European Union is working hard to diversify its energy sources and actively seeks other energy-producing countries as alternatives to Russia as its principal source of energy imports. According to data acquired by experts, of all gas energy suppliers to the European Union. Russia contributes up to 24.6% of the European Union's needs. Norway then supplies 24.9%. Algeria follows with 11.6% and others with 13.1%. This percentage indicates that, despite Russia's continued dominance in terms of numbers, the European Union no longer considers Russia to be its primary supplier. Norway will overtake the United Kingdom as the European Union's greatest supplier in 2022. Other countries' supply of gas energy has also become a break from Russia's monopoly. Similarly, Algeria is an important provider of gas energy to the European Union. It is one of the European Union's initiatives to safeguard its energy supply (Euronews, 2022).

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Norway, which is the second largest gas provider to the European Union after Russia and has huge natural gas reserves, is one option. Norway is critical to the European Union's ambitions to diversify its energy supplies and lessen its reliance on Russia. Norway is an appealing alternative for the European Union due to its stable political environment and well-developed infrastructure (European Commission, 2023). Equinor, a Norwegian state-owned firm (previously Statoil), has grown to become one of Europe's leading natural gas suppliers. Norway also supplies a significant amount of oil to the European Union. Norway and the European Union collaborate in the energy sector through numerous agreements and frameworks. The Energy Community Agreement, which provides for energy market integration and cooperation between EU and non-EU nations, is one of the most essential. Norway is also a participant in the European Union's internal energy market under the ECA agreement, which guarantees the free movement of energy products (European Commission, 2023).

Aside from Norway, Qatar has emerged as one of the European Union's key energy providers. Qatar's decision to increase LNG output has implications for Europe. Qatar Energy, the country's energy corporation, has strategically teamed with five major Western oil firms (Shell, ExxonMobil, ConocoPhillips, Total Energies, and Eni) for the North Field Expansion (NFE) project. The NFE project seeks to expand Qatar's LNG production by 48 million tonnes per year between 2025 and 2027, transforming the country into a major LNG supplier to Europe (Global Counsel, 2022). Qatar's rise as a less politicized energy supplier stems from Russia's use of gas as a political tool in its conflict with the West. Despite geopolitical turmoil, Qatar has remained trustworthy in meeting its energy supply promises. Qatar reaffirmed its commitment to contractual obligations, emphasizing that no other supplier could promptly replace the disrupted Russian gas supply to Europe (Global Counsel, 2022). As a result, Qatar is becoming increasingly crucial in supplying stable energy supplies to the European Union.

Algeria is a prominent natural gas producer and supplier of natural gas to the European Union (Sholika, 2019). The European Union imports natural gas from Algeria through a gas pipeline that connects the country to Spain and LNG facilities in other EU member states. Aside from Algeria, the participation of the United States (US) in natural gas supply greatly lessens the European Union's reliance on Russian natural gas imports. The United States has produced considerable amounts of this resource as a result of the shale gas revolution. The United States has began exporting LNG to overseas markets, particularly the European Union, so contributing to energy diversity. Australia is also a major producer of natural gas and an important alternate source for the European Union. To boost energy security in the region, the government has increased LNG exports to worldwide markets,

notably the European Union. Although the Netherlands has long been one of the top natural gas suppliers to the European Union, primarily through the Groningen gas field, difficulties related with gas extraction that contributed to earthquakes have resulted in a decrease in gas production from this field. Nonetheless, the Netherlands continues to be an important natural gas provider to the European Union (Sholika, 2019).

Accessibility

People's physical and financial access to energy, infrastructure, technology, and inexpensive prices are all part of this dimension. Through considerable investments in energy infrastructure, the European Union has committed to improve energy accessibility and security while also assisting in the transition to clean energy. One of the EU's most important efforts is the European Energy Transmission Project (ETS). The initiative aims to increase European Union connectivity and energy supply. The ETS accomplishes this by creating an integrated energy transmission network that connects member nations' energy infrastructure, allowing for efficient and safe energy transfer. As a result, this network assists the European Union in optimizing energy resource usage and maintaining a reliable energy supply, particularly in times of need (Taneja et al., 2022). Steps like these are critical in promoting sustainable energy policies and ensuring that society has proper access to the energy it requires.

The construction of dependable and safe energy infrastructure has a considerable positive impact on societal energy accessibility. Good infrastructure allows for efficient energy distribution, decreases the danger of disruptions in energy supply, and provides the community with a sense of security and confidence in meeting their daily energy needs. Aside from that, energy infrastructure development helps the economy by creating jobs and stimulating growth in a variety of sectors (Sadiq, 2019). Recognizing the significance of appropriate energy infrastructure, the European Union collaborates with its member countries to identify and plan urgent infrastructure projects. To develop innovative and sustainable energy infrastructure, the European Union fosters regional collaboration and knowledge sharing. The European Union encourages the use of environmentally friendly technology and energy sources, particularly renewable energy, in infrastructure development to minimize greenhouse gas emissions and combat climate change (Taneja et al., 2022).

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Furthermore, the European Union is working to improve energy efficiency, which is an important step toward ensuring energy security and decreasing negative environmental impacts. It is accomplished through infrastructure rules and regulations, where energy efficiency can be increased through various projects and practices (Hunko, 2022). As a result, the European Union has taken a comprehensive strategy to ensuring its citizens' access to reliable, sustainable, and efficient energy. The European Union recognizes that boosting public awareness of energy-saving methods is critical to improving energy efficiency. As a result, they actively initiate public awareness campaigns, education, and training programs to urge people to incorporate energy-saving techniques into their daily life. This understanding is a critical step toward improving energy efficiency (Taneja et al., 2022).

Diversifying energy sources is the principal policy of the European Union for reducing reliance on limited and unsustainable energy sources. They promote the use of renewable energy sources such as solar, wind, biomass, and others in order to attain energy security and accessibility. The European Union is investing in more sustainable and environmentally friendly energy technology by setting a target to boost renewable energy (Taneja et al., 2022). Renewable energy diversification reduces reliance on fossil fuels, aids in the reduction of greenhouse gas emissions, and promotes a low-carbon economy. Furthermore, by diversifying their renewable energy portfolio, the European Union can lessen the danger of unreliable supply. It is necessary because changes in energy supply might be caused by political reasons, conflict, or technical issues within a single energy source (Taneja et al., 2012).

Diversifying the energy portfolio also aids in keeping energy prices competitive or lower than those of fossil fuels. Because renewable energy sources such as solar, wind, and biomass are widely available and accessible, competition between them can promote energy production cost savings. Thus, the European Union has a comprehensive strategy for addressing the difficulties of energy security and efficiency, including public awareness, energy source diversification, and the development of renewable energy technology (Taneja et al., 2022).

Acceptability

An energy security conceptual framework that encompasses public acceptance of energy technology, sources, and infrastructure is a critical idea in the creation of energy policy. This acceptance involves support from the community for specific technologies and energy sources, as well as familiarity with current energy infrastructure. It is a critical aspect in determining the success of energy policy implementation and investment in the energy sector. Energy acceptance in society

can be influenced by a variety of social, cultural, political, economic, and environmental aspects. Societies may, for example, favor more ecologically benign energy sources or support specific technologies based on cultural values. Acceptance is influenced by economic issues, as energy costs can be a significant societal issue.

Understanding and managing public acceptance of energy requires public participation. People can express their thoughts, contribute input, and feel as if they have a say in issues that affect their life through public engagement. Energy policy has a substantial impact on society and the environment, hence public participation is becoming increasingly important in the energy context. The European Union emphasizes the need of public engagement in achieving long-term energy goals. They realize that increased public participation in energy decisions can improve their effectiveness and inspire greater support for sustainable solutions. As a result, the European Union has created structures to allow for effective public participation in energy decision-making processes (Taneja et al., 2022).

The European Union has taken major steps to encourage comprehensive public participation in the creation of energy policy. This strategy seeks to develop better energy policies that represent societal values and interests while maintaining focused on long-term energy sustainability and energy security goals. Public consultations are one of the primary ways in which the European Union incorporates society in the formulation of energy policy. The public can express their opinions, provide input, and ask questions about energy policy during this consultation. In addition to public consultations, the European Union organizes discussion forums with various stakeholders, including civil society, industry, non-governmental organizations, and academia. These events provide for direct interaction with decision-makers, the exchange of knowledge and experience, and the expression of objectives for energy policy. Transparency was also stressed, with the European Union committed to give clear, transparent, and freely accessible information on energy policy and infrastructure projects to the public. People must understand the influence of energy on their life, and energy education and information campaigns are part of that endeavor. As a result, the European Union recognizes the importance of public engagement in energy decision-making and invests in education and information to help the public comprehend. Communities can effectively participate in decision-making processes that affect their energy future if they have a better grasp of the repercussions of energy decisions (Taneja et al., 2022). It is a fundamental and forward-thinking strategy to creating a sustainable energy policy.

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Public participation in energy decision-making is critical for developing a more sustainable, inclusive, and responsive energy system. It is a step in the right direction for the European Union's ambition of a brighter and more sustainable energy future for all (Taneja et al., 2022). It not only opens the door to varied knowledge and opinions from society, but it also has a huge positive impact in several ways, including:

1. Public engagement adds varied perspectives and knowledge to the decision-making process. It can aid in the identification of new and efficient energy policy development options.
2. When citizens believe they have a say in policy decisions, they are more inclined to support and accept the policies that arise. It has the potential to lessen resistance and conflict that may occur as a result of community displeasure.
3. By including the community in decision-making, the possibility of friction and conflict can be lessened. Decisions that represent people's ambitions are less likely to spark demonstrations or opposition.
4. Public participation lends credibility to energy policy. When the community is intimately involved in the decision-making process, the policy gains support because it matches the community's interests and objectives.

The European Union emphasizes the need of public engagement in achieving long-term energy goals. They have pledged to increase transparency, accessibility, and inclusivity in energy decision-making in order to allow the public to engage more effectively. Collaboration with multiple stakeholders is also vital in building an environment that encourages improved cooperation between government, industry, and civil society (Taneja et al., 2022).

The European Union is deeply devoted to the advancement of safe, high-quality, and environmentally sustainable energy technology. They acknowledge the importance of energy technology that fulfill strict safety and environmental requirements in attaining sustainable energy development goals and fostering public trust. The European Union has adopted the following actions to achieve high standards in energy technology development (Taneja et al., 2022):

1. The European Union has stringent regulations for energy technologies and infrastructure. It addresses a variety of issues, including operating safety, dependability, energy efficiency, and environmental effect. It guarantees that technology fulfills high standards before introducing or using it.
2. The European Union mandates stringent safety measures for the design, construction, and operation of energy technologies. It involves methods to

identify and mitigate energy-related hazards, such as the risk of fires, accidents, and leaks that are harmful to society and the environment.

3. European Union guidelines are also intended to limit the negative environmental impact of energy technologies. Greenhouse gas emissions, air pollution, water pollution, and excessive land use are all examples. This standard promotes the development of more ecologically friendly and long-lasting energy technologies.

Affordability

Rising energy prices in Europe have produced enormous societal issues, as evidenced by the latest findings from the official European statistics office. Annual energy inflation in the European Union hit 41.1%, representing a 14.1 percentage point increase. Gas prices had the most inflation, according to a thorough examination of numerous subcategories in the energy industry. When compared to January of the same year, average gas prices in Europe increased by 10.7 percentage points, reaching 51.4% in June 2022. This increase in gas costs is linked to Russia's invasion of Ukraine, which pushed the European Union to seek alternative energy suppliers. The strong demand for gas from alternative sources has resulted in a price increase that has directly impacted consumers. In Germany, for example, the average household of four now pays an additional 480 EUR ($509) per year for gas as a result of a new tax on gas consumption imposed to cover the costs of replacing Russian gas supplies. Nonetheless, the government is proposing new relief measures to support consumers (Logayah et all, 2023).

Energy affordability, defined as people's ability to pay energy prices to meet their daily demands, has a substantial impact on individual dependence and government energy policy (Sovacool, 2013). Efforts have been made in the European Union to boost energy affordability by encouraging the use of renewable energy and energy efficiency through various subsidy programs. These initiatives are intended to lessen reliance on fossil fuels while maintaining environmental sustainability. Subsidies are provided by the European Union to producers of renewable energy such as solar, wind, hydro, and biomass. It intends to expand its manufacturing capability. These subsidies lower investment and operating expenses, making renewable energy infrastructure more economical and appealing to investors (Hanifah, 2017). Efforts like this one help to accelerate the transition to a cleaner, more sustainable energy system.

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Aside from consumer subsidies, the government offers financial help for the installation of solar panels or solar water heating systems in homes and businesses. This subsidy lowers the initial expenses of renewable energy technology, allowing society more widespread access to environmentally benign energy (Fedirko & Gamkrelidze, 2023). In order to reduce inefficient energy usage, the European Union also provides subsidies for energy efficiency schemes. This program provides financial assistance for the adoption of energy-saving technology and practices, such as LED lighting, energy-efficient electrical equipment, and increased building insulation. These incentives decrease excessive energy usage, lower societal energy costs, and lessen environmental impacts. Subsidy programs for renewable energy and energy efficiency not only lower greenhouse gas emissions and the impact of climate change, but they also foster innovation and the development of new technologies. Furthermore, it generates new economic growth prospects and boosts the competitiveness of the European Union's energy industry.

However, delivering this subsidy presents a number of obstacles. One critical task is to ensure that subsidies are effective and targeted. To verify and ensure that subsidies are only granted to authorized recipients, the European Union should implement transparent policies and effective monitoring.

The European Union gives social help to financially vulnerable populations in order for them to satisfy their energy demands through subsidies, energy tariff discounts, or other incentives. Energy is critical in the European Union, but some segments of society are struggling financially. To address this issue, the European Union created a social assistance program that gives direct subsidies to individuals or households experiencing financial difficulties in order for them to pay their energy costs more affordably. This subsidy can be applied directly to bills or monthly allowances (Hanifah, 2017).

Furthermore, the European Union offers energy tariff concessions to certain groups of individuals in order to make energy more cheap for them. Low-income groups, families with children, and people who meet additional conditions may be eligible for energy tariff savings. Other incentives to use economical and sustainable energy are included in the European Union's social aid programs. There are programs in place to increase energy efficiency in people's houses, such as installing solar panels or boosting insulation, which saves energy bills and has a positive influence on the environment (Hanifah, 2017). The European Union's social assistance programs are based on criteria tailored to member states' policies. Member countries are responsible for selecting the program's beneficiary groups and methods of implementation (Hanifah, 2017).

The European Union is also a forerunner in regional cooperation in a variety of industries, including energy. The major goal is to address the issue of energy affordability and to provide a consistent and long-term energy policy across the European Union. The European Union may help by coordinating energy policy among its member countries, identifying and evaluating existing energy concerns, and creating effective solutions to them. Member countries exchange knowledge, expertise, and best practices in energy management through this collaboration. Furthermore, regional energy cooperation includes the sharing of energy resources among member countries. Energy surplus countries can share their resources with energy deficit countries, lowering reliance on energy imports from outside the European Union. This regional collaboration also promotes more equitable and cost-effective energy commerce among member nations (Hanifah, 2017).

The European Union can improve energy availability for its members by lowering trade barriers. It has a favorable impact on the sustainability of energy supply, energy price stability, and the diversification of energy sources across the European Union. The European Union also actively participates in regional cooperation with third parties outside its borders, such as energy accords with adjacent or energy-producing countries. It aims to improve energy supply security and strengthen the European Union's global energy position. The European Union can handle energy affordability concerns more effectively through regional cooperation, including policy coordination, resource sharing, and encouraging freer and fairer energy commerce.

CONCLUSIONS

In response to the energy security challenges posed by the Russia-Ukraine war, the European Union has taken a number of real and comprehensive initiatives. According to the conclusions of this study, it is based on the energy security dimension to maintain its energy security owing to the Russia-Ukraine war availability dimension. The European Union is attempting to diversify its energy sources in order to lessen reliance on a single type of energy source. They are expanding natural gas imports from alternate sources such as Norway and the United States, as well as investing in renewable energy to lessen reliance on fossil fuels. In terms of affordability, the European Union provides subsidies and financial incentives for renewable energy and energy efficiency. It strives to maintain energy rates accessible for the community while also reducing reliance on fossil fuels, which has a negative impact on the environment. In terms of accessibility, the European Union is investing in energy infrastructure in order to boost connectivity

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and provide steady energy supply. They also involve member countries in regional cooperation to increase the community's access to energy. The European Union incorporates society in energy decision-making through public engagement and dialogue in the acceptability dimension. The public is free to share their opinions and provide feedback on energy policy. The European Union also offers the public with clear and accessible information about energy policies and infrastructure initiatives.

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