Powering up the European Union:

Addressing the Energy Security Crisis

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List of acronyms

APERC - Asia Pacific Energy Research Centre

CEF - Connecting Europe Facility

CIP - Critical Infrastructure Projects

DECC - Department of Energy & Climate Change

EC - European Commission

EEC - European Economic Community

ECSC - European Coal and Steel Community

EPRS - European Parliament Research Service

EU - European Union

EURATOM - European Atomic Energy Community

GDP - Gross domestic product

GIPL - Poland-Lithuania interconnector

GW - Gigawatt

Hm^3 - Cubic hectometre

IEA - International Energy Agency

IMF - International Monetary Fund

LNG - Liquified Natural Gas

MENA - Middle Eastern and North African

MVP - Mean-Variance Portfolio

NATO - North Atlantic Treaty Organization

NBP - National Balancing Point

NECP - Integrated National Energy and Climate Plan

OPEC - Organisation of the Petroleum Exporting Countries

PV - Solar photovoltaics

R/P - Reserves/Production Ratio

RRF - Recovery and Resilience Facility

TEN-E - Trans-European Energy Networks

TFEU - Treaty of Functioning of the European Union

TTF - Title Transfer Facility

UK - United Kingdom

UN - United Nations

US - United States

USSR - Union of Soviet Socialist Republics (Soviet Union)

List of Tables and Figures

1. Introduction and Research Problem

At a crucial moment in contemporary history, Russia's invasion of Ukraine has burst onto the international scene, triggering widespread shock just as the COVID-19 pandemic seemed to be subsiding and macroeconomic projections pointed towards global recovery. This conflict has shaken geopolitical foundations and exposed a critical vulnerability in the European Union's (EU) energy security. The EU's dependence on fossil fuels, supplied mainly by Russia, has emerged as one of the most sensitive aspects of this crisis.

At the epicentre of this dynamic is Russia's strategic position as a crucial natural gas, oil and solid fossil fuels supplier to European countries, exerting pressure and consolidating its geopolitical position through this vital resource. As the leading transit country for gas to Europe, Ukraine has become a key player in this plot.

This scenario raises three essential considerations: the geopolitical and strategic relevance of energy, the need to develop security plans, and the energy vulnerability of European citizens to geopolitical tensions. In this context, the EU's response, embodied in the REPowerEU plan, stands as a beacon in the quest to guarantee energy security in a post-invasion scenario, driving the transition to clean energy and reinforcing independence from unreliable suppliers and the vagaries of fossil fuels. This paper will delve into the intricacies of REPowerEU, exploring its objectives, implications and challenges in building a more sustainable and independent energy future for Europe. In the short term, the EU is compelled to diversify its suppliers, which implies the need to forge new cooperation agreements and strengthen ties with specific countries and allies. As it moves towards the medium-term, the EU intends to reduce its dependence on external suppliers, the main trigger of the current crisis, through a progressive transition to renewable and clean energy sources. However, the fundamental question arises regarding the long-term viability of this approach and whether the EU will succeed in definitively decreasing its dependence on

third countries by developing a clean energy mix capable of guaranteeing the continent's energy security.

1.1. Research Question

The research is framed by the following central question: "How can the European Union guarantee its energy security while diminishing the influence of Russian energy?" The empirical section of the study will address this central question, delineating it into three distinct inquiries: firstly, "Why does the EU face an energy security crisis?"; secondly, "What is the EU's strategy for shifting away from Russian energy resources?"; and finally, "Can these policies guarantee EU energy security?".

The war in Ukraine has underlined the urgent need for EU Member States to strengthen their energy autonomy and diversification. Therefore, this study provides a comprehensive analysis of global energy trends, proposing the main priorities that the EU should adopt to ensure its energy security beyond its borders. The main objective of this paper is to analyse the concept of energy security, apply it to the EU's energy crisis in the context of dependence on a warring actor, present the strategy outlined in the REPowerEU plan as a response to this crisis, and determine whether this is the way to ensure security. This analysis aims to understand the current challenges and offer practical guidelines for designing policies to consolidate the EU's energy independence.

1.2. Outline

The thesis is divided into eight chapters. Chapter 2 is dedicated to a detailed literature review on energy security and delves into international relations theories, particularly the Copenhagen School perspective. The aim is to establish a solid academic basis for the development of the paper, addressing also the analytical frameworks, measures and limitations associated with the concept of energy security. Chapter 3 outlines the study design and methodology used throughout the dissertation. It justifies the choice of a single case study

method, the predominant use of secondary sources, the introduction of additional analytical concepts and the overall methodological limitations. The empirical section starts in Chapter 4 and addresses the answer to the first research question: "Why does the EU face an energy security crisis?" The case study is contextualised, and the roots of the conflict are explored in this chapter, highlighting strategic objectives and key actors. It details how relations between the EU and Russia are forged, giving rise to energy dependence. Chapter 5 answers the second research question: "What is the EU's strategy for shifting away from Russian energy resources?" It sets out the EU's policies and objectives in the face of the energy crisis and dependence, applying what is set out in the literature review. Chapter 6 addresses the final research question: "Can these policies guarantee EU energy security?" Identifying the situation as a strategy, this chapter analyses the policies in place and assesses the international scenario in general. Finally, Chapter 7 reconsiders the three research questions, conducts a comprehensive assessment of EU energy security and summarises the results, conclusively answering the main research question: "How can the European Union guarantee its energy security while diminishing the influence of Russian energy?"

2. Literature Review

2.1. Introduction

This chapter comprehensively explores the complex energy security dilemma in international relations, integrating the perspectives of influential authors and scholars. Delving into the theoretical underpinnings and practical implications offers valuable insights into the challenges facing the EU and other actors in pursuing energy security and geopolitical stability. This chapter also sets the context for the research and outlines the three main objectives of the study. The following literature review addresses the first two objectives, while the third objective will be explored through the empirical study at a later stage:

1. Identification of drivers of energy security.
2. Identification of the barriers to the successful implementation of energy security.
3. Critically evaluate existing models and frameworks to help nations manage energy security challenges, including the drivers and the barriers they face.

By delving into the areas above –drivers and barriers to energy security-, this research seeks to make a substantive contribution to the literature on energy security. The methodical exploration and analysis of energy security addresses essential questions about the motivations and methods involved in preparing policymakers to address energy security challenges. This initial work is essential before seeking stakeholder input on the third objective.

Firstly, it is crucial to establish a clear understanding of the term "energy security". This explanation will serve as a building block for exploring the intricate dimensions of energy security, including the underlying driving forces and obstacles to its implementation.

2.2. Exploring Energy Security: A Comprehensive Perspective

This chapter explores the confusing dynamics of the energy security dilemma, shedding light on the multifaceted interplay between energy, economics, politics and social welfare. Authors such as Mearsheimer, Yergin, Buzan, Kruyt, Winzer, and Chester have contributed significantly to the discourse around this dilemma. The chapter begins by elucidating fundamental concepts such as energy security and the security dilemma, laying the groundwork for a nuanced debate in international relations.

Drawing on the ideas of leading scholars, the competing theories of realism, liberalism and neorealism have shaped the global political landscape, especially within the EU. Realism, articulated by authors such as Mearsheimer, emphasises the pursuit of power politics and rational decision-making. In this framework,

states compete relentlessly for energy resources, seeing them as essential ingredients of national power and prosperity. Mearsheimer (2001: 67) argues that states seek to maximise their relative power. Competition over resources, including energy, is integral to this dynamic, as energy resources are perceived as vital assets. States were willing to contemplate military action to secure their energy needs.

In contrast, liberalism, advocated by authors such as Yergin, supports limited government intervention, emphasising the role of market forces and international cooperation in ensuring energy security. As a concrete example, the EU embodies liberal institutionalism, promoting globalism, economic liberalism, and collaboration, influencing its approach to energy security. Yergin (1990: 13) examines the geopolitical history of oil and argues that international cooperation is critical to ensuring long-term energy security. The EU, as a liberal superpower, seeks to transfer its rules and legal norms to other countries, emphasising the importance of market-driven solutions and regulatory frameworks. This approach coincides with the liberalisation discourse, in which the EU seeks to establish an internal energy market and encourages other nations, especially Russia, to liberalise their markets.

Another crucial theoretical development is neorealism, also called structural realism, a theory attempting to reconcile elements of realism and liberalism. Buzan is a key figure in neorealism, viewing states as rational, self-interested entities driven by systemic forces such as anarchy and power distribution. This theory finds resonance in EU realpolitik. Furthermore, as an extension of structural realism, Buzan has developed the theory of the "Regional International Society" (2003: 222). Buzan has applied his ideas to energy security issues, considering how regional structures and power rivalries can influence access to and control of energy resources. Topics such as the Nord Stream pipeline highlight the complexity of regional security within the EU, where Member States have different perspectives on energy-related threats and hierarchies of security concerns.

Furthermore, Buzan (2003: 364) also elaborates on the process of securitisation, a mechanism in which actors identify threats and take extraordinary measures to prevent them from affecting their interests. Buzan's definition of security as a social construct is particularly relevant to understanding how energy dependence threatens the EU and how the EU, in turn, attempts to securitise itself by implementing measures to enhance energy security. From a psychological point of view, Skinner (2006) argues that security is seen as a feeling based on perception and, therefore, has a subjective character. As Hansen (2012: 525-546) points out, the Copenhagen School argues that something is designated as a global security issue because it is arguably more important than other issues and should, therefore, be given the highest priority. It is presented as an existential threat to a specific audience.

Furthermore, Hansen (2012: 525-546) indicates that securitisation occurs through a political actor's discourse when it pushes a "normal" policy area into the realm of security by using the rhetoric of existential threat to justify "emergency" measures outside of formal and established policy procedures. There are no natural things that are security threats and others that are not. Instead, citizens, as politically elected communities, determine that certain things are security problems and regard them as existential threats. Therefore, they can afford to apply extraordinary measures, such as war or political violence.

The same applies to the concept and definition of energy security. There is no consensus as it is a diffuse and changing concept over time. Since its origins, the concept has referred to the changing reality of each scenario (Kruyt *et al*., 2009). Access to energy sources in this century is limited by a convoluted global energy market system, in which many factors such as borders, infrastructures, technologies, dependencies and power games come into play. Energy security is, therefore, a concept that has evolved according to access to energy sources.

After the Second World War, there was a strong dependence on oil, replacing coal and becoming the essential material for economic growth as it was abundant and cheap. Therefore, as Yergin defined (1990: 13), energy security was aligned solely with access to an affordable oil supply. However, as Chester (2010) explains, the definition changed when the oil price crisis hit in the 1970s. The decision to restrict production by OPEC Member States and the creation of oil reserves for fear of shortages motivated energy security away from oil, so the less dependence a country had on this energy resource, the more secure it became. At the same time, the consumption of two new energy sources began to increase: natural gas and nuclear energy. The first resource had abundant reserves, which meant that the concept of energy security was extended to include access to all fossil fuels. The second resource began its commercialisation with poor public acceptance after accidents like Chernobyl (USSR). The costly infrastructure, the extended construction periods, and the potential for an exploitable arms race have led to the distancing of this particular energy source from the overarching notion of energy security. Gradually, the concept was given an economic term, as the energy price was also considered a factor in energy security. Then, a more general term was used when the economic factor relating to the energy market was also considered. Moreover, as a final addition, Chester (2010) indicates that energy policy and environmental sustainability factors, such as liquified natural gas (LNG) or nuclear energy, have re-emerged as secure energy sources because they do not emit greenhouse gases and support the fight against climate change. On the other hand, authors such as Barnett (2001: 1-21) defend an environmental perspective when defining energy security, stressing the need to prioritise alternative energy solutions that are less harmful to the environment.

With this in mind, Kruyt *et al*. argue that, although the definition is elusive and depends entirely on the context and perspective, ensuring energy security is the main objective of any energy policy. However, as a term lacking a universal definition, multiple definitions support multiple political ideals. As Winzer

(2011) points out this term is subjective, leading to ambiguity and necessitating an understanding of how it is measured, its limits, and its intended purpose. It goes beyond the origins of potential risks, the scope of their consequences, and the criteria for assessing the magnitude and scope of these impacts. While energy security is gaining prominence in public debates and national policies, its precise definition remains a challenge in the academic literature. Several authors, including Kruyt *et al*. and Winzer and Chester, have contributed to the discourse, but divergent definitions persist.

The definition of energy security depends on the different types of risk and their level of impact on the supply chain. To understand this concept, three scholars have been analysed: Winzer's (2011: 10) chart describes the dimensions of energy security and allows the definition approach according to the type of threat and its impact; Kruyt *et al*.'s (2009: 2168) chart describe four dimensions of energy security and; the quantitative and qualitative aspects distinguished by Chester (2010).

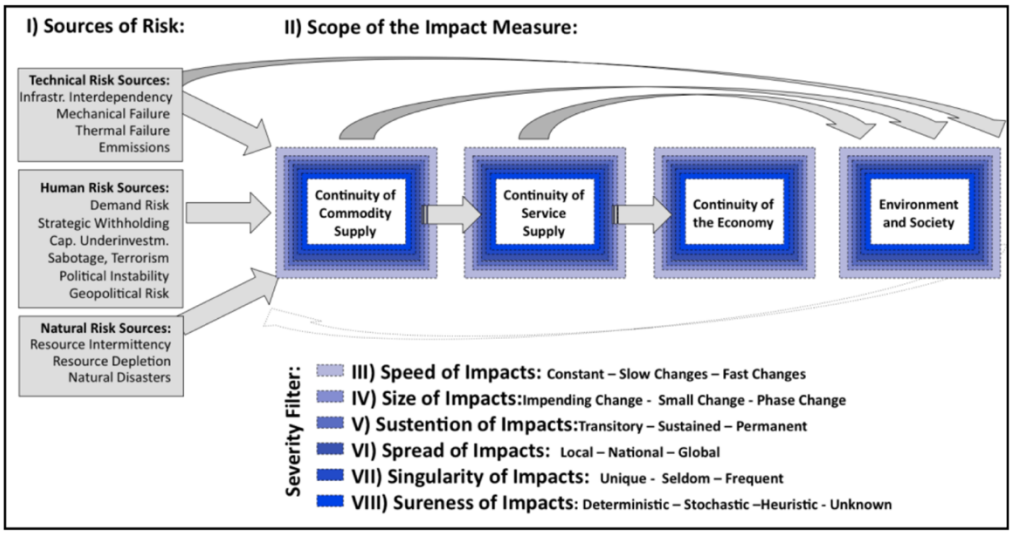

Figure 1, Dimensions of Energy Security (Winzer, 2011: 10)

Winzer distinguishes three steps in determining a country's energy security. The first step is to establish the sources of risk in the supply chain. These describe the type of hazard and they can be classified into three categories: technical risk

sources in the supply chain (failures in interconnected infrastructures such as communication networks), human risks (political instability and geopolitical risks, fluctuations in demand) and natural risks (depletion of fossil fuel reserves, natural disasters). The second step is to analyse the scope and impact of the source of risk in which four lines of thinking are distinguished: The first is **continuity of supply of energy products**, which is defined in terms of continuity and minimisation of disruption risks, according to DECC (2009). This perspective is closely linked to reliability because it focuses on the system's ability to meet consumers' needs and withstand disruptions. However, this thinking does not address policy issues or the risk of disruption itself. The second is the **continuity of service supply** perspective that uses filters to establish levels of security, following the International Energy Agency's (IEA, 2001) definition of energy security in terms of the physical availability of supplies to meet demand at a specified price. In this line of thinking, security is compromised only when prices exceed a specific limit. However, this approach is subjective, as filters are imprecise and cannot be measured, given that different factors affect each context. For example, what one country considers an insecure price may be perceived oppositely by another. The third perspective on the **continuity of supply in the economy** extends beyond energy products and their prices. It focuses on the impact of the availability of services and raw materials on the economy. The fourth perspective that provides continuity of supply is ensuring **environmental sustainability**. Environmental security aims to provide tools to assess, monitor and reverse threats to ecosystems at multiple scales for the world's populations. The environmental crisis is not only a problem for the economy or the environment; it also threatens global security, erodes democratic principles and challenges the rule of law (Interpol, n.d).

As can be seen, Winzer (2011) directly associates the concept of energy security with the concept of security of supply, and both the sources of risk and the scope of risk refer to the supply chain and its disruption. Winzer defines *energy security* as "the ability of a country's energy supply system to meet final

contracted energy demand in the event of a supply disruption" (Noël and Findlater, 2010: 237).

On the other hand, Kruyt *et al*. (2009) also confirm that, although there are different perspectives on this concept, there are two essential elements to any definition of energy security. The first is the idea that uninterrupted supply is fundamental to the functioning of the economy, and the second is that energy security is directly linked to the concept of security of supply. The definition may vary in the time frame to which it refers, as short-term energy security, which aims to avoid and solve specific disturbances, differs from long-term energy security, which generally focuses on the energy system. In the development of this paper, an essentially long-term perspective of energy security will be taken.

In order to illustrate the concepts and facilitate understanding, Kruyt *et al*. (2009) use four different storylines –a high level of globalisation and focus on equity (B1), a high level of globalisation and focus on economic efficiency (A1), a low level of globalisation and focus on equity (B2) and a low level of globalisation but focus on economic efficiency (A2)- which will serve as four scenarios to understand the following Figure.

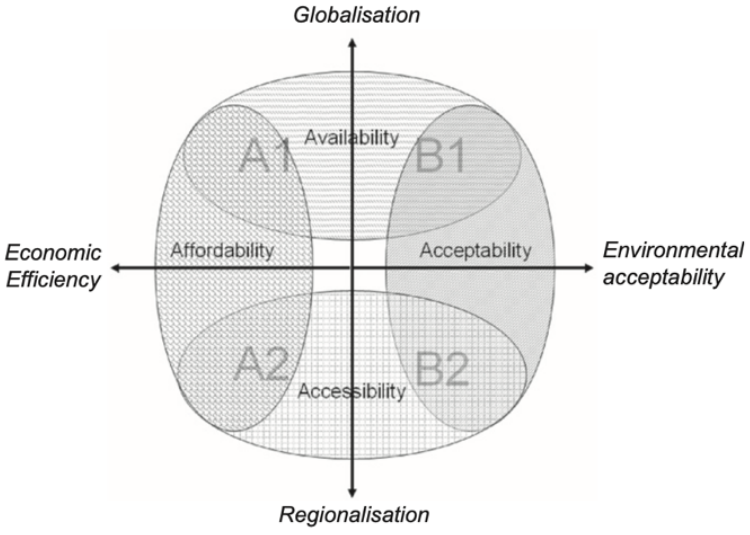

Figure 2, The four dimensions of energy security (Kruyt et al., 2009: 2168)

Moreover, both Kruyt *et al*. and APERC (2007) recognise four dimensions of energy security that help to understand better its long-term significance, also known as the four A's:

- Physical **accessibility** of raw materials implies access to and extraction of valuable materials from the earth practically and economically. This requires infrastructure, transport and understanding of the geology of the region.
- Resource **availability** in geopolitical terms implies the ability of countries to access essential natural resources and to ensure their steady and reliable flow. Geopolitical factors influence availability and can significantly impact the global economy and international relations. Supply can be interrupted by technical failures, accidents, war, terrorism, natural disasters or even political pressure from a supplier or transit country. Along these lines, insecurity occurs when there is extreme dependence on actors that could be considered unstable partners. Therefore, the feeling of security or insecurity is directly influenced by the diplomatic, international and political situation between the actors involved, including consumer, supplier and transit countries. While relations between countries are complex in themselves, they become even more complicated when interests are at stake and even more so when they are economic.
- **Affordability** in an economic context places *energy security* as "the constant and affordable availability of energy sources" (IEA, 2023). To achieve this, it emphasises the need to reduce internal and external risks in energy systems, build resilience and adopt methods such as diversification of energy sources and balancing supply and demand markets. The strategy also includes adequate production and transportation infrastructure, risk management systems, demand control through energy efficiency, and the ability to respond quickly to unexpected short-term changes. In the long-term, energy security

implies timely investments to meet demand in line with economic and environmental developments (IEA, 2023).

- **Acceptability** in political and environmental terms aims to provide tools to assess, monitor and reverse threats to ecosystems at multiple scales for the world's populations.

However, Chester (2010) distinguishes quantitative and qualitative aspects within the concept of energy security, which he considers "slippery" due to its polysemic nature. The first aspect he references is the IEA's (1995, p. 23) definition of energy security, which considers *energy security* as the "adequate supply of energy at reasonable cost". This definition places a well-functioning energy market as essential in ensuring a secure energy supply.

With this in mind, Chester confirms that the concept of energy security has an essential quantitative aspect, which, from an analytical point of view, can be seen in supply and demand forecasts, prices, and more specific indicators such as import dependency. The second qualitative aspect of energy security is the management of risks such as supply disruptions, insufficient capacity, unaffordable prices and dependence on unsustainable sources due to market instabilities or security threats. These aspects vary depending on a country's energy mix, local resources, and import dependence.

Chester also sees energy security as a strategic concept rather than a policy, as it involves measures to minimise import vulnerability and ensure continuity of supply. In addition, factors such as differences in energy markets, such as infrastructural rigidities, storage challenges, and regional character affect its interpretation. Therefore, perspectives on energy security differ between producer and consumer countries.

2.3. Key Factors Ensuring Energy Security: A Critical Analysis

At a time of rising global energy demand, climate change concerns and geopolitical tensions, securing a stable, affordable and sustainable energy

supply is paramount for nations and regions worldwide. To this end, securing supply while maintaining energy independence and diversification of sources is essential.

Considering the different dimensions the authors defined in the previous subsection, it is established that energy security is a multifaceted concept that meets at the intersection of geopolitics, economics, technology and environmental sustainability. However, for some scholars, energy security is directly related to reducing risks of accidents and proliferation (understanding the nuclear industry as a threat); for others, energy security implies the reliable supply of fuels; for others, it has an economic connotation and implies the protection of the population against price volatility, and others understand it as the protection of the economy against energy supply disruptions. Energy security can encompass many different policy perspectives. As a background context for understanding the factors that ensure energy security, the three pillars of EU energy policy, competitiveness, sustainability, and security of energy supply, will be used.

The last pillar is a recurrent term in political discourse. However, due to its lack of a clear and precise definition, it leads to varied interpretations of policy actions. As Winzer specifies, security of supply refers specifically to the ability to ensure the continuous and reliable supply of energy, be it electricity, natural gas, oil or other energy resources. It involves establishing measures and policies to avoid supply disruptions, which may be due to various reasons, such as technical failures, geopolitical crises, and natural disasters. To explain this, a typical pattern is found in the literature, and authors agree that security of supply is a determining factor for energy security. As just mentioned, security of supply refers specifically to the ability to ensure the continuous and reliable supply of energy, thus focusing on infrastructure and operational strategies to ensure that energy is available when and where it is needed and to avoid sudden changes in energy availability relative to demand.

Another recurring theme in the energy security literature is the challenge of reducing dependence on a single energy source or supplier. This term requires a country to rely on external sources to meet energy demands. This dependence on other nations can significantly affect a country's energy supply, economic stability and progress. When a nation relies heavily on foreign countries for energy, it risks disruptions in its energy supply because it needs more direct control over these external sources. The authors stress the importance of diversifying energy systems, exploring renewable sources, improving energy efficiency and investing in domestic resources to mitigate the vulnerabilities associated with excessive import dependence.

To reduce dependence on a singular energy source, energy diversification involves incorporating more energy sources into the mix and increasing the share of energy produced from each source. Akrofi (2021) notes that energy diversity enables adaptability in the face of uncertainty and provides a pre-emptive strategy against disruptions in the energy supply system. Ream (2015) lists some of the key benefits of energy diversification and indicates that a nation diversifying its energy mix increases its energy security, improves resilience to supply disruptions, reduces vulnerability to changes in energy prices and protects itself from energy shocks. In addition, it guarantees political independence and economic growth by avoiding dependence on third countries and thus avoids intimidation and manipulation by third countries.

Therefore, energy diversification involves seeking and promoting diverse energy sources, including renewable and non-renewable sources such as oil, natural gas, coal, nuclear, hydropower, solar, and wind energy. Diversification of energy sources seeks to reduce dependence on a single source, which can protect against risks associated with scarcity, price volatility and geopolitical conflicts (University of Calgary, n.d). International organisations, including the EU, stressed the need for variety, particularly by boosting investment in renewable energy to reduce costly greenhouse gas emissions from fossil fuels.

2.4. Overcoming Obstacles: Analysing Energy Security Measures and Security Indicators

This section explores the complex context of energy security, looking closely at the measures implemented to overcome obstacles and ensure reliable energy supplies. It also assesses energy security indicators, analysing the key variables that determine the vulnerability of nations in this crucial area.

Political alliances, conflicts and global power dynamics play an important role in energy supply chains, highlighting the need to understand how geopolitical events can disrupt energy flows. To mitigate these challenges, developing strategies that enhance resilience is essential. In addition, effective energy governance and well-designed interventionist policies are key pillars for achieving energy security objectives. In this context, assessing the risks and vulnerabilities inherent in energy supply chains becomes crucial to increase resilience. Research in this field identifies potential threats, such as natural disasters, cyber-attacks and geopolitical conflicts, and explores innovative strategies to strengthen the resilience of energy infrastructures.

Drawing on Winzer's (2011) chart on the dimensions of energy security, the third step he distinguishes in defining energy security is to filter risk and its impact by considering several factors. These factors are the energy security indicators. They are the tools that help governments, international organisations, and companies assess a country's or region's vulnerability to an energy crisis. These indicators help anticipate and prevent energy supply problems and develop more effective energy policies. Two lines of thought can be distinguished: On the one hand, Winzer (2011) finds six factors or filters to measure this risk, and on the other hand, the theory of Kruyt *et al*. (2009) distinguishes ten security indicators.

On the one hand, the first author lists the energy security indicators in Figure 1, and they are:

1. The speed of the impact. It can be long-term, such as fossil fuel depletion or short-term threats, such as a natural disaster.
2. The size of the impact. It can be small when, for example, the threat comes solely from price volatility or a more significant impact when a shortage of raw material reserves causes the threat.
3. The sustention of the impact. It can be transient, sustained or permanent.
4. The impact spread. It distinguishes a geographical filter that distinguishes a local, regional or global level.
5. The singularity which defines impacts experienced before, such as climate change; infrequent impacts, such as political upheavals; or frequent impacts, such as technical failures in infrastructure.
6. The impact's sureness distinguishes predictable, likely, certain or unknown impacts.

Furthermore, these indicators show that energy security is not only guaranteed if there is continuity of energy supply but that it is also necessary to consider the continuity of supply of raw materials, services and the economy in general. Winzer (2011) states that energy security depends on the absence of protection against or adaptability to threats in the supply chain.

On the other hand, Kruyt *et al*. (2009) recognise the existence of ten subjective security indicators:

1. The availability of energy sources.
2. Reserves/production ratios reflect years of production at current reserve levels.
3. Diversity in energy types and sources protects against supply risks and market power. However, while fuel diversity protects against shocks, it persists in price shocks and does not consider fuel-specific disruption risks.
4. The level of import dependence can be classified by fuel and region, quantified in physical and monetary terms.

5. The political stability of both consumer and supplier countries is vital for the security of energy supply. The stability of transit countries must also be considered as their contribution.
6. Energy prices balance supply and demand, and although various factors influence them, they help compare relative scenarios.
7. The mean-variance portfolio theory optimises energy mixes by considering unit generation costs, fuel cost variance and correlations between fuel costs. MVP is unsuitable for this case study due to its specific nature and lack of applicability in an energy environment characterised by dynamism and the influence of unique and changing factors.
8. Percentage of carbon-free fuels.
9. Market liquidity directly influences the security of supply and is indispensable to managing fluctuations in supply and demand.
10. Demand indicators, such as energy, fuel or sectoral intensity, indicate the energy dependence of the economy and sensitivity to price changes, reflecting supply problems for a given resource and affordability for consumers.

Indicators are useful tools in a dynamic and non-precise context to assess and observe different trends, but always with an approximate and limited meaning. However, it is still a subjective concept influenced by different perspectives and contexts. Monitoring these indicators and being attentive to their changes can provide early warning signals of an approaching energy crisis, allowing decision-makers to implement preventive and contingency measures to mitigate its impacts.

Energy crises are often triggered by unexpected changes in demand or supply, generating price fluctuations and economic consequences in both producing and consuming countries. In this constantly evolving context, energy security must be comprehensively adjusted to emerging challenges. Identifying ten traditional

indicators is insufficient to address potential vulnerabilities in building a country's energy security, so three additional indicators are included as own contribution. These new indicators seek to enrich the current theory by providing a more comprehensive framework adapted to contemporary complexities. The first consists in building a resilient energy infrastructure. This includes the capacity of the electricity grid, energy storage and transportation infrastructure, and resilience to extreme events, such as natural disasters or cyber-attacks. The second is energy efficiency because reducing energy demand and pressure on resources is essential. Indicators such as the energy intensity, the efficiency in energy production are key to assessing this aspect. Thirdly, the energy crisis response capacity, measured through contingency plans, emergency systems and the ability of governments and companies to manage supply disruptions quickly.

2.5. Summary and Emerging Issues

After thoroughly exploring the energy security dilemma, several key concepts are addressed to understand the threats and risks associated with energy security on the international stage and the strategies and tools needed to address these challenges effectively. First, the topic is approached from various theoretical perspectives, including realism, liberalism and neorealism. These schools of thought significantly influence the energy security policies both countries and organisations adopt. The intersection of these theoretical approaches has revealed the complexity and diversity of strategies implemented to pursue energy security.

In this vein, a fundamental aspect highlighted in the text is the ambiguous definition of energy security. The constantly evolving concept is subject to multiple interpretations. Security of supply, diversification of energy sources and reduction of dependence on a single supplier are critical drivers of energy security. In addition, energy security indicators emerge as valuable tools in

anticipating potential problems and facilitating the development of effective energy policies.

Also, geopolitical complexities impact energy security. Geopolitical tensions and intricate international relations considerably impact the stability of energy supplies. Political alliances and conflicts can significantly influence energy supply chains, highlighting the critical need to understand how geopolitical events can disrupt energy flows. Energy security thus emerges as a challenge intrinsically linked to global geopolitical dynamics.

In this paper, energy security is approached from multiple theoretical and practical perspectives, highlighting the definition proposed by Kruyt *et al*. (2009) as the most accurate and appropriate. This definition integrates various theoretical perspectives and focuses on the security of supply, identifying four key dimensions and using ten –and three own contributions- risk indicators for a more comprehensive assessment.

Kruyt *et al*.'s conceptualisation of energy security and the security perspective from the Copenhagen School of International Relations align with the core motivation of this paper. The fundamental aim is to perceive energy security as a crucial cornerstone of modern society, indispensable for overall life development. Without energy security, economies would stagnate, volatile prices would affect the global economy and communities without reliable access to energy would face significant challenges. In a longer-term context, energy security relates directly to climate change, highlighting the need to transition to cleaner and more sustainable energy sources. In short, energy security is not simply a technical or economic issue; it is an essential component for the proper functioning of society, affecting the economy, health, the environment and the future.

3. In-Depth Analysis: Research Design and Methodology

The literature review has highlighted the critical need for empirical data on the importance of energy security as an essential commodity and the need to explore the driving forces behind energy security initiatives and the barriers to their successful implementation (to be explored further in the empirical analysis). This chapter discusses and justifies the research strategy and data collection techniques to be adopted in the empirical data collection for this study.

3.1. Research Strategy: Single-Case Study

This thesis focuses on the geopolitically motivated energy security crisis the EU is facing as a result of Russia's invasion of Ukraine. With the use of a single case study approach, the research provides a detailed analysis of the specific context, factors, and conflict dynamics. It allows an in-depth understanding of the case. However, this approach has some limitations, such as problems related to data availability, as it is still an active conflict.

The research strategy chosen for this empirical study is based on a case study approach because it fits the purpose of the third research objective described in the Introduction of chapter 2, which is to "Critically evaluate existing models and frameworks to help nations manage energy security challenges, including the drivers and the barriers they face".

The case study method allows an in-depth exploratory study of the energy security crisis in the EU. This will involve focusing on specific units of analysis, such as government agencies, policymakers or international relations experts. However, there are different definitions of the case study. In the following, five case study definitions are examined to provide a broader understanding of this approach and explain why the case study is the most appropriate method for this research.

First, Yin (2018, cited in Sena, 2023: 44-45) highlights two main aspects of case studies. One key aspect is that a case study entails thoroughly examining a current, real-world phenomenon within its genuine context, mainly when the distinctions between the phenomenon and its context are ambiguous. Moreover, the second aspect is that a case study deals with situations with more variables of interest than data points, requiring the development of theoretical propositions to guide design, data collection and analysis, using multiple sources of evidence that converge in a triangulated fashion. According to Yin, case studies apply to accurate and current phenomena, emphasising the need to consider all variables and external factors. Following this definition, energy security can be considered a contemporary problem, as evidenced in the literature review, and the study will be conducted in a real context, the EU. Moreover, the boundaries between energy security and its broader context are complex and interrelated, reflecting the intricate nature of energy security challenges in the real world.

Second, Simons (2009, cited in Sena, 2023: 47) defines the *case study* as "an in-depth, multidimensional exploration of a project, policy, institution, programme or system in a real-world context". It achieves this exploration through research, different methods and evidence. However, this is limited to generating practical knowledge rather than broader cognitive objectives, such as theory building. Applying Simons' theory to the issue of the energy crisis in the EU, the case study would involve a thorough investigation of existing energy policies, institutions, programmes and systems in Europe to understand the situation's complexity. While the approach may appear to be oriented towards practical solutions, the information gathered could also contribute to the development of broader theories of energy crisis management in similar contexts.

Third, Cohen and Manion (1995: 253-263) define the *case study* as "an in-depth examination of a specific unit in a particular context, focusing on multifaceted phenomena within the unit's life cycle". The unit is the EU, facing energy security challenges in this scenario.

Fourthly, from an interpretative perspective, Stake (1995, cited in Sena, 2023: 47) presents a less precise definition, describing the *case study* as "the analysis of the particularity and complexity of a single case in order to understand its activity within important circumstances". The case study would involve diving into the uniqueness of the energy crisis in the EU and understanding how various variables and circumstances interact to shape the problem. The analysis would focus on identifying specific elements related to the crisis, such as the energy policies adopted, existing infrastructure, dependence on energy sources, and economic and geopolitical factors. Furthermore, Stake suggests that the case study is not only about collecting data but also about understanding the activity of the case within critical circumstances (Sena, 2023: 47). In this context, it would seek to understand how policy decisions, the actions of institutions and other factors contribute to the dynamics of the energy crisis.

Finally, Biggam (2018: 110) considers the case study valuable for exploring existing theories and contributing to a deeper understanding. In the research in question, the case study methodology will enable the comparison of theoretical knowledge on energy security with the practical challenges faced by the EU, identified in the literature review.

The case study definition that most aptly captures the essence of the energy crisis in the EU appears to be that proposed by Yin (2018). This is due to the contemporary nature of energy security, which encompasses numerous interrelated variables, such as energy policies, infrastructure, dependence on energy sources, and economic and geopolitical factors. Moreover, the complexity of the boundaries between energy security and its broader context reflects the intricate nature of the EU's fundamental challenges. While other definitions, such as Simons' (2009), could provide an in-depth exploration of the energy crisis, Yin's perspective emphasises the need for theories and convergence of evidence, which could be essential to address the complexity of the crisis and generate meaningful knowledge.

A case study is thus an appropriate methodology for addressing a thesis on the geopolitically driven EU energy security crisis because of its ability to explore in-depth, consider multiple variables and provide a contextual and contemporary understanding of the phenomenon.

3.2. Data Collection and Analysis

This research strategy adopts a mixed methods approach to address the complexity of the energy security crisis in the EU. Given the nature of the task, the predominant methodological approach has been qualitative. Qualitative methods allow for a detailed understanding by capturing the perspectives of the countries in question and the nuances in policy formulation. This means that hypotheses and proposals will be derived from general premises, such as historical facts, international relations theories and EU strategies. European institutions' opinions, communications and reports, such as the European Commission (EC) and the Council, have been central to the research. Along with the reports of the International Energy Agency. Existing legislation, particularly Communication COM/2022/230 and energy measurement data from Eurostat, have also played an essential role in understanding the European energy scenario. Collecting data from various sources and applying a case study research design ensure a strong and multifaceted exploration of the energy crisis, and different perspectives can be drawn for policy formulation and strategic decision-making.

The research process unfolded in four key segments:

In the first phase, the literature review was constructed through a comprehensive review of related literature. Particular emphasis was placed on work from the last twenty years to support the conceptual structure. Databases provided by the University of Glasgow library were used in this phase. Following an initial exploration and establishment of the doctrine, the emphasis shifted towards identifying the most recent and pertinent authors within the realm of energy security.

In the second stage, the search focused on the most relevant articles on EU-Russia relations, addressing both energy and non-energy aspects, in order to understand Europe's dependence on the Russian giant. To this end, consulting widely recognised authors on EU-Russia relations, such as Siddi, Högselius, and Balmaceda, was essential.

Subsequently, research was carried out on current EU legislation and its trajectory, paying particular attention to laws addressing the security of supply and efforts to decrease dependence on Russia. At this stage, reliable sources such as the official EU website, particularly the European Commission, and relevant portals of the European institutions, such as Eurostat and the European Parliament's EPRS, were used.

The final stage analysed the prospects for the EU's transition to Russian fossil fuels, considering possible challenges hindering progress. The implications for the global energy landscape and the EU's role as a leader in the sustainable energy transition were also explored. Various sources were consulted for this research, including news bulletins such as Politico or Al Jazeera, official websites of companies such as Gazprom, Naftogaz, Ørsted, or Enel Green Power, and governmental press releases.

As for the analysis phase, the information gathered is synthesised and interconnected, trying to cover different points of view, and critical judgements are applied to complement the synthesis. Figures are also incorporated to facilitate the assimilation and retention of the information presented.

4. Why is the EU Facing an Energy Security Crisis?

4.1. Understanding European Energy Dependency: Background Energy Relations with Russia

Energy trade has been the main economic driver of EU-Russia relations, with Russia being the EU's leading supplier of fossil fuels and a major supplier of

uranium. Energy relations between Russia and the EU are characterised by a sustained expansion of unstoppable impulse (Högselius, 2012: 220). Factors such as the decline in intra-European fuel production (because of the predicted depletion of the North Sea and the unexpected seismic shutdown of Europe's largest gas field in Groningen), the phasing out of nuclear power, the growing demand for natural gas due to the parallel phasing out of coal and oil, or the low prices of Russian natural gas make the EU Russia's first partner in meeting its energy demand. A prior historical understanding is necessary to understand the level of dependency at the beginning of the Ukrainian war in 2022 and the current situation. Högselius (2012) points out four phases in the system of gas dependency between the EU and Russia.

The initial phase began in the late 1950s when oil started to be replaced by gas. The USSR and Western Europe –at that time, the ECSC and later, with the signing of the Treaties of Rome, the EEC- faced different challenges. The shortage of steel pipes in the USSR led to collaboration with Western European companies that had resources, thus solving the problem of gas transportation. At the same time, Western Europe had access to high-quality pipes but lacked gas resources, which made collaboration with the USSR mutually beneficial. At this moment, gas was not expected to become a source of dependency but was used as a tool to counterbalance the use of oil. Collaboration was not limited to technical solutions but also involved the integration of governments, gas companies and pipeline manufacturers.

As the system evolved, new challenges emerged, such as ensuring the security of supply in the short and medium-term. Gas companies developed new infrastructure and constantly adapted to meet these challenges. The second phase was at the height of the Cold War, at the time of the Warsaw Pact invasion of Czechoslovakia in 1968. This scenario never disrupted the energy trade but instead boosted it. Europe's reasoning in this scenario is neither confrontational nor isolationist, but rather a strategy that allows it to move closer to Soviet totalitarianism, believing that it can manage and "control" it better. Moreover,

this gas trade fostered internal integration among European countries, creating transnational links and reducing vulnerability. Between the geopolitical situation and Europe's increased demand for gas, the USSR successfully dealt with several difficulties, such as creating costly infrastructure and new pipelines, which created more confidence for European countries.

With growing demand came the need to expand the energy system between the blocs further. Högselius (2012) situates the third phase in a time of international turbulence in which Europe chose and relied on Russian gas regardless of external shocks. The oil embargo due to the oil crisis in 1973 and rising environmental concerns created the perfect situation for Europe to end its energy dependence on Russian natural gas.

The fourth phase was amid the organisational and institutional chaos of the political and economic crisis following the collapse of the USSR. This context made it necessary to establish a stable regime for gas transport. New innovative solutions such as the Nord Stream pipeline appeared, connecting Russia and Germany directly, bypassing transit negotiations with the new Soviet republics (Belarus, Ukraine and Moldova) and guaranteeing a stable flow of gas to Western Europe.

The history of the East-West gas trade is remarkable for its adaptability and resilience and the power of bloc-to-bloc collaboration to overcome complex geopolitical challenges and foster regional integration. Europe's dependence on Russian natural gas has been solidified during these four phases. The essential factor for this solidification has been mutual trust, and regardless of internal and external events, both blocs remained faithful trading partners.

Before the beginning of the invasion of Ukraine in 2022, the EU and Russia remained major energy partners, with the EU relying on economic reasons, as gas was cheap; environmental reasons, as it pursued the elimination of oil; but, above all, it relied on trust during these four phases. The EU's main concern was not that Russia would intentionally decide to stop gas supplies to the EU for

political reasons but that the Russian gas industry would not make the required investments in infrastructure, such as pipelines and gas fields, and thus renege on its existing export agreements (Högselius, 2012).

Prior to the escalation of the Ukraine war in 2014, there were three main pipelines connecting Russia to European countries: the network of pipelines running through Ukraine, built during the Cold War and through which more than half of gas imports came; the Yamal-Europe pipeline, built in 1990, running through Poland and Belarus; and Nord Stream, built in 2011 and connecting Russia to Germany via the Baltic Sea (Siddi, 2017: 107-117). However, at the beginning of the 2014 Russian-Ukrainian disputes, Russia decided to phase out the transit of gas through Ukrainian territory, taking advantage of the fact that the transit agreement between Gazprom and Naftogaz was due to expire in 2019. This strategy isolated Ukraine energetically, as Naftogaz controlled the gas pipelines passing through Ukrainian territory, demanding payments and taxes from Gazprom, unlike the other two major pipelines. However, Siddi (2017: 107-117) identifies two obstacles in Russia's plan to isolate Ukraine: First, it had to overcome "European scepticism" about the negative consequences for Ukraine, an EU Energy Community partner country. Second, Russia would have to build additional infrastructure.

Although the EU launched an antitrust investigation against Gazprom in 2015 motivated by this debilitating position for Ukraine, Russia planned to weaken its neighbour. It invested in new infrastructure to secure its supply to European countries. Siddi (2018) points out that regardless of the context of political crises and reciprocal economic sanctions, the energy sector remained unscathed by both blocs. Therefore, a confident Russia launched three new projects between 2017 and 2018: the Yamal LNG project and two gas pipelines, the Turkstream across the Black Sea and Nord Stream 2, parallel to Nord Stream 1, which would become the main corridor for Russian gas exports to the EU. In the beginning, it was a project intensely defended by European countries such as Germany and Austria as it brought many advantages to the European energy market -

competitive prices, compensating for the depletion of the North Sea or the closure of nuclear power plants. However, constructing new infrastructure weakened Ukraine's role as a transit country and consolidated Gazprom's position in the energy market (Siddi, 2018). Against this backdrop, the EU sought energy security and believed that the support of a new and renewed Nord Stream would guarantee it. However, it only increased its energy dependence.

4.2. The Use of Energy as a "Weapon"

In the history of energy relations between the two blocs, energy has been both political and economic. Political developments such as the disputes between Russia, Ukraine and other former Soviet republics have led analysts to develop theories on using energy as a geopolitical tool that can help Russia regain political influence in these countries. In the first two phases of gas dependence described in the previous section, Högselius (2012) notes that the economic aspect was more critical, as gas was hardly considered a decisive factor in the global geopolitical system. However, in the last two phases, and when this energy dependence on Russia has been definitively consolidated, energy as a political "weapon" has begun to be discussed. A weapon that, as Högselius points out, has never been used in this scenario (no evidence has been found that Russia threatened to cut off supplies to the EU) and which has been socially constructed by the growth of mistrust between blocs.

Van de Graaf and Colgan (2017) define an *energy weapon* as "the threat or action by one state involving energy resources to coerce or deter another state". In the case of the war in Ukraine, energy has not played a determining and explanatory role in the crisis but has functioned as a contextual factor. Van de Graaf and Colgan distinguish three energy-related motives that could have fuelled the invasion of Crimea in March 2014:

- Oil and gas reserves on Ukrainian territory. Although this option is improbable because Russia already has reserves of these materials, it had to be reflected. Moreover, Crimea is rich in energy resources. It also has

cultural –of two million people living on the peninsula, 60% feel Russian-, historical, and strategic importance for Russia –as the Russian fleet has been established in Sevastopol for many years (Van de Graaf and Colgan, 2017).

- The solution to the 2009 gas dispute between Russia and Ukraine was to sign the supply and transit contract signed by Gazprom and Naftogaz, which was due to expire in 2019. Gas trade disputes were a key contextual factor in the development of the conflict but not the reference factor.
- Russia's "petro-state" nature makes it highly dependent on revenues generated by oil exports, which leads to greater involvement in international conflicts and favours a more aggressive external posture. According to Van de Graaf and Colgan, a resource-rich state is significantly more likely to be involved in international conflicts. Petro-state status is characterised by the presence of two key elements: the presence of an aggressive or revolutionary leader and strategic control over oil reserves. In this context, Russia's abundance of oil resources and Putin's position as a belligerent leader are key factors contributing to the development of the crisis. However, they are not the main factor.

In other words, the conflict in Ukraine does not have an energy background, although energy serves as a contextual factor. Energy lays the groundwork for the crisis, generating internal divisions in the country and geopolitical rivalry until the conflict finally erupts. Although there are strict limits to the use of energy as a weapon, it is not the most appropriate instrument for blackmail as Russia could have cut off supplies, but this would have meant losing its primary consumer. In this context, Van de Graaf and Colgan define *Russia's energy weapon* as "Russia's ability to disrupt gas supplies to Ukraine and other dependent states in order to exert pressure and defend its interests".

While there is no evidence that Russia has used gas as a tool of coercion towards Europe, it is possible to identify situations in which Russia could have used it as an indirect means of pressure during the Cold War. It is true that in this context, gas was used to enhance Soviet prestige and divide the capitalist world between those who received Soviet gas and those who were isolated, functioning as an ideological weapon. However, there is no evidence that it was used as political blackmail against the West.

In the context of the Crimean annexation, Russia used energy as an opportunity to bolster its domestic popularity and strengthen its sphere of influence, especially in a Crimea divided between pro-Westerners and pro-Russians. Van de Graaf and Colgan (2017) give some examples of where Russia may have used this "weapon":

- In 2010, it coincided with the reduction of Russian energy prices for Ukraine with a political concession on the Russian naval base in Crimea for another twenty-five years.
- In 2013, Russia offered gas price discounts after the Ukrainian president, Yanukovych, rejected an association agreement with the EU, leading to the Euromaidan protest.
- The gas wars are not seen simply as trade disputes but as Russian strategies to regain influence in former Soviet countries such as Belarus, Moldova and Ukraine. The 2006 crisis might have responded to the 2004 Ukrainian Orange Revolution, and the 2009 gas dispute might have been related to Georgia and Ukraine's NATO accession negotiations.

These are just a few examples of situations in which Russia could have used its "energy weapon" to exert pressure and defend its interests. However, this is only sometimes the case. For example, amid the Russo-Ukrainian war in June 2014, Van de Graaf and Colgan (2017) point out that Russia did not cut off gas supplies to Ukraine as a deliberate use of this "weapon" but as a result of negotiations that were unsatisfactory for both sides. Moreover, it is essential to consider the

context, as Russia had a dominant position as a supplier in the EU due to the lack of alternative customers. An "energy weapon" is entirely subjective and highly context-dependent.

Finally, it is essential to note that there is a relationship between deterrence and the use of energy as a "weapon". This relationship is based on the concept of economic and political power that can be derived from the control and manipulation of energy resources. Indeed, manipulation of energy supplies, mutual dependence and investment in alternative energies are some forms of deterrence. As George and Simons (1994: 7-21) point out, deterrence is a coercive strategy used in international relations to influence the behaviour of adversaries. Deterrence thus aims to prevent unwanted actions by invoking threats. In the context of Russia and Ukraine, Russia has used various tactics to deter Ukraine and the international community from intervening directly in the ongoing conflict, including the threat of military retaliation, as well as political and economic pressure. Some of these tactics include support for separatists, providing military, financial and logistical support to separatist groups in the Donetsk and Lugansk regions in eastern Ukraine (Zverev, 2016); propaganda and information warfare, using state media and social media to disseminate narratives that favour their point of view and misinform about the situation in Ukraine; cyber-attacks against Ukrainian infrastructure, seeking to disrupt communications and destabilise the internal situation; and economic pressure, with the cutting off of natural gas supplies, as a tactic to influence Ukrainian politics and exert pressure on the Ukrainian government.

4.3. Impact of the 2022 Ukraine War: Implications and Consequences

The conflict in eastern Ukraine in early 2014 marked a turning point in European geopolitics, generating a series of events with profound political, social and economic repercussions. Russian troops took control of the Crimea region, arguing the need to safeguard the rights of Russian and Russian-speaking

citizens on the peninsula. Russia's formal annexation of Crimea materialised after a local referendum. This episode intensified tensions and triggered a broader conflict in the eastern regions of Donetsk and Luhansk, where pro-Russian separatists sought independence backed by Russian forces (Council on Foreign Relations, n.d).

Negotiating efforts to end the conflict, such as the Minsk Agreements, were unsuccessful. On 24 February 2022, Russia launched a full-scale invasion of Ukraine, justifying it as a "special military operation" to demilitarise the country and put an end to an alleged genocide of Russians on Ukrainian soil.

The start of the conflict saw the Russian army's defeat in the battle for Kyiv, dealing a morale blow to its troops and evidencing an ill-conceived military strategy (Council on Foreign Relations, n.d). By the end of August, through a significant counteroffensive, Ukraine regained vast territories in the Kharkiv and Kherson regions (Masters, 2022). Subsequently, in September, Russia occupied the Donetsk and Lugansk regions in the East and Kherson and Zaporizhzhia in the South. It is this month that the UN Assembly condemned the referendums held in these areas as an "illegal annexation" with no validity to change the status of these regions in Ukraine (United Nations, 2022). After a stalemate in the war in the winter of 2022, Russia set a new strategy to capture the whole of Donbas in the spring of 2023 through an offensive. However, the offensive produced slight progress and became a prolonged Bakhmut siege (Al Jazeera, 2023). In early summer, Ukraine made small territorial gains and intensified attacks on bridges to Crimea, Russian ships and structures in Moscow. Ukraine launched a long-awaited counteroffensive, attempting to break through Russian defences to the East in Donetsk province, including around Bakhmut, and to the South in Zaporizhzhia province, forming the "land corridor" to Crimea (Council of Foreign Relations, n.d).

Since then, the conflict has evolved with clashes in various areas of eastern and southern Ukraine. Russian withdrawals have been recorded in some areas, and

Ukrainian forces have made gains. However, tensions and violations of international humanitarian law persist, with reports of war crimes and devastation of civilian infrastructure (such as the Zaporizhzhia nuclear power plant), and geopolitical tensions have affected the global food supply chain, given that Ukraine is a major supplier of wheat and other cereals.

Due to the Russian invasion, world energy prices rose significantly, especially in the EU. Fossil fuel prices soared due to the geopolitical turmoil. Since the beginning of the conflict, the EU has been taking steps to condemn the invasion and, as far as possible in diplomatic terms, to restrain Russia.

As the EC indicates (2022a), the EU decided to implement a series of sanctions in reaction to the conflict, spanning from February 2022 to the present moment as of the writing of this project. Some of the sanctions targeted individuals and organisations that contributed to undermining or endangering Ukraine's territorial integrity, other sanctions affect trade ties between the EU and Russia and limit the ability of the Russian state and government to access EU capital markets and services, freezing half of its foreign exchange reserves and isolating central Russian banks. In addition, it also restricts Russian coal and oil imports and imposes a price cap on Russian oil products. Bans have been imposed on Russian oil purchases, and a European embargo came into force in February 2022 (Boehm and Wilson, 2023). Internally, the EU pursued energy security through the REPowerEU plan, introduced in May 2022 by the EC.

The conflict has significantly strained US-Russian diplomatic relations, raising the possibility of a wider European confrontation. Tensions are expected to increase between Russia and neighbouring NATO Member States, which could involve the US due to security commitments within the alliance (Montero Moncada *et al*., 2023). Beyond the immediate military implications, the conflict poses broader challenges for future collaboration on critical issues such as arms control, cyber security, nuclear non-proliferation, global economic stability, and counter-terrorism. Moreover, Russia's growing isolation has forced the nation

to forge stronger strategic alliances with other states, such as China (Montero Moncada *et al*., 2023), willing to engage, often in opposition to Western interests.

At the time of the writing of this paper, Ukraine has liberated roughly half of the territory occupied by Russia, but the situation remains uncertain. Russia's threat of nuclear action has added a component of danger to this ongoing conflict, which has global consequences and remains the subject of multiple diplomatic efforts to seek a peaceful solution. Despite possible adjustments, the war in Ukraine is expected to drag on (Montero Moncada *et al*., 2023). The current status quo is considered unacceptable for both Russia and Ukraine.

4.4. Situational Awareness

These geopolitical transformations not only have consequences at the political level but also have an impact on economic and security aspects across the European region. The situation has led to a thorough review of the strategies and policies at play, both at the national level and within the EU, aimed at effectively addressing emerging challenges and reinstating regional stability. In this context, it is essential to carefully analyse current and future relations between Russia, Ukraine and the EU to understand the geopolitical landscape and its potential long-term implications. The changing dynamics between these key actors underline the need for continuous and adaptive assessment of policies and strategies in the European region.

4.4.1. Dependency Data: Understanding Key Statistics

According to the Commission (Korteweg, 2018), the EU's foreign-sourced natural gas consumption in 2016 was 69%, of which 37% was Russian. This conveys that EU natural gas consumption increasingly depends on foreign sources as domestic production declines. The decision by the Netherlands to cease production at the Slochteren gas field by 2030 (Euronews, 2023) and the depletion of the North Sea further contributed to import dependency across the EU.

Figure 3 below illustrates the importance of natural gas sources for the EU since 2012, with Russia remaining the leading external supplier, although Norway has become increasingly important. About a third of Russia's natural gas production is exported, and as Korteweg (2018) points out, 87% is destined for Europe. Although Russia is a significant natural gas supplier, it is also a major supplier of solid fossil fuels and oil. Therefore, Europe is Russia's most important market, making it its primary source of energy and therefore dependent on it.

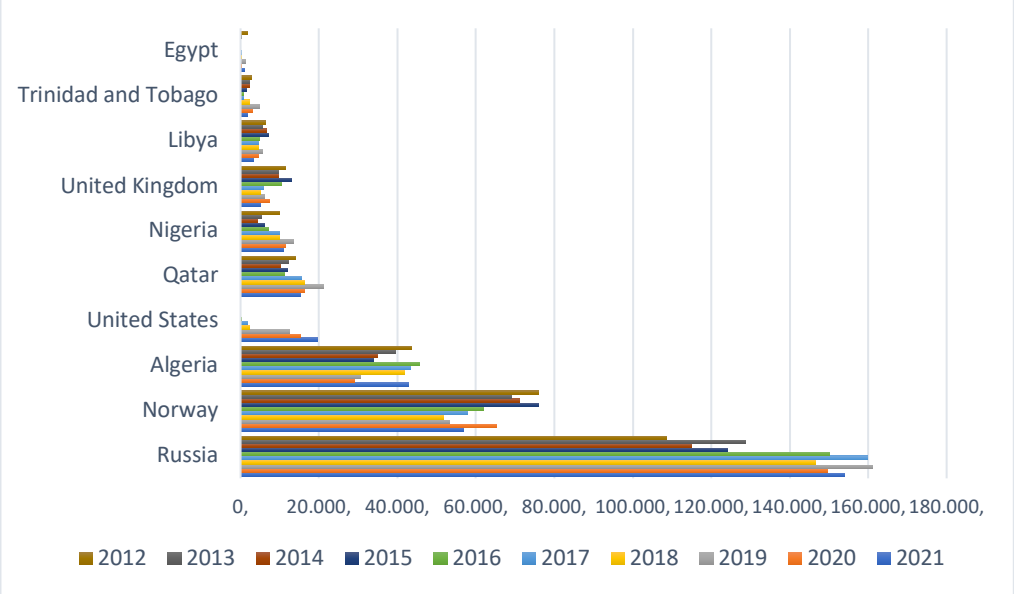

Figure 3, Gas imports by partner country (1 hm3) (Eurostat, 2023a, compiled by Clara Munarriz)

In this paper, energy dependence is understood as the amount of primary energy that a nation must import to supply itself sufficiently, whether for heating, electricity, or transport. It is, therefore, understood as a nation's dependence on the outside world for all its energy needs. High energy dependence on other nations can cause instability in energy supply and prices because they are outside the direct control of the importer.

Until the end of 2021, Russia was the EU's leading oil and natural gas supplier. However, EU sanctions packages affected –and continue to affect-, directly and indirectly, the oil and gas trade. In 2022, a considerable trade divergence in energy products emerged. The figure below (Figure 4) shows energy imports

from the EU and the rest of the world. The figure shows annual data between 2018 and 2022, trade data represented in millions of Euros, and net mass represented in tonnes. The energy products considered in this figure are oil, natural gas and solid fuels (Eurostat, 2023b).

Figure 4, Imports of energy products, 2018-2022 (Eurostat, 2023b)

Eurostat data (n.d.a) reveals that in 2020, the European Union generated 42% of its energy internal market, a figure that increased to 44% in 2021. This breakdown in 2021 comprised 3% from oil, 6% from gas, 18% from coal, 31% from nuclear, and 41% from renewable energy sources. Despite these proportions, which fell short of optimal levels, the EU still necessitated energy imports from external sources. In 2021, the majority of the EU's energy imports predominantly constituted petroleum products, making up nearly two-thirds of the total at 64%, followed by natural gas at 25%, and solid fossil fuels at 6%.

In the same year, Russia solidified its position as the primary supplier of crude oil, natural gas, and solid fossil fuels to the EU. Regarding crude oil, over 50% of extra-EU imports originate from five key sources: Russia (28%), the United States (US), and Norway (9% each), as well as Libya and Kazakhstan (6% each). A parallel analysis indicates that approximately 75% of the EU's natural gas imports are predominantly sourced from Russia (44%), Norway (16%), and Algeria (12%). In contrast, more than half of the imports of solid fossil fuels,

particularly coal, are supplied by Russia (52%), followed by Australia (17%) and the US (15%).

The figures below show oil and gas imports from partner countries in 2022 by quarter.

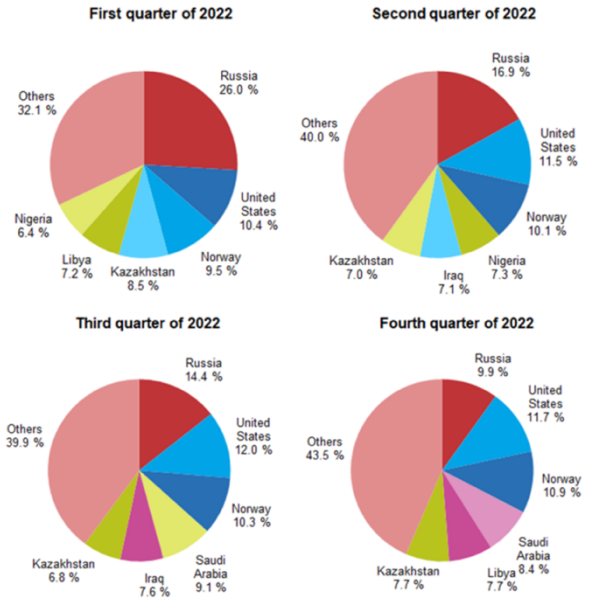

Figure 5, Oil imports by partner country (Eurostat, 2023b)

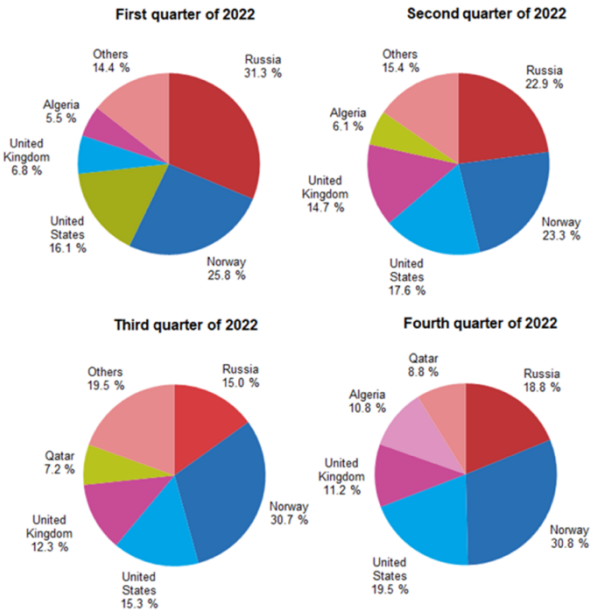

Figure 6, Gas imports by partner country (Eurostat, 2023b)

The above figures illustrate that during the first quarter of 2022, the EU relied on Russian imports for 26% of its oil and 31.3% of its natural gas, establishing Russia as the primary supplier. Nevertheless, the imposition of sanctions against Russia at the beginning of the war resulted in noteworthy changes in import distribution. A comparative analysis of the first quarter of 2022 reveals a substantial decline in collaboration with Russia, while other nations, including the US, Norway, and the UK, have emerged as principal partners for the EU. Notably, former partners such as Algeria for gas or Iraq, Saudi Arabia, Nigeria, and Libya for oil, have concurrently strengthened their status.

In conclusion, Russia continues to assert itself as the principal supplier of primary energy, specifically natural gas and oil, to the EU. The recent decision by European countries to reduce their energy ties with Russia means that the EU's previous strong dependence on Russia is disappearing, but also introduces the possibility of new forms of dependence. To enhance energy and supply security, these emerging energy dependencies must be diversified, avoiding concentration within a single actor.

4.4.2. Global Energy Landscape and Market Dynamics

The economic policy of energy security seeks to develop strategies and policies to ensure a stable and affordable energy supply while reducing the risks associated with over-dependence on specific energy sources or third countries. Therefore, all EU Member States face the challenges of climate change, increasing dependence on oil and gas imports and rising prices. As noted by the Commission (2007)

> "Energy markets and geopolitical circumstances have undergone significant transformations since then. As a result, the urgency for the EU to take decisive action has increased and has become more critical than ever. If Europe does not respond effectively, it could jeopardise achieving EU objectives in several areas. The new European energy policy must be characterised by ambition, competitiveness and a long-

term vision to address these challenges, ultimately fostering benefits for all European citizens".

The energy market is characterised by a pronounced concentration of global supply and significant dependence on specific countries.

On the one hand, in the realm of oil, supply is heavily concentrated within OPEC Member States. Furthermore, the primary challenge within the oil market stems from its organisation as a cartel and the intricacies of interactions among its members.

On the other hand, the analysis of the gas market shares similarities with that of oil, yet it involves variations in the types of traded products and the idea of a unified European market. The gas market has undergone a liberalisation process in recent years in all EU Member States due to the Directive on common rules for the internal market in natural gas (EU, 2003). The Directive sought to balance liberalisation objectives and maintaining public service obligations. However, the gas scenario is diverse in the different countries of the Euro-Mediterranean sphere. For instance, Spain and Italy face a significant challenge as they rely exclusively on external gas supplies to fulfil their demand, whereas Ireland, though also dependent on external sources, exhibits a comparatively lower level of dependence than its Spanish and Italian counterparts.

This situation underlines the importance of energy diversification and the need for these nations to explore strategies that promote greater energy self-sufficiency and resilience in the face of global energy dynamics. Addressing these energy vulnerabilities becomes a crucial priority to ensure energy security and stability in the region.

4.5. Security Indicators

Chapter 2 highlighted the importance of indicators as valuable tools for assessing and monitoring various energy security trends. While subject to varying perspectives and contextual influences, these concepts enable the early

identification of warning signs signalling an impending energy crisis. Consequently, this enables decision-makers to implement proactive measures and contingency plans to mitigate potential impacts. Kruyt *et al*. (2009) recognize ten subjective indicators; nevertheless, the literature review revealed that certain crucial factors were omitted from these tools, prompting the inclusion of three additional indicators. Subsequently, each indicator will be examined individually, laying the groundwork for the doctrine employed to determine the presence of an energy crisis in the EU.

The EU faces limited **availability of energy sources**, with over half of its energy resources being imported, resulting in energy dependency, as previously defined. It is imperative to consider resource development and exploration plans within the EU to guarantee a well-balanced and sustainable energy mix. In 2020, 42% of the energy was sourced from the Union's internal market; by 2021, this figure had marginally risen to 44% (Eurostat, n.d.a). Nevertheless, this remains a relatively modest share, underscoring the significance of enhancing domestic production capacity to decrease dependence on external sources.

Reserves-to-production (R/P) ratios serve as estimates for the lifespan of a particular reserve, like an oil field, and play a crucial role in safeguarding the national or global availability of a natural resource. In line with this, the figure below (Eurostat, n.d.b) illustrates the emergency oil stocks in the EU and the minimum level required to adhere to energy security regulations.

The EU's emergency oil stocks currently surpass the levels observed before the Russian invasion of Ukraine, representing a positive indicator. Nevertheless, it is crucial to acknowledge the deficiency in oil production within the EU internal market, constituting 3.7% in 2020 and 3% in 2021 (Eurostat, n.d.a). This signifies that reserves are depleting faster than production, potentially presenting long-term challenges for sustaining energy security.

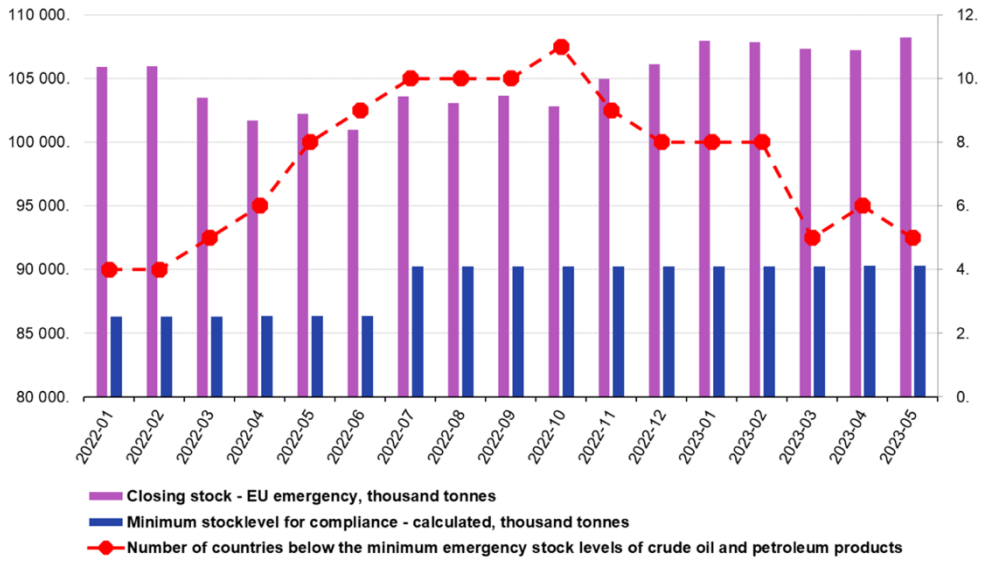

Figure 7, Emergency oil stocks of the EU and minimum stock level for compliance (Eurostat, n.d.b)

Energy diversification, both within the EU (intra-EU) and beyond (extra-EU), mitigates specific risks of disruption, such as an excessive reliance on gas imports, resulting in enhanced energy security. A country's level of energy security increases with greater diversification. In the case of the EU, a mix of energy sources is utilised, but regarding imports, oil imports held significant importance in 2021, constituting 64%, whereas gas and solid fossil fuels accounted for 25% and 6%, respectively.

In terms of domestic production in 2021, the EU draws on various resources but predominantly focuses on renewables (41%) and nuclear energy (31%), as opposed to domestic gas production (6%) and oil (3%). This diversified domestic production strategy contributes to energy security by lessening reliance on external sources.

The EU has the potential to classify and quantify its **dependence on energy imports**, considering both physical and monetary dimensions. Such an analysis would shed light on geographical diversification and the security of transport routes, enabling the identification of vulnerabilities and the formulation of effective policies to diversify energy supplies. Reference to the preceding

chapter, "Dependency Data: Understanding Key Statistics," provides insight into the analysis of energy dependency in other countries, emphasizing a notable reliance on Russia. This approach yields crucial information for enhancing the resilience and security of the EU's energy supply.

Ensuring energy security in the EU hinges on the **political stability** of supplier, consumer, and transit countries, as well as the interrelations among them. Assessing the political stability of energy supplier countries involves considering factors such as governance, social cohesion, internal and external conflict management, and the consistency and predictability of government policies. Here is a concise analysis of the strengths and weaknesses of the largest energy suppliers in the EU:

- **Russia:** Possessing a stable political structure with a robust central government, Russia's relationship with the EU has been intricate, marked by political tensions and disputes, notably concerning support for Ukraine and sanctions against Russia.
- **Norway:** Demonstrating stability and a long democratic tradition, Norway has proven to be a reliable partner in terms of energy supply.
- **Algeria:** Serving as a key gas supplier to the EU, Algeria has maintained some political stability, particularly after the civil war in the 1990s. However, the situation could be sensitive to internal or regional changes.
- **Saudi Arabia:** As a significant oil producer, Saudi Arabia boasts a strong central government and has maintained political stability. However, the region confronts growing geopolitical tensions, particularly with the Israeli-Palestinian conflict.
- **United States:** With a stable political system and a longstanding democratic tradition, the United States is politically secure. However, the political structure may change with each administration, potentially influencing the direction of energy policies.

Energy prices in the EU serve as key indicators for evaluating market efficiency and the competitiveness of diverse energy sources. It is essential to consider the impact of policies, subsidies, and price volatility on the delicate balance between supply and demand. In the first half of 2023, household electricity and gas prices in the EU exhibited signs of stabilization, following a notable surge prior to the Russian invasion of Ukraine.

As per data from the Council (n.d.a), average electricity prices witnessed an upswing compared to the same period in 2022, reaching record highs. This increase is attributed to the removal of support measures and higher energy taxes. However, EU policies have played a crucial role in mitigating the impact of these elevated prices. The Council implemented a temporary mechanism to curb excessive gas prices by the end of 2022 (Council, n.d.b). In October 2022, EU countries collectively adopted an emergency regulation to tackle soaring energy prices and provide support to the most affected citizens and businesses (Council, n.d.a).

Evaluating and increasing the **share of energy derived from carbon-free sources**, including renewables and nuclear, is critical for reaching environmental targets and ensuring long-term sustainability in the EU. In alignment with the European Green Deal, the EU internal market achieved a commendable balance in 2021, with 41% of energy sourced from renewables and 31% from nuclear energy.

However, it is essential to note that more than half of the energy the EU imports comes from fossil fuels, such as oil and gas, which implies a high carbon footprint. This underlines the need to intensify efforts to diversify energy sources and reduce dependence on carbon-emitting fuels, aligning more closely with the EU's decarbonisation and sustainability goals.

The EU could assess the **liquidity of its energy market** to ensure efficient management of fluctuations in supply and demand, facilitating investment and the transition to more sustainable technologies. This indicator is intrinsically

linked to energy prices, and thus, the EU's decision to regulate prices (Council, n.d.b) was geared towards enhancing the long-term stability of electricity markets.

Examining **energy intensity**, whether in terms of consumption by quantity, fuel type, or sector, would enable the EU to comprehensively understand its energy dependence and evaluate consumers' resilience to price variations. Additionally, this analysis would play a crucial role in identifying critical sectors that impact energy security in the region. Regarding the most consuming sectors in the EU, data from 2021 reveals that the transport sector constitutes 29% of final energy consumption, followed by households (28%), industry (26%), services (14%), and agriculture (3%). These figures underscore the distribution of energy demand across various sectors, providing valuable information for formulating policies and strategies to enhance efficiency and sustainability in specific areas of the economy (Eurostat, n.d.a).

The EU should invest in robust and **resilient infrastructure**, especially electricity grids and storage systems, to ensure supply continuity in extreme events, such as natural disasters, cyber-attacks or any supply disruption. A prominent example is the "EcoGrid EU" project in Denmark, which implements cutting-edge technologies to develop an advanced power system model in the EU. This enables the efficient integration of renewable sources, improving resilience to variations in demand. Another innovation case is the pilot project "Naturstromspeicher" in Gaildorf, Germany, where an energy storage system is currently being tested to store the energy generated by wind turbines. These projects contribute significantly to maintaining supply stability even in variable weather conditions. The EU has also committed to electricity interconnection projects, such as "NordLink", which connects Norway and Germany, allowing a two-way exchange of electricity between the two countries. This initiative improves resilience by enabling the sharing of resources at critical times. In addition, modernising the Olkiluoto nuclear power plant in Finland is an example of how the EU addresses resilience in energy infrastructure. This

project includes improvements in safety and technology, strengthening the plant against possible incidents and ensuring high safety standards. These concrete examples illustrate how the EU has implemented various measures to strengthen the resilience of its energy infrastructure, addressing specific challenges and ensuring a robust and sustainable supply.

Implementing policies and technologies to improve **energy efficiency** is critical to reducing overall demand and ensuring a more sustainable use of resources in the EU. Legislative frameworks such as the Energy Efficiency Directive and the REPowerEU set ambitious and binding targets for EU Member States. These frameworks focus on improving energy efficiency, reducing consumption and contributing to the EU's overall climate and energy objectives. With the implementation of the Energy Efficiency Directive, the EU has set targets for 2030 focused on reducing energy consumption, managing energy prices, mitigating climate change and promoting sustainable economic growth. This commitment is intensified, especially in the construction, industry, and transport sectors –critical areas for improving energy efficiency and moving towards a more sustainable economy. It is imperative to stress that each Member State must draw up a National Integrated Energy and Climate Plan (NECP) with a 10-year perspective by 2030. These plans are crucial for achieving the set targets, as they provide a detailed roadmap for implementing specific measures tailored to each country's circumstances. Therefore, implementing policies and technologies that promote energy efficiency is essential to meet the EU's sustainability and climate change commitments and contributes to building a more resilient energy future geared towards innovation and efficiency (EC, n.d.a).

Energy crisis response capacity is fundamental to a nation's or region's resilience and comprehensive security. It can be measured by various indicators that assess how effectively and quickly the EU and its Member States can manage energy emergencies, such as national contingency plans and well-

established emergency systems to respond to supply disruptions and ensure energy security in crises.

This set of 12 indicators –as the MVP index was not considered and the addition of three home-grown indicators- provides a detailed overview of energy security in the EU. However, some are subjective in their assessment and not easily quantifiable. The complexity of energy security in the EU is revealed when considering the significant dependence on third countries to meet its energy needs, which inevitably impacts several of these indicators and their interconnectedness, such as the availability of energy sources, reserves/production ratios, diversity in energy sources, and the level of import dependency.

Although some indicators may show negative results, the assessment should not be simplified to conclude that there is no energy security. High dependence on third countries introduces additional vulnerabilities and challenges, particularly regarding political stability and energy prices. Political stability in consumer and supplier countries also ensures stable and reliable energy supplies. Moreover, price variability, influenced by geopolitical and economic factors, adds complexity.

It is essential to recognise that energy security cannot be guaranteed absolutely. However, a detailed assessment of these indicators allows areas for improvement to be identified and proactive measures to be taken. Diversifying sources and investing in more sustainable technologies reduces vulnerability to specific disruptions while implementing contingency plans and improving storage and transport infrastructure contribute to greater resilience.

While some indicators point to challenges and risks, the EU can strengthen its energy security through proactive and collaborative strategies. Adapting to a changing energy landscape means implementing new policies and measures that minimise vulnerabilities and strengthen the capacity to respond to potential crises.

5. What is the EU Strategy for Shifting Away from Russian Energy Resources?

The EU's quest for energy independence is and has been a key objective. Over the years, the EU has developed several policies and strategies to foster energy independence and reduce dependence on third countries.

These measures include diversifying the energy mix, promoting the use of renewable energies, promoting energy efficiency in domestic energy production, building energy interconnections and networks between Member States to facilitate energy exchange, and fostering cooperation between them.

5.1. Energy as the Key Element for the EU Construction Process

The REPowerEU plan and the Recovery and Resilience Facility (RRF) are current initiatives that aim to provide a European space for planned energy interactions with economic and political objectives that go beyond the mere reduction of energy consumption (EC, 2022b). However, energy has already been a source of unity among European countries before the creation of the European Union itself (EC, n.d.b).

EURATOM and ECSC were two energy policy projects that began Western European development in the 1950s. These programmes had objectives that went far beyond the protection of energy sources. They result from the European desire to create a shared space of political cohabitation based on infrastructures and energy policy alternatives. The political nature of these activities should be emphasised, representing a genuine political will to forge a political community and long-term strategic planning.

5.2. Assessing the Current Energy Landscape in the EU

European countries were ambitious in stepping away from Russian energy resources because they knew taking a stand on Ukraine would provoke a new energy crisis in Europe.

Reducing dependence on Russian energy is a complex strategy, as Russia is one of Europe's largest energy suppliers, trading partners and neighbours. As mentioned above, the EU is taking several measures to regulate energy prices and mitigate market volatility. These include new obligations among Member States to maintain minimum levels of gas storage, reduction of electricity and gas demand, reduction of energy consumption, joint energy purchasing, more significant investment and transparency in the use of infrastructure, greater solidarity among Member States and good energy demand management (EC, n.d.d).

The EU's energy plans include the following:

First, the EU plans to reach carbon neutrality by 2050 with the help of the European Green Deal, presented in December 2019. This transformative initiative represents a mix of EU policy, strategy, and legislation focused on meeting environmental, energy and climate targets in 2030. Second, the REPowerEU plan, launched in May 2022, encompasses a wide range of measures to ensure a reliable energy supply for all citizens while transitioning to a more independent, stable and sustainable energy system across the region. This plan is designed to reduce dependence on Russian fossil fuels significantly. By effectively implementing the European Green Deal and the REPowerEU plan, the EU aims to improve its energy security, enhance environmental sustainability and pave the way for a resilient and self-sufficient energy future.

5.2.1. EU’s Long-Term Goals

The principles of EU energy policy are governed by Article 194 of the TFEU, which establishes shared competence in certain areas, moving towards a

standard energy policy. Although each Member State retains the right to determine its conditions for exploiting energy resources, the choice of energy sources and the structure of its energy supply (EU, 2007).

In November 2018, the Commission presented its vision of a climate-neutral EU to achieve carbon neutrality by 2050. This implies a society and economy with zero net greenhouse gas emissions, covering sectors such as energy, industry, mobility, buildings and agriculture, in line with the European Green Deal and the Paris Agreement commitment.

With a determined effort towards social and economic transformation, the EU and its Member States aim to catalyse global climate action, demonstrating the feasibility of the transition to climate neutrality and working with all stakeholders. The EU proposes three key objectives: renewable energy and decarbonisation, energy efficiency and resilient infrastructure.

Renewable energy and decarbonisation

In the framework of REPowerEU, decarbonisation is a key pillar in moving away from energy dependence on Russia and leading the global transition to sustainable energy sources. This includes initiatives such as the Global Methane Pledge, signed by the EU with the US and eleven other countries in 2022 (IEA, 2022a), or the EU Solar Energy Strategy, which aims to increase solar capacity to 320 GW by 2025 and double it by 2030 (EC, 2022f). The strategy also seeks to significantly increase the deployment of renewable gases, mainly hydrogen, quadrupling the "Fit for 55" targets (EC, n.d.c). However, this push towards renewables and the increase in hydrogen capacity may lead to increased dependence on imports of finished products, such as solar panels or wind turbines, and raw materials, according to the European Commission's 2022 (c) report.

Energy efficiency and demand management

The recent escalation of energy prices, driven by the invasion of Ukraine, highlights the need for long-term action beyond immediate EU financial support. The EU's climate ambition, which aims to reduce emissions by at least 55% by 2030 and achieve climate neutrality by 2050, has prompted reform proposals, such as the Commission's recommendation to amend the 2012 Energy Efficiency Directive, updated in 2018 and 2023 (EC, n.d.a).

The proposal, presented in the REPowerEU plan, sets an energy efficiency target of 13% by 2030, emphasising the transition to a system based on renewable technologies and the active engagement of energy users. Technological advances and energy efficiency measures are underway (such as the Energy Performance of Buildings Directive), supported by funds such as the RRF, the Cohesion Policy Funds and the Modernisation Fund.

The EU has set ambitious targets for 2030, seeking to reduce primary and final energy consumption, address energy prices, mitigate climate change and promote sustainable economic growth. It focuses mainly on the building, industry and transport sectors as critical areas for improving energy efficiency. However, to achieve these targets, each Member State must develop a 10-year NECP by 2030 (EC, 2022c).

Energy infrastructure and resilience

This objective focuses on enhancing the resilience of Europe's energy infrastructure against diverse threats, including natural disasters, cyber-attacks, and the challenges associated with the energy transition. The EU seeks initiatives to create a more integrated energy system that efficiently generates, stores, and distributes energy, reducing import dependency and promoting clean technologies and renewable energy.

The drive towards renewables decreases the need for hydrocarbon imports and accelerates self-sufficiency. The EC (2022c) has raised the renewable energy target from 40% to 45% by 2030. Investments in LNG terminals and gas interconnectors have enabled each Member State to access gas supplies from at

least two sources, with the possibility of reverse flows between neighbouring countries (EU, 2017). The security of gas supply is supported by the Security of Gas Supply Regulation, which requires national contingency plans and preventive action. Essential achievements include gas interconnectors between Poland and Lithuania and Greece and Bulgaria, strengthening the resilience of the Baltic gas market, and the Trans-European Energy Networks (TEN-E) programme.

5.3. REPowerEU Plan

In response to the current geopolitical situation triggered by the conflict between Russia and Ukraine, the EU has prioritised the search for alternative energy sources and the diversification of energy suppliers and resources to reduce dependence on Russian oil and gas. The REPowerEU plan, framed in the broader EU context, emerges as a key initiative for affordable, secure and sustainable energy, which seeks to accelerate the energy transition, improve energy security and combat climate change.

The central question of this paper, "How can the EU guarantee its energy security while diminishing the influence of Russian energy?" arose at the beginning of the invasion of Ukraine and led to the European response in the form of the REPowerEU plan. This aligns with other EU climate strategies, such as the Green Deal and the "Fit for 55" target, which aim for climate neutrality by 2050 and a 55% reduction in emissions by 2030, respectively. The Green Deal outlines the long-term vision, while the "Fit for 55" details specific legislative measures. The REPowerEU plan, driven by geopolitical considerations, shares common objectives and principles with these strategies.

The EC’s REPowerEU policy, through the promotion of renewable energy, energy savings and diversification of energy sources, aims to eliminate imports of Russian fossil fuels by 2027. These principles are reflected in the following chart, highlighting the REPowerEU plan's key measures to reduce dependence on Russian fossil fuels (EC, 2022c).

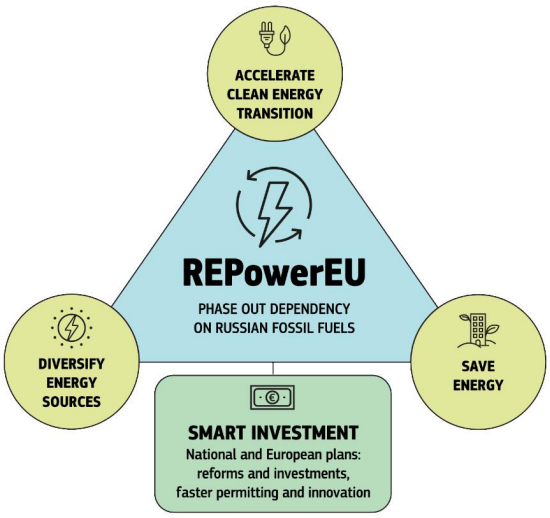

Figure 8, REPowerEU plan (European Commission, 2022c)

The first principle of the plan is the acceleration towards more sustainable and environmentally friendly energy alternatives. This objective aims to move away from conventional fossil fuels while adopting and integrating renewable energy technologies, promoting improved energy efficiency and the widespread adoption of various clean energy solutions.

As previously mentioned, the EC has increased the Renewable Energy Directive target to 45% by 2030 (EC, n.d.c). In this context, solar photovoltaics (PV) and hydrogen stand out as particularly noteworthy resources: On the one hand, the REPowerEU has ambitious targets to deploy more PV technology by 2025 and 2030, which already positions solar energy as the leading renewable source. The EU actively encourages the uptake of solar energy through initiatives such as the European Solar Roof Initiative and the EU Solar Energy Strategy (EC, 2022f). On the other hand, to address the challenges to decarbonising sectors, the Commission also aims to import and produce renewable hydrogen domestically (EC, 2022d).

The second objective is diversifying energy sources and broadening the range of resources and technologies to meet the EU's energy demand. This includes reducing reliance on Russian fossil fuels by incorporating diverse sources, such

as renewables, nuclear energy, natural gas, and hydrogen, among other viable options. Key initiatives such as the European Energy Supply Platform, the EU Energy Platform and AggregateEU facilitate joint procurement of gas, LNG and hydrogen (EC, n.d.d). Collaborations within the EU and with international partners are essential to finding alternative gas, oil, and uranium sources and enhancing existing capacities within the EU or with foreign partners.

The third objective is energy conservation, which involves a series of efforts and actions to curb consumption and improve energy efficiency by implementing practices to minimize energy waste and optimize the use of available resources.

Reducing energy consumption is crucial to address the current energy crisis, as it not only lowers costs and reduces Russian fossil fuel imports but also strengthens the EU's competitiveness and economic resilience. The EC Communication "Saving Energy" (2022e) proposes a dual approach: achieving immediate savings through behavioural changes and supporting medium and long-term structural changes with energy efficiency measures. Minimum gas storage requirements and a 15% demand reduction target have been suggested. Member States have adopted these measures, and efforts to save energy and fill storage facilities have been successful so far, exceeding 90% of gas storage in the EU (Chatain, 2020). The European Commission's Energy Storage Recommendation (2023), "Supporting a Decarbonized and Secure EU Energy System", is taken as a reference framework.

According to the Commission's assessments (2022e), standardising behaviours aligned with this objective could reduce oil and gas demand by 5%. This drive towards energy-saving practices extends from reducing household consumption to promoting savings in industry, commerce and transport.

5.3.1. Strengthening the Union through Interconnections and Energy Infrastructure

According to the Commission's analysis (2022c), the successful implementation of the REPowerEU plan requires significant investment –in line with the last point of Figure 8, "Smart investment". Despite this significant investment, the overall impact is expected to be cost-effective. By 2030, it is estimated that the joint implementation of the "Fit for 55" package and the REPowerEU plan will allow the EU to save millions of Euros annually in gas, oil and coal imports. However, the rapid decoupling of Russian energy imports during the transition could lead to higher and more unstable energy prices. The investment will focus on developing new renewable technologies, energy storage technologies, and resilient infrastructures. Storage is essential to improve the security of supply and will receive investments for gas infrastructure, including pipelines, LNG terminals, and reverse flow capacities (EC, 2022c).

The REPowerEU plan seeks to radically transform Europe's energy system, establishing an integrated market to ensure the security of supply with solidarity. The TEN-E has strengthened European gas infrastructure through Critical Infrastructure Projects (CIP) launched in 2022, adding gas transport capacity. Initiatives such as the Poland-Lithuania interconnector (GIPL) and an LNG terminal in northern Greece will reduce dependence on Russian supplies (EC, 2022c).

The three crucial demands include Central and Eastern Europe, Northern Germany and the reinforcement of the Southern Gas Corridor. The vulnerability of Russian pipeline-dependent states highlights the need for energy security investments, such as Transalpine, Adria and Southern European Pipeline projects, and the reconfiguration of refineries (EC, 2022c).

6. Strategic Forecast: Can These Policies Ensure EU Energy Security?

This chapter analyses the prospects for the EU's transition to Russian fossil fuels, considering the potential challenges hindering progress. It also explores the implications for the global energy landscape and the EU's role as a leader in the sustainable energy transition.

However, in the medium to long-term, the EU will remain dependent on fossil fuels for the energy transition pursued by both the Green Deal strategy and REPowerEU. At the time of writing, almost all energy resources consumed by European countries are imported from third countries. In 2021, the EU imported 64% of its oil and 25% of its gas consumption. In contrast, it produced only 3% of oil and 6% of gas (Eurostat, n.d.a).

So, it is essential to remember that Russia is leading in this scenario. The invasion of Ukraine triggered the crisis, but the EU's dependence on Russian energy has amplified it considerably. As explained in previous chapters, Moscow has been the EU's leading supplier of oil and gas for decades.

To put this into perspective, Norway is the second largest gas exporter to the EU. The crucial difference in energy dependence between Russia and Norway is that the latter is a reliable strategic ally. At the same time, Russia has been able to use its fossil fuels as a geopolitical weapon in this scenario.

When the Russian government decided to invade Ukraine, the EU imposed harsh sanctions on Russia, and Moscow responded by cutting off gas supplies to its European neighbours. On the one hand, the EU responded by saving energy and developing an energy-saving plan that would allow all countries' gas reserves to be filled before the winter of 2022. On the other hand, the EU has been looking for alternative sources, energy suppliers and allies to compensate for the loss of Russian gas. At the time of writing, Member States have already concluded agreements with countries such as Azerbaijan and Qatar. The key

idea revolves around the delicate balance within the EU. It faces the urgent need to compensate for the shortage of Russian gas, yet it must also apply geopolitical and economic pressure on Russia in response to the ongoing conflict.

6.1. Advancing Renewable Energy: Investments in Clean and Sustainable Solutions

By promoting renewable energies, mobilising energy savings and diversifying energy sources, the European Commission's REPowerEU policy aims to end imports of Russian fossil fuels by 2027.

Advancing the energy transition entails the substantial substitution of fossil fuels, particularly natural gas, with green hydrogen and renewable energies. Nevertheless, uncertainties persist regarding the return on innovation, and there are lingering questions about the feasibility of emerging technologies. Increasing the volume of investment, however, can pave the way for the envisioned decarbonization. This not only promises positive employment effects but could also ripple through the entire EU economy.

The Commission published the REPowerEU in March 2022. Subsequently, the EC (2022g) issued a Recommendation to help Member States streamline the licensing of renewable energy installations in line with the REPowerEU Communication (2022c). This will allow Member States to immediately start reducing approval times for applications for renewable energy installations and address the exceptional energy crisis caused by the geopolitical scenario without delay. A Directive (EU, 2022) was presented to speed up and simplify the project approval process across the EU.

Since the launch of the REPowerEU plan, the EU has managed to increase production and capacity, generating, for the first time, more electricity from wind and solar than from gas and obtaining 39% of electricity from renewable sources (EC, 2022b).

In addition, as mentioned in previous chapters, legislation has been further strengthened to achieve the targets. In March 2023, the Commission agreed on stricter legislation to increase its renewable energy capacity. It raised its binding 2030 target to 45%, almost doubling the current share of renewables in the EU (EC, 2022b).

Significant investments will be distributed to the production of solar, nuclear, and hydrogen energy:

Initially, the predominant focus of renewable energy development at the time of writing revolved around PV systems. However, the "Asian giant" surpassed the EU as the global leader in PV panel supply in 2008, steadily expanding its presence in this sector ever since. Notably, China manufactures nearly half of the world's solar equipment and furnishes 80% of European solar panels (Van Wieringen and Hüntemann, 2022). Moreover, the Commission proposed a solar plan as part of the REPowerEU programme to triple solar PV capacity by 2025 and double it by 2030. Therefore, the demand for solar panels would inevitably increase. In this regard, it is necessary to stress the importance of diversifying the sources of raw materials essential for the energy transition.

By making solar energy a reliable source of electricity for the EU, dependence on imported solar equipment would shift from imports of Russian fossil fuels to a new technical dependence on a new supplier. As indicated in Chapter 2.4. "Overcoming Obstacles: Analysing Energy Security Measures and Security Indicators", insecurity occurs when there is extreme dependence on actors that could be considered more unstable partners. Dependence on these technical PV materials is seen as a threat to energy security within the EU, as the leading supplier could also use this dependence as a geopolitical weapon. This issue raises questions about the strategic autonomy of solar PV as a natural source of promoting energy security across the EU.

Second, the European Parliament endorsed the inclusion of gas and nuclear power in the "green taxonomy", a crucial system for assessing the

environmental impact of European projects (Göss, 2022). Although nuclear power is an essential source of low-emission electricity, challenges such as costs and construction times remain. Despite concerns about upfront investment, waste management and safety, nuclear power is considered viable for the energy transition due to its low emissions and reliability.

Third, hydrogen is gaining attention as a clean solution. Renewable hydrogen can contribute significantly to decarbonisation through its use in heavy industry, chemical manufacturing, transport, power generation and storage. Hydrogen is an energy carrier, a flexible feedstock and an affordable source (Gregor and Svensson, 2023). However, most hydrogen is created using fossil fuels, which produces carbon emissions. As the need for climate-friendly solutions grows, the demand for renewable hydrogen will increase rapidly.

Several countries are pursuing strategies for its development, but as the challenges grow, the question of creating a new global market for this resource arises. According to Van de Graaf *et al*. (2020), in addition to technical and economic factors, geopolitical dynamics play a crucial role in the success of a global hydrogen market. It is, therefore, essential to foster international collaboration, establish harmonised frameworks, reduce risks and explore various infrastructure and technical options. Geopolitical implications highlight the emergence of new dependencies and geo-economic competition.

The REPowerEU plan is a key driver for the transition to renewable energy in the EU, seeking to reduce dependence on fossil fuels, especially from Russia. This approach, focused on decarbonisation, has global implications by promoting diplomatic and energy transition initiatives at the international level.

In brief, the proposed substantial increase in renewable energy generation, particularly in solar capacity under the EU Solar Energy Strategy, represents a bold step towards a more sustainable system. However, this transition is challenging, highlighting the need to address external implications, such as dependence on imports of critical raw materials and final products.

REPowerEU's comprehensive approach to the transition to renewable energy seeks to mitigate environmental impact and address geopolitical and economic challenges associated with dependence on critical resources. Effective implementation of these strategies will be vital to achieving a successful and sustainable energy transition in the EU.

The EU's robust regulatory framework, financial incentives and support for research and innovation create a favourable environment for clean energy investments. Building on these advantages, the EU can strengthen its position as a world leader in clean energy production, boosting economic growth and environmental sustainability. Moreover, as highlighted in the literature review, investing in clean energy is essential to increase energy security.

Renewables are a strategic and sustainable option that can benefit the EU and the global community. It is a significant challenge and an excellent opportunity to modernise the continent's economy and foster development, employment, technological progress and social inclusion. Although the future looks promising, there is still a long way to go, and the EU will still need to be able to rely on other energy sources, as depending only on renewables is a medium to long-term goal. The EU must concentrate its economic efforts on investing in renewables and creating new energy partnerships until it achieves its longed-for energy independence.

6.2. Gas “Oilification”: The Importance of LNG

LNG has emerged as a crucial substitute for Russian gas in the EU and is considered a potential transitional stage toward hydrogen (IEA, 2022b). This transition is motivated by various advantages, including the convenience of storage and transportation, along with the more manageable size when transitioning from gas to liquid. The alteration in the trading dynamics of natural gas, involving its conversion into liquid at the source and subsequent regasification after transportation in an LNG carrier, has contributed to the upsurge in LNG acquisitions (Heidecke *et al*., 2022).

To understand the transition from oil to gas, it is essential to realise that the distinctions between natural gas and LNG correspond to the simultaneous evolution of gas trade and transport modes (from pipeline to LNG carrier). Therefore, the change in how natural gas is traded (converted to liquid at source and regasified after being transported in an LNG carrier) could be causing the global gas trade to become oil-based and take on oil-like characteristics (Heidecke *et al*., 2022). There are several signs of this:

The first is the sharp increase in LNG purchases made through trading hubs (USA-Henry Hub, UK NBP, Dutch TTF), where gas is regularly bought and traded (Heidecke *et al*., 2022). Spot or short-term contracts accounted for 40% of global LNG trade in 2021 (GIIGNL, 2021). This is one of the factors contributing to the increasing volatility of the gas market, which has historically relied on bilateral LNG contracts with long-term stability.

Secondly, this market is growing geographically, as evidenced by the opening of the floating regasification plant in the port of Wilhelmshaven, Germany, in December 2022. This means that any buyer in the world with regasification infrastructure on its territory can buy gas from a hub without the need for prior bilateral relations. At the same time, a geographically more diversified market is evolving from a relatively small export market with three hub countries (Algeria, Indonesia, and Malaysia) to a reasonably diverse one featuring two primary exporters (Qatar and Australia). However, of utmost significance is the emergence of two highly influential new LNG exporters—Russia, which has been exporting LNG since 2009, and the US, which began LNG exports in 2016 (Heidecke *et al*., 2022).

While the industry remains regionally segmented, these trends suggest a globalization of the LNG market. Gas is poised to behave similarly to the characterization of oil. Furthermore, if this trend consolidates, the "international" gas price will play a similar role. However, it is early to predict the new players in this evolving structure, reminiscent of the oil industry's

developments in the 1970s. The EU may once again find itself in a position of subordination akin to that experienced with oil, particularly if the expansion of the hydrogen vector for energy storage or conversion is entwined with the growth of new infrastructures linked to LNG expansion (De Jong, 2023). The construction today will undeniably shape Europe's future geo-energy relations. Irrespective of this scenario, current data indicates a significant increase in geographical dependence on US LNG, and the once-held comparative advantage of European nations, owing to lower oil costs than other regions, is diminishing (EC, 2021).

The consequences of inflation could lead to adverse developments in energy costs and an increase in Europe's external energy bill. The outcome will depend on the ongoing implementation of policies that affect gas prices and electricity costs, as well as the quick execution of measures to replace gas as a transitional technology. Additionally, it is important to consider the relationship of LNG to the EU's objective of combating climate change.

Therefore, LNG has become the leading solution to the EU’s energy crisis. However, any gas producer tends to sell to the highest bidder, so the EU must address this. The EU is committed to joint purchases aimed at reducing gas prices and enhancing competitiveness, particularly against expanding markets like Asia. This underscores the imperative for the EU to secure new suppliers. As a recent example, Germany took advantage of the 2022 World Cup to sign a 15-year LNG agreement with Qatar starting in 2026 (Wintour, 2022).

The gas market operates within limitations, necessitating the negotiation of long-term deals, and the EU faces an urgent need for diversification. Acknowledging that Russia lacks an easy substitute, the key lies in diversifying and seeking alternative supplier countries. Historically, Russia served as a beneficial energy partner, given its proximity, facilitating infrastructure and trade between blocs. However, the current challenge revolves around the requirement for increased infrastructure to accommodate the growing demand

for LNG from new energy partners. Consequently, the EU must address short-term perspectives to resolve the immediate crisis while concurrently addressing medium-term infrastructure needs for LNG. Simultaneously, it must strategise for additional possibilities in the long-term.

In the short term, the critical question is where the EU will obtain all the necessary gas. The resolution lies in diversification and collaboration:

- **Norway:** A strategic ally, Norway can be relied upon for gas imports, leveraging existing infrastructure, even though it may not fully meet the EU's requirements.
- **United States:** Emerging as the EU's second strategic LNG ally, the US has played a significant role in the energy crisis. However, economic concerns arose as French President Emmanuel Macron pointed out that the US sells gas to Europe at a much higher price than its domestic companies (Hernández, 2022). While the EU and the US share values, their interests may not align entirely. This prompts questions about the extent to which the US benefits from Europe's energy crisis, raising considerations of diminishing independence from third parties, as the EU would be losing the independence it gained by distancing itself from Russia.
- **Algeria and Libya:** Possessing natural resources, these countries can contribute to Europe's energy diversification goal but require economic investment to modernize their infrastructure. Despite the closure of the Maghreb-Europe gas pipeline, Algeria remains a significant trading partner for certain European countries such as Italy. Libya, Algeria's traditional rival, is gradually increasing its gas production levels post the civil war (Tanchum, 2020). However, the ability to export gas hinges on resolving the country's unstable and uncertain political situation. While European policy directions may not fully align with Arab growth interests, the emerging geopolitical scenario prompts consideration of

the option suggested by the EC's Communication (2016) –investing in African or Middle Eastern territories.

- **Egypt:** While a potential competitor, Egypt's chances of becoming a significant exporter are slim due to issues like falling production and political instability (Ruble, 2017). The country's debt, especially in the unstable scenario of political change following the fall of Mubarak and the revolutionary process, acted as a brake on increased investment, resulting in lower production and significantly influencing LNG exports. However, with the arrival of the Zohr gas field, Egypt now has the opportunity to reverse its trend of being an importer and regain its export capacity.
- **Azerbaijan:** In 2022, the EC agreed with Azerbaijan to double gas exports by 2027 (Euronews, 2022). Although gas from the Caspian Sea is insufficient to meet the EU's entire gas demand and is currently embroiled in a conflict with Armenia, energy agreements have been reached. However, this is a sensitive issue due to the EU's mediation efforts, between Azerbaijan and Armenia. It is essential to consider the alliances that the EU either adheres to or abstains from, as well as the positions it embraces or rejects when dealing with such situations.
- **Saudi Arabia and Qatar:** Despite conflicting with European decarbonisation goals, these Persian Gulf countries offer a potential short-term option for reducing Europe's energy dependence on Russia. Qatar, being the world's second-largest exporter of natural gas (EC, 2022e), presents a reliable yet partially committed supplier due to existing long-term agreements with Asian nations. The primary technological disadvantages lie in the location and the necessity to transport the resources by sea. Nevertheless, the main advantage is that the production costs for natural gas and oil are significantly lower than those in the Maghreb countries.

- **Eastern Mediterranean gas reserves (Israel, Cyprus, Turkey):** Despite the potential of discovered gas reserves, disputes among the bordering countries over ownership and exploitation hinder immediate usability.
- **Iran:** Despite possessing substantial oil and gas reserves, geopolitical reasons and existing sanctions make Iran an unviable option for the EU.

In conclusion, the EU faces significant challenges in transitioning to LNG to solve the energy crisis. Diversification of suppliers, consideration of climate aspects and the search for energy security are crucial aspects in this geopolitical transformation of the gas market in the European region. Norway and the US stand out as the most reliable countries upon which the EU can depend in the short and medium-term. However, additional measures are necessary, and the EU should actively pursue diversification to enhance energy security. Considering the substantial energy capacity of the MENA countries, investing in these regions could effectively address the EU's concerns related to energy supply and security. Moreover, such investments could foster closer diplomatic ties between these countries and the West, promoting the European rule of law and democracy in the Arab region. The EU should continue to expand its partnership portfolio and build strong alliances with new partners such as Qatar, Azerbaijan and the Southern and Eastern Mediterranean.

6.3. Diversifying Suppliers and Key Players in the Energy Sector

As Akrofi (2021) points out, energy diversification can open up new trade opportunities, fostering economic growth and development in the EU and its partner countries. The EU, therefore, faces a pressing need to diversify its energy partners for two crucial reasons:

First, one of the main drivers of energy diversification is the concept of energy security. Excessive dependence on a limited number of energy suppliers,

especially from politically unstable regions, exposes the EU to significant energy security risks. By diversifying its energy partners, the EU can spread its energy imports across different sources and routes, reducing dependence on a single country –Russia- and maintaining a more balanced position in international relations.

Second, diversification fosters competition among energy suppliers, increasing price stability and market efficiency. By sourcing energy from multiple partners, the EU gains more bargaining power during negotiations and can seek favourable terms, including price agreements. In addition, diversification increases the EU's ability to cope with fluctuations in energy demand.

Some regions have high political and social instability levels, so trade agreements with them may not be as fruitful as desired. For instance, Spain endeavours to maintain positive relations with Nigeria, a country rich in natural gas for export. Trade agreements between nations often span extended periods. However, establishing a long-term natural gas supply pact between Spain and Nigeria may not be advisable. The current situation in Nigeria is somewhat unpredictable due to the ongoing conflict with Boko Haram over the past five years, and the future outlook is not overly optimistic. Therefore, committing to infrastructure construction between Nigeria and Spain might not be prudent if Nigeria faces the potential of a civil war in the next five years.

A new era begins when unforeseen events with significant socio-economic repercussions become more frequent. This is a theory known as the black swan theory, and it is defined as a metaphor that describes an unexpected, high-impact event (Taleb, 2007). It underscores the importance of monitoring all potential risks and developing a methodology to enhance the adaptability of the economy and industry. Therefore, the EU must anticipate future economies and work to preserve positive diplomatic and trade ties. For example, in Asia, the foremost economic power is undeniably China, marked by its substantial investments in technology and its appealing domestic market. The European economy relies on

imports from China, and the prospect of procuring goods at competitive prices significantly advantages the EU. Nonetheless, it is undeniable that reliance on this player is growing, and as mentioned in the previous subsection, this could pose challenges for the EU during an energy transition. The EU should concurrently forge diplomatic ties with other neighbouring countries, such as Japan. Furthermore, according to the International Monetary Fund (IMF) (n.d), India boasts the world's fifth-largest GDP. Although still heavily reliant on manufacturing and agriculture, India is making substantial investments in technology education. Additionally, Indonesia, the Philippines, and Malaysia are anticipated to witness a significant expansion of their labour force in the coming years.

Hence, it can be observed (Figure 9) that employment is rotating and shifting towards Asian economies, establishing crucial trade links with South America – for instance, China purchases 80% of Ecuador's oil exports.

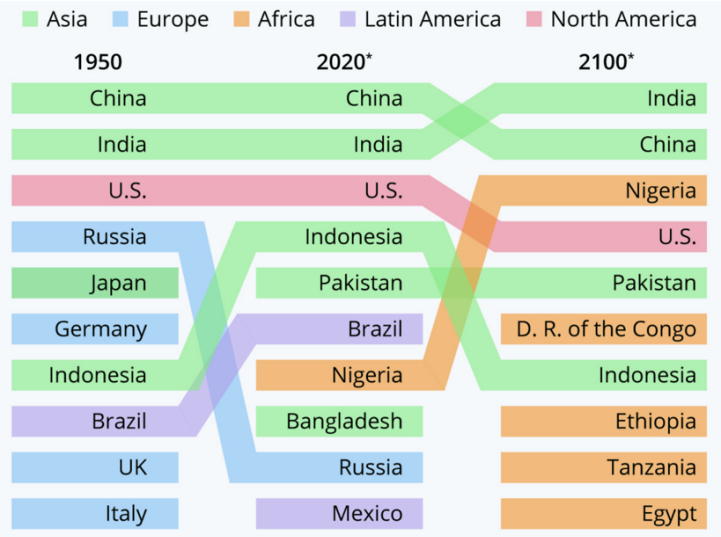

Figure 9, "The world's biggest economies over time" (Buchhloz, 2020)

Maintaining a diversified and efficient portfolio of energy raw material suppliers would increase flexibility and help overcome energy crises by not relying on a single source. Geopolitics plays a crucial role in EU energy security. As Montero Moncada *et al*. (2023) note, the EU should seek to strengthen its

diplomatic and commercial ties with the previously mentioned neighbouring actors, but also, China, Japan and India to counter potential risks.

Russia's recent actions have implications for energy security. The conflict between Russia and Ukraine has redefined energy security, highlighting the importance of decarbonisation and resilience in supply chains. The EU should seek to accelerate the transition to renewables and electrification to reduce dependence on Russian gas and improve energy security. In this line, the EU has made progress in its transition towards energy sustainability but faces challenges. Investments in energy storage, green hydrogen and low-carbon sources are suggested to strengthen the energy system's resilience. Furthermore, Leca *et al*. (2023) point out that the EU should support decarbonisation in fossil fuel-producing countries and promote a sustainable value chain for hydrogen production.

7. General Assessment: Comprehensive Evaluation of Energy Security in the EU

The war between Russia and Ukraine has become the biggest disruption on the continent since 1945. Beyond the transformation of the European security system, the situation significantly affects several aspects essential to regional stability, including the energy sphere. The significance of this occurrence categorizes it as an event with far-reaching consequences that could shape the overall global landscape.

Analysing the Russia-Ukraine conflict, Snyder (2022) argues that it seems destined to "establish principles for the twenty-first century". In the realm of international relations, Russia's possible annexation of the Crimea, Donetsk and Lugansk regions represents a challenge to the territorial conquest that has prevailed since the end of World War II. It also warns of the impact on the global

governance structure, noting that the conflict tests the effectiveness of international bodies and regional alliances in conflict management.

The outlook for the international order in the aftermath of the Russian-Ukrainian conflict is uncertain, influenced by several factors including the waning influence of the US and the concurrent rise of China, as well as issues like protectionism, trade wars, financial crises, and other challenges. While the conflict has strengthened NATO, it has also heightened regional divisions. Despite widespread global condemnation of the invasion of Ukraine, many countries avoid imposing economic sanctions on Russia, apprehensive of potential costs and economic consequences. This reluctance signals a decline in the adherence to a rules-based system. Rodrik and Walt (2022) envisage a less prosperous and more dangerous scenario, with competition between the US and China, and a remilitarised Europe with regional economic blocs.

7.1. Summary of Findings

This thesis addresses the energy security crisis in the EU, which is rooted in geopolitical reasons linked to the Russian invasion of Ukraine. A case study approach is an appropriate methodology to explore the EU's interrelated challenges in this complex international context. Despite some limitations, such as data availability due to the still active nature of the conflict, the case study method is considered fundamental for a contextual and contemporary understanding of the phenomenon in question.

The thesis begins with a literature review, addressing the energy security dilemma by exploring key concepts and analysing various theoretical perspectives. It highlights the evolution of the fuzzy definition of energy security, which encompasses aspects such as the security of supply and diversification of sources and suppliers. The geopolitical complexity of energy security, where international tensions affect the stability of supplies, is highlighted, proposing Kruyt *et al.*'s (2009) definition of energy security as the

most precise and fundamental for the development of energy security, considering it a vital element for the functioning of society as a whole.

In response to the conflict, the EU emphasises the search for alternative sources and the diversification of suppliers. In this context, the REPowerEU plan emerges as a strategic initiative to strengthen energy security, reduce dependence on Russian fossil fuels and position the EU as a leader in transitioning to a more sustainable energy model. It seeks to accelerate the transition to renewables, diversify sources and improve efficiency to achieve these goals.

When contemplating future possibilities, evaluations encompass investments in renewable energy, LNG gas investments in the short and medium-term, and endeavours in diversification. Emphasizing the significance of energy diversification for ensuring energy security and promoting competition among suppliers, establishing ties with new powers. Anticipating potential risks and expediting accelerating the transition to renewable energies to diminish dependence on Russian gas are also underscored. In this context, the suggestion includes investment in resilient infrastructure to facilitate both an intra-EU renewable energy system and extra-EU gas and hydrogen imports.

In conclusion, REPowerEU not only addresses the EU's energy security but also presents an ambitious vision for leading the transition to a sustainable and globally responsible energy future. Diversification and investment in resilient infrastructure are highlighted as the critical elements to ensure energy security and promote sustainability in the EU.

7.2. Evaluating EU Energy Security Without Dependence on Russian Resources

The EU faces the crucial challenge of ensuring its energy security as it seeks to reduce its dependence on Russian energy. Energy security is presented as a fundamental pillar for the economic, societal, and political well-being, as well

as the stability of EU Member States. Reducing the influence of Russian energy has become even more important amid the geopolitical tensions generated by the war in Ukraine and concerns over the long-term security of the energy supply. Throughout this paper, a combination of short and long-term strategies aimed at reducing the EU's energy dependency has been consistently discussed and reiterated. Consequently, the following compilation of strategies essential for addressing the research question, "How can the European Union guarantee its energy security while diminishing the influence of Russian energy?" is presented below:

Diversification of energy sources

Energy security relies on diversifying energy sources. By depending on a variety of energy sources, an energy system becomes more resilient to potential disruptions in supply from any specific source. Relying excessively on one energy source can expose a region to substantial geopolitical risks. Diversification mitigates this vulnerability, fostering a more resilient and adaptable system.

Supplier diversification

Fostering energy ties with different countries can alleviate the EU's susceptibility to potential geopolitical tensions. Broadening global energy connections contributes to general stability and guarantees a secure supply. Consequently, the EU should actively seek alternative energy sources and suppliers, diminishing its reliance on a singular country. Importing LNG from regions such as the US and MENA countries emerges as an effective strategy to diversify gas sources.

Developing resilient infrastructure

Enhancing energy interconnections among Member States enhances the efficiency of energy distribution and establishes a grid that is more resilient to disruptions. This capability facilitates the seamless transfer of energy between

countries, contributing to the alleviation of shortages in the event of disruptions in a specific area.

Efficient energy policies

Advocating for energy efficiency through innovative policies and technologies has the potential to reduce overall energy demand, thereby reducing dependence on any specific supplier. The EU could promote higher energy efficiency standards across various sectors, including industry, transport, and households.

Decarbonisation of the energy system

Shifting towards renewable energy sources can diminish reliance on fossil fuels, consequently reducing the influence of any supplier, including Russia. Investing in solar, wind, hydropower, and other renewables enhances energy security while aligning with environmental sustainability objectives.

In conclusion, the EU can ensure its energy security and reduce the influence of Russian energy through this set of measures. These strategies will not only improve the EU's energy security but also contribute significantly to its long-term sustainability and resilience goals. Furthermore, as Chevalier (2006: 20) points out,

> "For improving the security of energy supply of the world economy, the EU has a very important role to play. Through energy efficiency, energy diversity, regulation "in concert", diplomacy and international action, Europe should play a key role in building the future's sustainable energy and economic model".

8. Conclusion

This thesis takes a comprehensive approach to the complex issue of energy security, highlighting its conceptual evolution over time and its close connection with global geopolitical dynamics. Energy security is a multifaceted concept in which various factors intervene, focusing on the security of supply, diversification of energy sources and dependency reduction. These aspects are considered key elements for an in-depth understanding of energy security, highlighting its role as an essential commodity and fundamental pillar for modern society.

Based on this premise, the history of gas trade between the European Union and Russia highlights Europe's strong dependence on Russian gas, based on economic and mutual trust motives, until the invasion of Ukraine in 2022. This event triggered geopolitical tensions with significant implications for EU energy security. The REPowerEU plan, in response to this crisis, seeks to diversify sources and suppliers, promoting the transition to renewable energy and improving energy efficiency. Until the war in Ukraine, Russia's energy strategy focused mainly on its position as a supplier of natural gas to the European Union, exerting political influence and interrupting supplies on several occasions. Despite commendable efforts, the European Union faces challenges that require careful consideration. The detailed assessment of twelve indicators reveals the complexity of energy security in the European Union, marked by significant dependence on third countries. Although some indicators suggest vulnerabilities, energy security cannot be guaranteed. However, proactive strategies, such as diversification of sources and suppliers and investment in sustainable technologies and infrastructure, reduce vulnerability and improve system resilience. The European Union's approach to energy transition, embodied in the REPowerEU plan, reflects the search for alternatives to Russian fossil fuels and the promotion of affordable, secure and sustainable energy. The

REPowerEU plan seeks to transform the energy system radically, creating an integrated energy market to ensure the security of supply.

Concerning upcoming opportunities, investment in renewable energy, the transition to LNG as a short and medium-term solution, and broadening the supplier base through diversification are crucial. Although the future appears promising, there is still a long way to go. The European Union must continue to depend on alternative energy sources since relying solely on renewables remains a medium to long-term objective.

From now on, the European Union will have to concentrate its economic efforts on gradually investing in renewables and, simultaneously, creating new energy partnerships until it achieves its long-awaited energy independence. The European Union system, overall, can enhance its energy security and reduce dependence on Russian energy by implementing a comprehensive strategy. This strategy should encompass diversifying sources and suppliers, promoting renewables, improving energy efficiency, and developing resilient infrastructure. Effective implementation of these measures will position the European Union as a leader in transitioning to a sustainable and resilient energy system, reducing its vulnerability to new geopolitical threats.

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