THE EUROPEAN UNION’S ENERGY SECURITY POLICY: TRANSITION FROM RUSSIAN NATURAL GAS TO THE UNITED STATES LNG

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ABSTRACT

THE EUROPEAN UNION’S ENERGY SECURITY POLICY:
Transition from Russian Natural Gas to the United States LNG

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The European Union (EU) is dependent on Russian natural gas due to its high demand. The dynamics of energy relations between the EU and Russia have changed after the 2022 Russia-Ukraine War. In the context of energy supply security policies, the EU aims to reduce its dependence on Russian natural gas and diversify energy suppliers. During this period, there has been an increased demand for Liquefied Natural Gas (LNG) from the United States(US) as an alternative energy source. This thesis argues whether or not US LNG can be a long-term energy alternative over Russian natural gas for the EU. It examines the political, economic, and technical rationales of US LNG and Russian pipeline natural gas with the context of EU energy supply security through comparative analysis. The findings highlight that the technical infrastructure requirements, the installation process, and the high financial investment required to utilize US LNG lead to challenges for sustainable energy imports. Furthermore, it is predicted that increased demand for US LNG may create a new area of energy dependency for the EU. Therefore, completely abandoning Russian natural gas does not offer a long-term solution. Instead, this thesis advocates balancing the EU's natural gas energy demand between Russia and the US.

Keywords: European Union Energy Security, Natural Gas, Russian Pipeline Natural Gas, US Liquefied Natural Gas

ÖZ

AVRUPA BİRLİĞİ ENERJİ GÜVENLİĞİ POLİTİKASI:
Rusya Doğal Gazından ABD LNG ‘sine Geçiş

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Avrupa Birliği (AB), yüksek talep nedeniyle Rusya doğal gazına bağımlı durumdadır.2022'deki Rusya-Ukrayna Savaşı'nın ardından AB ile Rusya arasındaki enerji ilişkilerinin dinamikleri değişmiştir. AB, enerji arz güvenliği politikaları çerçevesinde Rusya doğal gazına olan bağımlılığı azaltmayı, enerji tedarikçilerini çeşitlendirmeyi hedeflemektedir. Bu bağlamda, AB’nin alternatif enerji kaynağı olarak Amerika Birleşik Devletleri'nin (ABD) Sıvılaştırılmış Doğal Gaz'ına (LNG) olan talebi artmaktadır. Bu tez, ABD LNG'sinin Rusya doğal gazına göre uzun vadeli bir enerji alternatifi olup olamayacağını tartışmaktadır. Karşılaştırmalı analiz yoluyla Rusya boru hattı doğal gazının ve ABD LNG'sinin siyasi, ekonomik ve teknik gerekçelerini AB enerji arz güvenliği bağlamında incelenmektedir. Bulgular, ABD LNG’sinin teknik altyapı gereklilikleri, kurulum süreci ve gereken yüksek finansman yatırımları nedeniyle, sürdürülebilir enerji ithalatında zorluklara neden olduğu vurgulanmaktadır. Ayrıca ABD LNG'sine olan talebin artması AB için yeni bir enerji bağımlılığı alanı yaratacağı öngörülmektedir. Dolayısıyla Rusya doğal gazını tamamen terk etmek uzun vadeli bir çözüm sunmamaktadır. Bunun yerine tez, AB’nin doğal gaz enerji talebini Rusya ve ABD arasında dengelenmesini savunmaktadır.

Anahtar Kelimeler: Avrupa Birliği Enerji Güvenliği, Doğal Gaz, Rusya Boru Hattı Doğal Gazı, ABD Sıvılaştırılmış Doğal Gaz

To my precious family…

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LIST OF ABBREVIATIONS

BCM : Billion Cubic Meters

EC : European Commission

EIA : U.S. Energy Information Administration

ESS : The European Security Strategy

EU : European Union

EUEA : European Union External Action

FDI : Foreign Direct Investment

FSRUs : Floating Storage and Regasification Units

GIS : Geographic Information System

ICIS : Independent Commodity Intelligent Services

IEA : International Energy Agency

IGU : International Gas Union

LNG : Liquified Natural Gas

MMT : Million Metric Tons

NSR : North Sea Route

OECD : Organization for Economic Co-operation and Development

US : United States

USEA : United States Energy Association

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CHAPTER I

INTRODUCTION

Energy resources contribute to economic growth in countries while also having a critical role in strengthening foreign policy in international areas. The trade of energy resources establishes commercial boundaries between exporting and importing countries, and energy policies are formulated within this ecosystem. Energy trade may not always be advantageous and profitable for both sides, especially when the countries that import energy resources are vulnerable in energy trade. In this context, the relationships between energy-importing and energy-exporting countries highlight the prominence of energy security policies. Energy-importing countries formulate energy policies to ensure long-term energy supply security and the diversity and sustainability of energy sources.

Natural gas, a widely used energy source, is a fossil fuel in high demand across many countries. Typically transported via pipelines, natural gas is a leading export for Russia, contributing significantly to the country's economic growth. In the context of energy security policies, the energy relations between Russia and the European Union (EU) have been a long-standing subject of discussion in the context of energy security policies, primarily due to the substantial volume of natural gas imported from Russia. This discussion stems from the potential negative impact of crises and conflicts in the European region. Interruptions in natural gas supply during crises can result in fragile energy relations for the exporting countries.

Political fluctuations and crises influence the natural gas trade between the EU and Russia. The primary reason is the EU's substantial dependence on Russian natural gas to meet its domestic demand due to insufficient domestic energy sources. In this context, the reliable delivery of natural gas and ensuring its long-term energy supply constitute the basis of the EU energy security policies. In recent years, the EU has sought to diversify its energy resources and routes through new energy policies to prevent potential energy supply interruptions from Russia, particularly during winter. Disruptions and conflicts in natural gas pipelines, along with Russia cutting off natural gas flows during political tensions through transit countries like Ukraine and Belarus., particularly impact the EU indirectly. In particular, the crises between Ukraine and Russia have damaged Russia's image as a reliable energy supplier due to natural gas interruptions (Lee and Kim, 2023, 6).

This thesis comprehensively examines natural gas relations between the EU and Russia, focusing on analyzing energy security policies. The main research question of the thesis is whether the EU's strategy, aimed at diversifying energy sources and altering natural gas routes, can be considered a viable long-term solution to diminish dependence on Russian natural gas and attain a sustainable energy security strategy.

Due to geographical inadequacy in natural gas, the EU has depended on Russian natural gas. This dependency has persisted for years and has been impacted by recent conflicts and crises. As a result, the EU has strategically diversified its energy suppliers as part of a comprehensive initiative to reduce dependence on Russian natural gas pipelines. As an alternative source, the EU has shifted its focus towards liquefied natural gas (LNG) exports from the United

States (US), recognized as an emerging and dynamic energy source amidst increasing global demand.

Over recent years, the flexible pricing mechanisms and comparatively short-term LNG contracts have catalyzed an upsurge in demand within the EU. In this context, the European Commission (EC) advocates that EU member states construct LNG facilities and increase gas storage capacities (2022). However, while some EU member countries support the notion of severing ties with Russian natural gas, others do not agree on the availability and sustainability of this transition of energy sources. In light of these emerging developments, the EU's energy dependence has again taken center stage.

The thesis is divided into six chapters. The first and second chapters of the thesis elaborate on the aim, main subject, research questions, and methodology of the thesis.

The first section of the third chapter explains the theoretical framework of the energy security concept within the context of international relations. This section contributes to understanding the European Union's (EU) energy supply security policy in the broader energy security framework.

The third chapter focuses on the outlook of the EU regarding natural gas, providing explanations for the reasons behind natural gas usage and consumption. It presents statistical data on the EU's reliance on natural gas, particularly highlighting changes in demand, especially between 2019 and 2022. Furthermore, this chapter examines the Russian natural gas pipeline route to the EU and evaluates the capacity of LNG installations.

The fourth chapter focuses on Russian and EU natural gas relations. Examining the historical process of natural gas energy relations between the EU and Russia discusses whether the natural gas trade is sustainable. Particularly since the early 2000s, policies related to the EU's energy dealings with Russia are presented in the axis of the Russia-Ukraine conflicts. The potential for reducing energy dependency and the prospects for long-term natural gas relations between the EU and Russia are discussed within the framework of these energy policies.

The fifth chapter examines the development of US LNG as an alternative to natural gas energy sources and the potential export capacity for the EU. Technical aspects are discussed, including the installation process, contracts, finance, and operational functionality of LNG as an emerging energy source. This chapter compares the potential and drawbacks of the US LNG within the EU energy supply security.

CHAPTER II

METHODOLOGY

The methodological approach of the thesis involves analyzing and comparing the political and strategic aspects of natural gas from Russia via pipelines and LNG from the US within the framework of EU energy security policies. This research explores changes in natural gas relations between the EU and Russia since 2000, examining their impact on natural gas supply and demand. The analysis also examines the supply processes of US LNG, offering insights into the advantages and drawbacks within the context of energy supply diversification policies.

The primary research focus of the methodology is to explore the relationship among natural gas energy demand, imports, and energy security. The thesis aims to establish a balance in EU energy security within the framework of the EU, Russia, and the US axis.

Specifically, by analyzing the changing data on natural gas energy demand from 2019 to 2022, the research delves into the natural gas energy relations between Russia and the EU. Additionally, the emergence of US LNG as an alternative energy source is investigated.

The main dependent variable of this thesis is the effectiveness of the EU energy supply security policies. Based on the academic literature review, it is suggested that the EU's efforts to reduce dependence on Russian natural gas have significantly influenced energy supply security within the framework of energy policies.

The level of dependence on Russian natural gas is considered among the independent variables. This variable illustrates how the influence of Russian natural gas in the EU's energy landscape correlates with the quest for a reliable energy supplier. The second independent variable is the increase in US LNG imports, demonstrating the impact of the US LNG as an alternative energy source in ensuring the EU's energy supply security.

By analyzing these two independent variables, the thesis aims to reveal the direction and impact of the EU energy security policies. Additionally, as an intervening variable, this thesis seeks to understand the impact of transitioning to the Green Deal, considering expectations and effects, on the future increase or decrease in natural gas demand and its sustainability concerning renewable energy policies.

Due to fluctuations and crises affecting natural gas export and import data within Europe over the years, the research scope of this thesis is focused on the period between 2019 and 2022. The thesis is specifically limited to the energy policies of the EU, with a focus on reducing natural gas consumption and transitioning to green energy. The primary focus of this thesis is on the positions of natural gas imports in the European market, involving the EU, Russia, and the US. Therefore, the thesis does not discuss other natural gas-importing states within the EU or alternative sources, aside from US LNG.

The thesis chapters are supported by statistical data and maps, encompassing current EU natural gas energy consumption, pipeline routes, and

LNG installation capacities. The presentation of statistics relies on updated data, particularly emphasizing changes in natural gas energy demand, after the 2022 Russia-Ukraine War.

This thesis hypothesizes that if the EU reduces its dependency on Russian natural gas, it may transfer this dependency to the US. The processes and procedures related to the extraction, transportation, and distribution of US LNG are crucial considerations, prompting inquiries into the sustainability of US LNG as a long-term solution for EU energy security.

This thesis argues that replacing Russian natural gas with US LNG in the EU may not provide sustainable energy supply security issues. The first argument of the thesis asserts that the levels of dependence on Russian natural gas vary among EU member states, and the demand for Russian natural gas demonstrates disparities between states. European Parliament (2023) has released data illustrating the dependence on natural gas energy within EU member states. According to this data, natural gas demand varies among the EU member states (12). Western EU member states constitute a quarter share of natural gas consumption. Additionally, states have more opportunities to diversify natural gas supplies and have geographical advantages to installation of LNG terminals. In this context, where the Russian natural gas trade is restricted, the impact ratio among EU member states may change. As a result, US LNG does not offer a uniformly sustainable natural gas demand solution for all EU member states.

The thesis's second argument is that the US's increasing dominance in the EU natural gas energy market, in line with its policies to reduce the demand for

Russian natural gas, affects EU member states by increasing competition between the US and Russia. In this context, the EU aims to reduce dependence on a single major energy importer. On the other hand, energy export competition between these two states destabilizes the European energy market.

The third argument of the thesis is that the technical installation of LNG terminals and storage facilities requires sufficient infrastructure. Additionally, the prolonged process of LNG trade, encompassing extraction of gas, liquefaction, transportation, regasification, distribution, and delivery, is incapable of providing a prompt and adequate response to the energy demand of the EU. Furthermore, it contends that the significant financial investments required for LNG projects and the long-term LNG contracts are impacting the EU economy alongside rising inflation.

Within the framework of EU clean energy transition policies, the target is zero carbon emissions by 2030. Contrary to clean energy transition policies, US LNG demand is increasing while natural gas demand from Russia is decreasing. The fourth argument of the thesis argues that the existence of established LNG terminals and long-term supply contracts causes uncertainties in realizing the desired goals in the green energy transition.

This thesis utilizes statistical data from sources such as BP Statistics, ENTSOG, and Eurostat, along with analysis reports from international organizations, including the International Energy Agency (IEA), the European Commission (EC), and the Energy Information Administration (EIA).

CHAPTER III

THE EUROPEAN UNION NATURAL GAS POLICY

3.1.The Place of Energy in International Relations: Complex Interdependence Theory

This section evaluates natural gas energy relations with Russia within the framework of EU natural gas energy policies and the rationale for using US LNG in terms of international relations theories. Europe is geographically insufficient regarding fossil energy resources, especially natural gas resources. Energy resources affect many factors, such as economic development, foreign policy decisions, and environmental policies. As discussed in other sections of the thesis, natural gas energy production in the EU is insufficient to meet the current demand. For this reason, the EU has been importing its natural gas mainly from Russia for many years. In this context, natural gas energy relations affect both parties' foreign policy formation processes. The use and import of natural gas are of critical importance in the EU's foreign policy, which is dependent on foreign energy.

The impact of energy resources on countries' foreign policy can be associated with industrial development and rapid economic growth. Namely, in the 1950s and 1960s, Europe was the most competitive market in the world in terms of energy resources, as it is today. In the European energy market, which is dominated by natural gas today, the transition from coal to oil, which would also form the basis for the establishment of the EU, brought energy sources to the fore in terms of international relations (Yergin,1991,587).

As the dependence on energy resources increased with the demand from Western countries, the energy pricing problem came to the fore. Yergin (1991) stated that by the 1960s, energy resources became a power problem rather than a demand source. Industrially developing countries have increased their dependence on energy resources (587). From a broad perspective, energy resources are crucial for a country's economic development and ensure stability in acting independently in foreign policy. In this context, energy relations established for access to energy resources cover a wide range from economy to political developments, infrastructure to environmental policies. Uninterrupted access to energy resources, affordable energy, and reliable energy suppliers are essential factors in shaping foreign policies and ensuring a reliable energy supply.

The increasing demand for energy resources accompanying industrialization implies a growing need to import these resources from countries that are insufficient in terms of energy sources. As energy import rates increase, so does energy dependency. Collaborations between states possessing energy resources and those with energy demands, along with the competitive environment surrounding energy sources, have underscored the significance of energy on international relations.

Energy resources have transitioned from being solely an economic matter to becoming integral to security concerns. This shift has prompted the inclusion of energy resources in foreign policy discussions within the framework of international relations. Barry Buzan introduced a new definition to the traditional understanding of security in his 1991 work titled "New Patterns of Global Security in the Twentieth Century." The traditional security approach primarily focuses on military power and threat issues. However, Buzan presented security policies from a broad perspective, incorporating military threats and political, economic, growth, and social dimensions (449). Energy, among other economic, political, and environmental concerns, has emerged in all areas of state security policies. In this context, energy policy has become a critical focal point within security policies.

Energy relations between states with energy resources and states with high energy demand create an area of dependency. Within the framework of international relations theories, this dependence can be examined through the theory of interdependence put forward by Robert O. Keohane and Joseph Nye. In this context, Keohane and Nye (1977) emphasize that in negative developments or crises between two states, some consequences arise from mutual dependence, which tends to affect the other state (5). Keohane and Nye examine state relations through two concepts in interdependence theory. Depending on sensitivity and fragility, it refers to whether the other party is advantageous or disadvantaged in interdependence. The highly dependent side also has higher sensitivity and vulnerability than the other side.

When evaluated in terms of energy relations, supply interruptions in crisis and conflict environments significantly affect an energy-dependent state. For example, in any crisis between the EU and Russia, indirect supply disruptions may strengthen Russia's hand. With the Putin government coming to power, natural gas as an energy source became integrated into foreign policy. Therefore, energy is used as a tool in foreign policy. As Keohane and Nye point out, there is vulnerability and sensitivity due to the dependence on the other party, which increases the bargaining power of the other party. In the interdependence theory, one of the states directs and controls the relationship relative to the other, creating an asymmetrical power dynamic (Baldwin, 1978, 1167).

When the historical natural gas energy relations between the EU and Russia are examined, it is seen that the natural gas relations that started in the 1970s provide a symmetrical interdependence and serve the interests of both parties. While Russia needed economic development and industrialization, the EU's growing industry needed more energy. Therefore, despite political fluctuations and crises, natural gas energy relations were binding for the EU and Russia (Harsem and Claes,2013,785). After the 2000s, natural gas energy relations began to be seen as a means of establishing hegemony in foreign policy and acting independently in crisis and conflict situations, rather than meeting the energy demands of both parties and ensuring economic development. In this context, an imbalance of power has emerged between the parties. While the EU has become increasingly dependent due to increasing energy demand, Russia has expanded its market power in Europe with its abundant natural gas reserves. In particular, shaping Russia's foreign policy through natural gas and energy relations can be challenging occasionally for the EU. In this context, the natural gas energy trade, which serves the interests of both parties, has shifted towards asymmetric interdependence after the 2000s (787).

When natural gas energy relations between the EU and Russia are analyzed, it is observed that the EU's energy dependence on Russia has increased (European Council, 2023). This increase in demand has developed asymmetric interdependence between the two actors. Asymmetrical dependency expresses the imbalance of political power and, in this context, increases the possibility of conflict and crisis for both parties. Keohane and Nye state that beyond military power, the impact of economic development, technological developments, and the diversity of communication channels on international relations has increased (1977,95). In this context, when energy is associated with economic and industrial development, the state with energy resources means the state with more power in mutual relations. Keohane and Nye (1977) define complex interdependence as state relations in which many actors are influential. In this context, it becomes difficult for states to control their relations in foreign policy. They argued that, in particular, the political goals of states cannot be determined precisely and that the diversity of communication channels between societies leads to an increase in the diversity of political tools(26-28). For example, when the natural gas relations between the EU and Russia are evaluated, it is seen that energy companies, beyond the state, also play an essential role in the natural gas trade. In particular, Gazprom, which is controlled by the Russian state, can impose sanctions and high prices on the EU.

With the multifaceted economic relations, the use of energy resources and energy trade have also increased their importance. According to Baldwin, changes in economic relations are sensitive to interdependence (1980, 471). The fact that states are multifacetedly interconnected causes them to become more sensitive to any crisis and conflict environment. When energy trade is evaluated within the framework of economic activities, countries that export and import energy are sensitive to energy prices and market availability. According to the classification made by Austvik (2016) regarding the price of a good and its access to the market, the degrees of dependency are divided into three: neutral, sensitive, and vulnerable (27). When the concept of neutral dependency is explained in the energy framework, the country that exports or imports energy can always find a customer or energy supplier. This is the advantage of diversifying energy suppliers and creating alternative energy sources. On the other hand, when sensitive dependency is evaluated within the energy framework, it necessitates the creation of rapid and sustainable policies for problems in energy prices or energy supply. Because the sensitively dependent country is economically highly affected by the changes in factors (Keohane and Nye, 1977,18). When evaluated in terms of energy imports, factors such as dependence on a single supplier and high energy consumption amount mean that they are affected by crisis and conflict environments that may occur in energy relations.

When EU-Russia relations are evaluated in the light of the complex theory of interdependence, energy relations between Russia, which is less dependent, and the EU, which is more dependent on energy, progress on a plane where many factors are effective. The EU, which has recently aimed to reduce its demand for natural gas energy, is looking for ways to reduce its dependence on Russia.

In summary, energy relations between Russia and the EU based on natural gas initially developed with a symmetrical interdependence. However, it can be argued that these relations have turned into an asymmetrical interdependence, especially after the crises and conflicts experienced in the post-2000 period. The EU, which wants to break Russia's hegemony in the European market and reduce its energy dependence, is trying to eliminate its current disadvantage by including LNG from the US in this dependence.

3.2. The Conceptualization of Energy Security

Energy is the subject of domestic and foreign political events, impacting virtually all security aspects. Therefore, the first question concerns how the integrity of the energy affects the conception and implementation of security. Major conflicts among states appear to be the competition for scarce energy resources, emphasizing the critical role of energy (Cıuta, 2010, 135). Energy can be examined into various sub-branches. These are types of energy sources like renewable energy, fossil resources, and nuclear developments; fields of activity like extraction, distribution, and marketing of energy like energy actors; energy supplier countries, energy-dependent countries, producers, hegemonic international companies, and consumers. Energy security encompasses multiple dimensions, including energy policies, infrastructure capacity, and geographical distributions. As a result, the concept of energy security takes on distinct meanings in different contexts.

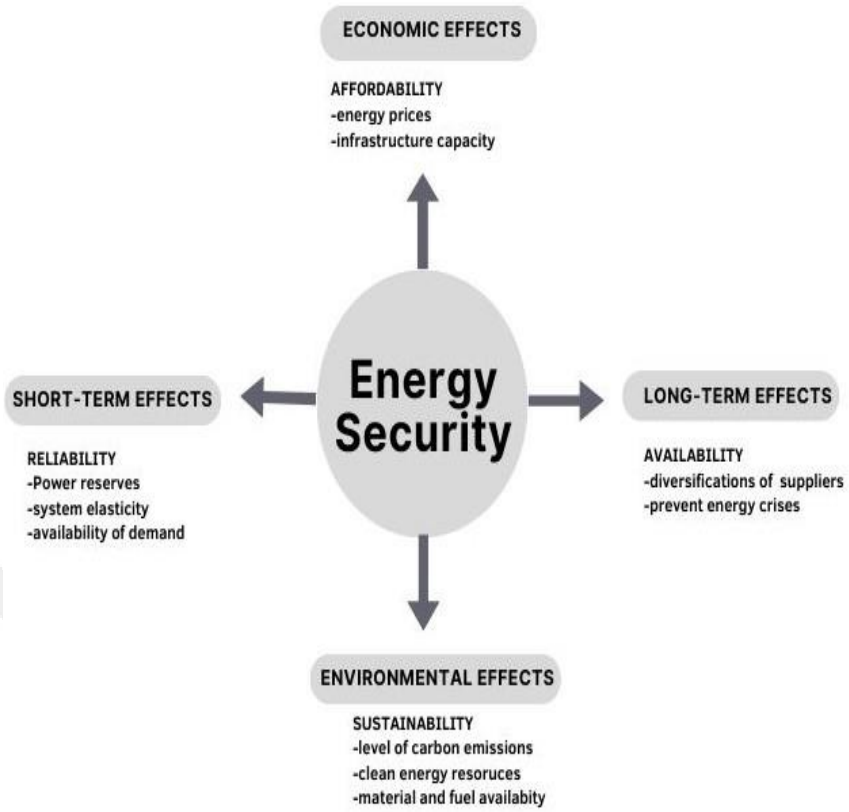
The concept of energy security has various definitions in the academic literature, and historical and political developments significantly affect the concept of energy security. Cherp and Jewell (2014) explained the concept of energy security into four pillars: affordability, accessibility, availability and acceptability (415). Using sufficient affordable energy within the country builds confidence in domestic policy; however, disruptions in ensuring the uninterrupted flow of energy from the source in foreign policy constitute the foundation of energy security policies.

Energy security policy is one of the most critical issue components of international relations. The definition of energy security varies depending on an energy dependency and whether it faces interruptions in energy supply. For energy-dependent countries, energy security ensures an uninterrupted flow of energy. For example, the EU, which does not have significant energy resources and relies on external sources, addresses energy security to ensure a regular and reliable energy supply. This is a priority for energy-dependent countries facing disruptions in energy supply. On the other hand, countries with energy resources, especially energy exporters like Russia, often define energy security as the protection of energy resources and securing their energy markets. These countries, rich in energy resources, shape their energy policies to ensure the sustainable use of energy resources and the protection of national interests. In this context, mutual dependency occurs in energy bilateral relations. Protection of mutual interests and establishing long-term collaborations are considered (Haghighi, 2007, 419).

One of the energy security problems is energy supply interruptions toward energy-importing countries. For this reason, energy strategy policy is shaped by cooperating with reliable energy suppliers and diversifying energy sources. These countries are concerned with improving bilateral energy relations and strengthening their infrastructure. It is essential to ensure supply security, especially for sustainable energy consumption. Matsumoto, Doumpos, and Andiosopoulos (2018) examined the energy security performance in their study. According to this study, strengthening energy security policy, reducing dependence on foreign energy sources, and increasing energy self-sufficiency are among the primary objectives of countries (1739).

Another definition of energy security is the uninterrupted supply of energy resources at appropriate and affordable prices (Gitelman, Magaril, and Kozhevnikov, 2023, 10). Figure 3.1 indicates that energy security is divided into four main pillars. Economic and environmental factors influence long-term energy security. In contrast, short-term energy security involves changes in the supply and demand of the energy source within the concept of energy security. Responding immediately to energy crises required diversification of energy dealing, transition to clean energy, and facilitating renewable energy systems.

Figure 3.1. The Concept of Energy Security



Source: Gitelman, Magaril, and Kozhevnikov, 2023, 6

Energy supply security emerges at every stage of the energy relations that countries establish to meet their energy consumption. The sustainability of energy trade is politically one of the most critical aspects of energy security. To achieve this, the infrastructure of energy systems is established to ensure that energy reaches the region, and the energy source is used in the long term. Pipelines, terminals, and power plants are being established to facilitate energy resource transportation to strengthen infrastructure systems and prevent supply disruptions. Having a strong energy infrastructure is another way to prevent supply disruptions for energy-exporting countries.

The emergence of energy security is linked to reliance on the energy dependency of countries. The concept of energy security emerged in the 1970s, and energy crises affected international relations studies during this period. Chester

(2010) explained that the historical process of energy security dates back to World War II, with the increase in oil demand by the industrial sector and households. In this context, member states of the Organization for Economic Co-operation and Development (OECD), established to ensure economic development and improve trade and investment, have increased their demand for oil over time and enhanced energy dependence. With the oil crisis in 1970, oil-importing countries realized that there may occur an energy crisis in the future by keeping their energy demands high (888).

Gustafson (2020) analyzes the evolution of the energy market with the discovery of natural gas as an energy source in Siberia in the 1950s within the framework of energy security (2). After the expansion of the natural gas pipeline in the 1980s, there was an increased demand for natural gas. With technological advancements and increased energy investments, infrastructure projects for distributing natural gas energy gained momentum. After the dissolution of the Soviet Union in 1991, Russia expanded its natural gas pipeline to revitalize its economy and maintain the ties of the former Soviet states (5-6). Russia strengthened natural gas energy relations with Europe and succeeded in establishing a presence in the European market. Therefore, after the 1980s, the process of natural gas becoming a sector with high energy dependence began. Enhanced natural gas dependency levels accompanied the increasing Russian natural gas energy export.

The emergence of modern energy systems with the developing technology beyond traditional energy transportation methods and energy trading through private companies indicates that unilateral energy security cannot be ensured. With the globalizing energy market, energy security policies are the main pillar for both energy exporters and importers. In this context, the IEA was established to control developments in global energy trade. This situation enables energy-importing countries that rely on energy dependency to constitute long-term energy supply security policies. According to the IEA (n.d.), energy security is acquiring energy sources at an affordable price and uninterrupted delivery. In summary, energy security is the capacity to respond immediately and provide solutions to potential risks and threats.

The concept of energy security is interpreted differently from many perspectives. It can be defined differently depending on the country, time and geopolitical conjuncture. For states with energy resources, energy security means searching for an efficient market, economic development, and profitable energy prices. In contrast, for states with insufficient energy resources, it means providing affordable energy, safe suppliers, and continuous supply(Austvik,2018,27).

Energy security can be summarized in seven dimensions. These are energy availability, infrastructure, energy prices, societal effects, environment, governance, and energy efficiency (Ang BW, Choong WL, 2015, 42). It is essential to ensure sustainability and energy supply, from consumption to import of energy resources. In this context, long-term energy relations are ensured. On the other hand, it is also essential that energy resources are compatible with society's needs and environmental policies.

Figure 3.2. Dimensions of Energy Security

• **GOVERNANCE** govern short-term and long-term energy security policy	• **AVAILABILITY** consist of import sources, technology and logistics, geographical location	• **INFRASTRUCTURE** Energy system consist of energy conversion , distribution and transmission	• **PRICES** the prices in the energy market
• **SOCIAL IMPACT** the relationship between society and energy consumption	• **ENVIRONMENT** carbon emissions, environment pollution and climate change	• **EFFICIENCY** the relationship between energy demand and energy resources	• **SUSTAINABILITY** long-term energy supply security policy

Source: Ang BW & Choong WL & Ng TS, 2015

The concept of energy security is constantly expanding and developing over time. However, primary energy supply security and geopolitical concepts are essential while defining energy security (Rokicki & Perkowska,2021,7). The regulation of energy collaborations, management of demand, and efficient use are among many aspects aimed at controlling the increasing energy demand.

When examining environmental factors and geographical elements in the context of energy security, countries that lack sufficient energy resources try to meet energy demand by importing energy. Energy security is also used as a tool for geopolitical interests (Shirazi, Fuinhas, and Silva,2023,2471). In this context, it becomes crucial for energy to be accessible in every part of the region. For example, alternative energy sources are demanded in regions where natural gas pipelines cannot reach. On the other hand, the countries that have energy resources develop economically, and their welfare levels increase. Owning an energy source reduces foreign dependency.

Energy is a crucial component for the development of various sectors. Countries with high industrial density experience a substantial energy demand, and affordable energy procurement accelerates economic growth. High energy prices create challenging conditions for both industries and households. To achieve sustainable energy use, energy is delivered to consumption points and distributed efficiently. In this context, the uninterrupted and easily accessible energy flow ensures reliable availability (Jefferson, n.d., 423).

Politically, effective management of energy policies is necessary to implement these concepts. Efficient governance ensures that energy policies are directed accurately, and that energy is used optimally.

In conclusion, this part of the thesis demonstrates the lack of consensus on defining an energy security policy. Energy security, generally encompassing political and economic approaches, shares commonalities. These approaches include ensuring the secure and uninterrupted transportation of energy sources, utilizing affordable and accessible energy sources, and collaborating with reliable energy suppliers. Due to the multifaceted and complex nature of the concept of energy security, each country operates in line with its policies based on strengths and vulnerabilities regarding its energy policy.

3.3. The EU Natural Gas Energy Security Policy

For energy-dependent countries, achieving balance in supply security is challenging, specifically in the EU region. Ensuring energy supply security is a critical issue for the highly energy-dependent EU. The EU is one of the largest energy consumers and importers in natural gas demand. The EU meets most domestic energy demand from energy resources imported from other countries (IEA, 2020). The EU is a geographical region that lacks energy regarding fossil resources like oil and natural gas. Therefore, its demand for energy imports is constantly increasing over time. Since the establishment of the EU, it expanded its area with the accession of new member states. The levels of energy dependence are not at the same level among the states. According to Streimikiene, Siksnelyte-Butkiene, and Lekavicius (2023), diversification of energy demand and inadequate infrastructure in the EU leads to comparative assessment within energy policies. Among EU member states, there are differences in levels of access to energy sources, infrastructure capacity, and integration with energy strategies (6). This situation has led the EU to guide the establishment of target strategies to create a common ground in energy policies.

The EU energy security supply is based on the dependency ratio, which is determined by the amount of energy a country produces and imports to meet its energy demand. This calculation is measured by the share of net imports in the country's domestic energy consumption (Eurostat, 2023). The EU member states that are dependent on Russian natural gas are vulnerable in terms of energy sustainability. This energy dependency led to many aspects, including economics, domestic politics, and foreign policy.

Energy dependency is considered a common concern of EU energy policies. The European Security Strategy (ESS) stated the necessity of a more integrated European market, interconnected energy infrastructures, investments in countries where energy cannot be transmitted, and policies to respond quickly and produce solutions to energy supply interruptions in order to eliminate energy dependence (Dimitrova, 2010,7).

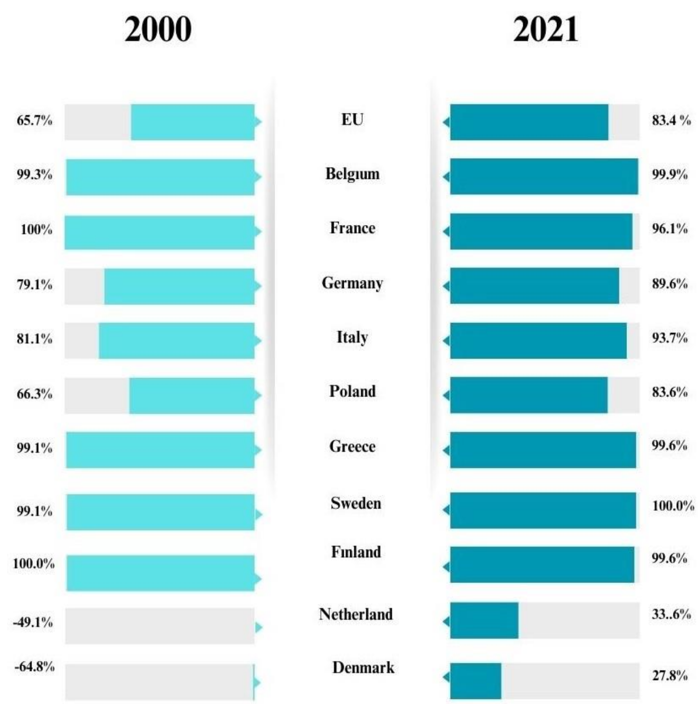


Table 3.1. The EU Member States' Natural Gas Energy Dependence Rate

Source: Eurostat, 2021

The EU member states' natural gas energy dependency varies in accessing energy sources. Some member states that can generate energy demand, like the Netherlands and Denmark, have low or even zero natural gas import demands (Table 3.1). However, this context is different for other EU member states. Natural gas is not evenly distributed across all regions of the EU. As a result, Eastern and Central Europe is required to expand their natural gas pipeline networks. According to the European Parliament (EP), Germany, Italy, and Belgium rely on natural gas dependency for about a quarter of consumption within the EU member states. Especially Germany has a high rate of natural gas energy imports from Russia. With projects like Nord Stream I and II, Germany is expanding its pipeline network to increase natural gas imports from Russia. In contrast, natural gas is not geographically available in Sweden, Finland, and Estonia for less than 10% of the EU's energy supply (2023,12).

The EU natural gas energy policies are progressing within the context of rising energy dependence, price control, and the expansion of the EU. The European Commission (EC) has expanded the framework of energy security policies due to the increasing strengthening of energy dependence on Russia due to the enhancement of the EU landscape (Elüstü,2021,141). According to the EP (2023), The EU encompasses various issues within the scope of energy policies, including increasing import dependency, limited energy resources, high and fluctuating energy prices, growing energy demand, conflicts in transit countries, risks associated with climate change, and the transition to renewable energy. The key objectives of these policies include establishing an integrated energy market, ensuring energy supply security, and fostering a sustainable energy market. Therefore, energy security policies are crucial for all EU members.

The EU’s energy policies can be classified into five main pillars. Diversifying energy sources, energy efficiency, and strengthening energy associations are decisive for the EU's energy demand. In recent years, the transition to low-carbon clean energy has been prominent. These policies are designed to foster sustainability, energy security, and economic growth(European Parliament, n.d.).

The Energy Union has been constituting in alignment with the energy policies of the EU. The Energy Union strategy aims to provide Europe and its citizens with affordable, secure, competitive and sustainable energy (Correlje, 2016, 31). The primary purpose of the energy strategy is to diversify natural gas routes and supply sources. The EU recommends the development of an integrated energy market and infrastructure, emphasizing regional cooperation with its member states (European Commission, n.d.).

The EC has prepared a joint European Action Plan to mitigate this negative impact of natural gas energy dependence. The action plan aims to increase gas storage levels to around 80% by efficiently using natural gas consumption. This action plan seeks to take effective measures to prevent potential gas disruptions (European Commission, 2022). The EU has published the Energy Security Strategy report in this direction to reduce reliance on Russian natural gas. The report outlines the difficulties and weaknesses in Russia's natural gas supply. To secure natural gas energy imports, the EU proposes strengthening cooperation mechanisms among member states in this report (European Commission,2023). This targeting enables securing natural gas flows and rapidly responding to potential supply disruptions. Energy supply security concerns are shared by all member states, particularly in weakly integrated and interconnected regions (European Commission,2014,4).

One of the significant drawbacks of being dependent on a single energy supplier is the limited alternatives in energy prices. The EU generally meets its natural gas demand from Russia; in this context, frequent supply cuts by Russia lead to energy crises. The political reasons for gas cuts in 2006, 2009, and 2014, especially due to the Ukraine crisis, negatively affected the EU (Richman and Ayyılmaz,2019,2). After the beginning of the Russia and Ukraine war, the EU concentrated on strategic projects against natural gas trade in these insecure conditions. In 2015, the EC underwent a significant transformation in energy policies. The EU energy policies prioritize affordable energy, sustainable competition, and members of cooperation. The EC underlined the necessity of growing its infrastructure and connecting the energy market. According to the EU, energy supplier diversification is crucial for supply security (Kotek, Selei et al., 2022, 3).

As the EU's demand for natural gas increases daily, it has become vulnerable to energy crises. Economic activities in energy, rapid industrial growth, supply constraints, and increasing natural gas prices are the three main factors that accelerate this crisis. For this reason, the EU aims to minimize the impact of volatility in natural gas energy costs. An essential component of the EU energy balance is sustainability in energy imports. However, gas scarcity and high natural gas prices, especially amid the Ukrainian and Russian crises, strengthen the energy supply security policy (Hartley PR and Medlock KB., 2009,55).

The Russia-Ukraine war in 2022 further escalated the energy crisis between the EU and Russia. As a result, the EU planned to phase out the use of Russian natural gas by 2027 and become independent from natural gas before 2030 in the scope of the REPowerEU plan in 2022. The EC has advocated to EU member states to reduce Russian natural gas usage rates by 15% (European Council, 2023). In this context, EU-centered gas reserve strategies constitute to be implemented in general.

The REPowerEU plan presents a diversified gas supply, accelerates the transition to renewable energy, and enhances energy efficiency (European Commission, n.d.). Ursula von der Leyen, the President of the European Commission, stated that enhancing energy consumption efficiency has proven vital in the light of the REPowerEU plan. This approach not only provides to mitigate the impacts of the Russia-Ukraine War but also fosters collaborative strategy among member states (European Commission, n.d.).With this plan, the transition to green energy is accelerating, aiming for the EU to establish its energy system and ultimately reduce dependence on Russian gas. By formulating the EU energy efficiency policy, the EU is strengthening its efforts not only to combat climate change but also to reduce energy dependence on Russia.

26 October 2021	Implementation of short-term national measures against the increase in energy prices.
24 February 2022	Urgent call for an action plan on energy by EU leaders.
10 March 2022	Gradually reduction of dependence on Russian natural gas.
2 May 2022	Suspension of Gazprom natural gas due to Russia-Ukraine War in 2022.
19 May 2022	Gas Storage Agreement : Filling gas storage facilities by 80% before the winter of 2022/23
3 June 2022	Sanctions on Russian natural gas
27 June 2022	RePowerEU Plan
5 August 2022	Agreement to reduce natural gas energy demand by 15% for the winter 2022/23
6 October 2022	Emergency measures accepted to reduce high energy prices.
19 December 2022	Establishment of a market mechanism to limit excessive gas prices

Table 3.2. The EU Natural Gas Energy Policy Process between 2021 and 2023

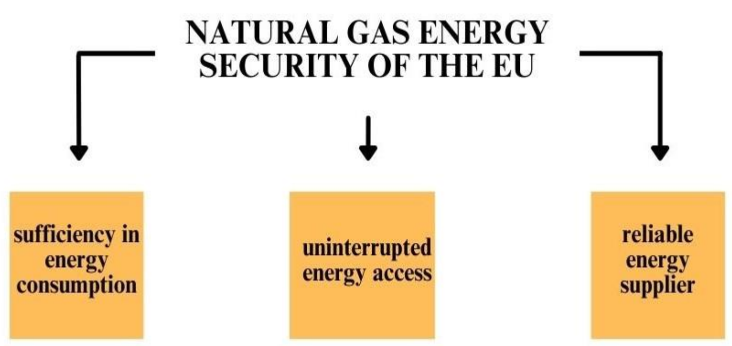
Source: European Council, 2023

The increase in energy prices is the main focus of the energy supply security policies of the EU, which has a high demand for natural gas. For this purpose, market measures and energy strategies such as gas storage and co-fueling are adopted. In line with the gas storage strategy of the EU, it is targeted to have storage facilities filled to 80% during the winter of 2022 and 2023, and to increase to 90%

in the following winter (European Commission, 2023). The EU prepares its fragile energy structure against possible supply disruptions with this strategy.

With the increasing energy demand after 2020, Russian natural gas is the primary issue of interest to the EU within the scope of energy security. Namely, the EU, which is dependent on Russia for natural gas, has put forward a series of action plans to meet and control natural gas demand, such as diversifying supply sources and routes and accelerating investments in renewable energy and energy efficiency. In this context, REPowerEU serves as a common energy strategy for the EU. This plan includes infrastructure investments to diversify the EU's energy suppliers (European Commission, n.d.). In this regard, the EU Energy Platform, which was founded in 2022, is a coordination that aims to provide the EU's energy supply. This platform coordinates the financing of energy resources such as pipeline gas and LNG (Hat et al., 2023, 35). A mechanism for demand aggregation and joint purchasing, called AggregateEU, has been established. It is based on the construction of energy sources intended to address the high energy price in the EU and guarantee supply security (EUEA, 2023).

Figure 3.3. The EU Natural Gas Energy Security Policy



Source: EU Energy Platform, 2023

Furthermore, the EU has formulated the External Energy Engagement Strategy (EEES) to enhance and accelerate energy supply security. According to this strategy, the EU aims to increase collaboration with other international forums to establish balance in global energy markets (European Commission, n.d.).

The natural gas energy security of the EU can be summarized as ensuring adequacy in consumption, access to affordable energy, and a reliable supply of natural gas. Taking precautions against potential risks and threats in the importation process of natural gas, ensuring stable and long-term natural gas trade, and providing affordable energy that can cover transportation, delivery, and distribution costs constitute the foundation of the EU's energy security policy.

In light of these developments, the EU calls on its member states to expedite the implementation of numerous coordinated strategic plans in order to demonstrate its resolve to secure energy supply security in the natural gas sector against Russia. European Commissioner Member Responsible for Energy Kadri Simson emphasized the evaluation of these developments, highlighting their contribution to the EU's energy security and independence in alignment with jointly devised plans. According to Simson, with these strategies, affordable energy access will be extended to 440 million citizens, meeting the energy demands of the 27 EU member states (EU Energy Platform, 2023).

3.4. The EU’s Rationale Natural Gas Strategy

This part of the thesis elaborates on the EU’s energy consumption patterns and explains why natural gas is essential in energy security. The EU's rationale for natural gas is multifaceted, encompassing various aspects such as energy security, sustainability, economic opportunities, and the transition to a low-carbon energy system.

Natural gas emits less carbon dioxide than other fossil fuels like coal and oil despite being a fossil fuel and not being a completely carbon-neutral energy resource. As a result, it is regarded as a comparatively cleaner fossil fuel energy that can function as a transitional energy source to facilitate renewable energy systems. Moreover, natural gas can be adapted in various forms for energy suppliers and gas applications flexibility (Turan and Flaman, 2023,337).

Using natural gas in newly established renewable energy facilities is pivotal in facilitating the seamless integration of conventional energy sources into emerging energy systems. Incorporating natural gas in harnessing renewable energy resources aligns strategically with initiatives that enhance energy reliability and stability. Among the industries that use natural gas extensively is the production of electricity. It is now useful in many projects about the switch to renewable energy sources like solar and wind power. Natural gas is essential to implementing energy strategies because it links conventional fossil fuels and the development of renewable energy projects (IMF, 2022, 16). As a result, Natural gas, the least carbon-containing fossil fuel, is expected to overtake oil as the world's primary energy source in the late 2040s (DNV, Energy Transition Outlook 2022).

On the other hand, natural gas enhances competitiveness within the EU market. Natural gas contributes to employment and economic development as one of the most consumed energy sources. Natural gas pipelines are prevalent in almost every region of the EU, making them easily accessible and distributable due to established infrastructures and delivery processes. Therefore, the existing infrastructure and delivery processes make it indispensable to abandon natural gas completely. With rising demand for natural gas, new projects are being launched to improve production technologies and expand infrastructure for the EU. Expansion of storage capacity, addition of pipeline connections, and construction of LNG terminals are examples of infrastructure developments.

As a result, the EU's demand for natural gas as an energy source is growing. The long-established natural gas energy trade system allows for easier access and distribution, making it more cost-effective than other energy sources and ensuring long-term energy supply security, allowing it to maintain its share of consumption. Transitioning to new and alternative energy sources necessitates several factors. Finding new investors, constructing infrastructure facilities, and establishing distribution systems are more expensive than the traditional methods used for natural gas (CEER,2023,13).

In conclusion, during this energy transition period, natural gas is a favorable fuel for the EU’s energy strategies to reduce carbon emissions and transition to clean energy. In this context, an increase in demand for natural gas consumption and utilization is expected in the EU.

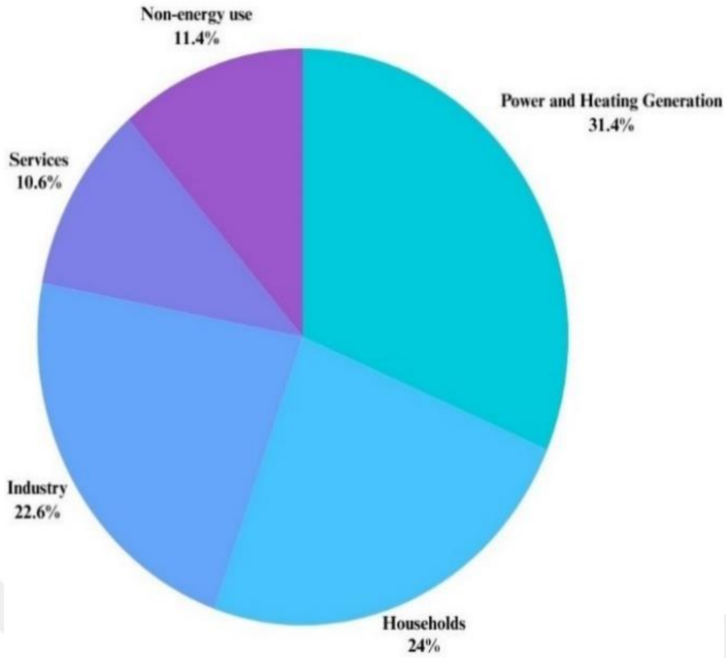
3.5. Natural Gas Outlook of the EU

The EU is one of the largest consumers and importers of natural gas. Energy supply security is challenging for energy-dependent countries within the EU region. Most of the EU's energy demand is met by importing energy resources from other countries. The demand for natural gas has been continuously increasing over time. Domestic natural gas production in the EU is not only sufficiently short of meeting domestic demand but also experiences a steady annual decline. In this context, the EU represents a favorable market for natural gas energy suppliers. Preventing energy shortages in the EU and ensuring the security of natural gas supply and demand are paramount. Nevertheless, owing to the inadequate natural gas energy resources, the EU is needed to maintain a balance between energy production and demand. As the demand for natural gas energy increases, the dependency on energy imports also rises. Hence, when examining the natural gas outlook of the EU, it is necessary to delve into production and consumption data. In this section, I delve into the present natural gas data of the EU, analyzing both production and consumption rates and presenting the changes in the EU's consumption rate between 2019 and 2022.

3.5.a. Natural Gas Consumption of the EU

The analysis of energy consumption by Balitskiy, Bilan, and Strielkowski (2014) suggests a correlation between natural gas consumption rates and economic development. Utilizing natural gas is a crucial stage in sustaining the functionality of the energy sector (128). In this context, the EU's sustainable and rapid economic development is driven by increasing natural gas consumption due to the growth of its industrial sector. Increasing industrial production is tied to increased natural gas demand. At this point, it is imperative for the EU to maintain a balance between supply and demand to constitute an energy security policy. Achieving a balance in natural gas consumption between the industrial sector and households becomes crucial for enhanced energy efficiency.

Figure 3.4. Natural Gas Consumption of the EU in 2022



Source: European Council, 2022

Primary uses of natural gas include energy production, residential heating, and industrial activities. The consumption of natural gas in the EU is demanded in various sectors, including electricity (31.4%) and household consumption (24.0%) (Figure 3.4.). Two-thirds of the EU's natural gas energy consumption is allocated to industrial, transportation, and household consumption.

The remainder of natural gas is consumed for electricity generation and distribution (European Council, 2022). In this context, the demand for natural gas usage is increasing. Especially with the expansion of the industrial industry, electricity is needed. The use of natural gas for electricity production is a critical factor. Natural gas consumption is increasing in terms of household consumption and electricity use.

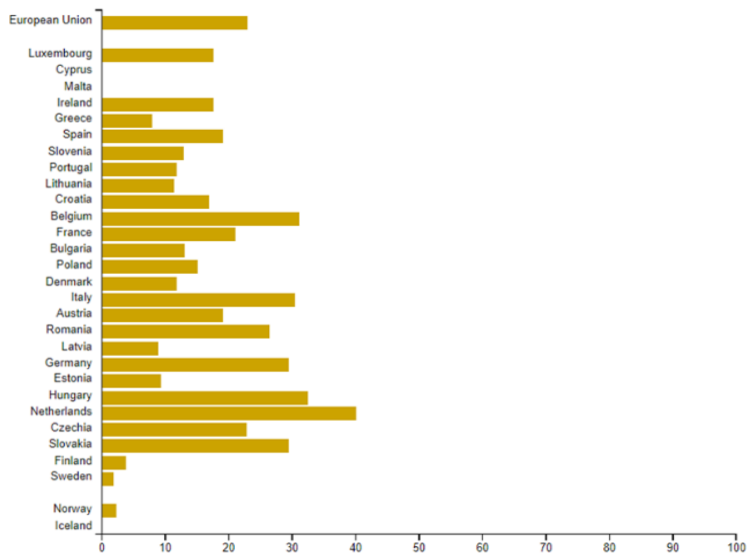


Table 3.3. Natural Gas Consumption of the EU Member States in 2021

Source: Eurostat, 2021

Natural gas usage rates vary among EU member states. Some EU member states, such as Germany, France, and Greece, rely highly on natural gas imports. On the other hand, some EU member states, such as Finland, Sweden, and Iceland, have a high demand for natural gas but import it in relatively low proportions (Table 3.3).

Natural Gas: Consumption (bcm)

Billion Cubic Meters	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Austria	9.0	8.6	8.2	7.5	8.0	8.3	9.1	8.7	8.9	8.5	9.0
Belgium	16.5	16.7	16.5	14.5	15.8	16.2	16.4	16.9	17.4	17.0	17.0
Bulgaria	3.1	2.9	2.8	2.7	3.0	3.1	3.2	3.0	2.8	2.9	2.8
Crotia	3.0	2.8	2.7	2.3	2.4	2.5	2.9	2.7	2.8	2.9	2.8
Czech Republic	7.9	8.0	8.1	7.2	7.5	8.2	8.4	8.0	8.3	8.5	9.1
Denmark	4.3	4.1	3.8	3.3	3.3	3.4	3.2	3.1	2.9	2.3	2.3
France	43.0	44.4	45.1	37.9	40.8	44.5	44.8	42.8	43.7	40.6	43.0
Germany	80.9	81.1	85.0	73.9	77.0	84.9	87.7	85.9	89.3	87.1	90.5
Italy	74.2	71.4	66.7	59.0	64.3	67.5	71.6	69.2	70.8	67.6	72.5
Netherlands	40.9	39.3	39.1	34.5	34.1	35.2	36.1	35.5	37.0	36.2	35.1
Norway	4.0	4.0	4.0	4.3	4.5	4.4	4.6	4.4	4.6	4.0	4.3
Poland	16.5	17.4	17.4	17.0	17.1	18.3	19.2	19.9	20.9	21.1	23.2
Romania	12.9	12.5	11.4	10.9	10.4	10.5	11.3	11.6	10.8	11.3	11.4
Switzerland	3.1	3.4	3.6	3.1	3.3	3.5	3.5	3.3	3.4	3.3	3.6
United Kingdom	81.9	76.9	76.3	70.1	72.0	80.7	78.5	78.6	77.7	73.0	76.9
Total Europe	580.4	565.7	554.4	500.0	509.2	537.4	558.8	547.4	554.5	542.0	571.1

Table 3.4. Natural Gas Consumption in bcm of Total Europe between 2011 and 2021

Source: BP Statistical Review of World Energy 2022 | 71st edition

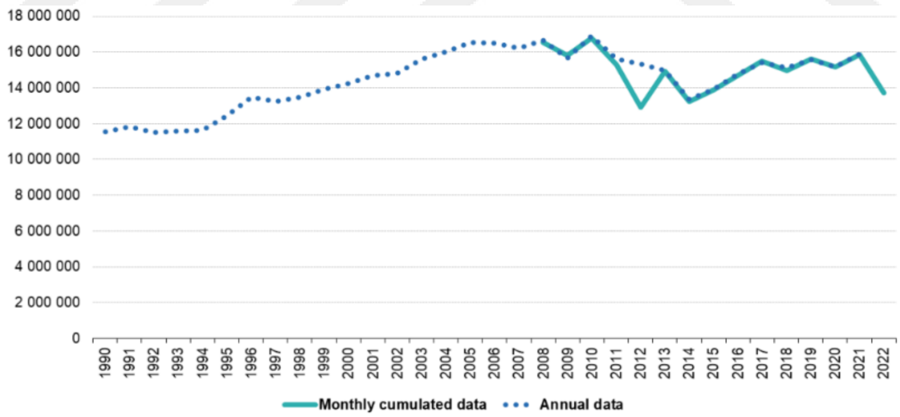
Table 3.4 indicates that the annual growth rate of EU natural gas consumption between 2011 and 2021 is 5.7% in 2021. However, when we compare the 2021 data with 2011, there is a 2% decrease in natural gas demand (BP Statistical, 2022). Germany, France, Italy and Belgium are the countries that use the most natural gas. While the natural gas production of EU member states continues to decline, the EU's natural gas consumption is expected to increase. In this context, the diversification of energy source countries for the EU is significant in ensuring energy security.

In 2021, the EU's natural gas energy imports amounted to 56%, and the dependence rate on natural gas imports was 83%. This rate represents a one percentage point decrease compared to 2020 (84%) (Eurostat, 2022). The 1% decrease in dependency rate in 2021 compared to 2020 data indicates a reduction in the EU's natural gas demand. However, despite the decreased demand for natural gas in the EU.

In terms of natural gas supply, Europe plans to limit further imports of natural gas but currently has no sustainable energy supplier other than Russia. In this case, inevitably, the EU's dependence on Russia as an energy importer Some EU members are looking for ways to diversify their supplies. Some EU member states are actively working to secure supply diversification and integrate the energy sector to mitigate the risk of potential disruptions in Russia's energy supply. IEA Executive Director Fatih Birol and European Commission President Ursula von der Leyen explained a strategic initiative to diminish the demand for Russian gas by two-thirds by the end of 2023 in the potential energy crises (IEA, 2023). The EU has accelerated its efforts to reduce Russia's dependence on natural gas resources, but a sustainable plan has not yet been formulated.

After the beginning of the Russia-Ukraine War in 2022, the EU significantly reduced its demand for natural gas. The EU is taking measures to prevent possible supply disruptions due to war, focusing on gas storage strategies. Within the scope of the European Gas Demand Reduction Plan, the EU reduced natural gas consumption by 19%, achieving a total reduction of 360 bcm. These figures represent the lowest levels in previous years (European Council, 2023). Figure 3.5. indicate that due to the decrease in the EU's natural gas demand for Russia during the crisis, there was a decrease in natural gas consumption, but then it returned to normal levels. As can be understood in this figure, after the 2009 Russia-Ukraine crisis, there was a sharp decrease in the EU's natural gas demand, but later this demand rose. It is seen that the EU's demand remained stable in 2019. However, there is a rapid decline after 2022.

Figure 3.5. Natural Gas Demand of the EU (terajoules)



Source : Eurostat, 2023

When examining the 2023 natural gas consumption data of the European Commission in the reduction of natural gas demand in the first quarter of 2023, it was observed that the gas demand was below the average by 18%. Subsequently, in the second quarter of 2023, energy demand remained 17% lower. The high rate of decline in natural gas demand in the EU is the reason for the Russian-Ukraine war. To take precautions against potential wartime scenarios, the EU is reducing natural gas usage and storing it in gas storage facilities. Depending on the war's course, these percentages may change the demand for natural gas.

In conclusion, the EU's demand for natural gas from Russia remains high without addressing the ongoing war between Russia and Ukraine. Despite occasional disruptions in these energy relations during crises since the 1980s, they have persisted. It is evident that, within the framework of its economy and renewable energy policies, the EU is seeking to pivot towards a new supplier as an alternative to Russian natural gas.

3.5.b. Natural Gas Production of the EU

The EU is a geography that is insufficient in terms of fossil energy resources. Therefore, natural gas energy production does not meet the demand within the European region. For this reason, natural gas energy import rates are high. Among the member states of the EU, the country that produces the most natural gas is the Netherlands. Apart from this, no country within the member states exports natural gas production. Europe's lack of sufficient natural gas resources causes energy imports. IEA, 2023 data stated that EU natural consumption decreased by 9% in 2022 and amounted to 3.6 bcm. Moreover, this decline is expected to be 5% by 2023. The reason for this decrease in natural gas consumption within the EU is the Netherlands' inability to export sufficient amounts of gas. In this case, the demand for energy imports increases.

Natural Gas: Production (bcm)

Billion Cubic Meters	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Germany	10.5	9.5	8.6	8.1	7.5	6.9	6.4	5.5	5.3	4.5	4.5
Italy	8.0	8.2	7.4	6.8	6.4	5.5	5.3	5.2	4.6	3.9	3.2
Netherlands	69.5	68.4	72.4	60.4	45.9	44.3	37.9	32.3	27.8	20.1	18.1
Norway	100.5	113.9	107.9	107.5	116.1	115.9	123.7	121.3	114.3	111.5	114.3
Poland	4.5	4.5	4.4	4.3	4.3	4.1	4.0	4.0	4.0	3.9	3.9
Romania	10.1	10.1	10.0	10.2	10.2	9.1	10.0	10.0	9.6	8.6	8.5
United Kingdom	46.1	39.2	37.0	37.4	40.7	41.7	41.9	40.6	39.2	39.5	32.7
Other Europe	9.2	8.4	7.2	6.3	6.1	8.7	9.0	8.4	7.4	6.3	5.4
Total Europe	284.8	287.5	280.0	266.1	260.8	259.9	262.7	251.3	234.8	218.7	210.4

Table 3.5. Natural Gas Production in bcm of Total Europe between 2011 and 2021

Source: BP Statistical Review of World Energy 2022 | 71st edition

The annual growth rate of EU natural gas production among EU members progressively declined between 2011 and 202. Total Europe's natural gas production was 284.8 bcm in 2011 and 210.4 bcm in 2021. This represents a decrease of approximately 25.9% (Table 3.5). It is not enough to provide the natural gas energy consumed by the EU (BP Statistic, 2023).

In 2022, the Netherlands, the largest natural gas producer in the EU, experienced a 15.6% decline in production. Germany, the largest natural gas importer in the EU, also saw a 4.9% decrease in production. (Eurostat, 2023, 4). For this reason, the EU directs its attention to external energy sources.

Although there is natural production in some EU member states, it is insufficient for domestic consumption, so natural gas is imported. However, most EU member states do not produce natural gas at all. As I mentioned, the geographical lack of energy resources is compelling. Table 3.6. shows that most of the EU member states cannot produce sufficient amounts of natural gas.

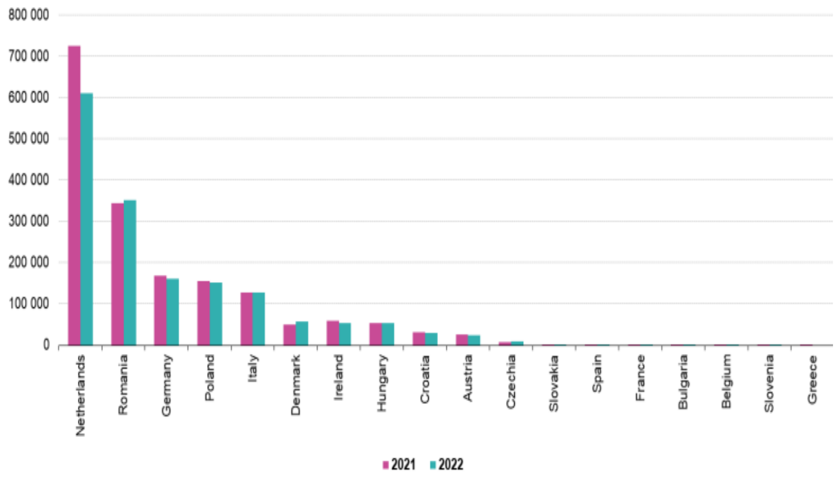


Table 3.6. Natural Gas Production of the EU between 2021 and 2022

Source: Eurostat, 2023

Due to the decrease in production in EU member countries and the insufficiency of natural gas to meet domestic demand, the EU has turned to policies to reduce natural gas consumption and use energy efficiently. Apart from the Netherlands, no member states in the European continent have sufficient energy resources in terms of natural gas reserves in the EU's domestic production. In this context, it is necessary to increase the import rate to compensate for the natural gas energy deficit.

3.6. Natural Gas Routes of the EU

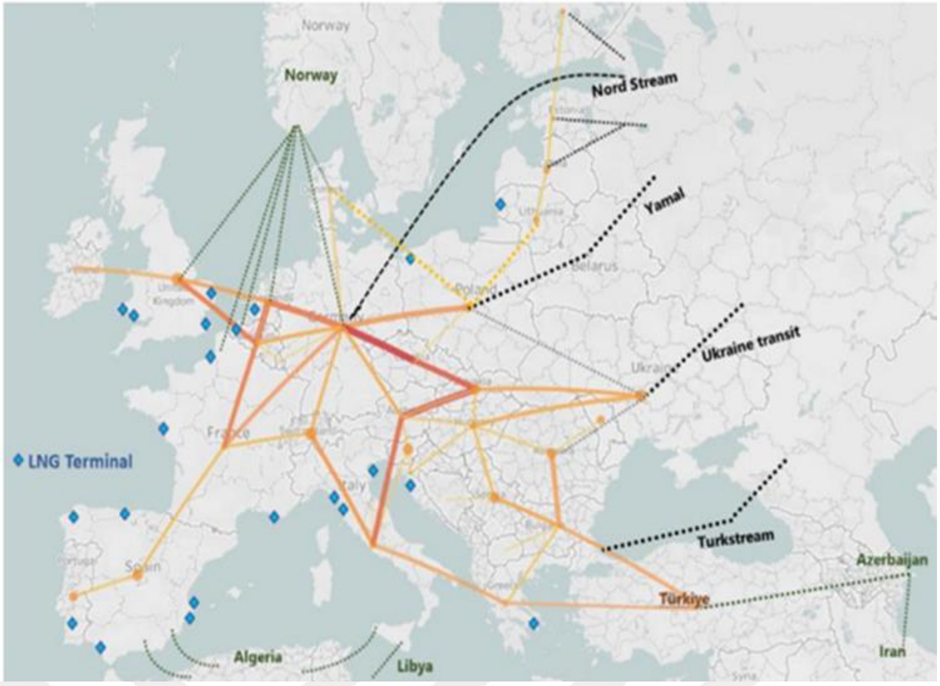
Natural gas transmission connections are part of the EU's energy security policy. Ensuring uninterrupted flow within the scope of the suitability of natural gas infrastructure and energy efficiency is important for energy supply security (Borisocheva, 2007, 17). Instabilities in energy suppliers, conflicts, economic fluctuations, natural gas price increases, and other factors also affect the natural gas energy trade. For this reason, the EU is developing pipeline and LNG projects in addition to the existing infrastructure in order to ensure that existing natural gas transportation routes are uninterrupted and sustainable. This section examines the pipeline and LNG routes used by EU member states in the energy supply of natural gas. It is discussed which supply route is advantageous and accessible in distributing natural gas to the EU.

Pipeline routes directly distribute gas, thus playing a significant stage in ensuring a reliable energy supply. The existing pipeline infrastructure reaching the EU and LNG routes poses potential alternatives by offering new sources. Managing energy trade in natural gas imports is challenging within the framework of the EU's energy security policies. Therefore, this section of the thesis analyzes the logistics of pipeline natural gas and LNG from a logistical perspective.

The pipelines for natural gas from Russia to the EU have been in place for many years. Due to the existing capacities and numerous pipelines, the EU can easily meet its natural gas demand. However, as I will delve into in detail in another section of the thesis, the increasing demand for LNG in recent years cannot be met by the existing LNG infrastructures of the EU. Therefore, additional capacity installations are required.

Many natural gas pipelines come to the EU, especially from Russia. Most of these pipelines pass through transit countries—for example, Ukraine, Belarus, and Türkiye. Non-transit pipelines are being built or are just starting to operate.

On the other hand, the EU, which aims to improve LNG terminal capacity, creates many LNG terminal projects that are under planning, operation, and construction (Map 3.1).



Map 3.1. Europe Cross-Border Transmission Capacities and Import Points

Source: ENTSOG, 2021 [1]

The EU meets its current natural gas demand through pipelines and LNG. For natural gas, import dependency from outside the EU was 83% in 2021. Amongst other natural gas suppliers, Russia has a larger share in imports. Russia has been the largest gas supplier to the EU: particularly in 2021, more than 40% of the total natural gas imports came from Russia (European Council, n.d.)

Natural gas via the Yamal pipeline reaches Germany through Belarus and Poland. Nord Stream I, operational since 2012, transports gas to Germany through a pipeline running beneath the Baltic Sea. TurkStream, operational since 2020, transports natural gas from Russia to Europe through Turkey. The existing natural gas pipelines from Russia can meet the annual natural gas consumption of the EU.

[1] On the map, thick lines : large transmission capacities. Dotted lines : pipelines and dashed yellow lines : pipelines expected to facilities.

Regarding technical capacity, Russia can supply the required natural gas to meet the EU's demand. Russia strategically established the best routes through transit countries for the smooth transportation of natural gas to Europe. However, disputes between Russia and the transit country Ukraine, particularly in gas supply interruptions and price increases, have led to regional problems. Therefore, Russia has turned to new pipeline projects and energy suppliers to diversify gas distribution to protect its market power within the EU.

Due to disruptions and crises experienced through its pipeline infrastructure, the EU has turned to US LNG in recent years. LNG is creating a new area in the global energy market. Within the framework of strategies for diversifying energy suppliers, the US is seen as an alternative energy supplier for the EU. However, the two sides' natural gas energy trade relations are relatively recent.

The EU natural gas energy infrastructure is technically divided into natural gas pipelines and LNG. These energy infrastructures are being examined in terms of energy supply, import quantities, and transportation routes.

The thesis examines the energy infrastructure as one of its research points to analyze the advantages and challenges within the scope of diversifying energy suppliers. In this context, it is necessary to scrutinize the existing natural gas pipelines and potential LNG infrastructure to analyze the current energy security policies of the EU regarding natural gas.

3.6.a. Pipeline Natural Gas from Russia to the EU

Russia's pipeline natural gas constitutes approximately one-third of the gas used in Europe (Statista, 2023). In 2022, the countries most dependent on natural gas from Russia through the pipeline were Germany, Italy, Poland, Bulgaria, and Austria (Euronews, 2022). The consistent increase in Russian gas exports can be attributed to the presence of these pipelines. Since 1980, Russia has been transmitting natural gas to the EU through pipelines. Therefore, despite political fluctuations on both sides, the continuity of the natural gas trade remains significant. Russia has several natural gas pipelines connected to the EU energy market. These include the Yamal-Europe Pipeline, Brotherhood (via Ukraine), Nord Stream I and II (not yet operational), and the TurkStream pipelines.

Map 3.2. The Natural Gas Route from Russia to the EU

Source: JP Morgan via The Economist based on ENTSOG

The Yamal-Europe Pipeline is a part of Russia's extensive natural gas pipeline network designed to export Russian natural gas to European consumers. The purpose of this pipeline is to meet the market demands of Germany. Constructed in 1999, the pipeline reaches the European Union via Ukraine and Belarus, ultimately reaching Germany through Poland. However, the pipeline has a capacity of 33 bcm with a length of 4,196 km (Hirschhausen & Meinhart & Pavel, 2005, 52). The Yamal-Europe pipeline has significantly developed Russia's and

Europe's natural gas relations, meeting Europe's natural gas demand for many years. The pipeline supplies natural gas to various European countries, including Germany, Poland, and other Central and Western European countries. It helps meet the energy needs of these countries and contributes to the diversification of natural gas supplies.

The Nord Stream pipeline system's two major natural gas pipelines, Nord Stream 1 and Nord Stream 2, were designed to carry Russian natural gas from Russia to Germany throughout the Baltic Sea. Nord Stream 1 became operational in 2011. According to the official data announced by Nord Stream AG (n.d.), with the combined capacity of 55 bcm of Nord Stream I and 55 bcm capacity of Nord Stream II, the total capacity is 110 bcm of gas per year. The project aims to meet Europe's increasing demand for natural gas and to create an energy source by creating additional supply routes.

Nord Stream is the first pipeline project designed to transmit Russia's natural gas to the European market directly. Thanks to this pipeline, Russia aims to facilitate the smooth transmission of gas by bypassing Ukraine's transit country power. The gas flow provided by the pipeline promises at least 50 years of sustainable gas transportation to Europe (Nord Stream, n.d.). The pipeline route starts in Vyborg, Russia, via Ukraine and Belarus and crosses the Baltic Sea to Greifswald, Germany. Russia's largest natural gas operator, Gazprom, is the project's operator. The pipeline project has been undertaken by German and Russian joint companies (Beidollahkhani & Rahmani, 2023, 430). This pipeline passes under the Baltic Sea with two 48-inch submarine pipelines from Russia to Germany. The Nord Stream I was designated as a 'Project of European Interest,' recognizing its status as one of the most critical projects to meet Europe's energy infrastructure needs (European Parliament, 2008).

After the success of Nord Stream 1 in providing the EU with direct and smooth access to gas, the Nord Stream 2 project came into consideration. The Nord Stream provides direct gas flow between Germany and Russia, and the gas coming to Germany is transferred to the EU energy imports. On the other hand, Germany guaranteed its energy security and established closer bilateral relations with Russia than other members. With the Nord Stream I and II, Russia has an additional route to reach the EU market directly. In conclusion, the European Commission has decided that with the implementation of Nord Stream 2, projects for diversifying the supply and developing the EU market may face obstacles. The project is currently on hold.

Nord Stream 2 was completed in early 2022 but could not become operational. During the construction phase of the Nord Stream II pipeline, EU countries were divided into two. The EU could not take a common stance on this issue. Nord Stream 2 has faced criticism from the EU for political and environmental reasons (European Parliament, 2021). The US government opposed the Nord Stream 2 pipeline and imposed a series of sanctions that could not be operational. It has been stated that the EU may increase its current energy dependence on Russia and that the project that takes Ukraine off the route may cause Ukraine to lose its transit revenue. In 2021, Gazprom completed the construction of the Nord Stream 2 pipeline. After Russia's invasion of Ukraine, German Chancellor Olaf Scholz announced the suspension of the certification process and the withdrawal of the supply security report, instructing that the project be put on hold (Energypost EU, 2022). Germany officially stopped the project in February 2022 (Nord Stream AG, 2022).

The TurkStream Gas Pipeline is a natural gas pipeline that connects Russia to Turkey and further extends into Southeastern Europe. TurkStream is 2200 m below sea level, with a maximum depth of two parallel pipelines passing through the Black Sea. (TurkStream, n.d.) The one pipeline runs directly to Luleburgaz. The other pipeline passes to the Türkiye- European border. Russia exports 32 bcm of natural gas annually to Türkiye and European countries (Hafner and Tagliapietra. 2015,14). The pipelines extend from the Russian town of Anapa on the Black Sea coast to the Turkish city of Kıyıköy on the Black Sea coast, passing under the Black Sea for approximately 930 kilometers. From Kıyıköy, the first line continues as the Turkish Stream pipeline to transport gas into Turkey, and the second line extends into Greece, Bulgaria, and Europe (TurkStream INFO,2018).

The TurkStream Gas Pipeline project was developed to replace the earlier South Stream project, which was canceled due to disagreements with the EU over regulatory issues. The primary purpose of TurkStream is to transport Russian natural gas to Turkey and eventually to Southeastern Europe, bypassing Ukraine as a transit route. The first line is intended to supply gas for Turkish domestic consumption, while the second line serves as a transit route for delivering gas to European markets (Schislyaevaa et al., 2022, 1985).

The pipeline project aims to enhance Russia's position as a major natural gas supplier to Turkey and Europe. It provides Russia a direct route to deliver gas to its customers, reducing transit through Ukraine and avoiding potential transit disputes. Although creating new pipelines alongside existing natural gas pipelines is primarily motivated by economic factors, there are often underlying political reasons. For example, in any conflict situation with neighboring countries like Belarus and Ukraine, gas supplies to these countries are halted under various pretexts or explicitly as a risk. Due to the interconnectedness of pipeline networks, gas flowing to Europe is indirectly affected. Despite multiple attempts by Europe, impacted by the conflict, to impose sanctions on Russia, it has been unable to overcome its dependency on Russia for energy supply. Projects such as Nord Stream and TurkStream have been introduced to avoid being affected by these interruptions and create alternative routes. These projects aim to deliver gas directly to Europe, bypassing transit countries like Ukraine and Belarus.

Dependency on Russian natural gas has been discussed within the EU since the 2000s. However, these discussions focus on Russia using its market power as a threat perception rather than the quantity and price of imported gas. Remarkably, Western EU member states propose creating various supply routes by building integrated network connections to reduce the risk from Russia. By creating the Trans European project, they aim to transfer natural gas from Russia directly to Europe without being affected by potential regional crises (Kotek, Selei et al., 2022, 5).

Natural gas pipelines to Europe reach from North Africa, the United Kingdom, Norway, Russia, and the Caspian region. A significant portion of Europe's natural gas pipelines comes from Russia. Russian pipelines reach Europe through Germany, Poland, Ukraine, and Turkey. Russian natural gas pipelines constitute 42% of the total gas import capacity to Europe, while pipelines from other countries make up 30% (Bella G., Flanagan M., Foda K., et al., 2022, 8).

3.6.b. Infrastructure Capacity of the EU for US LNG

LNG is an alternative solution for increasing energy supply security and diversification despite the European Union's dependence on Russian natural gas. With the discovery of shale gas, LNG is intensifying competition in the global energy market. In this context, the EU has initiated discussions on establishing infrastructure to access US LNG.

Map 3.3. LNG Import Capacity, Export, and Proposed LNG Terminals between 2022 and 2024 in Europe

Source: European Commission, 2022

LNG has changed the direction of the European market. By adopting gas supply through Russian natural gas pipelines, Europe presents new infrastructure requirements for LNG.

The EU aims to establish Europe's LNG infrastructure, consisting of 36 LNG import terminals and an additional 17 projects in various stages of construction or planning. Although there is a slowdown in the EU's LNG imports in the quarter of

2022, it continues to increase. LNG imports showed an 89% increase in the first quarter of 2022 and increased by 55% in the second quarter. (European Commission Quarterly Report, 2022). In 2022, the EU imported 65 billion cubic meters(bcm) of LNG (IEEFA, 2022). By the end of 2014, there were only 43 LNG stations in Europe, with 90% concentrated on the shores of Spain, the Netherlands, the United Kingdom, and Sweden. In 2022, the EU became the world's second-largest LNG importer. The EU imported 180 bcm of LNG, which increased by 71.7 bcm compared to 2021 (IGU,2023).

The EU member states that imported the most LNG were, in order, France, the United Kingdom, Spain, the Netherlands, and Belgium. Therefore, the utilization rates of regasification terminals in Europe reached 70%. Another area affected by the Russia-Ukraine war is the high increase in the EU's LNG demand in 2022 and 2023. EU member states, which prefer LNG capacities as an alternative to Russian natural gas, have also started to design their infrastructures accordingly.

The EU member states do not have sufficient LNG terminal infrastructure. Therefore, they need to build new LNG terminal projects. In this context, they consume gas economically from gas storage facilities by reducing the demand for Russian natural gas until LNG terminals are built. However, the installation of an LNG terminal takes years and requires many procedures to become operational. For this reason, the EU energy policies for natural gas consumption are critical in this process. Each project for LNG terminals varies within EU member states. While some EU member states have sufficient potential in terms of LNG infrastructure, some EU member states have not started work on LNG infrastructure installation yet. In this context, projects for LNG terminal installation within the EU are not at the same level.

Member State	Operational LNG Import Terminal Capacity in 2022,bcm	Planned and Under Construction LNG Import Terminal Capacity and FRSUs in 2022, bcm
Belgium	11	6
Croatia	3	3
Czech Republic	-	-
Denmark	-	-
France	33	4
Germany	-	31
Greece	7	19
Hungary	-	-
Ireland	-	-
Italy	16	18
Latvia	-	2
Lithuania	4	-
Malta	1	-
Netherlands	20	5
Poland	6	8
Bulgaria	-	-
Finland	-	-
Spain	60	-
Portugal	8	-
Sweden	-	-
Austria	-	-
Romania	-	-

[2][3]

Table 3.7. Operational, Planned, and Construction LNG Capacity of the EU Member States

Source : Lexie Ryan, 2023, 273

Table 3.7 presents the use of LNG terminals in EU member states and plans for developing LNG terminals. There are a limited number of terminals for importing LNG in Europe. Moreover, LNG capacities vary by the EU region. Due to the lack of integration among natural gas pipelines in Europe, the interregional distribution of LNG is not uniform. LNG import terminals in North-West Europe have an integrated pipeline network capable of transporting LNG natural gas to distribution and storage facilities. Therefore, they can utilize 115% of their LNG capacity. However, LNG import facilities in Southern Europe can only meet 58% of their capacity, satisfying domestic natural gas demand (EIA, 2022). Many EU

[2] FSRUs (Floating Storage and Regasification Units) are specialized marine vessels that can store, transport and gasify LNG for injection directly into natural gas pipeline.

[3] There is no operational, planned and under construction of LND in other EU members not on table 2.7.

members are building new LNG terminals because they do not have existing LNG terminals. However, the installation period of an LNG terminal takes between 3-6 years. Natural gas energy demands in the EU's energy market, affected by political and economic crises, have changed over the years. For this reason, politically and technically, the installation of LNG terminals cannot produce fast and effective solutions to energy demands.

In 2023, the utilization of the European Union's LNG import facilities is at 58%. Italy and Germany possess the lowest LNG facility capacities, while the Netherlands, Croatia, Poland, and Italy exhibit the highest capacities for LNG imports (IEEFA, 2023). While the growth in LNG demand is slowing in 2023, the construction of planned LNG facilities persists. Despite being positioned as an alternative for energy supply security amid tensions with Russia, the demand for LNG has not met the expected levels.

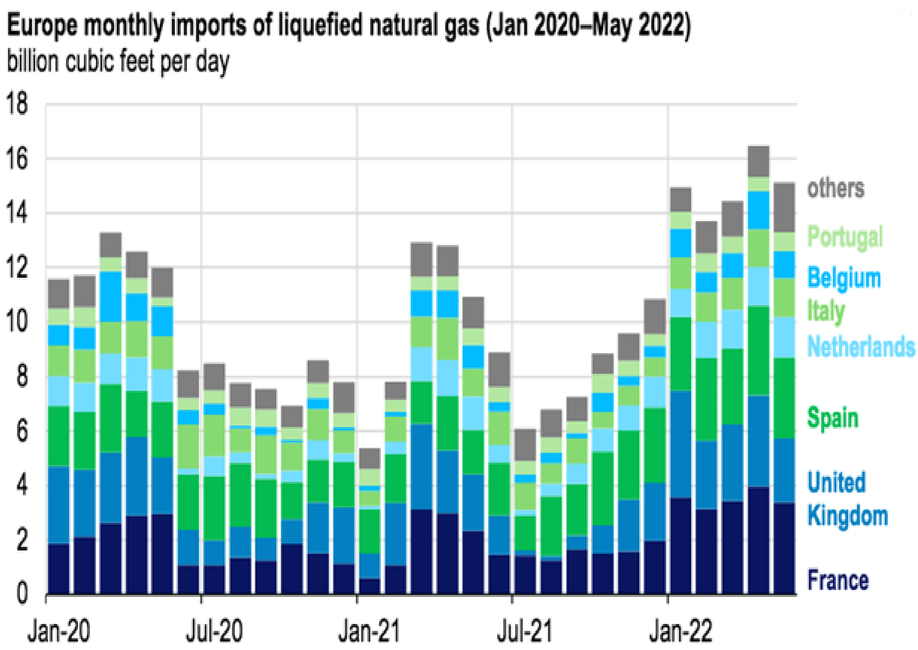


Table 3.8. The EU Member States Monthly Imports of LNG between 2020 and 2022

Source: Global Energy Hub

Spain has the most favorable infrastructure for LNG terminal installation in Europe. Spain became the largest LNG importer among EU member states, followed by France, the Netherlands, and Belgium (CEW, 2022). However, LNG integration within Europe is at a relatively weak stage. Expanding pipeline networks is necessary for the distribution of incoming LNG in Europe. Spain has the first-largest LNG capacity in Europe, while the UK comes in second largest. (Global Energy Hub, 2022).

There is a significant gap between the number of current and planned LNG terminals in the EU and the actual demand for LNG. The EU is actively proposing to decrease its reliance on natural gas as part of its shift towards cleaner energy sources. Specifically, in 2021, only 19% of the EU's natural gas consumption was met through LNG imports. Between 2021 and 2022, the largest LNG exporters to the EU were the United States (44%), Russia (17%), and Qatar (13%) (European Commission, 2023).

IEEFA (2023) suggests that the projected EU's LNG demand may not continue in the coming years. By 2030, a complete shift from pipeline natural gas to LNG is unlikely, with the anticipated demand not surpassing 150 bcm. Even with the construction of LNG terminals, there could be excess capacity of 256 bcm by 2030.

Despite declining natural gas demand within the EU, the expected surge in LNG imports did not materialize. Although there was a substantial 68% increase in LNG demand in 2021, the growth observed in 2022 was a mere 4% compared to the previous year. By 2023, the volume of LNG imports had decreased by 18% compared to 2022 (Bruegel, 2023).

The opening of new LNG terminals in the EU led to a notable capacity increase. Evaluating the future trajectory of LNG in light of these developments, it appears that the EU's diminishing natural gas demand, combined with the continuous establishment of LNG facilities, is likely to hinder the attainment of the projected import volume. Moreover, EU member states that have allocated substantial funding for constructing LNG terminals may face the prospect of idle capacities.

The EU expects to meet its natural gas demand from various supplier countries, such as the US and Qatar, through the establishment of existing and planned LNG terminals. Consequently, the EU has recently provided funding for the installation and infrastructure development projects of LNG terminals. The process of setting up and financing LNG terminals is a contentious issue within the EU.

On the other hand, establishing LNG terminals and related contracts is seen as increasing energy dependence. LNG can only be transported by sea; it needs to go through several stages from extraction to distribution. Therefore, having suitable infrastructure is essential for LNG's technical transportation and distribution (GIE, 2018). LNG terminals are required for regasifying, storing, and distributing liquefied gas. In order to put LNG into consumption, a suitable infrastructure must be available. There are many stages in the transmission of LNG as an energy source until its final consumption.

The trade of natural gas in the EU through LNG requires high financing and investment projects, as well as the establishment of terminal facilities, compared to pipeline transportation. Additionally, the initiation of terminal installations is contingent upon the sufficient capacity of countries to set up LNG terminals. Simon Dekeyrel, a climate and energy analyst at the European Policy Centre, stated:

> *"Due to the Ukraine-Russia war, EU member countries have expedited new projects to increase the capacity of LNG terminals. It is observed that the capacities of not only LNG terminals but also FSRU vessels and liquefaction facilities are being enhanced. However, the construction and commissioning of LNG terminals are long-term processes that require significant financial investments"* (Energy Monitor, 2022).

The EU aims to align LNG infrastructure projects to enhance energy supply security and reduce political and economic dependencies. However, the adaptation of Europe to LNG is a long-term process. Currently, LNG has not reached a level where it can solely meet the natural gas demand of the EU. The war in Ukraine has increased the demand for US LNG from Europe. Aware of this, the US is extending contract durations, including in spot markets. However, the EU is setting gas storage targets until the necessary infrastructure for LNG within the EU is established (Wright, 2023).

There is a lot of uncertainty regarding the future of LNG within the EU. While aiming to use LNG as an alternative energy source to ensure energy supply security against Russia, the EU might inadvertently create LNG as a new area of energy dependence. Therefore, when examining the capacities of pipeline natural gas and LNG, it is observed that the longstanding onshore pipeline natural gas does not pose an extra cost for the EU and ensures the continuity of the gas flow. However, substantial funding and investment are required in Europe, where LNG capacity is relatively new. It is essential to ensure the geographical suitability for the energy route of LNG transported to ports via maritime transportation.

Consequently, the EU may encounter results in the future that fall below expectations concerning LNG. In addition to constructing LNG terminals, the EU also requires pipeline infrastructure for gas distribution. There needs to be sufficient import infrastructure to replace the pipeline supplied from Russia with LNG. However, apart from ongoing projects in the EU, there is not enough infrastructure in place.

CHAPTER IV

NATURAL GAS RELATIONS BETWEEN THE EU AND RUSSIA

As emphasized in the previous chapter of the thesis, energy resources are frequently used as a foreign policy tool. Notably, during political conflict and crises, methods such as cutting off energy supplies and implementing sanctions through bilateral energy agreements are employed to influence the economy of the energy-importing countries. Like other fossil fuels, natural gas has limited reserves in the world. Since Russia has half of the world's natural gas reserves, it uses its energy resource power effectively in its foreign policy. In contrast, Europe is a geography insufficient in terms of energy resources, so being an energy-dependent country causes it to face difficulties in foreign policy.

This chapter provides a historical perspective on the natural gas relations between Russia and the EU, examines how the EU is affected by energy crises, and discusses the political effects of the natural gas energy relationship. Additionally, it addresses pipeline diplomacy towards the EU through strategically placed natural gas pipelines at the center of Russia's foreign policy.

4.1. The Historical Process of Natural Gas Relations between the EU and Russia

Significant expenditures imposed an additional burden on the Russian economy during World War I, World War II, and finally, the Cold War periods.

Both military and development spending posed challenges to the Russian economy. However, the economic situation began to change with the emergence of natural gas production in the Soviet era, starting in the 1970s. Despite the challenges of the Cold War, natural gas played a crucial role in promoting economic development.

During the Cold War era, despite political, economic, and technological competition between states, bilateral relations in the energy sector, particularly in natural gas, began to develop between Europe and the Soviet Union. With the discovery of natural gas in Siberia, the Soviet Union obtained half of the world's total natural gas reserves. The Soviet Union not only met its internal energy demand but also entered the global energy market. The Soviet Union's natural gas relations, which started in the 1970s, continued to progress in a pro-Western manner. Energy relations established through natural resources not only enabled economic development but also enhanced relations with Europe (Schattenberg,2022,558). The first natural gas pipeline to Western Europe was completed in the upcoming years. As relations in natural gas between Europe and the Soviet Union progressed, pipeline projects were initiated in the 1970s, and natural gas trade agreements were signed (Newnham, 2011,135).

While the Soviet Union needed steel and technological infrastructure for its growing industrial sector, Europe's demand for natural gas was increasing. In this context, the interests of both sides were aligned. Gas contracts based on mutual interdependence were beneficial for both sides. The number of contracts between Western European private companies and Gazprom increased. Thanks to these contracts, a new sector in the energy market, namely natural gas, was established between Europe and Soviet Russia (Gustafson, 2020, 42).

The Soviet Union expanded its pipeline networks to transmit the surplus of natural gas to other countries. Natural gas started being used in the industry in Western Europe and replaced oil and coal. Europe turned to natural gas energy supply to reduce its dependence on oil. Natural gas contracts with Russia became an alternative to the oil energy source associated with the Organization of the Petroleum Exporting Countries (OPEC) (Dekeyrel, 2023, 171). Europe aimed to develop its industry by diversifying energy sources. For this reason, it accelerated investments in pipeline projects with the Soviet Union. During that period, the absence of natural gas supply interruptions and the smooth natural gas flow increased investments in other developing pipeline projects. Despite fluctuations in East-West relations in the 1980s, trade continued within the scope of natural gas contracts. In line with these developments, there was an explosion in European natural gas demand in the 1990s (Sussman, 1981).

With the establishment of the EU, Europe became a more integrated market. With the formation of the EU, Europe became a region that adheres to legal and regulatory principles and acts in line with strategies created within the union. After the collapse of the Soviet Union in 1991, the government, following Gorbachev's views, turned to improve relations with the West. Yeltsin (1994) stated that cooperation with the West would provide sustainable policies for both sides. During this period, relations with the West, especially in the field of natural gas energy, were developed. On the axis of Russia's foreign security policies, it focused on maintaining its relations with the West and the states that gained independence as a result of the collapse of the Soviet Union (IMF, 288). Natural gas energy relations, which supported the initial cooperation and partnership, became a region dependent on Russia as Europe's natural gas resources were insufficient for domestic consumption and increased natural gas energy imports. This situation caused disagreements among the EU member states and the inability to implement common strategies.

The Partnership and Cooperation Agreement signed in 1994 between Russia and the EU has led to positive commercial and political developments in their natural gas sector relations (Branitskiy,2021,156). However, effective sanctions could not be implemented despite the EU's condemnation and warning to Russia for regional crises and conflicts that violate international law and norms. The EU, particularly vulnerable to potential gas interruptions during crises, experienced natural gas supply cuts by Russia during the winter months in response to the Ukraine and Belarus crises, putting the EU in a difficult position.

Between 2000 and 2013, four events significantly impacted the natural gas trade between Russia and the EU (Caiser,2016,383). These events include the regional instability following the 2004 Ukrainian elections, Russia's desire to increase gas prices to the EU from 2006 onwards, the global economic recession in 2008-2009 and its economic impact on Russia, and finally, the natural gas export cuts to Ukraine and the EU by Russia in early 2009 (Schmidt-Felzmann,2011,578). The 2009 natural gas outage and ongoing trade and political disagreements between Russia and Ukraine undermined the EU's confidence in Russian gas. Russia's use of Ukraine as a transit route for natural gas exports increased geopolitical risks. Despite these challenges, the energy dialogue between Russia and the EU continues to shape the regional dynamics of natural gas energy cooperation (Dimitrova, 2010,3). In 2009, while the world was under the influence of the global economic crisis, Russia further strengthened itself economically and politically through energy trade. In this context, a stronger Russian dominance emerged in the European market (Sonmez & Cobanoglu, 2016, 83).

The close energy relations established between Europe and Soviet Russia until the 1980s were affected by many crises and political events in the 2000s. In this context, Russian- EU energy relations can be summarized as the crises in the region following the collapse of the Soviet Union in 1991, the increased integration of Europe with the establishment of the EU, Russia's policies to increase its influence targeting the West with the Putin government coming to power; and after 2022 Russian Ukrainian war the EU's efforts to reduce natural gas demand within the framework of energy security policies.

As a result of these developments, the EU no longer considers Russia a reliable energy supplier. Russia has aimed to reduce its natural gas imports in response to potential crises and threats.

4.2. Russian Pipeline Diplomacy Towards the EU

Pipeline diplomacy is a significant foreign policy strategy for Russia to increase its geopolitical influence. Russia, which has almost half of the world's natural gas energy reserves, aims to expand its sphere of influence by entering the markets of countries through pipelines. The importance of transporting natural gas through pipelines played a crucial role in developing trade relations between Russia and the EU.

The foundation of Russian diplomacy is based on economic development and progress. The growth of trade networks, increased tax revenues from natural gas, bilateral trade relations, and direct energy investments have contributed to the global expansion of the Russian economy. The economic growth driven by Russia's significant natural gas resources has led to centralization in both domestic and foreign policies (Oliker, 2009,106-107).

With Putin coming to power in the 2000s, a tendency towards more excellent centralization was observed in Russian politics. The energy dialogue between the EU and Russia that began in the 2000s reflects the multifaceted cooperation between Russia and the EU. While maintaining variable collaborations with the EU, Russia also strengthens bilateral collaborations with European states. In Russia, political centralization around President Putin and the prioritization of energy as the primary economic sector stand out (Zhiznin, 2010, 9). Putin's government has accelerated its entry into global markets. In 2000, Russia's oil and natural gas exports reached around 67%. Russia, which could not use the energy resources of the Soviet Union efficiently, expanded its market with new pipeline projects and bilateral trade agreements. Russia began to create energy-based foreign policy strategies (Maness and Valeriano, 2015, 6-7). Putin's government is pursuing an integrated policy in foreign relations to stimulate economic growth. A significant part of the Russian economy is based on the extraction and distribution of natural gas. Russia conducts its projects through monopoly state institutions instead of private companies and restricts private investments (Mankoff, 2009, 34). By revitalizing its economy through energy trade, Russia has created a stronger image as a richer and more developed state.

Natural gas imports have also increased along with Europe's natural gas demand, which has increased over time. With its gas fields and pipeline capacity, Russia is Europe's primary natural gas supplier. Political disagreements in Russia's foreign policy and discomfort with the EU's expansion process have also affected the natural gas energy trade. In this context, the EU has aimed to reduce its energy dependence on Russia by diversifying energy sources through initiatives and infrastructure projects for new energy sources (Mankoff, 2009, 84).

The significant features of natural gas diplomacy between the EU and Russia are geographical proximity, low-cost transportation through pipelines, and fluctuations in energy relations that have a long history (Chen et al., 2023,3084).

Despite the EU's policies to reduce natural gas supply, Russia maintains its position as a long-term potential supplier of the EU. Russia can easily meet the EU's domestic natural gas needs. In this regard, Gazprom CEO Alexey Miller stated that demand for Russian natural gas increased from 15 countries in 2021 and that Germany and Italy are their biggest partners in the natural gas trade. Also, He emphasized that Russia already has reserves that can cover high rates of global gas consumption (TASS,2022).

Russia's energy foreign policy can be summarized as follows: expanding the pipeline network to effectively use energy resources, strengthening the energy economy, and expanding the energy market zone (The Ministry of Foreign Affairs of the Russian Federation,2023). The direction of Russia's pipeline diplomacy is toward the European market. In this context, Russia significantly supports new strategic pipeline projects that provide access to the European market through constructed pipelines. Russia's natural gas pipelines reach all three regions of Europe. Pipelines in Central and Eastern Europe differ significantly from those in Western Europe, designed to be accessible from east to west. However, due to pipeline capacities and geographical conditions, it cannot provide equal distribution among regions. As a result, some EU member states are highly dependent on Russian natural gas and do not have an alternative energy supplier. The EU member states' natural gas demand and Russia's goal of dominating the European market have led to the initiation of energy dialogues covering several topics such as energy, politics, and economy. In this context, Russia has secured its dominance in the European market through pipelines, sometimes using it as a political advantage. Russia's strategy in natural gas is referred to in the literature as "carrot and stick" (Randall, 2011, 136).

The pipeline connections between Russia and the EU can be affected by a series of political crises and tensions. However, conflict events between Ukraine and Russia, especially, can create indirect effects, leading to a reduction in the EU's natural gas demand. To focus on past crises, natural gas supply disruptions and price disputes in 2004, 2006, 2009, and 2022 can be examined.

Ukraine is a transit energy country that transports natural gas from Russia to the EU through pipelines. The region faces issues such as increased natural gas prices, supply disruptions, and long-term energy indebtedness in case of any disagreement with Russia. Until the mid-2004, natural gas energy relations between Russia and Ukraine were progressing well. Agreements had been reached on various issues, including the supply of Turkmen gas to Ukraine and the restructuring of past financial debts. However, the political disagreements intensified in Ukraine due to the upcoming presidential elections. The political events within Ukraine, known as the Orange Revolution, have also influenced relations with Russia, especially natural gas relations (Sonmez, Bıçakçı, Yıldırım, 2015,661). As a result, Russia began to cut off natural gas supplies to Ukraine. In 2004, Gazprom exported approximately 150 billion cubic meters of natural gas to the European Union. About 40% of Russia's gas went to the EU (Stern,2006,2). The political turmoil between Russia and Ukraine has indirectly affected the EU.

In 2006, The political turmoil continued. Due to its debts, Ukraine faced high gas prices and could not secure additional gas in line with its demand in 2005, leading to a gas crisis. Due to Ukraine being a transit country, there were disruptions in the gas deliveries to the EU, and Gazprom could not supply enough natural gas to the EU.

In 2009, Russia claimed that Ukraine cut off the EU's gas, and in response, it closed the natural gas valves, preventing gas shipments from Ukraine to the EU. In response, Russia emphasized the need to intensify efforts on the North Stream and South Stream pipeline projects, which would bypass Ukraine in the natural gas supply to the EU (T.C. Avrupa Birliği Başkanlığı,2009).

When evaluating the crises between Russia and Ukraine, it is evident that the continuous political disputes between the two countries have implications for the natural gas energy trade. Natural gas serves as a tool of sanction within both nations. The crises between Russia and Ukraine have impacted foreign policy and regional dynamics. These crises have affected relations between the EU and Russia as well. As seen in the energy supply disruptions experienced by Russia and the EU, problems have arisen due to issues related to transit countries. Supply interruptions caused by political influences have not been directly imposed on the EU. The EU's natural gas interruptions have generally been attributed to technical malfunctions.

Russia's energy relations and economy have been adversely affected by these crises. In 2022, the emergence of the Russia-Ukraine War prompted the EU to avoid similar supply disruptions and sanctions. After Russia invaded Ukraine, the EU decided to stop its natural gas demand by 2030 by gradually reducing Russian natural gas. Natural gas energy relations between the EU and Russia have been affected by a crisis again. Aiming to take precautions against possible supply disruptions, the EU has included energy within the scope of a series of sanctions against Russia's invasion of Ukraine.

Pipeline projects had accelerated with the increasing demand in line with the natural cooperation that had continued since the 1970s. Russia has strengthened its position as an energy supplier in line with European gas routes, gas payments in line with long-term gas agreements and Foreign Direct Investment (FDI). The main focus of the pipeline projects was to deliver safe gas directly to Europe, bypassing the transit countries. For instance, during the 2004 Ukraine-Russia crisis, the Nabucco pipeline project was put forward and came to the fore as a priority project for direct gas flow to Europe. After 2006, when crises dominated, the South Stream pipeline project was established in 2007 (Dimitrova,2010,5). Today, pipeline projects such as Nord Stream I and II and TurkStream have been put forward to prevent Europe from being affected by Russia's region's crises and ensure safe gas flow. Pipeline projects are being conducted by the EU and Russia, especially Germany. In this context, the EU has been investing in pipeline projects for many years. The gas transportation capacities of the pipeline projects can easily meet the EU's natural gas energy demand. However, due to political factors, the EU aimed to reduce its dependence on Russia and transition to green energy. In this context, the EU is currently looking for alternative natural gas energy sources to meet its natural gas energy demand.

Due to the war between Ukraine and Russia, which started in 2022, the EU plans to reduce its natural gas demand from Russia by 2027. While alternatives for the Russian natural gas supply are being sought, it is evident that both sides also face legal challenges, considering the continuity of long-term natural gas agreements signed with Russia.

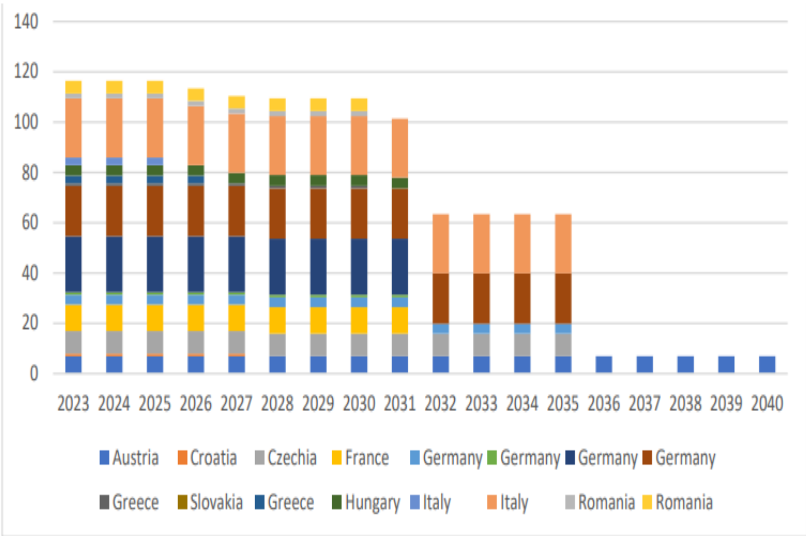


Table 4.1. The EU Natural Gas Supply Contract with Russia

Source : Cedigaz ,2023

Natural gas contracts prepared for long-term gas imports continue to remain valid. Namely, the EU is reducing natural gas supply by scaling back war and climate policies. However, the fate of the contracts to which it has committed, both politically and legally, is uncertain. Table 4.1. As shown in the EU's natural gas contracts, which aim to achieve zero carbon emissions by 2030, are valid until 2035. In particular, the maturity of the gas contract for Germany's pipelines connected to Russia until 2040 will bring many difficulties. 2027On the other hand, the continuation of gas contracts and the existence of the existing pipeline infrastructure have led to opinions that it may continue with the end of the war or direct gas flow (Cedigaz, 2023, 2).

In summary, the EU is trying to break its dependence on Russia by changing energy supply routes and reducing demand for natural gas. However, ongoing gas relations since the 1970s show this will not happen immediately. The EU's pipeline connections with Russia, gas contracts and the gas prices they have promised to pay continue their dependence. So much so that Russia has tied the EU to itself economically, politically, technically, and legally with its pipeline diplomacy; under all these obligations, the EU aims to develop its infrastructure by investing in alternative energy sources. Although alternative energy sources provide diversity as an energy source to the EU, they show that they create a new area of energy dependency with additional financing obligations and new natural gas contracts.

CHAPTER V

THE US LNG: AN ALTERNATIVE ENERGY SOURCE FOR THE EU

Since the discovery of natural gas, it has mostly been transported through pipelines. However, with the emergence of LNG over the last 20 years, the natural gas energy trade has transformed. Both the global energy market and the pipeline natural gas are being affected by this transformation.

The increasing demand for LNG and the expansion of trading capacity can be classified into three developments: Firstly, there was a rise in LNG demand following the closure of all Japanese nuclear reactors due to the Fukushima disaster in 2011. Secondly, the US entered the global LNG market as an LNG exporter in 2016, with the expansion of its LNG terminal infrastructure. Thirdly, the redirection of the EU towards US LNG due to the Russia-Ukraine war starting in 2022 reduced the demand for Russian natural gas (Hall and Marshall,2023, 15).

After the US shale gas revolution has enabled the transportation of natural gas in the form of LNG in recent years. With this transmission of energy landscape, countries with high demand for natural gas have turned to LNG imports. After liquefied natural gas is transported by ships, it can be exported to regions where pipeline infrastructure is unavailable by regasifying and distributing it upon delivery to the country. Another reason for the increasing demand for LNG is the uncertainty created by supply disruptions in pipeline networks.

LNG is seen as an alternative energy source to reduce dependence on natural gas and increase energy source diversity. The growing energy demand from Europe has played a significant role in increasing the importance of LNG in the natural gas market. The crisis and conflicts between Russia and Ukraine prompted the EU to seek reliable energy suppliers within the framework of energy supply security. In recent years, the EU has accelerated its energy supply security policy and increased financial investments. Recognizing the challenges in natural energy trade, the US is a market with opportunities for LNG exports.

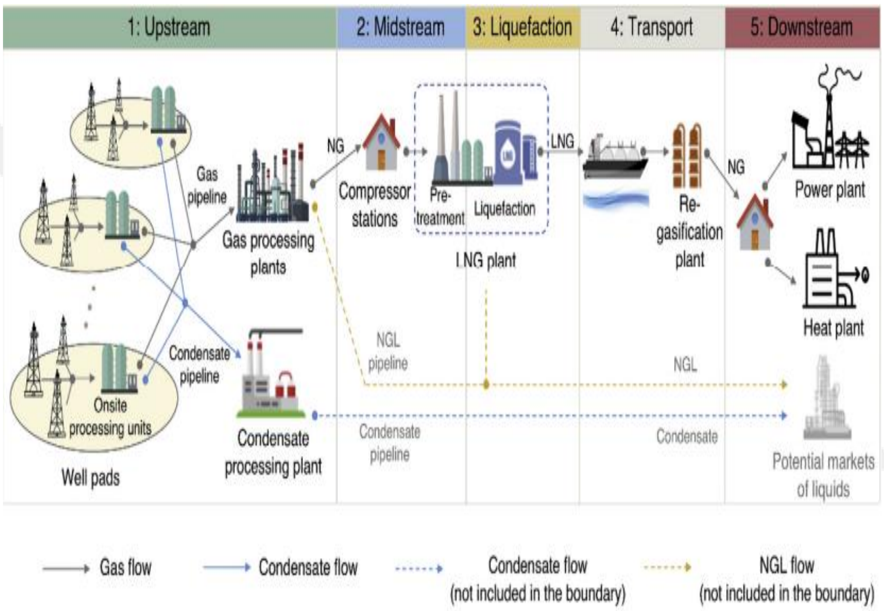
The emergence and establishment processes of LNG as an alternative energy source in energy supply security, constitute the main focus of this chapter. The EU's energy supply security policies discuss the advantages and drawbacks of the emerging US LNG as a replacement for Russian natural gas. Additionally, the potential political impacts of LNG on energy dependence are examined.

5.1. LNG Production Process and Major Exporting Countries

The process of exporting LNG in the energy market, from the extraction of natural gas to regasification at the destination terminal and distribution through the pipeline system, is referred to as the LNG value chain (Don and Zhu, 2011, 219). This chain consists of five stages: 1) upstream, 2)Midstream, 3)Liquefaction, 4) Transport and 5) Downstream (Figure 5.1).

Firstly, natural gas is extracted from underground rocks; this process is referred to as upstream. Secondly, the extracted natural gas is conveyed to liquefaction plants. Thirdly, natural gas is liquefied at low temperatures, necessitating the establishment of liquefaction plants. This process significantly reduces the volume of natural gas, making it suitable for storage and transportation. Fourthly, LNG is transported to ports by sea using loaded ships. Fifthly, LNG brought to the energy market by ships is regasified in facilities before distribution. Natural gas is conveyed to power and heat plants through pipelines for delivery from these facilities (Figure 5.1). These processes can take place either offshore or onshore, but the transportation of LNG is exclusively done by sea.

Figure 5.1. LNG Transmission Process



Source: ScienceDirect, 2020

When examining, the process of LNG entering the natural gas energy market, it reveals that establishing LNG terminals requires appropriate infrastructure and field development efforts for both LNG-exporting and importing countries. The construction of liquefaction plants, the establishment of ports, feasibility studies, procurement of LNG transport ships, and the expansion of pipeline networks for natural gas distribution are crucial for enabling LNG trade. LNG trade is a long-term process requiring a prominent financial infrastructure (Jong, 2023).

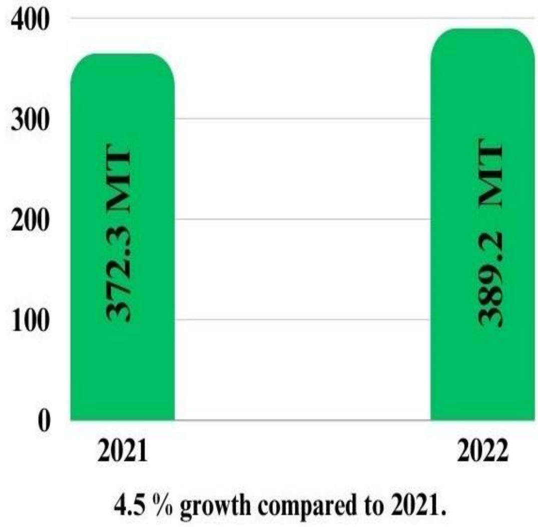


Table 5.1. Global LNG Trade Rate between 2021 and 2022

Source: GIIGNL, 2023

The emergence of LNG dates back to the mid-20th century, but its active role in the energy market has developed in recent years. Global LNG trade increased to 372.3 MT (approximately 570 bcm) in 2022, an increase of 16.9 MT(approximately 36.1 bcm) compared to 2021 (Table 5.1.).With the increasing demand in the global energy market, LNG imports have also been on the rise. The reason for LNG being considered as an alternative to pipeline natural gas is the presence of spot natural gas prices, relatively shorter-term contracts, an increase in spot LNG cargoes, investments by states with LNG energy resources to increase the number of LNG terminals, and the expansion of the transportation sector (Hartleya and Medlock, 2023,4). LNG has the potential to bring previously inaccessible gas reserves to market, but it requires developing technological infrastructure. Several new liquefied terminal projects started between 2015 and 2020 (Colombo, Harrak, Sartori, 2016,104).

LNG has made the natural gas energy market more competitive. Unlike traditional supply chains, the marketing of LNG through private companies has formed a market structure with diverse energy actors. With the advancement of technology, a foundation for the development of LNG extraction and distribution has been established. According to the International Gas Union (IGU) report, as of 2023, the Global LNG market has demonstrated growth with 20 export markets and 48 import infrastructures (2023).

The US, Australia, and Qatar are the top three in global LNG trade. Russia ranks fourth in LNG exports (IGU, 2023, 19). These countries expanding their LNG export capacity are accelerating their projects for this new area in the global energy market. However, current LNG export data is uncertain due to shipping logistics, and the top three countries' ranks are changeable (CEW,2022).

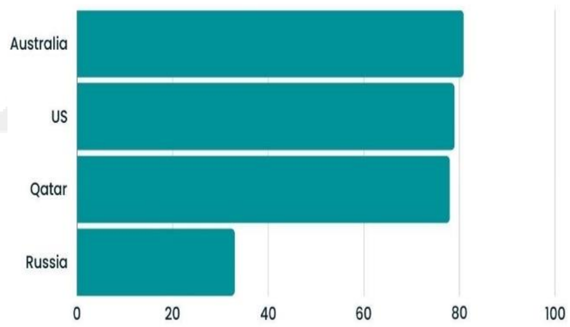


Table 5.2. Global LNG Trade Countries in 2023

Source: IGU Report, 2023

According to the International Gas Union Report(2023), Australia has the highest LNG export capacity, with 80.9 MT. The US came in second with 80.5 MT, and Qatar remained third with 80.1 MT. Russia is the fourth with 33 MT. The higher LNG exports from the US compared to other past years is due to its geographical proximity and transportation advantage, allowing access to the European and Asian markets via maritime routes. Additionally, the US is favored by countries with natural gas demand due to its ability to create relatively shorter-term and flexible LNG contracts in the spot market. On the other hand, Australia is more focused on the Asia-Pacific region than the European market due to its geographical location (GIS, 2023). While Russia exports natural gas energy resources through pipelines, it recently established LNG terminals as an LNG exporter to enhance its influence in the LNG energy market. Russia has an advantageous position as the largest natural gas energy source and strategically transports it to Europe and Asia via the Northern Sea Route (NSR) (JPT,2021).

Considering all these, the US has entered the EU market as a potential LNG exporter. In 2022, one of the reasons for the increase in LNG is the rise in demand from the EU. The EU imported 126.6 MT of LNG in 2022. The EU mainly turns to LNG to reduce reliance on the Russian pipeline (IGU,2023). Despite being the largest natural gas exporter to Europe until 2022, due to the increased demand for LNG after 2022, Russia is now in competition with the US LNG, providing an alternative to the EU's gas diversification policies. However, advanced infrastructure is necessary to establish dominance in the EU energy market. Russia has long-standing infrastructure in the European region with its established pipelines. In this section of the thesis, the US potential in the global LNG market has been examined.

5.2. The US LNG Export to the EU

Before the shale gas revolution, the US constructed LNG gas terminals to import to meet its natural gas demand. The LNG terminals built after the discovery of gas provided an advantage, allowing it to export surplus LNG internationally after satisfying its domestic gas needs (Dreyer, L., Gerald Stang, G., 2013). Following shale gas extraction, the US expanded its LNG volume and accelerated the construction of LNG terminals, which also influenced the global gas market. The US exports LNG to 44 countries (US Department of Energy, 2023).

The first large-scale LNG export occurred in 1959, transmission for the U.K. The 1970s witnessed a significant expansion period for LNG projects worldwide. Technological advancements in LNG production and transportation were recorded in the 1980s and 1990s, incorporating processes that made LNG more economical and improved storage and transport (Putter, 2020). The US expanded its LNG projects to leverage this advantage in the gas trade. In 2021, the US increased its total LNG capacity by 40% compared to 2020 (Schneider, L., 2021).

The primary reason for the significant increase in LNG exports from the US to Europe is the impact of the Russia-Ukraine War that began in 2022. With the outbreak of the war, the EU energy policies shifted towards ensuring energy supply security. Therefore, diversification of energy sources became the initial step in these policies. When examining the US LNG exports to the EU before and after the war. With the Russia-Ukraine War in 2022, the EU is reevaluating energy alternative opportunities to avoid facing another energy crisis and potential supply disruptions. Therefore, it aims to increase LNG demand, reaching sufficient gas levels for Europe compared to pre-2022 data. The goal is to replace the potential complete cutoff of natural gas from Russia, which could occur due to the war, by increasing LNG.

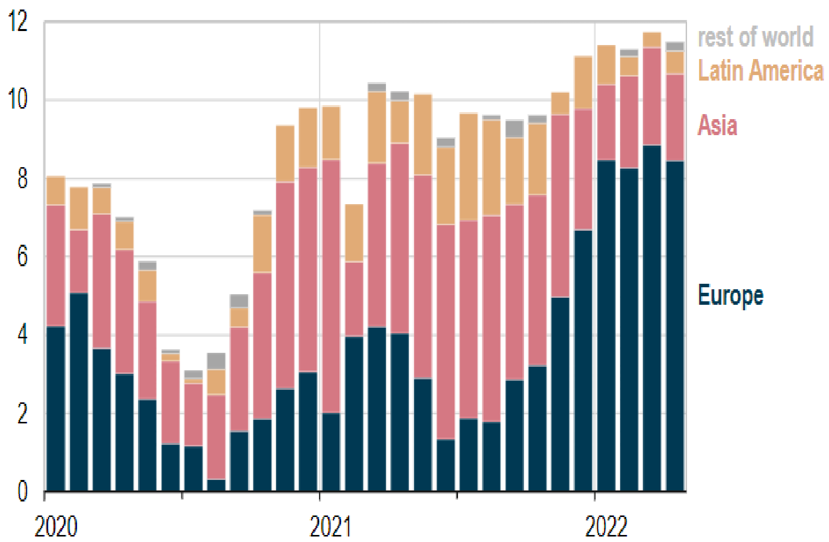


Table 5.3. The US LNG Export between 2020 and 2022

Source: EIA, 2022

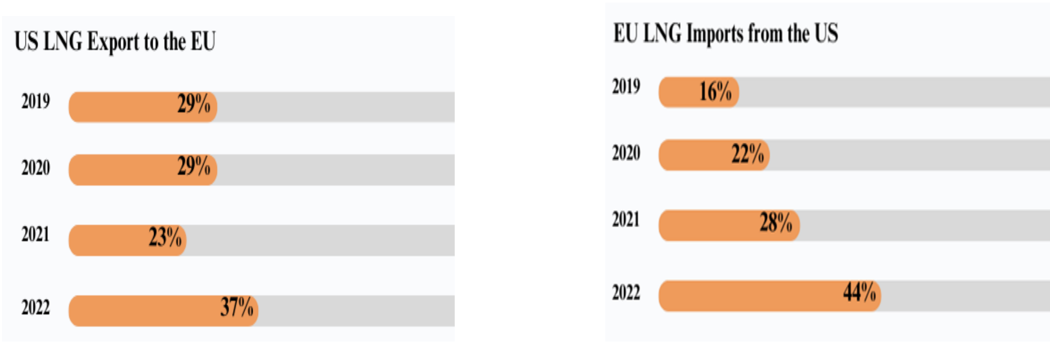
In recent years, particularly after 2020, the United States represents 32% of global LNG exports. As of 2023, the US has supplied 50% of the EU's total LNG imports. In 2022, the US witnessed a notable increase, exporting 44% of the total LNG shipments to the EU, compared to the previous years figure of 28% in 2021. (European Commission,2023).

After 2022, the US experienced a surge in its LNG exports to the EU, as indicated in Table 4.2. That same year, the US notably surpassed its target of supplying an additional 15 bcm of LNG to the EU, reaching an export volume of 56 bcm, a substantial increase from the 22 bcm exported in 2021. As a result, the US has become the largest LNG exporter to the EU, constituting more than 52% of the LNG export target between the US and the EU (European Commission, 2023). The US, the largest LNG supplier to the EU, exports LNG to 11 EU member states. The states that import the most from the US are France with 4.2 bcm, the Netherlands with 2.8 bcm, and Spain with 2.5 bcm (European Commission Quarterly Report, 2022). On the other hand, Other European member states are undertaking infrastructure projects to meet the demand for LNG.

With the impact of the Russian-Ukraine war in 2022, the number of cooperation talks between the US and the EU has increased. Energy Security Task Force meetings between the EU and the US have been established. In the meeting held in 2023, the LNG capacity of the EU and the US was assessed. Considering the US is currently the largest LNG supplier to the EU, its position in diversifying energy sources was evaluated. In 2023, it aims to reduce it further to 40-45 bcm. The Task Force continues its meetings in the forms determined by President von der Leyen and President Biden (EU-US Task Force On Energy Securıty, 2023). President Biden, in a Joint Press Statement with the President of the European Commission, Ursula von der Leyen, expressed that the US will supply an additional 15-15-15 MMT to reduce the EU's gas demand, emphasizing that these agreements may ensure energy security, economic stability, and national security (White House, 2022).

In a scenario without the impact of the war, it is possible to say that the demand for LNG in the EU was progressing steadily between 2019 and 2020. Specifically, the increase in imports of LNG from the EU, which was 16% in 2019, 22% in 2020 and 28% in 2021, reached 44% in 2022 (Figure 5.2.). This has currently opened the US to the EU energy market. The US redirects LNG exports to the EU to address the energy supply gap. The European market is economically favorable for U.S. LNG resources in this context. In this context , The EU, utilizing the existing LNG terminal capacities, has also initiated additional LNG terminal projects to meet its growing demand (Chapter 2.5.b).

Figure 5.2. LNG Trade between the EU and US from 2019 to 2022



Source: European Commission,2022

When all these data are evaluated, the EU and the US aim to break Russia's energy dependence on the European energy market by developing cooperation within the framework of LNG. The US' goal of entering the European market and the EU's LNG demands in line with this desire show that mutual interests are protected.

5.3. The Evaluation of US LNG Export for the EU Energy Security Policy

As of 2022, the increased demand for LNG by the EU has shifted the dynamics in the global LNG market, leading to a transformation and an acceleration in the number of new LNG installation projects. The demand for LNG, influenced by the Russia-Ukraine War, experienced a change in favor of exporting countries. The most evident example of this is the unprecedented increase in demand for US LNG.

The US is aware of the potential of the European energy market. The state is further strengthening by entering the European market economically and politically. With the increasing export of US LNG to the EU, the US has established its influence in its supply regions.

Firstly, when evaluating EU and US LNG relations within the scope of the transition to clean energy. The EU member states plan to reduce natural gas consumption by 50% by 2030 as part of the REPowerEU and "Fit for 55" green energy transition goals package. In this context, the EU uses natural gas as a transitional energy source during this energy transition process. However, Matsumoto and Najm (2020) identified in their study that the shift to green energy reduces LNG demand. They emphasize the necessity for countries importing LNG to diminish reliance on natural gas, facilitating the transition to green energy and promoting renewable sources (7). Simultaneously, the EU's investments are in the installation of LNG terminals. The EU needs to decrease its demand for natural gas to achieve these goals. However, in 2022, the EU demanded record-high LNG, leading to investments in LNG regasification and port installation projects.

While it is expected that the EU targets to reduce natural gas usage in the first seven years of its green energy goals, making long-term LNG contracts due to LNG demand is not in line with the transition to clean energy. LNG sales are typically conducted for 20-25 years or on a take-or-pay basis (USEA,n.d.). With the increasing preference for LNG, gas contracts are also rising. In this case, the duration of gas contracts extends beyond the year 2030.

In energy dependence, a politically hegemonic power state like the US in the EU energy market implies a new form of energy dependency. The US has never explicitly endorsed Russian influence in the European market. With a target towards the European energy market, The US has exhibited a stance against new pipeline natural gas projects between the EU and Russia, such as TurkStream and Nord Stream 1 and 2, in contrast to supporting the EU's policies to diversify energy suppliers.

The high demand has redirected US LNG to the European market, limiting the supply to other markets. For other countries, this has resulted in high spot prices and increased demand for natural gas. Consequently, the US has chosen the EU over other markets, leaving global LNG exporters to focus on other countries. Although the US has accelerated LNG projects for Europe, future developments could adversely affect the fate of these projects due to the lengthy procedural requirements for LNG exports, as explained in other sections.

When examining the technical aspects of the installation phase of LNG terminals, the infrastructure needed to transport LNG to the EU is insufficient to sideline the Russian Natural Gas Pipeline completely. Establishing an LNG facility takes 3-5 years, and ensuring feasibility and securing investors are essential (IGU,2023). The installation of LNG projects in the energy market equation may occur during this time, posing risks for the EU's LNG imports. LNG terminals undergo a series of risk assessments during the establishment phase. Primarily, securing financing for the project necessitates finding an investor; if the project is weak and complex, finding an investor becomes challenging. Additionally, the higher the investment in the project, the more it may impact LNG prices to safeguard the investor's return. In this context, ensuring the reliability and sustainability of an LNG project is crucial.

US LNG terminals operate at total capacity to ensure the uninterrupted progression of the five stages of LNG transportation. However, geographical and weather conditions can impact terminal capacity. LNG, mainly when transported only by sea, is susceptible to damage from storms and waves. Therefore, maintaining high-level security for both sea and land connections is crucial. For example, an explosion at the US Freeport LNG facility on June 8, 2022, led to a cessation of activities, resulting in an 11% reduction in US export capacity, which the facility could not fully recover (Ryan, 2023, 285). Encountering such a situation again is highly likely for exporting and importing states. Therefore, regular checks and seamless energy flow with total security measures for LNG terminals are essential.

The economic impact of LNG contracts in the context of high inflation is that the EU LNG importers have maintained a stable LNG supply for future years by entering into long-term agreements with US companies. The EU may consider predictable demand quantities and inflation in long-term LNG contracts. High interest rates due to inflation each year become a substantial financial burden for LNG terminal installations.

Europe spent decades building pipeline-based infrastructures to access affordable natural gas. The EU's decision to completely sever ties with Russian natural gas in the globally integrated market, where energy and the economy are interconnected, presented numerous challenges for revitalization and development. For instance, Germany had to close many facilities due to excessive costs. (Financial Times, 2023). The reduction in demand for natural gas pipelines from Russia and support for sustainable energy indicate that creating a new energy landscape may require more years.

US LNG is a viable alternative for the EU's supply security and supplier diversification policies. However, increasing dependence on US LNG can lead to several disadvantages. These challenges of US LNG for the EU can be summarized as follows: the emergence of a new energy dependency zone; the supplementary financial strain on existing and proposed LNG terminal projects and construction’s long-term duration; inadequate focus on transitioning to renewable energy and reduction carbon emissions, establishment of geopolitical interdependence; adverse environmental effects of operational LNG facilities, price fluctuations in the LNG market.

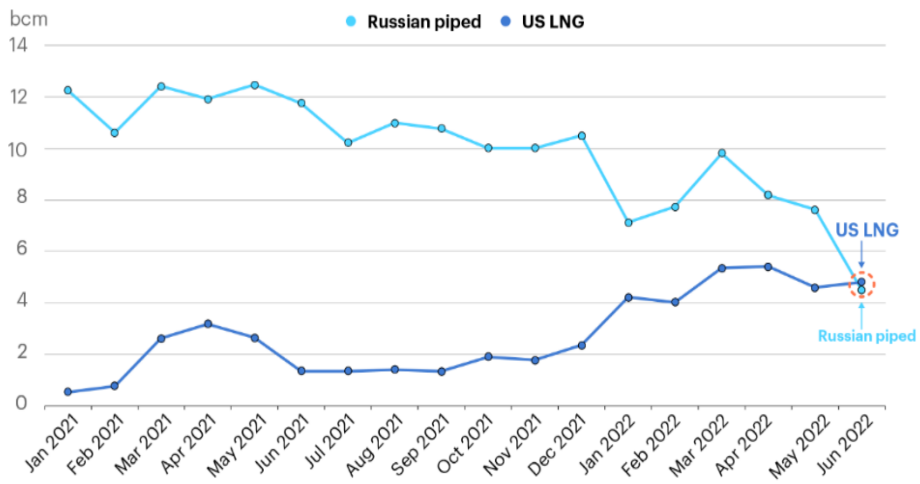
In this context, it remains uncertain whether LNG, a relatively new natural gas energy field, may meet the long-term natural gas demand. Extended construction processes for LNG terminals expose risks such as lower or unattainable profits, a shift in demand away from LNG, and changes in energy policies. Therefore, continuing dependence on natural gas and LNG usage in the future may pose risks and lead to disputes among EU member states.

5.4. The Competition between Russian Pipeline Natural Gas and US LNG in the European Energy Market

The Russian pipeline natural gas and the US LNG, which increases demand, stand out as competing participants in the European energy market. The EU energy policies aim to reduce dependence on Russia, a long-standing natural gas supplier to the EU, and increase its demand in the growing energy market with the influence of the emerging global LNG market, particularly in the context of US LNG. The EU energy policies have an economic basis and prioritize energy security and foreign policy issues. This section examines the positions and future of these two states in the European energy market by comparing the Russian natural gas pipeline and US LNG in political, economic, and technical terms.

The EU, which reduced its natural gas demand to Russia, increased its LNG imports in 2022 by turning to US LNG (Figure 5.3). International Energy Executive Director Fatih Birol noted that the EU imported more US LNG than Russian pipeline natural gas in June 2022 for the first time (Oil Price,2022). While Russian pipeline imports are decreasing, demand for EU LNG is increasing. With the decrease in the supply of Russian natural gas, the EU is reducing its natural gas consumption. The decline in the EU's natural gas demand for the Russian pipeline against LNG for many years also affects the European natural gas energy market. Namely, while the EU is decreasing its natural gas imports, mainly due to the Russia-Ukraine War, it is trying to control domestic consumption.

Figure 5.3. Russian Pipeline Natural Gas and US LNG Compared in the European Gas Market between 2021 and 2022



Source: International Energy Agency

Until 2022, Russia was the primary energy supplier of natural gas pipelines. The US aimed to enhance energy relations with the EU through LNG in 2016, but it achieved its highest LNG exports to the EU in 2022, accounting for 44% of the total, driven by the increasing demand for LNG starting in 2021. LNG is considered a viable alternative to address the natural gas energy supply gap (IEA,2022).

This situation means that the two states are facing each other in the European market regarding natural gas energy resources. The EU pipeline is a geography covered by natural gas infrastructure. On the other hand, with the entry of LNG into the European market in recent years, new LNG infrastructure projects have been put into operation to import natural gas. The competition between these two energy-exporting states in the European market may destabilize the energy market.

Since the 1980s, EU member states are constructing LNG terminals to utilize US LNG despite the well-established ties and infrastructure between Russia and the European energy market. This situation poses an economic and financial burden and contradicts EU energy supply security policies. Before the 2022 Ukraine-Russia War, Russia was aware of its dependence on Europe's natural gas demand, and although there were crises for both sides in other areas, the natural gas trade continued, and new pipeline projects were even being constructed.

While the import rates of Russia's pipeline natural gas are decreasing in 2022, Russian LNG exports are increasing. Specifically, Russia's LNG exports rose by 44% in 2022 compared to 2021. The increase in Russia's LNG imports has led the EU to spend more on Russian LNG (Ryan, 2023, 275). Lithuania, Estonia, and Finland have banned Russia's LNG exports in 2022 due to sanctions imposed. According to a report by the Financial Times (2023), Belgium, Spain, and France supply gas from Novatek through Yamal LNG, a major LNG exporter in Russia. At the beginning of 2023, the EU has imported 17.8 bcm of Russian LNG. In this context, Russia has become the second-largest LNG supplier to the EU after the US. While Gazprom manages pipeline natural gas exports from Russia, Novatek manages LNG exports. In this context, the impact of Russian natural gas pipelines on the European energy market is decreasing. In contrast, the effects of LNG exports are increasing, creating a competitive area between the US and Russia in the LNG imports of the EU. The presence of hegemonic powers such as the US and Russia in the European market may intensify competition, potentially making the EU market more aggressive (Ritz,2019,215). This comparison of the advantages and drawbacks of these two states in the EU natural gas market may reveal a more profitable choice.

Technically, Russia transmits natural gas through intercontinental pipelines to regions with high natural gas energy demand, such as Europe and Asia. In past years, Russia was the only supplier capable of adequately meeting Europe's natural gas demand. However, with the emergence of US LNG in recent years, there is an opportunity to diversify the energy supply. When Russia was the largest natural gas supplier, the US focused primarily on meeting its domestic needs and had to import energy, even prioritizing meeting its internal demand. In the early years of the emergence of US LNG, it primarily focused on meeting its domestic demand and exported the remaining surplus to countries such as Canada and Mexico (EIA, 2023). Therefore, limited natural gas trading occurred between Europe and North America. Therefore, there was minimal competition between the two states regarding the European energy market.

In Russia, natural gas extraction and distribution are conducted by state-owned companies. Gazprom, a dominant company, is the major player in natural gas distribution in Russia and is a global company supplying gas to various regions, especially in Europe. Gazprom is an energy company that conducts its trade in line with Russia's external energy policies. (Jirušek and Kuchyňková, 2018, 823). Natural gas serves as an economic financing source for Russia and a political tool in foreign policy and diplomacy. To mitigate the impact of these cuts, especially since Ukraine is a transit country, Russia has developed pipeline projects such as Nord Stream and TurkStream to transport gas directly to Europe. On the other hand, the initial extraction of shale gas and the subsequent development and implementation of these projects are undertaken by private companies in the US.

Russian pipelines have been stationed in countries for many years, eliminating the need for significant infrastructure and technology for importing and distributing natural gas. The introduction of LNG to the European market requires the construction of new ports and existing facilities. On the other hand, US LNG offers market mechanism-indexed natural gas prices to importing countries, and the number of routes is increasing with various transportation methods. This causes fluctuations in gas prices without being indexed. Global LNG prices are insufficient to compete with Russian natural gas prices in the global energy market. High inflation and technical costs require additional financing for countries (Albritzo & et al., 2022, 3).

Richman and Ayyılmaz created the scenarios from game theory about competition between Russia and the US in the European energy market equation have the following negatives for the future of the European energy market: Reactions shown by the US to pipelines in past years to protect its market power have had an impact, especially where it dominates LNG terminals (2022, 3). Similar to Russia's political policies with pipeline natural gas, the US may also exhibit LNG as a policy tool for foreign policy. This implies energy dependence on the supplier. In the event of crises or technical issues, the EU may again face supply disruptions from the US.

In conclusion, supplier diversification strategies are the correct choice for future EU energy supply security. The EU is geographically an insufficient region for energy sources, so it needs to establish equilibrium between Russia and the US to avoid meeting any supply disruptions. In this context, constantly changing external energy policies make it difficult for the EU to respond promptly to its energy security challenges. Strengthening its internal energy sources and adopting a progressive approach to the political, economic, and technical aspects of new energy projects are crucial for energy supply security.

CHAPTER V

CONCLUSION

The European Union's natural gas energy market has undergone a natural gas transformation in recent years. This thesis discussed the transformation of the EU's natural gas energy market, focusing on the advantages and challenges of transitioning from Russian natural gas to US LNG in the context of EU energy security.

The thesis is divided into three main sections: first, the EU's natural gas demand and energy security policies; second, energy relations between Russian natural gas pipelines and the EU; and finally, US LNG as an alternative energy source. In this context, an analysis of natural gas energy statistics and EU natural gas demand between 2019 and 2022 concluded that the transition from Russian pipeline natural gas to US LNG brings political, economic, and technical challenges.

The introduction of the thesis initially defines the concept of energy security and provides insights into the energy security policies of the EU regarding natural gas demand. Subsequently, the reasons for the EU’s demand for natural gas are outlined, establishing a connection between energy security policies and the EU's natural gas consumption. The impact of the concept of energy on International Relations studies has been evaluated through an examination of energy dependence. In alignment with the conducted literature reviews, it has been observed that the energy relations between the EU and Russia have evolved from symmetric dependence to asymmetric complex interdependence.

The literature review showed a standard definition of energy security in international relations could not be developed. The definition of energy security varies from country to country. While energy-exporting countries focus on economic policies such as efficient use of energy resources, economic development, and an energy market, energy-importing countries concentrate on political issues such as affordable energy, reliable energy suppliers, and reduced energy dependency. In this context, energy security policies can be summarized as establishing the energy supply chain, easy accessibility to energy resources, affordable and sustainable energy resources, and the energy resource being sufficient and suitable for social demand.

When examining the concept of energy security with EU energy policies, it is observed that EU energy policies are shaped by climate and environmental policies, ensuring sufficient energy supply for society and diversification of energy sources and suppliers.

Analyzing the process of EU energy policies, it is evident that the main focus is on the issue of energy dependence. Energy dependence occurs when a country's energy source imports exceed energy exports. Therefore, the EU has turned to alternative energy sources and diversification policies to reduce energy dependence.

This thesis examined the EU's annual natural gas consumption and production rates, taking the EU energy security policies as a framework. The findings of the thesis indicate that the EU's natural gas production is decreasing every year. When analyzing the natural gas consumption rates in the EU, an increase in demand was observed, especially after 2020, while this increase decreased and fluctuated in 2022, concerning clean energy transition and zero carbon emission goals. The EU imported much of its natural gas energy demand from Russia. Various crises and conflicts influence natural gas energy relations between the two sides. However, with the outbreak of the war between Russia and Ukraine in 2022, Russian pipeline natural gas demand has experienced a significant decrease to ensure energy supply security.

Due to the continuous fluctuation in the demand for natural gas energy and its susceptibility to political events, this thesis conducts evaluations based on 2019 and 2022 data. In light of this data, the positions of Russia and the US, both crucial for EU energy security, were assessed regarding energy dependency in the EU energy market.

This thesis aims to present the advantages and drawbacks of the transition from Russian natural gas to US LNG and compare how to balance energy dependency between the two countries by ensuring natural gas energy security. Therefore, the thesis explains the EU's policies to reduce Russia's natural gas demand. It has been observed that these policies were implemented more harshly and quickly after 2022. On the other hand, although the EU achieved its gas storage targets for winter, it turned to US LNG, increasing its demand from 21% in 2019 to 44% in 2022. The historical process of LNG, a new energy trade for the EU and the US, is relatively recent. LNG trade, which gained momentum in 2016, is increasing for both sides. However, when IEA(2023) data is examined, it is seen that LNG demand increase more steadily before 2022.

One of the research questions in this thesis is, “Within the scope of EU energy security, will a new area of energy dependency emerge with the increase in demand for US LNG?.” Within the scope of this research question, the historical process of Russia and the EU in the natural gas field was examined to gain an overview of the LNG energy relations between the EU and the US. When reviewing the data, it is observed that the US has the capacity to connect itself to the European market. Technically, scenarios can be formulated where establishing LNG infrastructures within the EU reflects long-term political collaborations, creating scenarios for new energy dependencies. The energy relations between Russia and the EU, which started in the 1970s, were remarkably close but fluctuated after 2000 due to political events. At times, the EU was exposed to natural gas supply interruptions. In this context, EU and US LNG energy cooperation is currently in the development stage. However, with the increasing demand for LNG in the coming years, energy dependency becomes inevitable for the EU. The presence of a hegemonic power state like the US in the European market may create a risk to the European energy market.

This thesis examines the EU and US LNG energy trade from political, economic, and technical perspectives and its effects on energy security. LNG trade is multi-staged, consisting of five phases: natural gas extraction, gas liquefaction, transportation to overseas countries, unloading at ports and regasification, and distribution. Technological equipment and infrastructure are necessary for LNG trade. Due to the long-term use of natural gas pipelines in the EU, LNG infrastructure is limited. Some EU member states are constructing new LNG gasification terminals and regulating their port infrastructures, which takes approximately 3-6 years to complete. LNG infrastructure adequacy varies from country to country among EU member states. While the infrastructure for LNG increases in countries with sufficient demand, some continue to use Russian natural gas pipelines. In this context, LNG energy policies cannot demonstrate a comprehensive approach.

On the other hand, when examining an LNG trade economic perspective, a substantial financing source is required because LNG terminals necessitate technological equipment. Finding investors and providing additional financing is essential for the continuity of LNG projects. Furthermore, the prolonged duration of LNG terminal installation and LNG trading through long-term contracts pose an economic disadvantage for the future of EU natural gas energy demand, given the prevalence of high inflation. LNG prices are anticipated to increase due to the high financing of investments in LNG.

In the thesis's comparative analysis of natural gas infrastructure, the current presence of Russian pipeline natural gas facilitates its flow into the EU without additional infrastructure financing. On the other hand, the installation and infrastructure requirements of US LNG cause natural gas demand not to be met quickly. The EU currently meets demand from existing LNG terminals and their gas storage, but it is insufficient.

In light of all these evaluations, completely abandoning the Russian pipeline natural gas, triggered by the Ukrainian war, may create economic and technical difficulties. The EU uses natural gas as a transition fuel within its clean energy transition policies because it produces relatively less carbon emissions than other fossil fuels. Therefore, the importance of natural gas in installing renewable energy systems is critical. The EU has started to supply a large part of its natural gas demand from LNG. However, the EU aims to minimize natural gas consumption by 2030, and the continued demand for LNG contradicts climate policies, considering the long-term contracts of LNG and installing LNG terminals for long-term use.

By EU energy supplier diversification policies, the EU is required to invest in its energy infrastructure. However, when examining 2022 LNG data, it is seen that the demand is exceptionally high. These rates pose a risk for the EU to develop dependence on a single supplier again.

In conclusion of this thesis, Natural gas is not only a means of consumption source for the EU but also a critical issue in pursuing a more independent foreign policy and reducing energy dependency within the framework of energy supply security. The geographical constraints on natural gas energy reserves for the EU are limited; therefore, importing natural gas is necessary. However, it is crucial that natural gas import rates remain reasonable for energy dependency and that the EU focuses on developing its energy resources. It is acknowledged that the EU implements its energy security policies in unity and harmony. In this context, imports of US LNG occur at alternative sources without completely abandoning the use of Russian natural gas pipelines. Thus, a balance can be established between the two countries in case of potential risks and political fluctuations.

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