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MSc in Energy: Strategy, Law & Economics

Master's Thesis:

"The energy relationship between Russia and Europe"

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Abstract

The historical evolution of the energy relationship between Russia and Europe, from Cold War up to the break after 2022, is examined in this thesis. Furthermore, the way this shift reshaped the EU's security of supply, market design and decarbonisation pathway is analysed. By using official statistics, policy documents and academic literature, the thesis maps how interdependency grew around long-term pipeline contracts. It also identifies the episodes that exposed structural vulnerabilities and the broader framework of diversification and energy transition that was triggered by the 2022 war in Ukraine, resulting in the REPowerEU package. It is shown how energy price shocks, storage dynamics and reliance on imports led to structural responses in the EU framework. Specifically, internal market rules, reverse-flow systems, interconnections and storage obligations are included in these responses. They were complemented by the Green Deal that directs investment to renewables, grids and flexibility. Moreover, transatlantic dynamics are taken into account. It is shown how flexible US LNG, alongside with Europe's regasification capacity and market integration, have provided short-term flexibility. Thus, Russian pipeline volumes could be gradually replaced and storage to be refilled. However, it is expected that gas demand will be in decline because of the increase in electrification, efficiency and environmental protection. Finally, the potential risks and benefits of a limited, conditional re-engagement with Russian energy supply are evaluated. It is seems that Europe's path forward relies on further electrification by domestic renewables, stronger grids and cross-border connections. The importance of demand-side flexibility is also highlighted, with gas expected to be in a declining, backup role in the future.

1 Introduction

Europe's energy policy does not only deal with energy price issues. It lies at the intersection of security, sovereignty and the EU's ability to achieve strategic autonomy. The most characteristic case is Europe's long and complex energy relationship with Russia. It was built on pipelines and long-term contracts, shaped by commercial interdependency and security concerns. It was marked by changing power dynamics from the late Cold War up to the present. The phases of this relationship – its growth, the disputes over transit and the final break after 2022 – set the context for the central issues examined.

In this thesis, the primary aim is to make a comprehensive analysis of the energy interconnection between Russia and Europe throughout the years. Thus, the historical evolution, current conditions and the potential risks of any future re-engaging with Russia are examined. Particular attention is given to how historical ties shaped Europe's energy strategy, the impact of the war in Ukraine and the subsequent EU sanctions on Russia, the European shift from fossil fuels' dominance towards environmentally friendly energy sources and the influence of American energy policy on European energy security.

The historical evolution of the energy relationship between Russia and Europe is the first step of this analysis. The ways oil and gas trade expanded between them from the late 1960s, the ways pipelines and contractual design built lasting connection and the ways periods of disruption exposed structural vulnerabilities are examined. Decisions on routes and interconnections, the mix between pipeline gas and liquefied natural gas (LNG) and the role of storage turned technical details into strategic constraints. Understanding this relationship clarifies why infrastructure topology, contractual terms and system's operation have carried geopolitical weight.

A major turning point has been the war in Ukraine since 2022. This shock accelerated an ongoing policy's shift within the EU including: diversification of supply, reinforcement of storage and interconnections, improvement of coordination and acceleration towards renewables and efficiency. Immediate crisis' management (limiting price spikes and ensuring winter supply adequacy) and a broader re-design aimed at adaptability are connected in this discussion. Specifically, security of supply relies on a combination of: physical capacity (grids, storage, reverse flows), flexible contracts (hub-based sourcing and destination-flexible LNG) and demand's side responsiveness. Therefore, the energy's transition objective and security of supply are terms structurally linked lately, which have led to a new path.

Analysing this subject, the thesis is structured in six chapters. After the Abstract and Chapter 1: Introduction, follows Chapter 2. This sets the historical and geopolitical background, outlining how interdependency formed and how energy has been used as a geopolitical leverage. It then examines the current crisis, showing key macroeconomic and energy-risk indicators that influenced policy decisions. Chapter 3 examines the EU's transition strategy, including market design, governance and

infrastructure. It also discusses the expected benefits and challenges of this implementation. Chapter 4 explores the way US' energy policy has affected European security, focusing on destination-flexible, hub-linked LNG and on how Europe's market structure turned that flexibility into resilience. Chapter 5 evaluates both the risks and potential benefits of a future, limited and conditioned re-engagement with Russian energy supplies. Chapter 6 offers conclusions and future perspectives. The structure moves from context, background and factors towards options, benefits and challenges.

Methodologically, the thesis follows a mixed-method approach that combines a literature review and document analysis with quantitative indicators (macroeconomic and energy-risk), complemented by in-depth analysis of the shift from fossil fuels to renewables and case studies of key policy shifts (such as the Green Deal and the Paris Agreement). More specifically, the approach is based on official sources and data. Evidence from policy frameworks (e.g. the Energy Union architecture and later reforms), market and system indicators (storage, interconnections, price trends) and the geopolitical use of energy are all together taken into account. Figures and data referenced throughout the thesis show how infrastructure, contracts and market rules interact to create – or to mitigate – vulnerabilities. The focus is on cause-and-effect links. They show how Europe's internal market design and system influenced its ability to simultaneously manage security, affordability and sustainability.

Objectivity and neutrality are of high importance. Both the practical benefits associated with pipeline gas and the systemic risks exposed in recent years are recognised. Additionally, the role of the transatlantic energy ties since 2022 is highlighted. Not as a replacement for European's policy objectives, but as a supportive factor that Europe's existing market and infrastructure managed to effectively integrate. At the same time, the significance of avoiding new lock-ins is highlighted as the system electrifies, integrates more renewables and relies more on flexibility, instead of depending heavily on a single supplier.

The contribution of the thesis is to bridge historical knowledge with present geopolitical and economic challenges, to provide a multi-dimensional view of how external pressures (including US' policies and international sanctions) influence European energy strategies, and to enhance understanding of the potential risks and benefits arising from re-engaging with Russia for energy supplies.

In summary, the thesis examines how Europe can ensure energy security in ways consistent with historical background, open markets, social resilience and decarbonisation. By looking at the historical, infrastructural and market context, and by examining the interaction between internal EU policy and external supply conditions, the thesis analyses the energy relationship between Russia and Europe, and EU's available strategic choices in the coming years.

2 Historical and geopolitical evolution of the energy relationship between Russia and Europe

2.1 Introduction

This chapter shows how a mutually beneficial energy interdependency between Europe and Russia was formed from the late Cold War, through the post-Soviet period and ended with the 2022 war in Ukraine. It explains how contracts, pipeline routes, and transit politics transformed technical decisions into strategic constraints. It sets the stage for understanding why the 2022 invasion exposed structural vulnerabilities and accelerated a strategic rethink in Europe.

2.2 Historical background

The strategic significance of Europe's energy policy is more than economic calculations. Geopolitical stability, national sovereignty and the European Union's capacity to act with strategic autonomy are also deeply impacted. One of the most iconic cases of energy interdependency is the long-standing and complex relationship between Russia and Europe, which has great influence on global politics. This relationship has lasted for more than half a century and is deeply linked with geopolitical dynamics and economic demands. Driven by a blend of practical considerations and strategic priorities, it has developed through distinct historical phases: from Cold-War to post-Soviet dependency until eventually to the war caused by the Russian invasion to Ukraine in 2022. This relationship is much based on Europe's increasing reliance on Russian fossil fuels and the development of complex transnational energy infrastructure, particularly pipelines. So, as someone can understand, the phases not only depict economic demands, but also wider changes in global power dynamics and regional security outlooks.

Even though there were ideological hostilities, energy cooperation between Western Europe and the Soviet Union started in the 1960s. It was the 1968 gas export agreement with Austria that symbolised the USSR's entry into Western energy markets. Stable flows across Eastern Europe were enabled by infrastructure such as the Brotherhood and Soyuz pipelines (Cleutinx, 2003). Initially, these flows were viewed as mutually beneficial: the Soviet Union was in need of hard currency for maintaining its centrally planned economy, while Western Europe was in search of reliable and affordable energy sources for fuelling its post-war reconstruction. It could be said that these arrangements were a bit ironic since despite the generally minimal trust between East and West, yet energy flows remained intact for decades (see Figure 1). Through this continuity, energy has been highlighted as a domain of practical cooperation, even when other diplomatic ways were frozen. Therefore, it seemed that energy interdependency could be maintained irrespective of political alignment.

Figure 1: *Map of oil and gas pipelines from Russia*

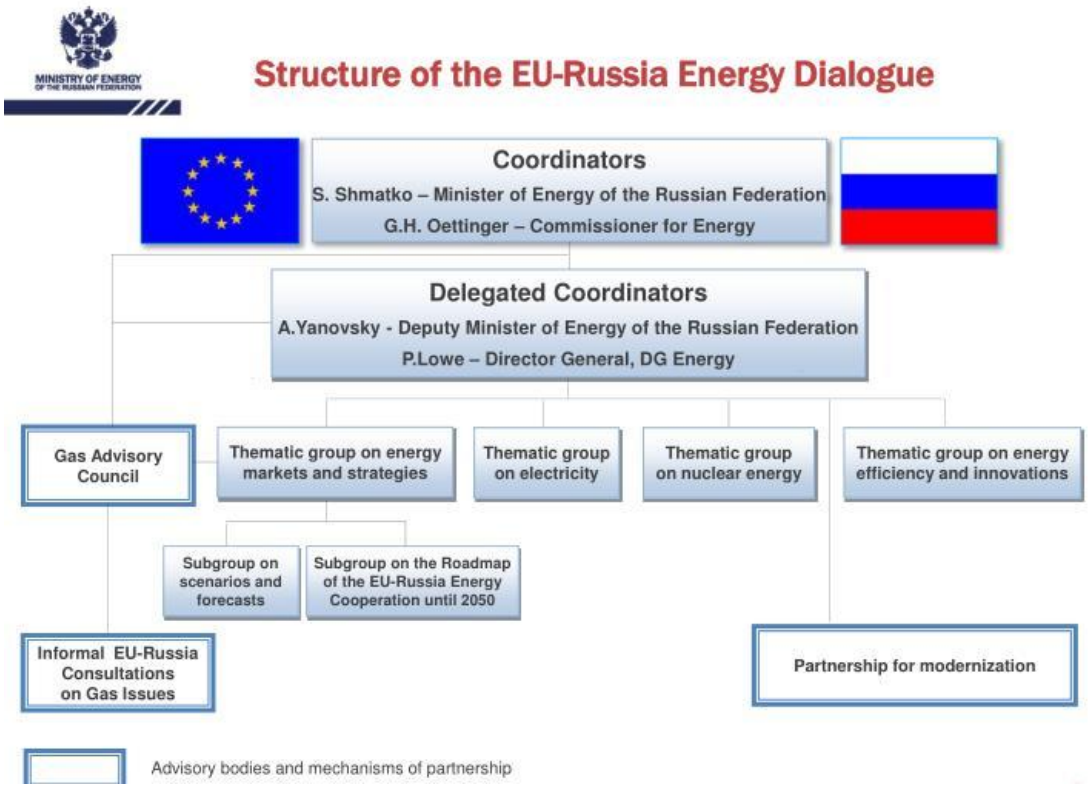
Source: U.S. Energy Information Administration (2010)

Even after the Soviet's collapse in 1991, Russia inherited its predecessor's role as Europe's main energy supplier. During 1990s, gas and oil exports continued uninterrupted, boosted by the development of new infrastructure such as the Yamal-Europe pipeline, which started in 1994 (Nagal, 2020). During this period EU member states, most notably Germany, often negotiated bilateral agreements with Russia. As a result, considerable leverage through long-term contracts and market dominance was gained by Russia. Specifically, according to Eurostat (2023), by the early 2000s Russia supplied over 25% of Europe's oil and 40% of its natural gas. This dependency on Russian sources was locked in via supply contracts controlled by Gazprom and pipeline systems.

Although in Russia there was a shift from a command economy to a more market-based system, its energy sector remained state-dominated. This enabled energy to be leveraged as a strategic instrument, strengthening Russia's influence on both its

neighbourhoods and beyond. In 2000 the EU-Russia Energy Dialogue was launched to strengthen their energy partnership and harmonise their interests (see Figure 2). However, it seems that, its effectiveness was limited due to significant differences in governance models, legal culture and regulation standards (Cleutinx, 2003; OECD, 2008).

Figure 2: *Structure of the EU-Russia Energy Dialogue*



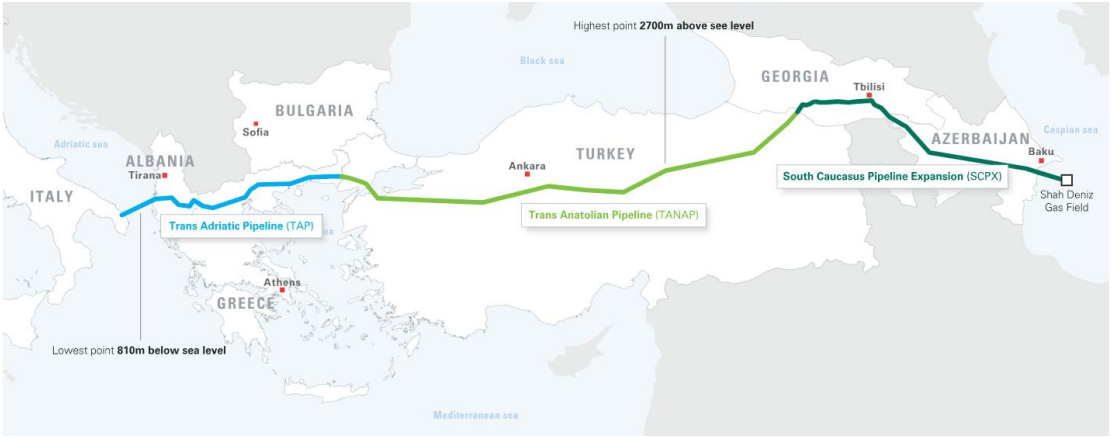
Source: Slideserve (2012)

Even though Russia continued using its supplier status as a geopolitical tool, energy trade did not stop. However, it was at 2006 and 2009 that disputes between Russia and Ukraine led to disruptions of gas supplies to several EU countries, characteristically demonstrating the vulnerability of Europe's energy dependency (EIA, 2016). These incidents were more than just technical disagreements; they symbolised a broader pattern of using energy as a means to achieve political objectives. Thus, policy action at the EU level was catalysed by this vulnerability, leading to the establishment of strategic gas storage requirements and the development of reverse-flow mechanisms. However, implementation varied across member states. Taking into account Germany, it continued to deepen its ties with Russia via the Nord Stream pipeline, which connected directly to its gas network under the Baltic Sea. Gazprom's decision to bypass transit countries by building direct pipelines, like Nord Stream 1 that started operating in 2011, led to serious concern among Central and Eastern European member states. Nord Stream 2,

though never operational because of geopolitical pushback and sanctions, further separated the EU over its stance on Russia and energy policy (Roberts, 2018).

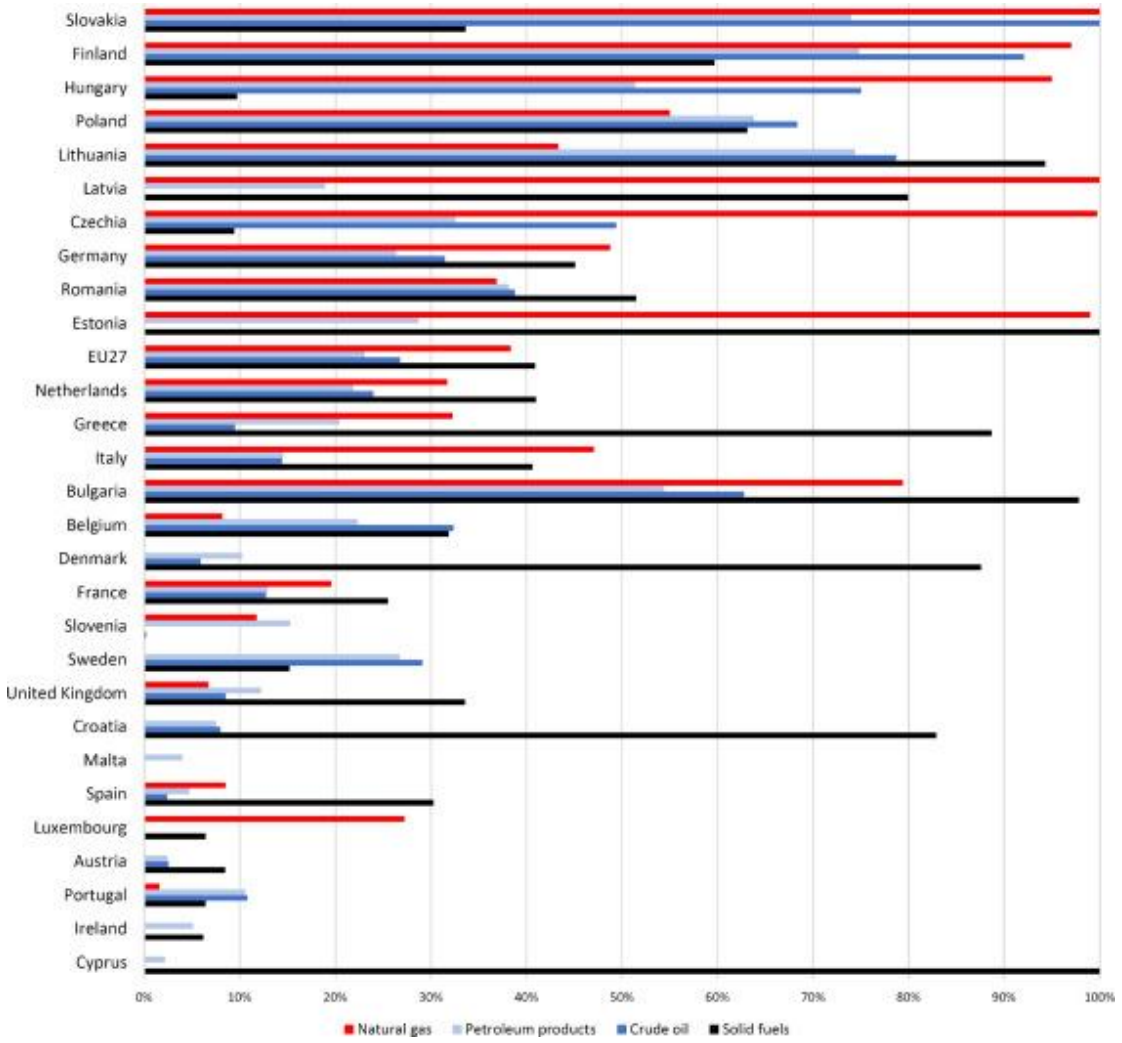
In response to growing concerns regarding dependency, the EU gradually started promoting energy diversification and resilience. New projects like the Southern Gas Corridor (see Figure 3), particularly the Trans-Adriatic Pipeline (TAP) and TANAP, were launched to connect Europe with Caspian reserves. At the same time, flexibility was expanded thanks to the development of LNG terminals across the continent, including Poland, Lithuania, Spain and Greece. Furthermore, regulatory measures under the Third Energy Package were also implemented to restrict Gazprom's market power and promote market liberalisation. Despite these efforts, Russian gas remained price-competitive and the rigidity of existing infrastructure reduced adaptability. There was lack in access to LNG infrastructure or alternative supply routes by many Central and Eastern European countries. Specifically, according to Eurostat (2023), by 2020 EU dependency on Russian natural gas stood at 41% and oil at 27% (see Figure 4 as well). Plenty of the Western European countries maintained a practical approach, believing that economic ties with Russia could still promote political stability. However, this assumption underestimated Russia's use of energy as a strategic extension of state power (OECD, 2008).

Figure 3: *Southern Gas Corridor*



Source: BP (2020)

Figure 4: *Share of Russian imports in fossil energy imports by country (%) year 2020 (sorted according to total share of Russian energy imports). Eurostat Database.*



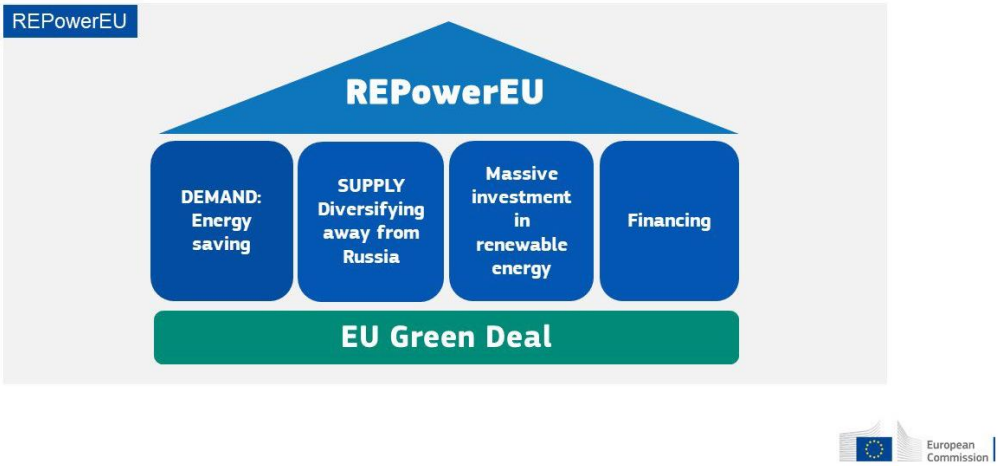
Source: Eurostat (2020)

The backbone of this interdependency was formed by the pipeline networks. Pipelines like Yamal-Europe, Blue Stream and Nord Stream are not just commercial projects, they serve as tools of geopolitical influence. Through their routes, Russia's desire to control flows and bypass politically unreliable transit states (such as Ukraine) is reflected (Nagal, 2020). Europe's reliance was also reinforced by infrastructure limitations, including the shortage of adequate interconnectors between member states. As a result, surplus gas could not be efficiently distributed across borders during supply crises. Even though EU invested in projects of common interest (PCIs), progress was slow and funding uneven. In contrast, projects like TAP and the expansion of LNG infrastructure symbolised Europe's efforts to regain strategic independency. However, internal conflict between especially Germany's industrial interests and Eastern Europe's security concerns weakened the EU's united negotiating power (OECD, 2008).

A much significant turning point occurred with the Russian invasion to Ukraine in 2022. Although energy had long played a crucial role in geopolitics, the war made its

strategic dimensions impossible to ignore. Demonstrating rare unity, the EU imposed sanctions on Russian energy, explored alternative sources and accelerated the shift towards green energy (Yergin, 2020). The REPowerEU plan, launched in May 2022, aimed to reduce dependency on Russian fossil fuels (see Figure 5). Policies included coordinated gas procurement, rapid expansion of renewables, and investment in hydrogen technologies. As a result of the war, Russia shifted its focus towards the East, expanding gas exports to China through the Power of Siberia pipeline. But due to physical and market limitation, replacing Europe's short-term losses remains a major challenge.

Figure 5: *REPowerEU plan*



Source: European Commission (2022)

The transformation in energy dynamics has significant consequences. Energy security is central to EU policymaking, securing the concept of strategic autonomy. The energy transition is not only a way to achieve climate goals, but also a significant matter of national security. In the long run, Russia seems to lose its dominance on the European energy market, facing reduced investment and isolation from Western technologies. At the same time, there have been questions about Europe's resilience and solidarity rising from the sudden shift away from Russian imports. While some countries adapted quickly, others faced price shocks and energy shortages. It will be the EU's ability to stay united under pressure that will determine its strategic credibility. For Russia, turning to Asia may mitigate losses, but this strategic shift carries significant costs. Pipelines to China require time and capital, while the European market historically offered shorter distance, capacity and predictability.

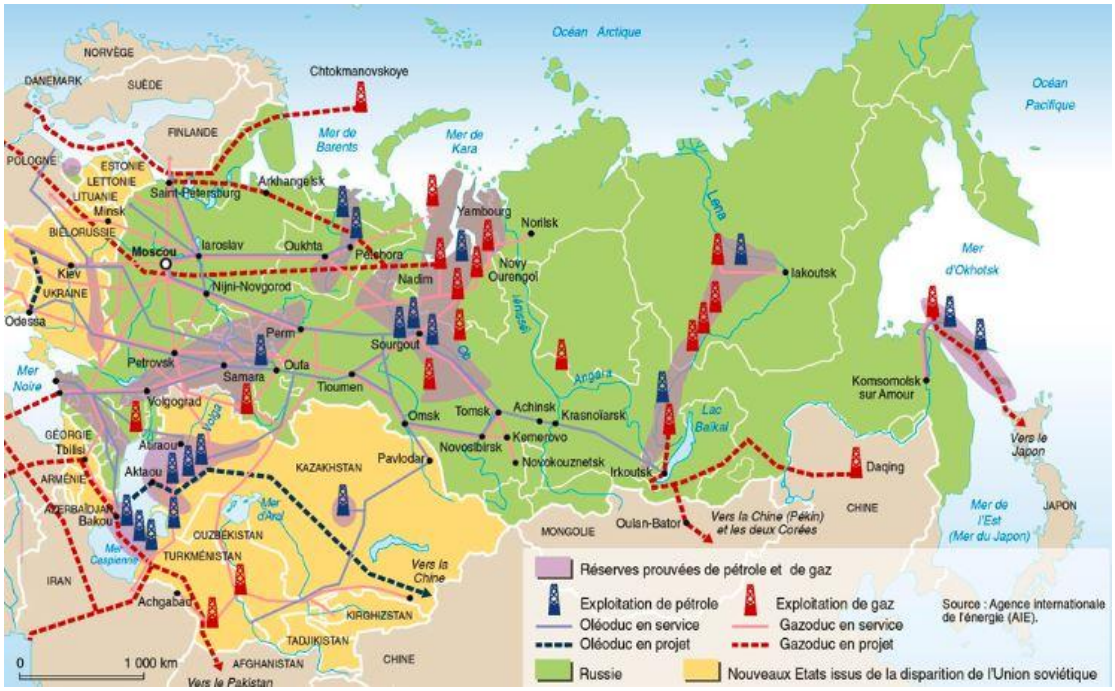
The energy relationship between Russia and Europe was once a symbol of practical cooperation, but has become a practical case of strategic vulnerability. Although it was developed over many years based on economic ties, it eventually collapsed due to growing political differences and conflicting views on security. Europe's reliance on Russian fossil fuels begun as a practical choice, but eventually became a geopolitical risk. Although pipelines and contracts helped energy trade grow, they also created imbalances that were later weaponised by Russia. The war in Ukraine broke the

illusion that energy trade could stay natural and eventually acted as a catalyst for Europe to diversify its energy sources. As the EU reshapes its energy system and Russia adjusts its export plans, the situation will depend not only on geopolitics, but also on how well the world generally shifts to cleaner energy. Indeed, the relationship between Russia and Europe highlights the danger of energy interdependency without political alignment.

2.3 Russian energy policy and geopolitical dimensions

Russia's energy policy has long played a crucial role in its international strategy, connecting economic strength with geopolitical influence. The Russian Federation, as one of world's leading producers and exporters of oil and natural gas (see Figure 6), has used its energy wealth not just for economic gain. It has also strategically used as a means of power and leverage. Russia is known for its huge natural gas reserves (by far the largest globally) and its developed pipeline infrastructure. Combing these, it can connect commercial dealings with political power. According to the U.S. Energy Information Administration, Russia's energy exports have surpassed 40% of its federal budget revenues (EIA, 2016). Thus, the fundamental role of hydrocarbons in state stability and external projection is clearly depicted. This situation has created an advanced kind of diplomacy, where energy is used both as a national asset and a means of influence.

Figure 6: *Russia's oil and gas field*



Source: Drilling Formulas (2017)

Russia's geopolitical strategy is generally symbolised by the mix of energy policy and foreign policy, which is especially seen in the natural gas trade. Europe, particularly Central and Eastern, has been heavily dependent on Russian gas supplies for many decades. As a result, Russia is given the opportunity to shape foreign attitudes through economic pressure, including tactics like price control and unexpected interruptions in supply. For instance, in 2006's and 2009's conflicts with Ukraine, Russia cut off gas supplies in the middle of winter, impacting both Ukraine and several downstream EU countries (Van de Graaf, 2012). So, the signal was clear: energy flows could and would be influenced by political compliance. This practice is

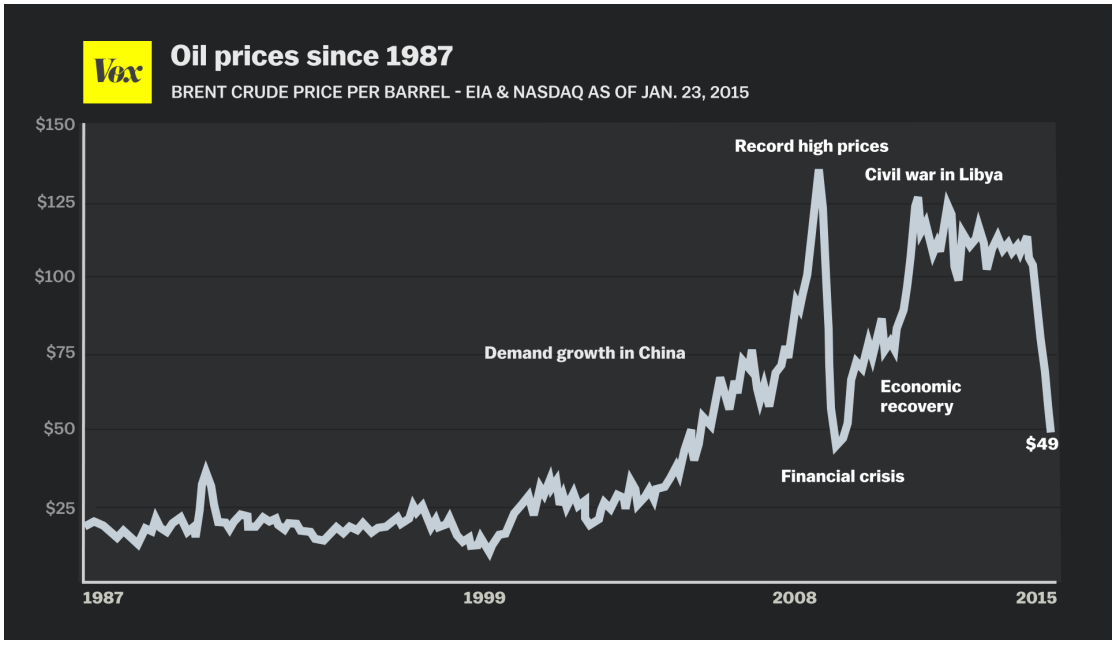
sometimes called as pipeline politics, reflecting a complex strategy of combining infrastructure investments with long-term geopolitical advantage.

Russia boosts this policy by intentionally shaping the physical energy network, using its control over key export routes. The construction of pipelines such as Nord Stream and TurkStream has enabled Russia to successfully bypass transit states that were regarded as politically hostile or unreliable. For example, Ukraine had historically served as a key transit country for Russian gas. However, both the Orange Revolution (2004-2005) and the annexation of Crimea (2014), resulted in political tensions and Russia's reduced dependency on Ukraine routes. Afterwards, alternative pipelines that link Russia directly to major European markets were constructed (Nagal, 2020). Although the infrastructure is commercial, it also has strategic purposes. Specifically, Russia's vulnerability is reduced, while its ability for bilateral agreements is maximised, sometimes bypassing EU regulatory controls.

At the same time, a geoeconomic approach is reflected by Russia's energy strategy, using economic means to achieve geopolitical goals. Tools like energy supplies are often used by states for more than just economic cooperation. These tools can also be used to reward allies and punish rivals, without applying military force (Blackwill and Harris, 2016). This strategy is exemplified by Russia's dealings with Moldova, Georgia and the Baltic states. For instance, countries aligned with Western Europe often faced higher energy prices or supply threats, whereas Russia's allies received discounts or investment incentives. Russia's intentional use of energy asymmetry is highlighted by this strategy: Russia produces and exports while its neighbours consume and depend.

However, this policy faces internal limitations. Russia is affected by price fluctuations and structural economic imbalances due to its overdependency on hydrocarbons. Both the 2014 crash in oil prices (see Figure 7) and the Western sanctions after the annexation of Crimea revealed the fragility of Russia's budget because of the heavy reliance on energy exports (Hancock and Vivoda, 2014). Consequently, state's capacity was weakened leading to cuts in public spending. Additionally, the pressing need to diversify the economy was highlighted, an objective that remains unfulfilled. While Russia dominates on global energy exports, it has neither developed renewable energy nor modernised much its existing production facilities. Thus, significant challenges are risen due to the lack of long-term planning, especially taking into account today's decarbonisation and sustainability approaches.

Figure 7: *Oil prices since 1987, focusing on around 2014*

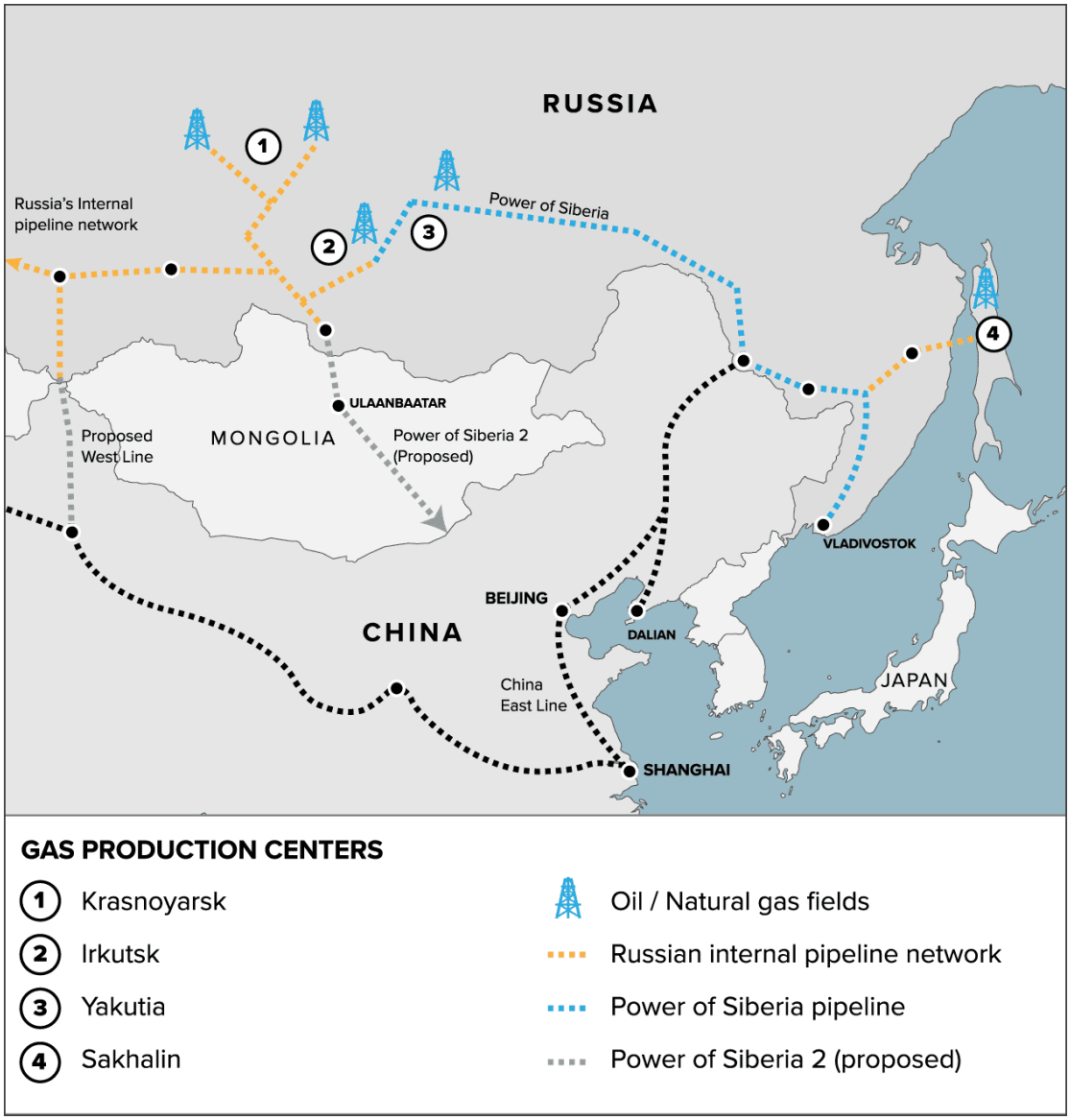


Source: Vox (2015)

The strategic role of Russia's energy system was further highlighted at the 2022 invasion to Ukraine. In anticipation of sanctions and Western countermeasures, Russia restricted gas flows to Europe in advance, intensifying price increases and a broader energy crisis. This action affected Europe both economically and psychologically, exposing its energy vulnerability and challenging the unity of the EU's response (Yergin, 2020). Countries depended on Russian energy faced a dilemma: maintain unity with Ukraine or shield their own energy security. Recognising this challenge, energy leverage was used by Russia to intensify it.

Facing Western disengagement, Russia has looked for alternative markets for its energy exports. Russia's strategic shift towards Asia (see Figure 8), especially China, has been shaped through projects like the Power of Siberia pipeline and multiple long-term agreements aimed at locking-in demand from Eastern partners (EIA, 2016). Nonetheless, there are still challenges for Russia. China, which is a dominant energy consumer and is aware of Russia's situation, negotiates from a position of strength and often secures favourable terms. Therefore, a new form of dependency for Russia has been created that may weaken its strategic autonomy in the future. Regarding the development of energy infrastructure in the Russian Far East, it demands significant capital and is slowed down by both Western technology sanctions and limited domestic funding (Van de Graaf, 2012).

Figure 8: *Russia's strategic shift towards Asia*



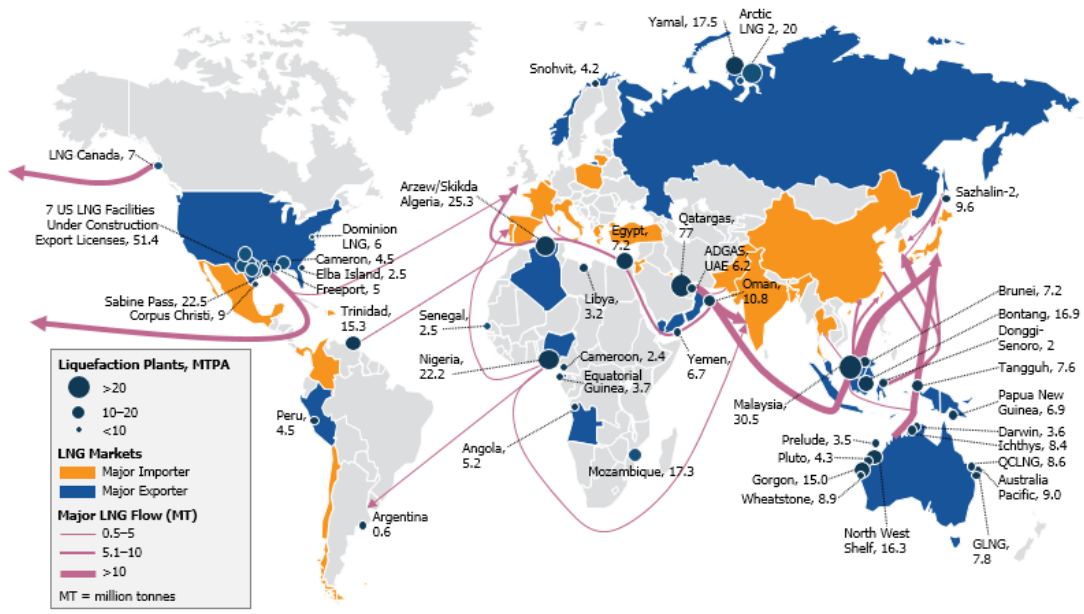
Source: CNBC (2022)

Russia has repeatedly used pipelines and contract terms as leverage in its energy strategy. Specifically, importing states are locked into long-term agreements based on oil-linked prices and (reselling) destination restrictions; hence, buyers' flexibility to search for alternative suppliers has been historically limited by Gazprom. These frequently binding agreements have resulted in what can be called as structural dependency. Even if there are alternative supply routes available, diversification is deterred due to the legal and financial penalties included in Russian contracts. Therefore, Russia's influence goes far beyond the physical flow of gas (Nagal, 2020).

The global energy system is notably shifting in significant ways. Market liberalisation, the spread of LNG (see Figure 9) and the rise of new suppliers, such as the United States and Qatar, have weakened the old monopoly power of pipeline exporters. In particular, LNG plays an important role since it offers flexibility (quick switch of

suppliers) while reducing vulnerabilities (Grigas, 2017). A long-term strategic challenge to Russia's export-dependent model is raised by these changes, along with the EU's focus on energy diversification and the Green Deal. Nevertheless, taking into account Russia's competitive prices as well as its scale of reserves, it mostly seems that it will remain resilient for the current period. Also, it is argued that Russia's balance on the changing energy sector depends on its willingness to innovate, liberalise and negotiate without coercion.

Figure 9: *The global spread of LNG, 2024*



Source: Incorrys (2024)

To present its infrastructural energy policy and role in the global energy markets, a consistent diplomatic and communicative approach is used by Russia. The country's long-standing position as a major energy supplier and partner to various regions (particularly in Europe and Asia) has been mentioned by official statements and diplomatic communications. Thus, the mutual interdependency between producers and consumers is promoted and therefore energy trade plays a significant role for a stable, long-term cooperation. So, Russia promotes investments in energy infrastructure (Pascual, 2015), agreements and share of technology knowledge. Apart from fulfilling its economic goals by selling resources, Russia's global role and energy influence are also strengthened by the aforementioned ways.

Overall, a carefully constructed mix of economic interests and geopolitical objectives is demonstrated by Russia's energy policy. A sophisticated understanding of interdependency and leverage is reflected by the strategic use of its fuel resources (through pipelines, agreements, diplomatic approach and selective partnerships). Even though Russia faces considerable challenges – like technology innovation slowdown and political disengagement by Europe – it still has strong influence thanks to its energy resources. However, it seems that Russia's energy policy is increasingly

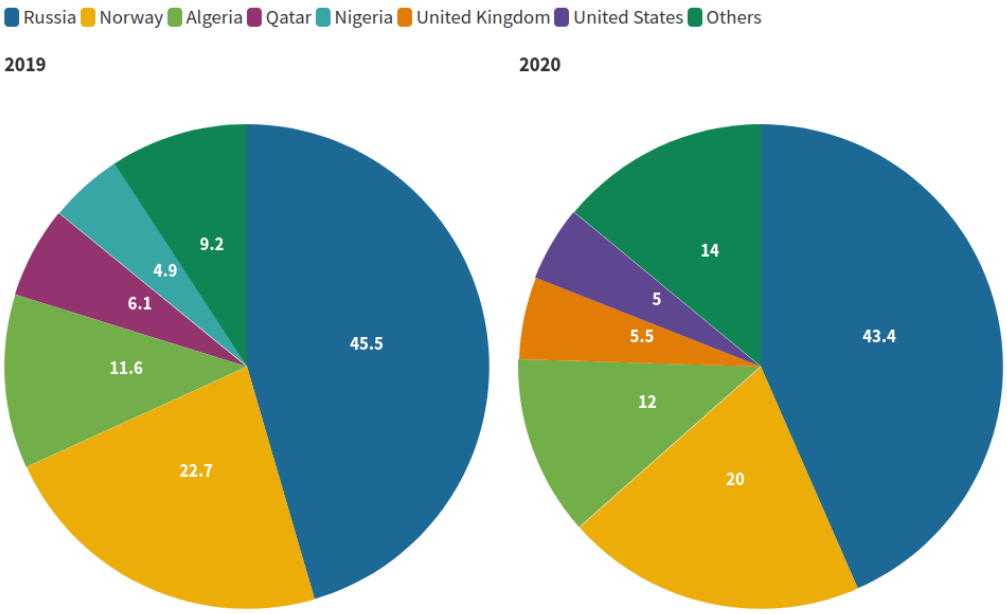
affected by global changes that require more flexible, cooperative and sustainable approaches, rather than strategies that are based on pressure or dominance.

2.4 Current crisis

The 24th of February 2022 Russian invasion to Ukraine marked a pivotal shift in Europe's geopolitical and energy strategy. Even though successive sanctions against Russia were imposed by the European Union (EU), it clearly seemed that the continent's longstanding dependency on Russian fossil fuels emerged as a crucial strategic vulnerability. Responding to the conflict and its subsequent economic instability, an accelerated effort for diversifying energy sources, safeguarding energy security and revising its energy policy was initiated by the EU. The war has played an important role at awakening this immediate transition, which had been difficult due to long-standing structural concerns.

Before the invasion, Russia was the EU's largest energy supplier, characterised by over 40% of its natural gas (see Figure 10) imports (IENE, 2022). This high dependency had been developed over decades and was anchored by extensive infrastructure, including major pipelines like Nord Stream and Druzhba. Long-term contracts were maintained between Gazprom, other Russian energy companies and several EU member states. In this way, EU remained exposed to market instability and geopolitical pressure. Even though alarms had already been signalled by previous cases of supply disruptions, diversification attempts were limited due to political concerns and economic interdependencies (Jones, Steven and O'Brien, 2014).

Figure 10: *EU's natural gas imports, Eurostat*



Source: Memgraph (2022)

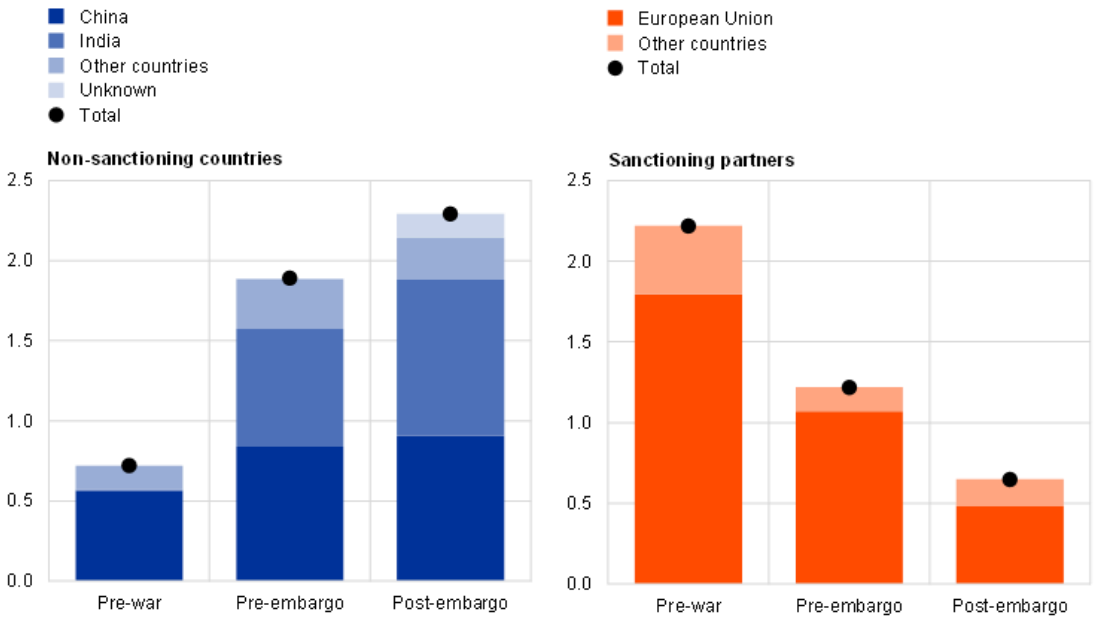
After the invasion, a series of sanctions targeting Russia's financial and energy sectors were initiated by the EU. Initially, direct disruptions of energy supplies seemed to be avoided by the earliest measures. However, restrictions on oil imports and

infrastructure investments were progressively included in the subsequent packages. In May 2022, the REPowerEU plan was unveiled by the European Commission, ultimately aiming to reduce Russian gas imports by two-thirds before the end of the year and eliminate them altogether by 2030 (European Commission, 2022). In order to balance the immediate risks, LNG imports from alternative supplies such as the United States, Qatar and Nigeria were increased by the EU. Additionally, natural gas flows from Norway were increased, while storage targets have been adjusted higher for ensuring winter resilience (IENE, 2022).

In parallel, steps to reduce internal demand and promote alternative energy sources were promoted by the EU. Policies promoting energy efficiency, storage enhancement and the increase of green energy usage were implemented among member states. Furthermore, geopolitical situation enabled the acceleration of projects like the Southern Gas Corridor and alternative pipeline routes from North Africa and the Eastern Mediterranean (Giovannelli, 2025; Roberts, 2018). These measures came along with targeted investments in grid modernisation and cross-border interconnectivity, particularly in the Baltic and Central-Eastern European regions. It is the combination of supply diversification and demand management that has played an instrumental role in mitigating the risk of systemic energy shortages after the sanctions.

Taking into account Russia, both economic challenges and long-term strategic consequences were raised by the loss of the European cooperation. Initially, high global prices in 2022 enabled Russia to partially balance the reduced sold volumes through increased per-unit revenues. However, the EU oil embargo and the G7 price cap mechanism (see Figure 11) led to the weakening of this (IEA, 2023). Moreover, Russia's reorientation of exports towards Asian markets, such as China and India, resulted in complicated challenges due to infrastructure constraints, unfavourable contract terms and limited price power (McWilliams et al., 2024). The shift to Eastern markets offered some short-term relief. However, the European market, which had historically provided higher profits and more predictable regulation, was not fully replaced (McWilliams et al., 2024; IEA, 2023).

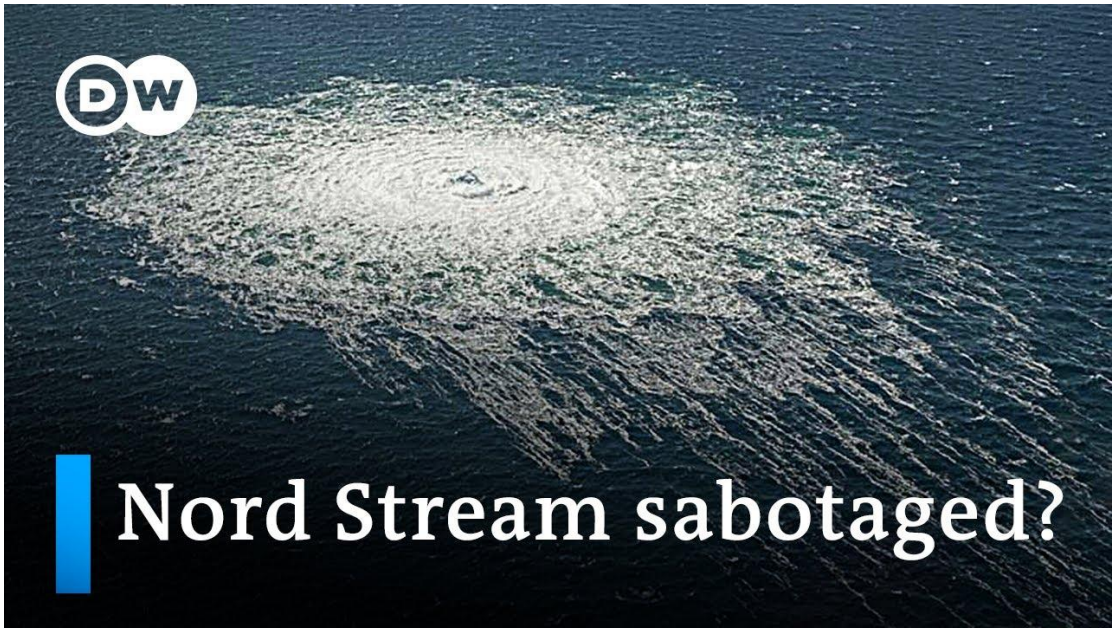
Figure 11: *Russian seaborne crude oil exports before the war and around the EU embargo implementation date (million barrels per day), IEA*



Source: European Central Bank (2023)

Infrastructure has played an important role throughout the crisis. Russia's investments in Nord Stream 1 and 2, which were designed to bypass Ukrainian transit routes, were opposed after the beginning of war. Russia's supply options were further challenged after the suspension and subsequent sabotage of Nord Stream 1 (Figure 12). Regarding the EU, interconnection, reverse-flow capabilities and the enhancement of LNG regasification capacity had a central role on its infrastructure development. At the same time, regional efforts like the Three Seas Initiative grew in importance, offering political and financial support for cross-border energy projects in Europe (Roberts, 2018). In this way, the resilience of member states that had previously been more vulnerable to Russian supply cuts was boosted.

Figure 12: *Nord Stream pipeline leaks raise suspicions of sabotage, Deutsche Welle*

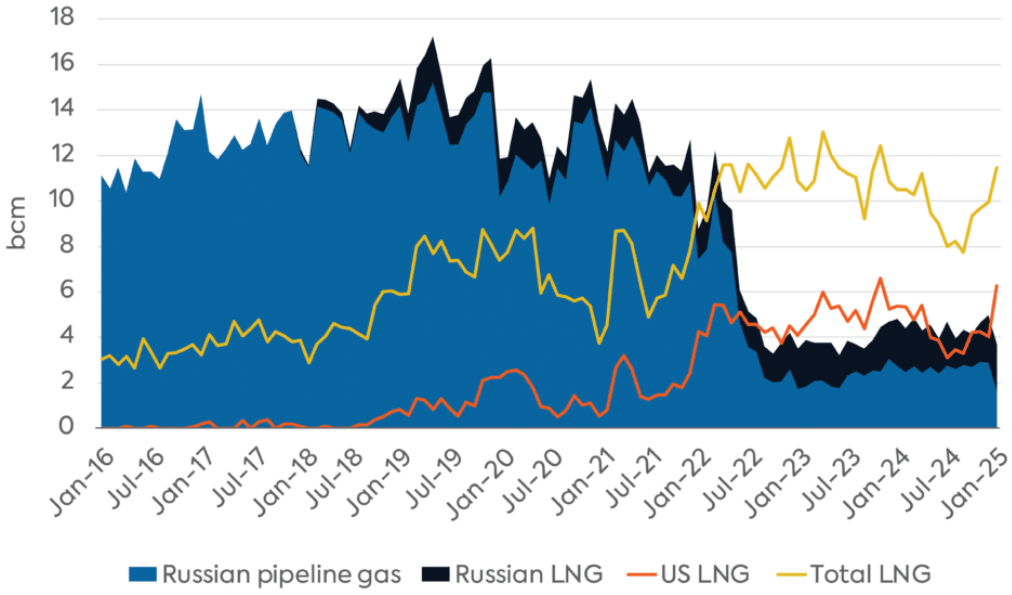


Source: Deutsche Welle (2022)

Disruptions also have consequences on contractual and legal arrangements. Many long-term gas supply contracts, with strict delivery rules and clauses, faced increasing pressure. Some companies stated that unexpected events prevented them from meeting their contracts, while others tried to adjust the terms or settle the issue with legal processes (Stebbing and Hajjar, 2022). These disagreements characteristically showed how commercial contracts can be affected by geopolitical tensions. Thus, more attention has been given to fields like energy law and international arbitration. In addition, during the sanctions, the complexity of adjusting energy contracts has led to even more legal uncertainty for both suppliers and consumers (Abnett and Rashad, 2025).

Globally, wider consequences were observed by the shift in Europe's energy demand. As the EU increased its LNG imports (see Figure 13), global competition intensified, affecting availability and affordability for poorer countries. For example, short-term shortages ere experienced by some Asian and African countries because of limited access to immediate-delivery shipments under high price conditions (Russell, 2023). Furthermore, environmental concerns were raised because certain EU countries temporarily increased coal use in order to face supply issues. Nevertheless, the long-term decarbonisation remains the goal, despite the short-term adjustments.

Figure 13: *EU imports of Russian gas, US LNG and total LNG, ENTSOG*



Source: Center on Global Energy Policy (2025)

A shift in EU governance was highlighted by the crisis: from focusing on market-based mechanisms, to a more strategic and centralised policy approach. Energy security had been addressed through diversification and liberalisation (Far and Youngs, 2015), but nowadays it is also seen as a core part of both foreign and economic policy. The EU has been led to strengthen diplomatic relations with other countries and international organisations. The goal is the security of reliable supply and the expansion of the EU's influence. Additionally, coordination within the EU framework has been enhanced among member states, enabling a more unified response in case of future supply disruptions.

Russia's longer-term outcomes are still to be observed. The combination of energy revenues' decline, restricted access to Western technology and markets is expected to impact investments and production capacity. Meanwhile, Russia's leverage in Europe has been weakened by the shift in global energy flows, an outcome that seems unlike to change in the near future. Although new opportunities are provided by the cooperation with China and other countries, Russia's previous benefits of EU-Russia energy relations cannot be fully replaced because of different geopolitical dynamics.

It is indicated that the transformation of Europe's energy system has been accelerated because of the war in Ukraine and the subsequent EU's sanctions. Diversification, autonomy and sustainability will be playing key roles on the policy shifts that rise from the geopolitical conflict and immediate disruption. Simultaneously, Russia's former dominance in supplying energy to Europe has been significantly weakened, triggering greater challenges for its political and economic status.

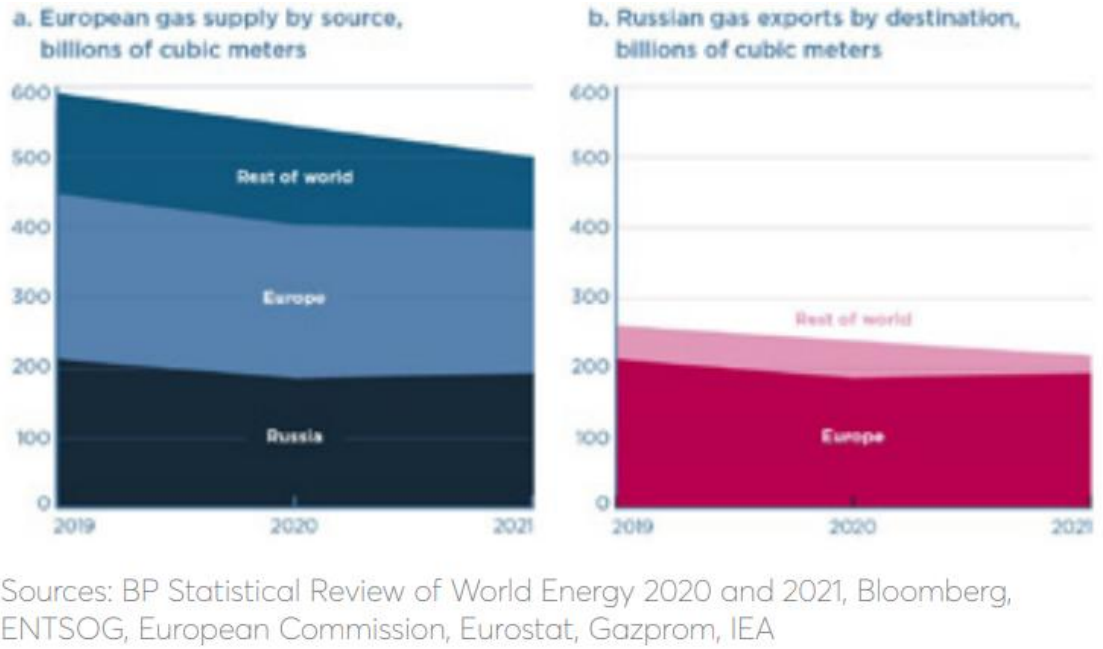
Taking into consideration these developments, it is illustrated that when conflict disrupts energy interdependency, significant fundamental adjustments can be occurred. Also, the complexity of balancing economic, environmental and security goals in times of crisis is highlighted. Even though the outcome will be shaped by future political choices and market reactions, the developments so far point to a lasting shift. Both the EU's energy policy and Russia's external energy influence appear to have entered in a new phase.

2.5 Macroeconomic and energy risk indicators

The economic and geopolitical relationship between Europe and Russia has been historically characterised by energy interdependency, particularly in natural gas and oil. For decades, mutual economic benefits were provided by this relationship: Europe had access to affordable and stable energy supplies, while Russia gained consistent export revenues that significantly contributed to its GDP and economic prosperity. However, especially following Russia's invasion to Ukraine in early 2022, someone could observe that this interdependency has also contained important macroeconomic and energy-related risks. As a result, the vulnerability of relying heavily on a single external supplier was highlighted and therefore Europe's energy policy was reassessed. Europe-Russia's fragile relationship can be further understood by examining both macroeconomic and energy-specific indicators.

Macroeconomically speaking, the balances of many European economies were affected by Russia's heavy energy supply role. Up to 2022, around 40% of Europe's natural gas (see Figure 14) and one-third of its oil imports were provided by Russia. Germany, Italy and other energy-dependent countries were heavily affected by subsequent fluctuations in global commodity markets, which resulted in their trade balance volatility. Especially in economies with limited domestic productivity, pressure was put on current account deficits due to increasing energy import costs. Regarding Russia, energy exports have historically played a crucial role on its economic model. Specifically, combining oil and gas mass exports accounted for over 40% of its federal budget revenues in 2015 (EIA, 2016). Thus, relying mainly on one sector for both government income and foreign exchange made the economy vulnerable, increasing the risk from external shocks such as price drops and geopolitical crises.

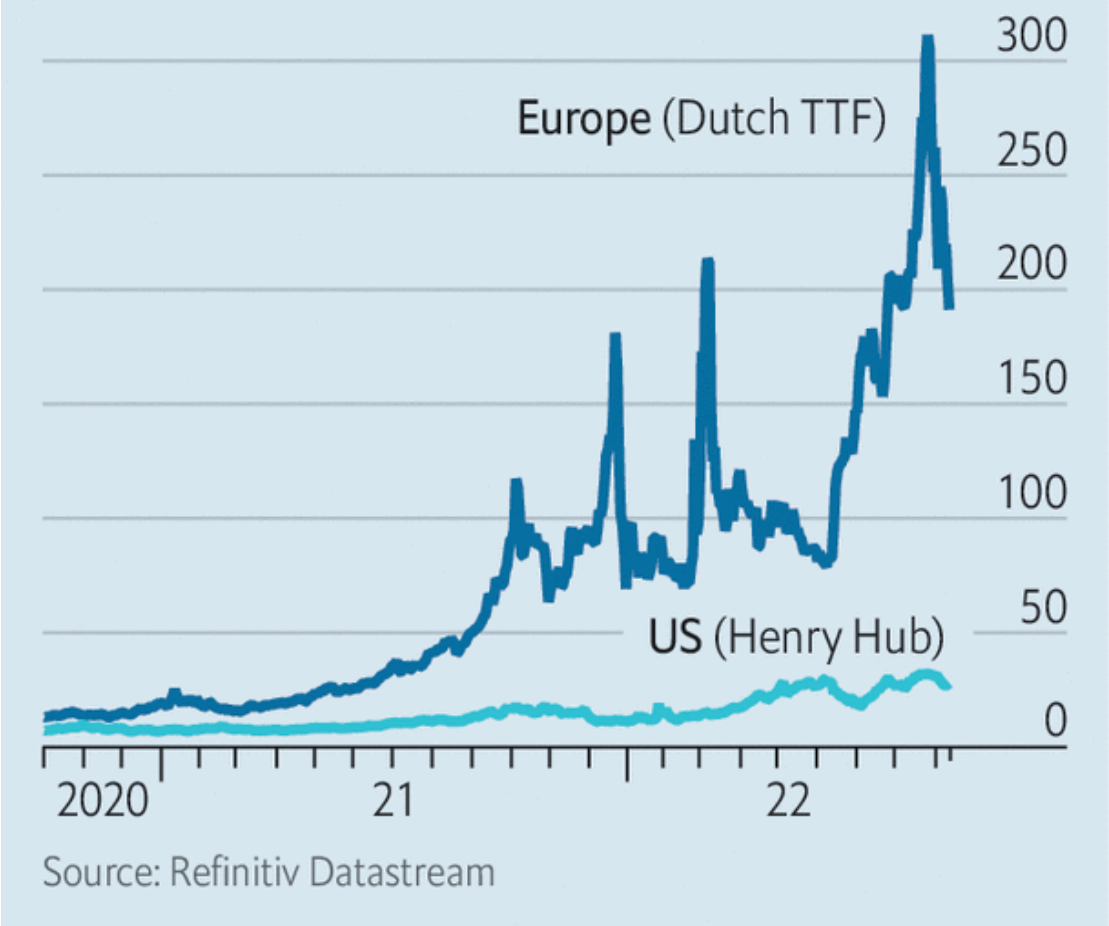
Figure 14: *Europe-Russia's gas market relies*



Source: IENE (2022)

A characteristic consequence of energy dependency was the rise of inflation because of energy price volatility. In late 2021 and early 2022, there were dramatic spikes in European natural gas prices due to reduced Russian pipeline flows and geopolitical uncertainty. As seen in Figure 15, at the Title Transfer Facility (TTF), a Europe's key gas trading hub, prices jumped from €85/MWh in early Q4 2021 to higher than €200/MWh in 2022 (IENE, 2022). These unique fluctuations had a serious impact on the whole European economy, increasing household energy bills, production costs in energy-intensive industries and overall inflation. Subsequent measures, like subsidies and emergency price controls, added extra pressure on national budgets and limited monetary policy flexibility.

Figure 15: *Natural gas prices in €/MWH in European TTF and US Henry Hub*



Source: The Economist (2022)

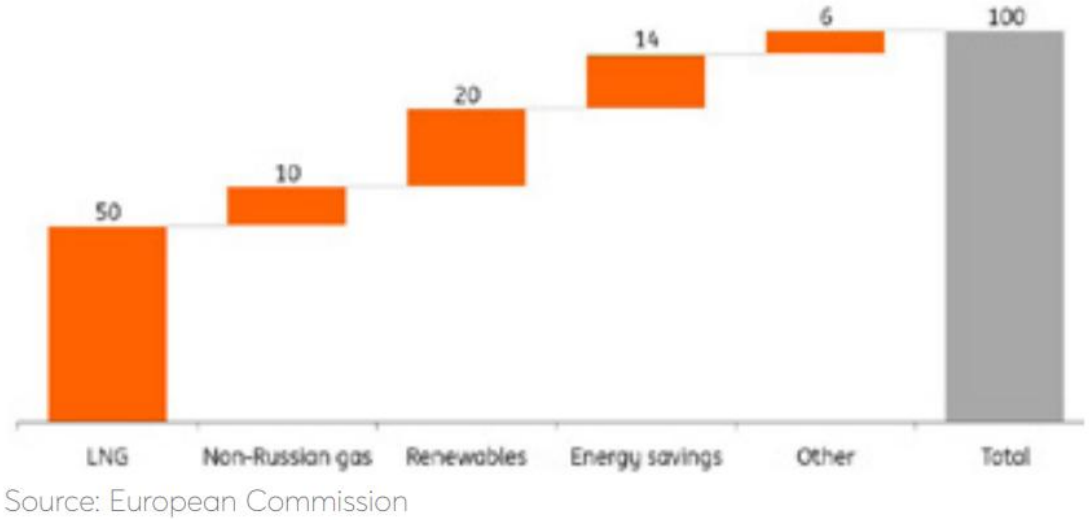
Energy import dependency is a key indicator when evaluating long-term structural vulnerability. By 2016, EU heavily depended on natural gas imports, with Russia being the dominant supplier (BP, 2017). A systemic risk for EU's energy security was created because of high concentration imports by Russia. This vulnerability got even worse by the inflexibility of the pipeline infrastructure. Specifically, most of Russian gas exports to Europe were delivered through pipelines such as Nord Stream 1, Yamal pipeline and those crossing Ukraine. Consequently, security of supply was threatened by any disruption, either due to political conflict or infrastructure sabotage. For example, in the fourth quarter of 2021, Russian gas exports to Europe fell by 25% compared to the same period a year earlier, resulting in market concerns and vulnerable existing energy system (IENE, 2022). Although some diversification was provided by liquefied natural gas (LNG) imports, Russia was still one of EU's biggest suppliers during that period.

Apart from supply routes, Europe's limited storage capacity made it even more vulnerable to sudden disruptions in supply. In 2024, EU's gas storage had reached around 100 bcm, which was about one-third of EU's annual consumption (European

Commission, 2024). At the start of winter 2021-2022, storage levels were 10% lower than the historical averages, mainly due to underfilling by Russian suppliers, like Gazprom-owned facilities in Europe (IENE, 2022). Because of this shortage, there were fewer ways for Europe to react when pipelines supplies dropped, which clearly shows the risks of insufficient domestic control over key energy infrastructure.

In response to these risks, the REPowerEU plan was launched by the European Commission in May 2022. Its aim is the reduction of Russian fossil fuel imports by two-thirds within 2022 and their total elimination "well before 2030" (IENE, 2022). Specifically, diversification through increased LNG imports from other suppliers, acceleration of renewable energy technology and greater energy efficiency were promoted by this plan (see Figure 16). Despite the plan's decisive shift in Europe's energy strategy, its implementation demanded high upfront costs. For instance, massive investments are required for LNG terminals and interconnectors. Additionally, other short-term macroeconomic challenges were raised by this transition. They included inflation effects caused by limited infrastructure capacity and increased demand for alternative energy sources.

Figure 16: *REPowerEU's Targets Aiming to Reduce Russian Gas Consumption by 100 bcm by 2030*



Source: IENE (2022)

Taking into account Russia, key pillars of is macroeconomic stability were threatened by the decrease in European demand and the imposed sanctions on its energy exports. Starting from the 2014 annexation of Crimea, attempts were made for redirecting exports towards Asian markets, particularly China (EIA, 2016). However, they were constrained by infrastructural and economic limitations. Since most of Russia's export infrastructure was directed to Europe and the new Eastern pipelines still needed much time to be finished, there were limited choices for the country. As a result, it was forced to reduce gas prices, export revenues and narrow its public finances. If isolation from European markets continues, investment in extraction projects may be discouraged, eventually diminishing Russia's production capacity and strategic leverage.

Price volatility is a characteristic issue of energy markets and a major cause of risk for both producers and consumers. The BP Statistical Review presents annual crude oil prices, in which notable year-to-year fluctuations are shown (BP, 2017). These fluctuations make planning even more complicated for governments and companies. For Europe, the unpredictable fluctuation of prices leads to household purchasing destabilisation and industrial competitiveness undermining. For Russia, uncertainty in budget planning and foreign reserve management is caused. While long-term contracts had historically contributed to reducing this risk, neither side could be completely shielded from fluctuations in global energy prices.

An energy economics perspective can be very valuable for understanding such challenges (Schwarz, 2018). Energy commodity markets are especially prone to volatility due to inelastic demand and supply, political risk, and long demanded time for infrastructural development. Additionally, both Europe and Russia are affected by their energy interdependency, but in a different way. Although Europe is affected more severely by the short-term energy supply disruptions, its institutional stability and unity have enabled a relatively fast transition. The shift to alternative energy sources has been further supported by coordinated policy responses. Regarding Russia, in the short term, it was less exposed to sudden changes in energy demand. However, deeper, long-term challenges have been created due to its long-standing dependency on energy exports and limited economic diversification.

In conclusion, the energy partnership between Europe and Russia was once a mutually beneficial partnership that boosted both their economic stability as well. However, due to recent geopolitical tensions, it is more likely seen as a structural vulnerability nowadays. The need for strategic adjustment is highlighted by the aforementioned macroeconomic and energy risk indicators (from trade imbalances and inflation to supply dependency and price volatility). Europe's efforts for energy sources diversification, renewables expansion and energy security improvement are likely to increase short-term costs. However, in this way, greater long-term independency and stability can be achieved. On the other hand, Russia's loss of a major export destination has resulted in economic diversification and infrastructural reorientation pressure. As both sides are adapting to the changing global energy reality, effectively facing these macroeconomic and energy risk indicators will be crucial for ensuring sustainable policy and stronger economies.

2.6 Conclusion

Overall, the evidence shows that the pipeline-based interdependency gave Russia leverage that could be turned into a weapon, and the war in Ukraine broke the illusion that energy trade is not related with political strategies. This experience anchors the EU's shift towards diversification and strategic autonomy in energy policy.

3 European energy transition from fossil fuels to renewable sources

3.1 Introduction

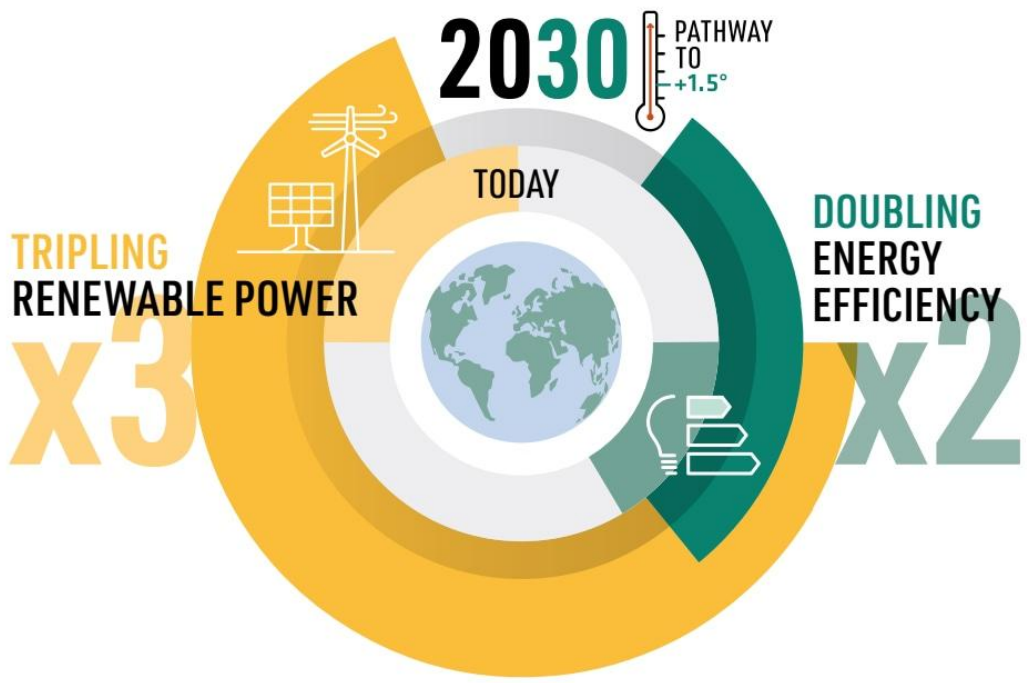
In this chapter, the EU's transition is analysed as a decarbonisation project, focusing on security of supply and protection of the environment. It brings together markets, grids, and governmental measures (Energy Union, Clean Energy Package, Green Deal) while staying aligned with the Paris Agreement and COP28 targets of tripling renewables and doubling efficiency by 2030. It explains how market design, interconnection and demand-side flexibility make the system cleaner and more resilient.

3.2 Analysis of the EU's strategy for energy transition

European energy transition away from fossil fuels is an active, structural project rather than just a verbal policy turn. The EU's strategy is based on three mutually important pillars: decarbonization aligned with the 2016 Paris Agreement, market reform and integration to promote investment and energy-security measures to reduce strategic exposure while decarbonising the energy system. This logic can be seen from the early Energy Union initiatives to the 2019 Clean Energy for All Europeans package. It continues into the 2019 European Green Deal that promotes climate neutrality as a strategy for economic growth and competitiveness (European Commission, 2017; Yergin, 2020).

At the international level, both direction and discipline are provided by the Paris Agreement. During the first global stocktake (GST) at COP28, its long-term temperature targets were translated into specific near-term targets: tripling global renewable energy capacity and doubling energy-efficiency improvements rates by 2030 (see Figure 17). Additionally, a gradual shift away from fossil fuels was pointed out by the GST in order to reach net-zero emissions by 2050 (UNFCCC, 2023). For the EU, these objectives boosted its pre-existing trajectory: expanding renewable energy electrification, energy efficiency improvements and restructuring markets regarding carbon costs, flexibility and demand response (European Commission, 2017; European Parliament, 2017).

Figure 17: *COP28 will aim to help find a way to triple renewable power and double energy efficiency by 2030. IRENA*



Source: World Economic Forum (2023)

The internal market's architecture is the strategic backbone. Since the 1990s, electricity and gas have been liberalised by successive legislative packages, ACER was created, and cross-border rules were built enabling renewables expansion in an efficient way (European Parliament, 2017). The 2016 Clean Energy Package changed the focus from isolated targets to a system designed for distributed generation, energy storage and active consumer participation. Furthermore, an integrated planning process through national energy and climate plans was promoted, operationalising the Energy Union's five interconnected dimensions as seen in Figure 18 (European Parliament, 2017). Clear trends are reported by the Commission's State of the Energy Union: renewables' rising share, declining costs and the ongoing decoupling of GDP from emissions. In this way, investment is successfully attracted by the policy design and market reforms (European Commission, 2017).

Figure 18: *The Energy Union's five interconnected dimensions*

	Dimensions	Description
1	Energy security, solidarity and trust	Working closely with Member States to diversify Europe's sources of energy and ensure energy security.
2	A fully integrated European energy market	Energy should flow freely across the EU – without technical or regulatory barriers. This would enable energy providers to compete freely and promote renewable energy while providing the best energy prices.
3	Energy efficiency contributing to moderation of demand	Improving energy efficiency to reduce the EU's dependence on energy imports, cut emission and drive jobs and growth.
4	Decarbonising the economy	Putting in place policies and legislation to cut emissions, moving towards a low-carbon economy and fulfilling the EU's commitments to the Paris Agreement on climate change.
5	Research, innovation and competitiveness	Supporting research and innovation in low-carbon and clean energy technologies which can boost the EU's competitiveness.

Source: European Commission (2015)

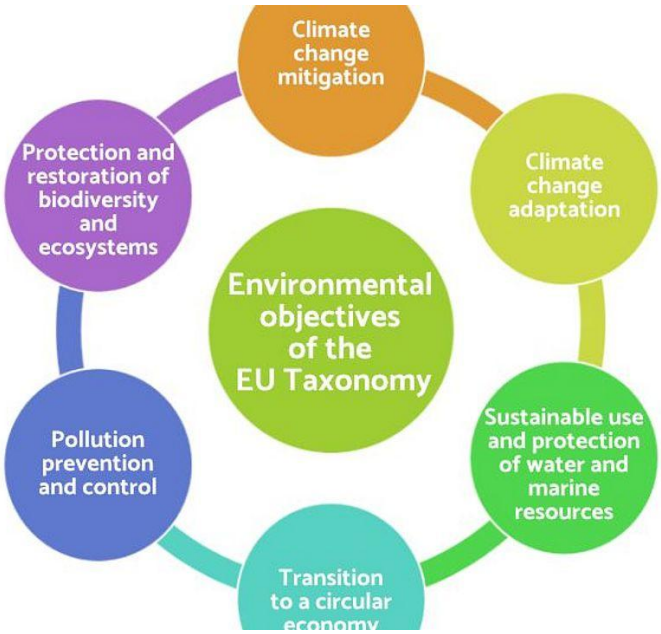
However, energy security is not just a side effect of decarbonisation. Diversification, interconnection, reverse flows and energy storage have been highlighted by the EU as keyways for risk management during the shift (European Commission, 2014). Multiplying energy sources in an unpredictable world is important. This approach was shaped by the geopolitical reality that Europe imports more than half of its energy from abroad, with some member states of the Union being very dependent on imported gas (Stergiou, 2019). In other words, the EU has long faced a strategic challenge: cutting emissions while also reducing its energy dependency. For this reason, infrastructure projects, market reforms and the expansion of renewables have been coordinated as a solution.

From a global governance perspective, a wide shift away from the oil-focused institutions of the 1970s is reflected by the EU's strategy. The operation is based on a multi-polar framework where UNFCCC's rule-making, IRENA's renewables expertise, IEA's emergency coordination and G20's leadership work alongside each other (Global Energy Governance, 2014). The importance of adapting older institutions to meet current needs is highlighted. Moreover, the value of regional platforms in connecting producers and consumers is underlined, while promoting efficiency, clean technology and energy for all is included into the energy security agenda (Global Energy Governance, 2014).

These different elements are brought together into a political and economic framework for the transition by the European Green Deal. The EU's Taxonomy is designed to guide investment towards sustainable activities (see Figure 19). Also, disclosure and supervisory systems are aligned with climate objectives, a tool to direct the trillions required for the system's change. The Green Deal positions net-zero emissions by 2050 as Europe's growth strategy, linking recovery funding to clean

energy, building renovations, clean transportation and hydrogen development. It also acknowledges the short-team economic challenges and uneven impacts that the transition may bring (Yergin, 2020). The way this sustainable shift is implemented is important because a lasting transition should remain investable and politically supportable, even during times of crisis.

Figure 19: *Environmental objectives of the EU Taxonomy*



Source: OroVerde (2025)

Instruments and initiatives are designed to address particular obstacles. First, in scaling up renewables and electrification, the Clean Energy Package's market design (shorter imbalance periods, scarcity pricing and locational signals) improves the case for variable renewables and flexible resources. In parallel, integrating more renewables at a lower overall system cost can be achieved thanks to smart grids, interconnections and demand-side participation (European Parliament, 2017; European Commission, 2017). Second, in terms of governance, the combination of integrated NECPs and ongoing feedback from the Commission helps at identifying gaps early and coordinating corrections across Member States (European Parliament, 2017). Third, on consumers' protection and energy poverty, the Commission went beyond market rights (switching, transparency) by clearly placing energy poverty on the agenda. Efficiency improvements, safeguards against disconnection and targeted social measures were promoted by the Commission, signalling the "just transition" (European Commission, 2017).

Energy security tools have also been developed. National grids have been transformed into a more resilient regional network thanks to interconnectors and reverse-flow capabilities (see Figure 20). In parallel, LNG access, varied pipeline routes, storage requirements and better electricity market coupling help at reducing dependency on single suppliers and sharing the impact of disruptions (European Commission, 2014; European Parliament, 2017). Regarding regional diplomacy, it is

important as well. For example, the Eastern Mediterranean Gas Forum fulfils both energy and security objectives and it could help at the EU's diversification goals, if economics and politics align (Stergiou, 2019).

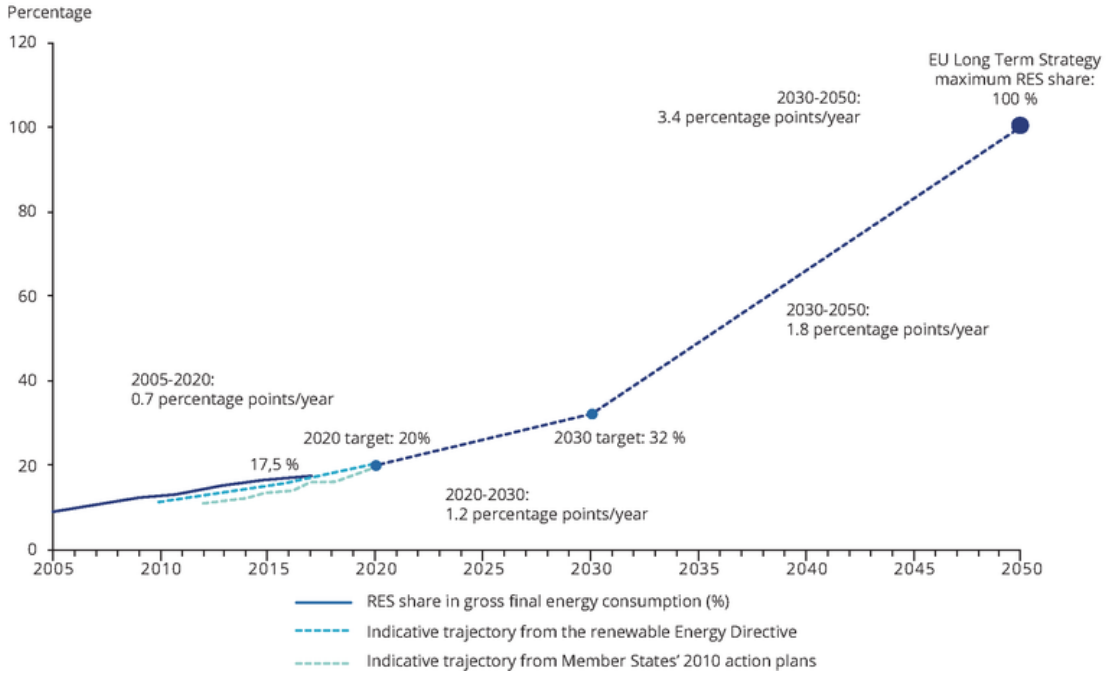
Figure 20: *Map of the interconnected electricity transmission networks 2024*

Source: Med-TSO (2024)

The transformed geopolitics of technology and supply chains must be taken into account by the EU's strategy. Geopolitical emphasis is also given into critical materials, manufacturing capacity and standards. The clash between trade policy, industrial policy and climate goals was predicted by Bressand's triple agenda – competition, security and sustainability. Climate policy should be treated both as environmental protection and a tool of geoeconomic strategy (Bressand, 2012). Balance is needed between keeping markets open enough to sustain scale and lower costs, while reducing risky overdependency. This can be done via diversification, promoting recycling and encouraging fair competition in clean-tech manufacturing.

A valuable external measure of the EU's progress is provided by the GST targets set at COP28. The goals of tripling renewables and doubling energy efficiency by 2030 are tied to specific EU actions, not just verbal ambitions. In practice, faster permitting and grid expansion, accelerating electric vehicles and demand-side flexibility play an important role (UNFCCC, 2023; European Commission, 2017). It is highlighted that, while trajectories may differ, renewables with better efficiency result in a more sustainable future, declining fossil fuel demand over time. The scale of this task can be explained by historical data: even in the mid-2010s, the majority of the EU's primary energy was still supplied by fossil fuels (BP, 2017). This means that in order to achieve the objectives, a historical acceleration is needed (see Figure 21).

Figure 21: *Share of energy from renewable energy sources in the EU's gross final energy consumption, 2005-2050*



Source: European Environment Agency (2019)

A just transition plays a crucial role in the European strategy. Political durability will be determined by the social distribution of costs and benefits. There is global evidence that poorer households and vulnerable regions are hit the hardest by climate impacts and transition mechanisms (World Bank, 2016). Thus, poverty can be rooted unless mitigated through targeted policy. This understanding is reflected by the EU's focus on tackling energy poverty, providing retraining and funding regional support (e.g. support to coal regions in transition). At the same time, there are warnings that unmanaged climate issues can lead to fragility and conflict (IMF, 2023; Cheila, 2023). As a result, it will be harder for the EU to secure energy supplies and build partnerships. In short, social policy is not just a side element of decarbonisation; it is a key factor to achieving it.

There are two separate risks to be mentioned. The first one is about timing risk. The EU needs to maintain the fossil-era security while accelerating towards clean energy. Consequently, practical steps for the transition are needed, like increasing capacity in power systems, keeping gas flexibility (strategically important) and improving markets for storage and other services. Thus, reliability can be maintained without locking in emissions (European Parliament, 2017; European Commission, 2017). The second one is about coordinating risk since there is interaction between climate, industrial and trade policy. Finance guided by the taxonomy, carbon pricing, border adjustment measures and innovation policy are brought together by the Green Deal in order to create a consistent strategy. However, there are debates about how gas

and nuclear are classified in this taxonomy treatment, resulting in difficulties (Yergin, 2020).

Additionally, there is the issue of aligning with the pre-existing international energy context. Global governance is adapting, but there are still risks and questions. For instance, problems can be caused by the lag in mechanisms regarding risks like price volatility, technology spread and energy poverty (Global Energy Governance, 2014). Regarding the EU, it has an opportunity to gain leadership on the global green stage by promoting its ambitious goals (Green Deal, etc.) in the UNFCCC and clean-tech groups. Apart from it, regional cooperation and bilateral partnerships can be promoted by the EU to make supply chains more secure and accelerate clean technologies' adoption (Global Energy Governance, 2014; European Commission, 2017; UNFCCC, 2023).

Great Sea Interconnector and EastMed illustrate how regional cooperation can promote the EU's transition and security aims. The EastMed Gas Pipeline remains at the development/studies stage as a Project of Common Interest. Pre-implementation studies have been funded in order to reach the technical and permitting maturity needed for any investment decision (European Commission, CINEA, 2023). Conceptually, EastMed–Poseidon would link Eastern Mediterranean fields to EU markets via Cyprus and Greece, through a 2100 km total length pipeline, with a design capacity in the ~12–20 bcm/yr range and bi-directional flow (IGI Poseidon, n.d.). In this way, routes will be diversified and market competition in Southeast Europe may be enhanced. Whether it proceeds depends on techno-economics (e.g. deep-water routing and costs), market conditions (LNG alternatives, EU demand declining under decarbonisation), and environmental/permitting outcomes. Indeed, the aforementioned are precisely what the current EU-funded studies are intended to clarify (European Commission, CINEA, 2023).

By contrast, the Great Sea Interconnector (the rebranded EuroAsia Interconnector) is an HVDC subsea electricity link, which aims to connect Cyprus, Greece (through Crete) and Israel. It is designed to end Cyprus' isolation, improve security of supply, and integrate more renewables by enabling large cross-border exchanges. The project secured €657 million from the EU's Connecting Europe Facility and an additional €100 million from the EU Recovery and Resilience Facility, underscoring its priority status (European Commission, CINEA, 2022; European Commission, n.d.; European Parliament, 2025). Technical parameters published by the promoter and the Greek TSO indicate a 1208 km route, with 500 kV HVDC and 1 GW in phase one, which can scale up to 2 GW in the future (Great Sea Interconnector/IPTO, 2025). In January 2024 IPTO created a dedicated SPV ("Great Sea Interconnector S.A."), and in October 2025 Cyprus' energy regulator approved the transfer of licenses to IPTO (IPTO, 2024; ekathimerini, 2025). Strategically, once built, the interconnector will facilitate RES integration across the East-Med region, boosting adequacy on each side of the link, and strengthen the EU's internal market shock-absorption capacity.

In summary, the EU's transition strategy seems to be well-structured, combining Paris-aligned targets with market and governance reforms, attracting investment and encouraging flexibility. Additionally, energy security measures are included that make decarbonisation resilient to shocks. The remaining work includes executing quickly and at scale (permitting, grids, flexibility, critical materials strategy), while making sure the social aspects of the transition are preserved. If this balance is sustained by Europe, then COP28's targets will serve as short-term milestones instead of distant goals.

3.3 Discussion of the subsequent benefits and challenges

Europe's decision to mitigate dependency on Russian natural gas (see Figure 22), while accelerating the shift to renewable energy sources, is considered a combined strategy for security, economic stability and climate action. Before 2022, pipeline gas from Russia significantly affected Europe's energy strategy: physically through the east-west infrastructure and politically through pricing and reliance on transit routes. After the 2022 war in Ukraine, the fragility of that model was exposed resulting in rapidly implemented changes that the EU had already been processing. Specifically, market integration, interconnection, efficiency and decarbonisation moved from policy ambitions to urgent tasks. The same way was pointed out by international directions as well. At COP28, Parties were asked to triple global renewable capacity and double the annual rate of efficiency improvement by 2030 and for "transitioning away from fossil fuels" in a just, orderly, and equitable manner (UNFCCC, 2023). In-short, someone can understand that the European energy transition is not just a climate policy; it is a fundamental change in the continent's energy security architecture and industrial base (UNFCCC, 2023).

Figure 22: *EU's dependency on Russian gas collapsed after 2022*

TWh	2021	2022	2023	2024*
Russian gas via Ukraine	409	193	140	112
Other Russian gas pipeline imports	1,080	472	140	115
Russian LNG imports	145	195	183	150
Total Russian gas imports	**1,634**	**860**	**463**	**377**
Total gas imports	**3,856**	**3,751**	**3,250**	**2,072**
Ukrainian transit as % of EU imports	11%	5%	4%	5%

Source: Bruegel (2024)

One immediate benefit of shifting towards internal renewables is improved energy security. It is accepted that depending on a dominant external supplier and a few transit routes is very fragile. According to the European Commission's State of the Energy Union, energy security has been linked to finishing the EU's internal energy market. This can be materialised via more interconnections, removing chokepoints and creating tools for regional solidarity, so as electricity can be sent flexibly where is needed (European Commission, 2017). As electricity generation moves to wind and solar, which both are availably domestic sources, the main vulnerabilities move from fuel supply to system management and operation. This is considered a more controllable risk, handled by planning, grid investment and market design, rather than by foreign-policy conflicts (European Commission, 2017).

A second gain is long-run cost stability. Unlike the classic fossil fuel cost profile, renewables have high up-front capital costs but minimal and predictable operating costs. Characteristically, European households and industry were hard hit by the 2021-2023 gas price spikes. Thus, being more independent from that volatility is a macroeconomic benefit on its own. Indeed, the structural cost declines of wind, solar and storage over the past decade, driven by learning and scale, are recognised by the COP28's outcome (UNFCCC, 2023). The same direction is pointed by long-term forecasts. According to BP's 2024 outlook, renewables are expected to see the largest growth in primary energy use by 2050, while fossil fuels fall in Net Zero scenarios. In this way, Europe will spend less on dollar-based gas markets (BP, 2024).

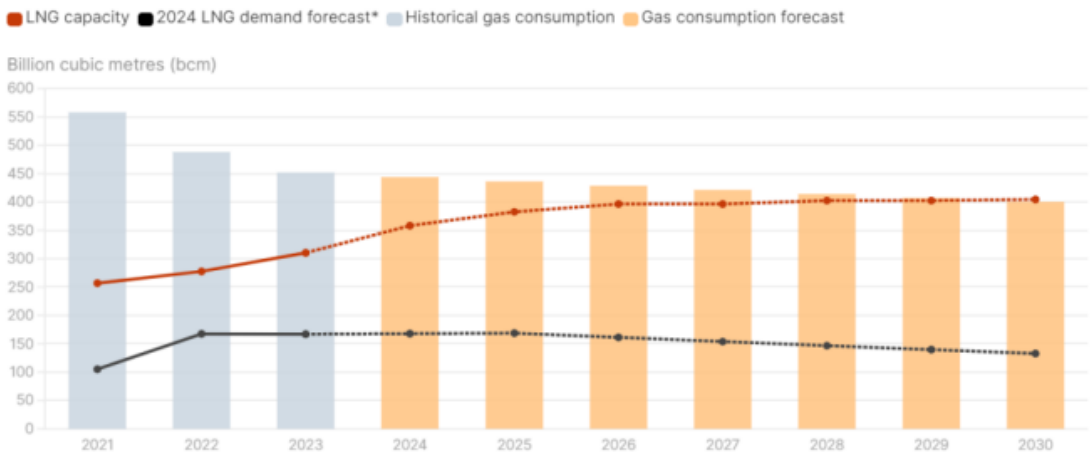
A third gain is the climate and environmental benefits. Major cuts in emissions over the next decade are required by the Europe's Green Deal objectives. Consequently, CO_2 emissions and local air pollution will be reduced by switching from gas power plants and heating to low-carbon electricity. COP28 effectively combines the tripling of renewables and the doubling of efficiency with the temperature goals of Paris, while promoting the end of subsidies for inefficient fossil fuels (UNFCCC, 2023). For Europe, each new offshore wind farm, rooftop solar panel, heat pump and insulation upgrade improve energy security while tackling climate change, because gas demand is permanently reduced.

The fourth benefit is about industry and technology. Investment is directed towards power grids, energy storage, digitalisation and clean-tech production, creating opportunities for skill and regional development. However, there are still challenges and tensions faced by the geopolitics of clean energy. For instance, supply chains for critical minerals (lithium, nickel, rare earths, copper) are concentrated, giving leverage to those who control mining, processing or key manufacturing steps (Bordoff and O'Sullivan, 2022). Europe cannot simply swap one dependency for another. Therefore, a materials strategy (diversified sourcing, recycling, etc.) is needed alongside the increase of renewables.

Even though the aforementioned benefits seem very beneficial, there are real challenges that must be managed. It is necessary to keep the energy system running reliably while infrastructure and energy usage are being changed. The loss of Russian

pipeline gas was partly balanced by demand reduction and record LNG imports. Europe's LNG capacity was expected to be increased around the mid-2020s as seen in Figure 23 (BP, 2024). In a Net Zero pathway, it will be dropping due to reduced gas demand for electrification and increased efficiency. However, in slower transition scenarios, demand stays high for longer before eventually falling. It is accepted that LNG should be seen as a short-term backup, not a long-term reliance. This means that contracts and infrastructure projects that lock in high LNG usage beyond 2030s should be avoided.

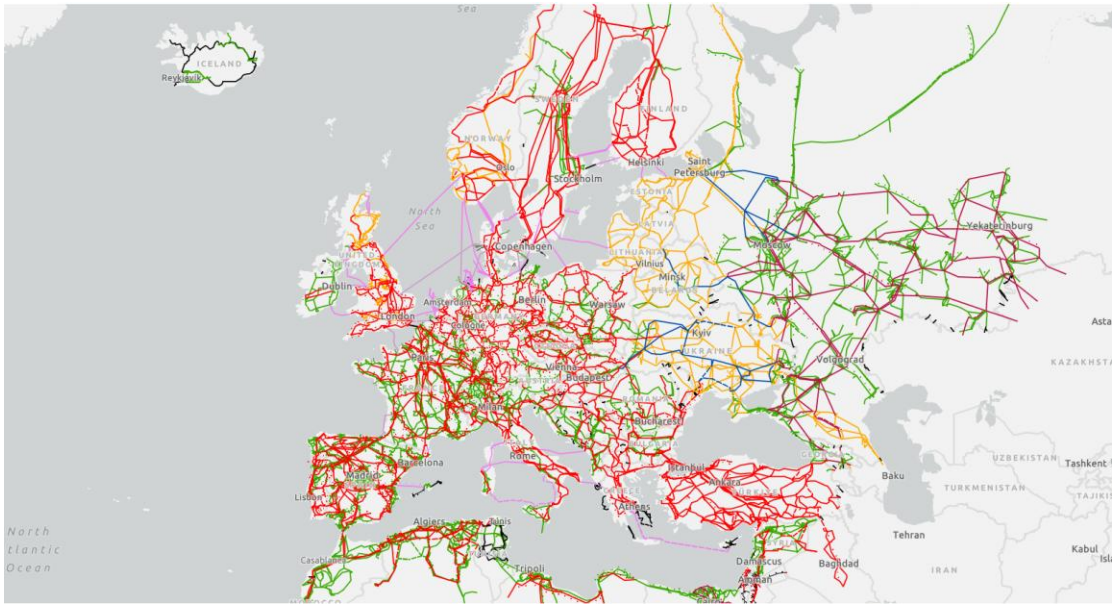
Figure 23: *Europe's LNG capacity expected to be increased*



Source: IEEFA (2024)

A second challenge is flexibility. Stronger transmission network (see Figure 24), storage solutions for different timeframes, better cross-border interconnections and large-scale demand-side participation are required for high shares of variable renewables. It is clear in the Commission's 2017 report that energy security now depends more on integrated markets and regional cooperation (European Commission, 2017). However, progress in interconnection has been uneven and existing constraints still divide markets. Therefore, flexibility is not only an engineering issue, but also a market design one. Fair pricing for balancing services and faster approval for grid projects are required. Additionally, digital tools are involved so as aggregated demand becomes a regular part of the system, rather than something unusual (European Commission, 2017).

Figure 24: *ENTSO-E Transmission System Map*

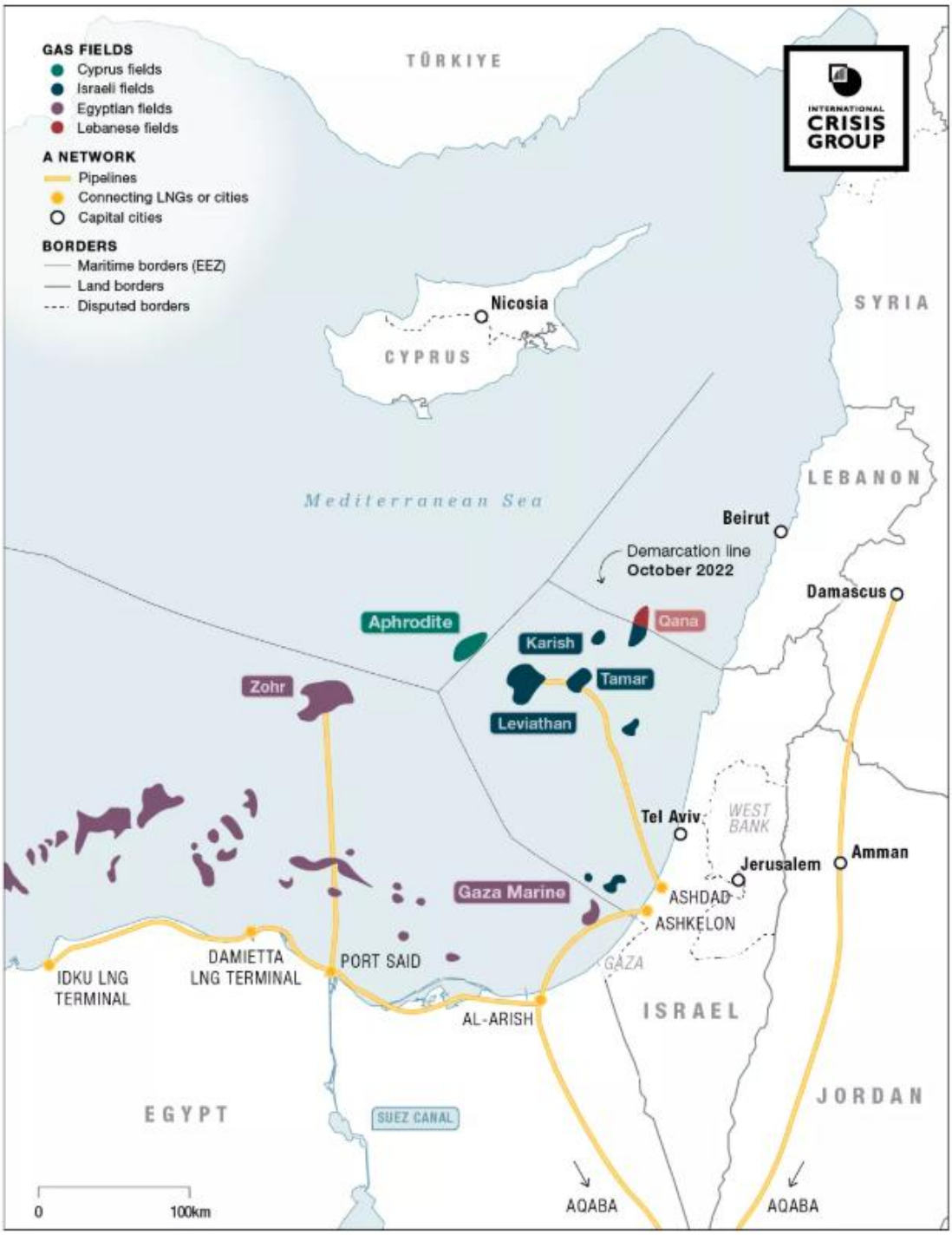


Source: ENTSO-E (2025)

A third one is about social acceptance and fairness. The Energy Union's transition was shaped focusing on consumers' rights and affordability. This focus is even more important today, because households are proposed to replace gas boilers with heat pumps, cover network costs for grid upgrades and accept this new infrastructure locally (European Commission, 2017). It is important how households will react to this transition. If it is experienced as fair, reliable and opportunity-creating, it will last. But if it is seen as reducing reliability or affordability, it will freeze.

Fourth, Europe's external diversification options must be taken into realistic consideration. East Mediterranean gas can be a diversification source (see Figure 25), but does it have a time-limited role? Egypt's amount of LNG exports has been reduced lately due to its falling domestic production and growing demand. Much of Israel's surplus gas also needs to pass through Egypt's liquefied facilities (Bowden and Golan, 2024). Thus, although the 2022 EU-Israel-Egypt LNG agreement (MoU) points in the right direction, significant limitations may be faced in the upcoming years. Furthermore, large amounts of LNG from the United States and Qatar have entered the market lately. As a result, East Mediterranean's importance for Europe may be reduced, especially as European gas demand falls under the Net Zero objective (Bowden and Golan, 2024). Even though the aforementioned projects may be important at a regional level, they may not be a long-term structural solution for Europe.

Figure 25: *Map of Eastern Mediterranean gas fields*



Source: International Crisis Group (2023)

A fifth challenge is that old geopolitics keep co-existing during the transition. The politics of oil and gas (Yergin, 2020) are not set aside on the way to net zero. They co-exist and shape the geopolitics of energy as well. Regarding the Eastern Mediterranean, it is highlighted that export routes are characterised by political disputes and commercial challenges. This shows that infrastructure choices are shaped by political realities (Ellinas, 2022). Even though the leverage of specific

suppliers is reduced by Europe's transition, it could still be emerged through other chokepoints (e.g. transmission routes, converter stations, battery supply chains) unless actively managed.

How strong then is the strategic case for replacing fossil fuels with renewables? The direction seems to be clear enough. According to BP's Net Zero pathway, renewables will have become the dominant source of energy by 2050. In parallel, gas demand in developed regions is expected to drop significantly as electricity replaces gas in power generation, heating and parts of industry (BP, 2024). The gradual shift towards clean energy plays an important role on Europe's energy security plans. For every efficiency upgrade, heat pump, offshore wind farm and interconnector that replaces gas usage, vulnerability is reduced (BP, 2024; European Commission, 2017).

The shift is also favoured by the economics, provided that investments are planned well. It is underlined that interconnection and market integration are the basis for least-cost decarbonisation (European Commission, 2017). Larger but well-connected energy systems are cheaper to manage and less vulnerable to local shocks. A clear global policy message was sent by the COP28: low-emission technologies have been getting cheaper lately, and the world needs to triple renewables and double efficiency by 2030 (UNFCCC, 2023). Therefore, this can be regarded as an opportunity to invest now so as exposure to fuel-price volatility to be diminished later. Europe's challenge is to turn this strategy into projects, by speeding up permitting, ensuring stable frameworks and focusing on improving grids and flexibility (European Commission, 2017).

Emphasis should also be given to the temporary role of natural gas until Net Zero objective. Gas usage can be prioritised to end-uses that are hardest to diminish it quickly, while substitution where mature alternatives exist is being accelerated. That means targeting buildings (insulation and heat pumps), reducing running hours of gas-fired power and promoting storage and interconnection, while minimizing CO_2 emissions. After 2030, additional LNG may not be needed towards the Net Zero path (BP, 2024). As a consequence, over-investments on natural gas nowadays could result in less capital then and a new lock-in. It seems that Europe needs time-limited, flexible LNG arrangements rather than infrastructure lock-ins that become barriers to decarbonization later (BP, 2024).

Limited benefits can be provided via external diversification. For example, regional stability and extra supply volumes could be achieved by East Mediterranean gas (Bowden and Golan, 2024; Ellinas, 2022). But it remains a supplement rather than a pillar of Europe's long-term energy security

The holistic picture seems clear enough. The benefits from diminishing fossil fuels while increasing renewables are mainly considered to outweigh the challenges for the time being. Specifically, greater resilience, lower long-run price risk, emission cuts, and a more environmentally friendly industry are the key benefits. The challenges are significant but can be addressed through consistent policy. This

includes using LNG as short-term solution without creating new dependency, rapidly expanding grids and storage, ensuring social fairness and avoiding a shift to another external dependency through diversification. Europe needs to be united in order to quickly and efficiently reduce gas demand while maintaining the energy system's reliability high. If this is achieved, there will be benefits on security, affordability and sustainability (European Commission, 2017; UNFCCC, 2023; BP, 2024). A possible question could be whether cost considerations could justify a limited re-engagement with Russian energy. This section will be further discussed later taking also into account strategy, climate and legal risks.

3.4 Conclusion

This chapter's analysis underlines that Europe's ability to achieve resilience and reduce long-term energy price risks, without creating new dependencies, will depend on how quickly it executes permitting, grid expansion, and flexibility measures. In parallel, LNG is expected to play a temporary, time-limited role. Furthermore, maintaining social fairness and avoiding lock-ins are essential to keep the energy transition durable.

4 The influence of US energy policy on the European energy security

4.1 Introduction

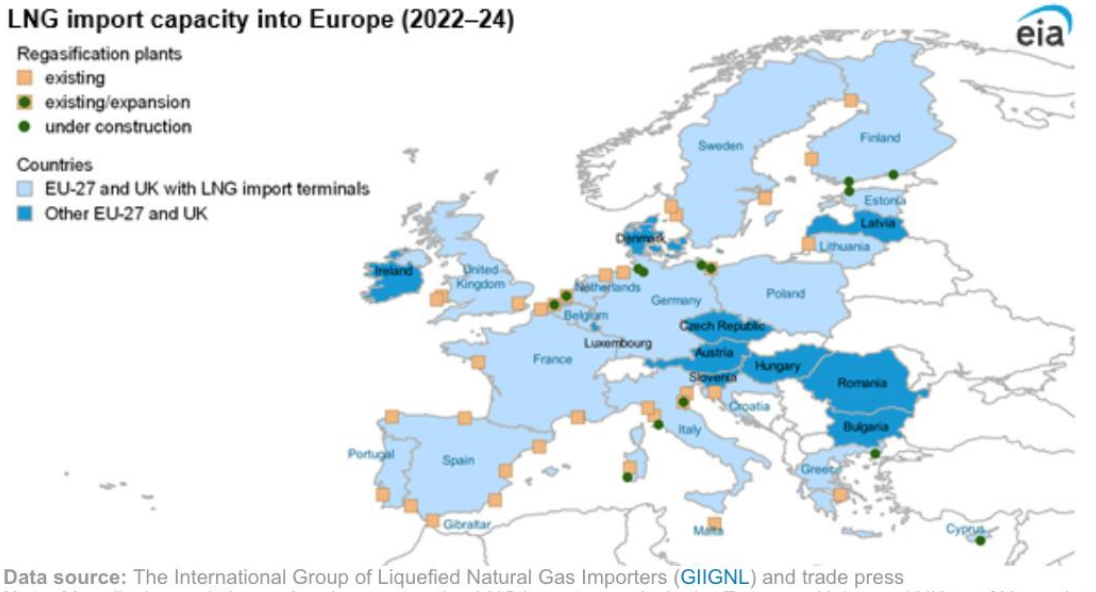
This chapter assesses how US's energy policy—especially destination-flexible LNG supported by export licensing—reinforced Europe's energy security. It did so by supplying record LNG cargoes that Europe's integrated market was able to absorb, replacing Russian pipeline gas. It shows that this external flexibility worked because it was connected with EU's rules and infrastructure, complementing rather than replacing Europe's own strategy.

4.2 Analysis of the US energy policy focusing on increased LNG exports to EU

United States' policy has materially strengthened European energy security since 2022 via large, destination-flexible LNG flows that Europe's integrated gas market could rapidly absorb to displace Russian pipeline gas. After 2022, more than half of US LNG cargoes were delivered to Europe. By 2024, US had become the EU's largest LNG supplier, showing the impact of the transatlantic energy relations on supply capacity and flexibility (U.S. Department of Energy, 2024; IEA, 2025).

A decade before, the European Commission had already set the basis: diversify suppliers and fuels, complete the internal market, build interconnectors and reverse-flow capability, expand storage and match security of supply with demand-side efficiency and domestic renewables (European Commission, 2014). This framework is important because LNG only enhances energy security when the infrastructure and markets are able to deliver it to wherever is needed, at an affordable cost. As highlighted in the Commission's report, having flexible infrastructure and operations is key to resilience, so as shocks can be absorbed without causing extreme price increases (European Commission, 2014). Indeed, the EU's investments - such as reverse flows, hub trading, expanded regasification capacity - have allowed LNG's flexibility to be fully used and turned into economic value (see Figure 26).

Figure 26: *LNG import capacity into Europe (2022-24)*

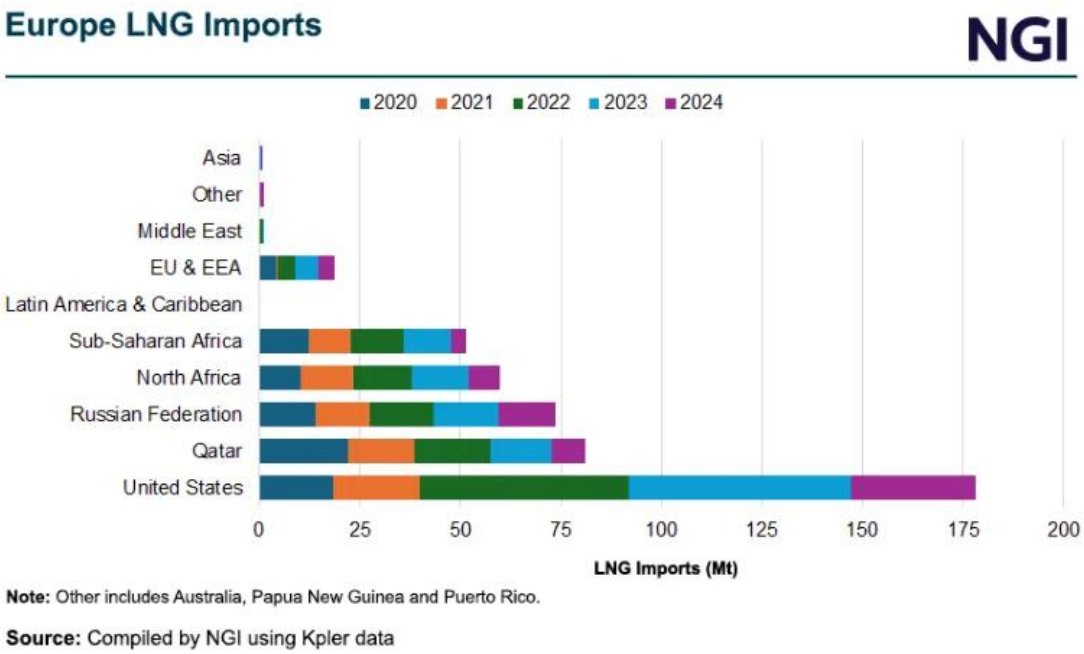


Source: EIA (2022)

Regarding the US policy, two pillars proved decisive. First, under the Natural Gas Act, the Department of Energy's public-interest authorisation regime built a large base of non-FTA export approvals over the last decade. Thus, a rapid rise in liquefaction and tradable cargoes was enabled (U.S. Department of Energy, 2024). Second, the dominant US commercial model - Henry Hub pricing and flexible, free-on-board (FOB) sales – gave buyers more options and limited the chances of politically motivated delivery constraints (Grigas, 2017; O'Sullivan, 2017). These characteristics were intentional and reflected specific market design choices. U.S. LNG's FOB and destination-flexible model allowed buyers to redirect cargoes in response to price and security signals, rather than being locked into fixed destinations (Medlock, 2025).

The result has been clear since 2022. Europe's gas shift is outlined by the IEA: from high Russian pipeline imports to high LNG imports. At the same time, LNG's share of supply increased, with the US becoming the leading supplier to European gas hubs between 2023 and 2025 (IEA, 2025). US cargoes were consistently redirected to Europe (see Figure 27) due to high TTF price premiums and clear policy signals. While the gas was not cheap, it was accessible at the global market price, allowing Europe's storage refill and avoiding supply cuts during two crucial winters (IEA, 2025).

Figure 27: *Europe's LNG Imports*



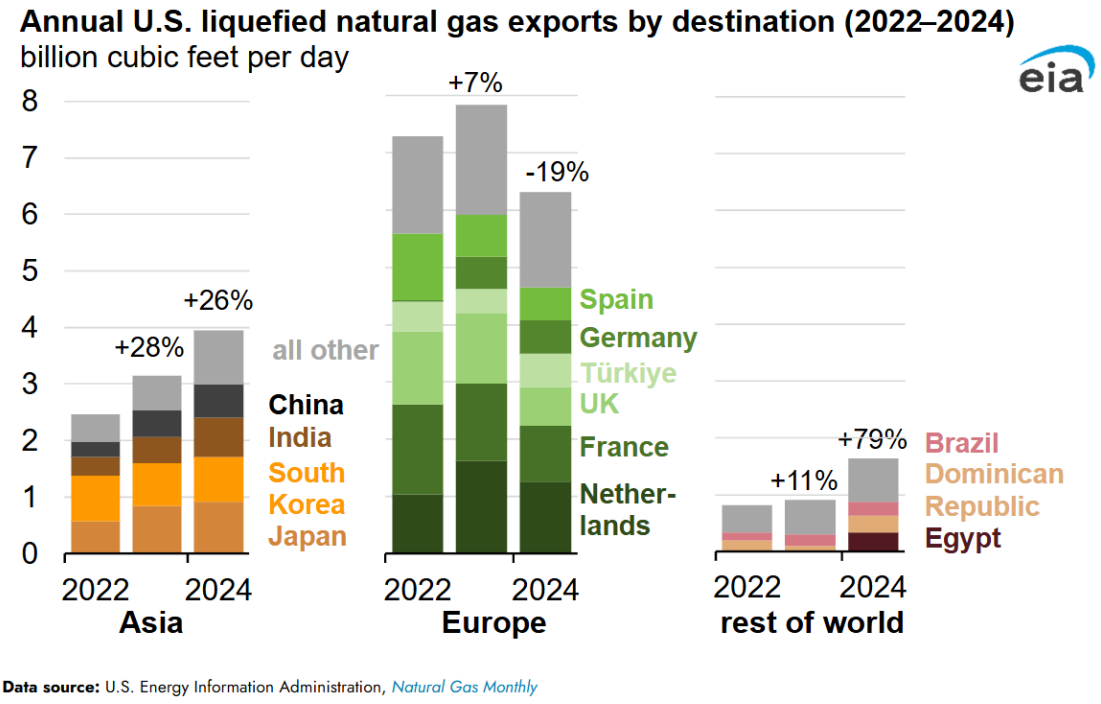
Source: Natural Gas Intel (2024)

There are three main factors that show how the US policy helped Europe's energy resilience. First, flexible contracts and logistics played a key role. Free-on-board (FOB) and destination-flexible sales, often held by portfolio players, gave buyers the ability to redirect or resell cargoes when European prices signalled higher demand. This flexibility was seen as an energy security advantage in both US Department of Energy analysis and in academic policy work (U.S. Department of Energy, 2024; Medlock, 2025). Second, transparent pricing played an important role. Europe's dependency on oil-indexed contracts, which could be used for political leverage, was reduced by linking LNG prices to the Henry Hub (Grigas, 2017). Third, the size and timing of US LNG exports were significant. Since high volumes were authorised and commissioned, the US was able to rapidly increase supply to Europe after 2022. As a result, storage refills and the flexibility of the energy system that the European Commission had designed were supported (European Commission, 2014).

Both the opportunity and the dependency were recognised by European institutions. The European Parliamentary Research Service (EPRS) identifies US LNG as Europe's primary backup source after 2022, complementing Norwegian pipeline gas and other non-Russian LNG to achieve record on supply diversification. Additionally, the reliability of US export licensing is highlighted as an important factor in energy security planning for the EU (EPRS, 2025). This issue was evident in January 2024, when the US government paused approvals for new LNG exports to non-FTA countries so as the public-interest criteria to be updated. Then, concern was caused in Brussels because of the pause. However, the US Department of Energy's (DOE) report in December 2024 emphasised that a large amount of LNG export capacity had already been approved.

In terms of numbers, the size of the shift is remarkable. A high percentage of US total LNG deliveries went to Europe (see Figure 28), growing to more than 63% after 2022 (U.S. Department of Energy, 2024). Indeed, the United States was the EU's top LNG supplier in 2024. This reliance is expected to continue in 2025, as the balance is affected by reduced pipeline flows and changed storage conditions (IEA, 2025). A clear conclusion is suggested by these facts: US energy policy and market structure did not replace Europe's own strategy. Instead, they strengthened it by providing the gas and flexibility that Europe's internal market was able to absorb efficiently.

Figure 28: *Annual U.S. LNG exports by destination (2022-2024)*



Source: U.S. Energy Information Administration (2025)

However, there are some important limits and trade-offs that should be also taken into consideration. Even though US LNG is flexible, it does not immunise Europe from high energy prices. Since it is sold at global market rates, it can still spike when supply is short or shipping routes are disrupted (IEA, 2025; U.S. Department of Energy, 2024). Furthermore, the management of gas supply contracts is important for Europe. Although long-term agreements can result in attracting investment and reducing sudden price spikes, they could also limit flexibility as gas use declines. On the other hand, relying too much on short-term agreements can keep supply flexible, but increase the consequences of price volatility (Medlock, 2025). Moreover, the way gas is shipped can still be affected by physical obstacles and risks at seas (conflict areas), even if there is plenty of LNG available. Consequently, transport and insurance costs can be raised, increasing the final price of delivered gas.

American influence has appeared within a broader European policy framework before the crisis began. The Commission's 2014 report linked long-term energy security to reducing import dependency through efficiency, interconnections and

renewables. Combining supply-side diversification, demand-side measures and grid investment can protect the system against shocks (European Commission, 2014). This view has been further developed by recent European strategy papers, such as the EUISS analysis. It is argued that the surest route to protect consumers from fossil-fuel geopolitics over time is by building a resilient, highly interconnected energy system with adaptable demand and strong grids (EUISS, 2025). In that perspective, US LNG serves as a bridge between stabilising today's and tomorrow's energy situation, when gas usage is expected to be diminished for the EU (EUISS, 2025).

Even before 2022, it was argued that North American supply growth would limit the usage of gas as a political weapon. It was also pointed out that the rise of flexible LNG reduces producers' pricing power when supply is tight and supports diversification of supply (O'Sullivan, 2017; Grigas, 2017). The last three years in Europe can be used as a practical example of this theory. The combination of US supply capacity and contract flexibility with Europe's established market infrastructure have led Europe to less dependency on any single supplier, while providing it with more strategic options (IEA, 2025). This is not the same as energy autarky, but is a meaningful resilience, especially when demand is reduced.

Policy implications follow directly. For example, it is important to keep a reliable gas connection between Europe and the US, even while European gas demand is expected to be decreased. Stable US licensing and contractual flexibility are crucial for Europe's energy security. It is argued that US LNG policy will be playing a significant role on Europe's energy security planning (EPRS, 2025). Furthermore, investing in infrastructure is significant for Europe's flexibility, but without creating new dependencies. According to the European Commission, LNG usage will be gradually replaced by projects that promote interconnections, reverse-flow capability and storage optimisation (European Commission, 2014). Besides, the general policy is to achieve energy security by moving away from heavily relying on fossil fuels to increasing clean energy usage. Investing in grids, electrification and demand-side flexibility can result in limiting gas price fluctuations and external energy pressure for the EU over time (EUISS, 2025; IEA, 2025).

In summary, increased US LNG exports, enabled by American policy choices and market design, have given Europe more options during a transitional time of severe pressure. In parallel, this flexibility was converted into actual resilience and stability by the EU's internal market. Despite the ongoing high prices, because of tight global market's balances, it seems that LNG exports from the US have helped Europe's supply diversification, storage management and hub functioning through 2023-2025. Looking ahead, US LNG might be less strategically important over time, given for instance the global decarbonization objectives. As Europe moves forward, focusing on the energy transition, both its gas demand and vulnerability are expected to be decreased. Therefore, US LNG serves mainly as short-term support, rather than a long-term energy path for Europe (European Commission, 2014; IEA, 2025; EPRS, 2025; Medlock, 2025).

4.3 Examining the impact of the geopolitical and strategic US interests on EU

American energy policy has affected Europe's energy security not by directly controlling decisions, but by shaping the broader conditions – like incentives and constraints – within which European choices are made. Since the shale boom, the US has focused on strengthening transatlantic cooperation and limiting the influence of hostile energy exporters. In parallel, it has worked on maintaining a global market based on the dollar and on better alignment of energy policy with climate and industrial goals. These US goals are materialised through export licensing, agreements, pricing standards, sanctions and diplomatic efforts across regions and shipping routes (Yergin, 2020). As a result, the EU can easier experience diversification, market liquidity, shared risk mechanisms and faster shift to electrification.

The US have been turned from a gas importer into a major LNG exporter (see Figure 29 for US LNG projects), which helped it establish a market system based on open competition and transparent hubs (Yergin, 2020). Europe, which was already towards market liberalisation, gained a strong external support for hub pricing, diversification and cross-border cooperation. In this way, Europe was helped at reducing any single supplier's political leverage on it. So, it seems that market design is not just a technical matter, but it also plays a role in security. Liquid hubs, reverse-flow infrastructure and flexible supply can reduce coercion, while gas can be redirected or resold (Grigas, 2017). Additionally, there has been the case of the long-standing debate about Nord Stream 2. The pipeline was treated as a geopolitical tool by the US and therefore sanctions and pressure were implemented. Thus, EU leaders were pushed to focus more on diversifying supply rather than relying too heavily on a single supply route.

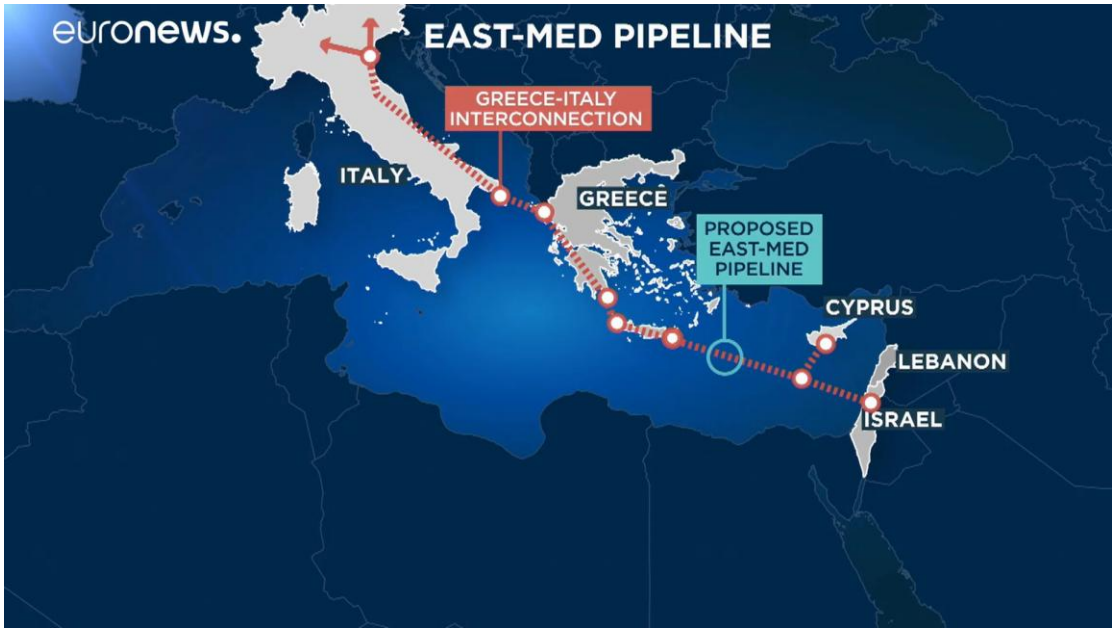
Figure 29: *U.S. LNG projects, February 2024. Data: U.S. EIA*

Source: American Security Project (2025)

Geoeconomic links both US interests and European policy. Finance, trade and energy are used as strategic leverage, so as geopolitical goals are achieved without engaging in direct military conflict (Blackwill and Harris, 2016). The US sanctions system (e.g. banking and insurance limits, technology controls, shipping constraints) increased the financial and reputational costs of heavily relying on adversaries' hydrocarbons. The message to Europe was clear: relying too heavily on single routes or other monopolistic suppliers could result in geopolitical tensions. In contrast, diversification and open markets would be politically supported. Specifically, after 2022, the EU officially introduced stress tests for energy supply security, emergency solidarity and directed funding towards key energy infrastructure. Actually, these measures materialised policy directions that had being developed by the EU over the past ten years (European Parliamentary Research Service, 2025).

Maritime and regional diplomacy also play a significant role. Europe's diversification strategy is based on safe maritime routes and backup options. For example, the presence of US navy in the Atlantic and world-wide key chokepoints secures the passage for LNG shipments, which is essential for the EU's diversification. Correspondingly, it is supported that US involvement in the broader Middle East and Eastern Mediterranean seeks to promote energy cooperation among partners. Specifically, in the Eastern Mediterranean, the cooperation among Greece, Cyprus, Israel, Italy and Egypt (see Figure 30) has been encouraged by the US diplomacy (Yergin, 2020). Therefore, EU's diversification is achieved, while its dependency on just one energy route is avoided. However, individual projects are not enough by themselves, but a wider network of infrastructure and partnerships could make the difference. In this way, heavily depending on a single asset is avoided, while investing in connecting markets is promoted.

Figure 30: *EastMed gas pipeline*



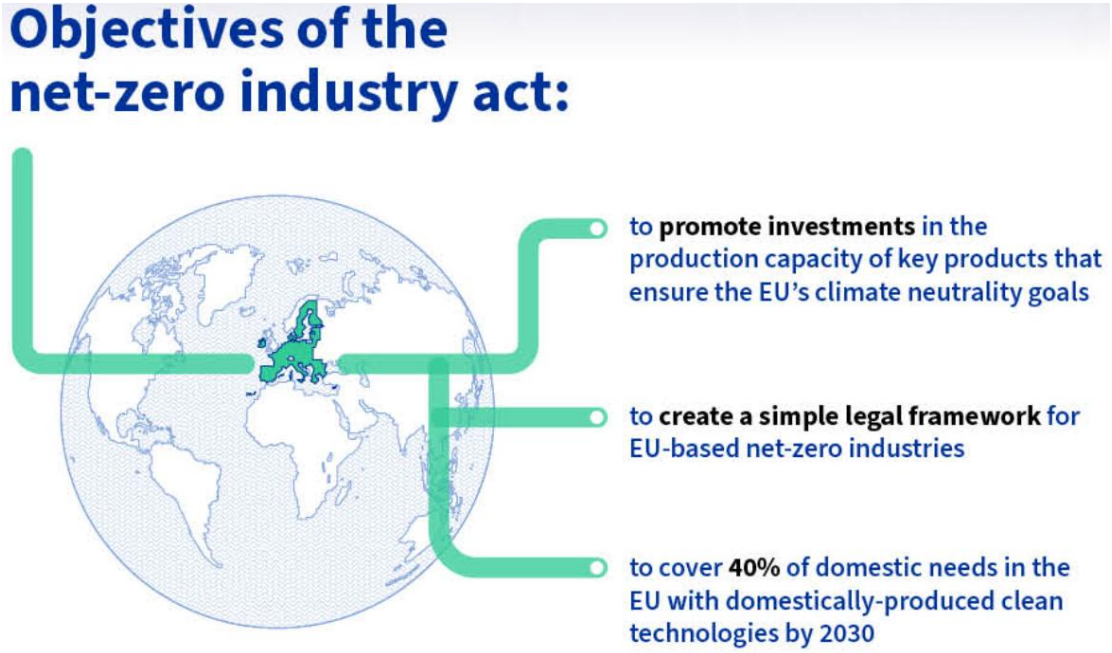
Source: Euronews (2020)

The monetary and legal framework of energy trade is another important factor. Global price's signals and liquidity are spread via hub-based pricing and deep financial markets, which are typically based dollar. At the same time, US' preference for rules and transparency is promoted. In the gas sector, pipeline dominance is weakened by the rise of LNG and flexible infrastructure, because cargoes are allowed to be directed more easily. However, for consumers who want to truly benefit and strengthen their negotiating position, investments in storage, interconnections and trade are needed (Grigas, 2017). After the crisis, this idea was prioritised by the European policy, aligning with the US' strategic interests (European Parliamentary Research Service, 2025). The idea was not followed as an obligation, but as a way to strength Europe's own energy resilience.

Climate and industrial policy have been considerable issues for the US national security approach. An increasingly competitive world is expected, where control over supply, technology leadership and the consequences of climate change will be playing a central role in shaping geopolitical influence and power dynamics (National Intelligence Council, 2021). As a result, the US have prioritised securing critical mineral supply chains, expanding manufacturing and reducing dependency on foreign technology. On Europe's side, this prioritisation shows that is is high time it strengthened its own resilience and reduced strategic vulnerabilities as well. In practice, investing in grid reinforcement, demand-side flexibility and accelerating green technology manufacturing (see Figure 31) will be playing a crucial role not only on protecting the environment, but also on increasing Europe's geopolitical power and independency. Nowadays, there are tensions over subsidies and demands between the US and Europe. However, Europe's general objective is to focus on using fewer fossil fuels in the short-term to keep the energy system stable, while gradually

shifting to electrification and flexible demand to protect the environment and cut long-term dependency (International Energy Agency, 2025).

Figure 31: *EU net-zero Industry Act*



Source: Council of the European Union (2024)

Goals and priorities are also influenced by the way leaders behave and make decisions. It seems that the US increasingly see international partnerships and regional agreements in more practical, deal-based terms nowadays (Lavdas, 2025). However, even when the political tone changes, energy still play a key role in forming partnerships and preventing conflicts. For Europe, its existing efforts to take more control over its own energy security can be strengthened by the changing tone in US politics. Europe's goal is to maintain cooperation with the US as long as it is viewed as a benefit, rather than depend on it.

Overall, Europe's policy options are limited by the aforementioned factors. Europe's focus in on energy diversification, flexible markets and the shift to cleaner energy sources. In fact, relying much on energy from rival states has become even more politically and financially costly due to high sanctions and export restrictions. Thus, diversification seems to be a good solution for ensuring energy security (Blackwill and Harris, 2016). Actually, it is easier and cheaper for the EU to change its energy market setup thanks to the flexible US LNG, while maintaining its energy's system security and reliability (Grigas, 2017). Additionally, maritime and regional diplomacy keep energy transport routes safe and open, supporting EU's infrastructure and flexibility (Yergin, 2020). Regarding the climate's objective, increasing flexibility and domestic renewables leads to less dependency on foreign suppliers over time (National Intelligence Council, 2021; European Parliamentary Research Service, 2025).

This is not considered to be a perfect alignment. Even though US' and EU's interests may generally align, there are policy disagreements between them (e.g. regarding sanctions and subsidies for green industries). So, active negotiation and agreements are needed rather than just oral words (European Parliamentary Research Service, 2025). Timing and resilience are keys regarding the US-EU conversation. Europe's general idea is to rely on US LNG and maritime support as a temporary solution, while it accelerates efforts to reduce long-term dependency via electrification, grids and flexible demand. As a result, energy flexibility and energy transition are considered to be crucial parts for the European security strategy. In the short-term, the focus is on diversification and liquidity, while in the long-term electrification and flexible demand are prioritized (Yergin, 2020). In this way, Europe's vulnerability to external pressure can be notably reduced over time.

4.4 Conclusion

In short, US LNG seems to serve as a temporary bridge rather than a final solution. Reliable transatlantic gas linkages and flexible contracts can provide near-term support, while Europe reduces gas consumption through electrification, stronger grids, and responsive demand. Therefore, American's energy policy could be seen as a temporary supporting factor in Europe's long-term energy transition.

5 Potential risks and benefits associated with Europe's re-engagement with Russia for energy supplies

5.1 Introduction

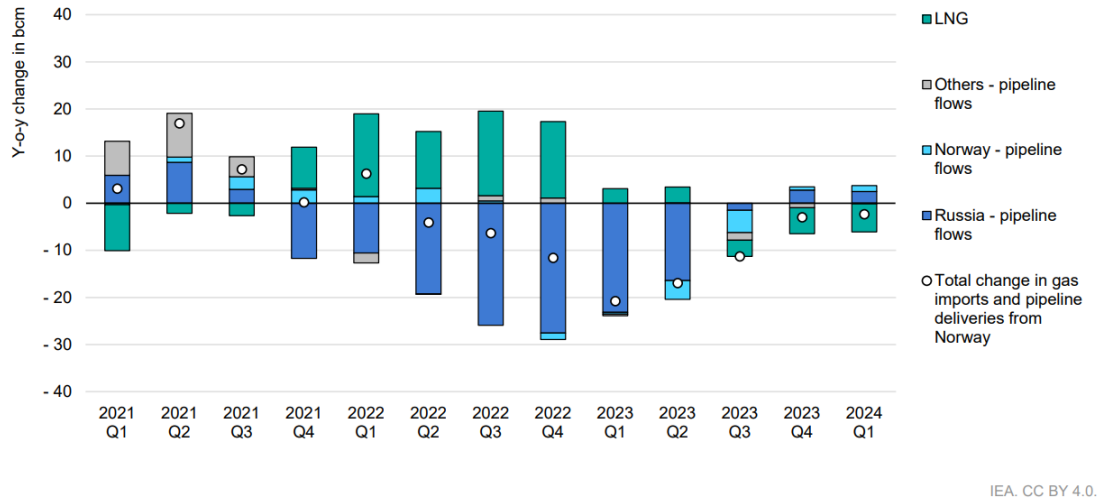
This chapter weighs the narrow, conditional benefits of any limited re-engagement with Russian supply (primarily hub-indexed LNG) against the systemic commercial, legal and geopolitical risks, in a market that has already rebalanced through diversification. It clarifies that any such discussion is about marginal, short-term options rather than a return to pre-2022 pipeline dependency.

5.2 Critical evaluation of the energy risks and benefits of Europe

The debate about Europe's "re-engagement" with Russia for "cost-effective" fossil fuels lies between short-run price advantages and long-run system risk. For clarity, the "re-engagement" is used here to describe restricted and conditional purchases, especially LNG under hub-indexed terms, rather than a total return to pre-2022 long-term pipeline dependence. Furthermore, the phrase "cost-effective" is used here to describe the delivered fuel cost in relevance with available alternatives, like LNG and Norwegian pipeline gas, regarding the upcoming years. Since 2022, Russian pipeline flows to the EU have clearly diminished and the market has rapidly adapted. The limited and short-term benefits of cheaper pipeline gas may be important. But at the same time, the deeper structural changes in Europe's gas, infrastructure and contract systems, along with the non-commercial risks tied to Russian supply, should be taken into account (IEA, 2024a; IEA, 2024b; ENTSOG, 2024; Henderson and Chyong, 2023).

A clear change in Europe's energy strategy can be noticed. By winter 2023/24, Russian pipeline gas remained below 10% of Europe's gas demand. Although volumes were slightly increased through the 2023/24, they were still about 70% below 2020/21 winter levels (indicatively see Figure 32). The energy's transition gap was filled by LNG and Norwegian supplies, while the increased storage levels also contributed (IEA, 2024b). Meanwhile, EU gas demand declined, falling about 20% in 2023 compared to 2021. That same year, around 60 bcm of LNG were provided by the US to Europe, which was around half of the EU's total LNG imports (IEA, 2024a). The changes are important because they could balance the short-term profits that Europe could gain re-engaging with Russia.

Figure 32: *Year on year change in quarterly European natural gas imports, 2021-2024*



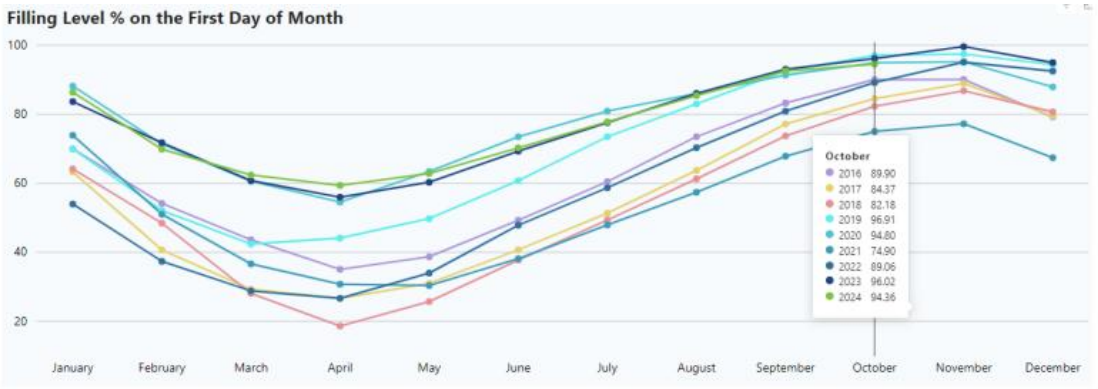
Sources: IEA analysis based on ENTSOG (2024), Transparency Platform; Eurostat (2024), Energy Statistics; Gas Transmission System Operator of Ukraine (2024), Transparency Platform; ICIS LNG Edge; JODI (2024), Gas World Database.

Source: IEA (2024b)

Regarding the benefits, the most credible one is economic. Pipeline gas delivered on historic routes can be cheaper in variable-cost terms than LNG, especially in periods of tight supply. Under these circumstances, additional Russian gas could result in reduced TTF price volatility and costs for industrial users, and therefore limit the impact of high electricity prices. Yet this advantage depends on time. Specifically, around 270 bcm of new LNG liquefaction is expected by 2030, which is almost a 50% global increase (IEA, 2024a). As a result, Europe's flexibility is expected to be increased since there will be more alternatives when prices rise sharply. With more flexible LNG supply and lower European demand, the price advantage of re-engaging with Russia seems to be occasional, rather than durable.

This perspective is further reinforced by system's adequacy studies. According to ENTSOG's Winter Supply Outlook 2024/25, which is based on pan-EU network simulation using TSO data, Europe entered October 2024 with 94% storage fullness (see Figure 33). As a result, under normal weather conditions, the winter demand could be met while maintaining at least 30% of storage by end of March. The main contributors were LNG and Norwegian gas (ENTSOG, 2024). Additionally, even in short high-demand periods, there would be no issues in a normal winter. But even in colder than usual winters, a combination of additional supplies and a temporary 15% demand reduction could make the job without using Russian pipeline gas (ENTSOG, 2024). A key point is that LNG terminals are not running at full capacity in most cases, which means there is still room to increase output to face a potential emergency (ENTSOG, 2024). This does not make Russian gas unimportant. But it does mean that the security of supply value of re-engagement is smaller than it was in 2022 and depends more on extreme weather phenomena or continuous disruptions in LNG supply (ENTSOG, 2024; IEA, 2024b).

Figure 33: *Filling level on the First Day of Month since 2016, %*



Source: ENTSOG (2024)

Potential benefits are further limited by practical constraints in contracting and infrastructure. Both the physical routes and legal conditions for Russian gas exports, as well as Gazprom's long-term contracts are examined. By early 2023, Europe had already shifted towards LNG, sending out about 450 mmcm/d of LNG, which is seven times higher than Russian pipeline deliveries at the time (Henderson and Chyong, 2023). Furthermore, the Ukraine-Russia transit contract expired in December 2024. Although gas could technically still flow through Ukraine, using this route would bring back risks about reliability and security, and therefore any new contracts should provide stronger safeguards (ENTSOG, 2024; Henderson and Chyong, 2023).

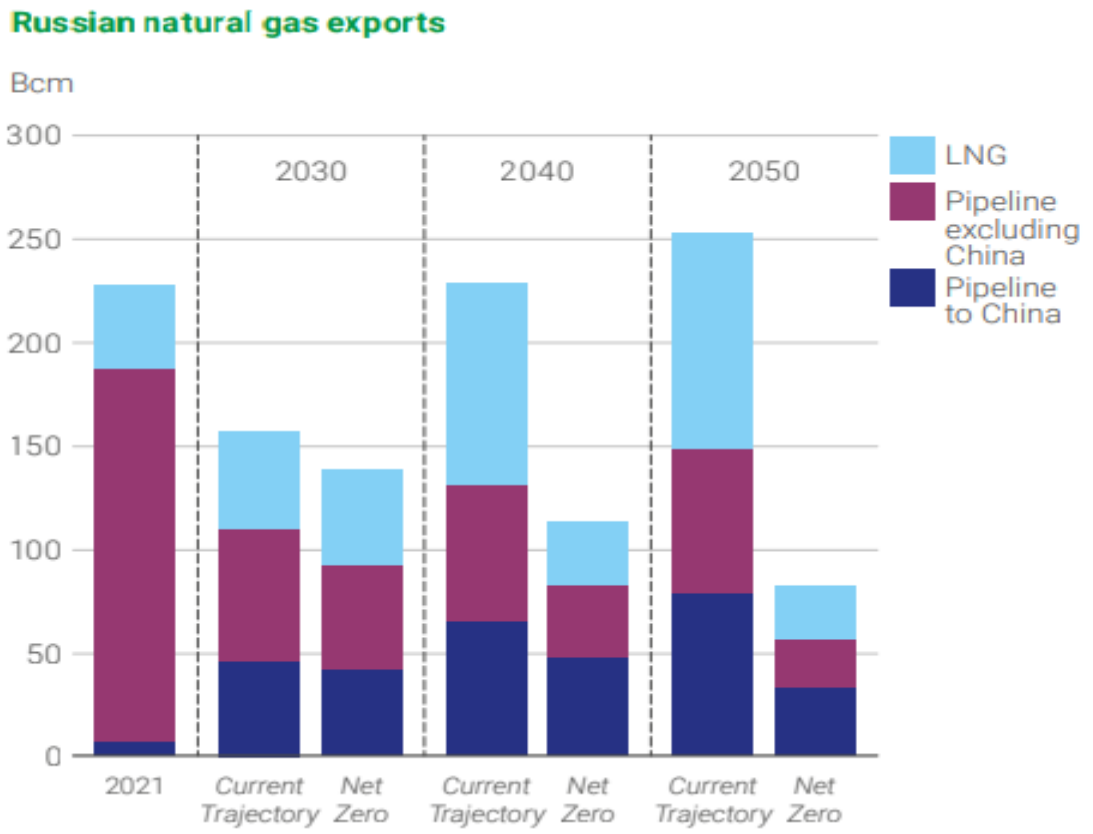
Another potential benefit is greater diversification and flexibility in supply choices. In theory, a limited, short-term return of Russian flows could be seen as a backup option, particularly in cases of LNG scarcity or severe weather phenomena. However, flexibility can only be valuable when it is credible and practically implemented. It is highlighted that there are unresolved regulatory and legal challenges linked to pipeline routes and contract enforcement. Thus, the credibility of re-engagement is reduced since a significant level of risk for buyers occurs (Henderson and Chyong, 2023).

On the other hand, the risks seem to be structural. The first one is volume and price risk from heavily relying on a single exporter under non-commercial uncertainty. The 2023/2024 outcome, including Russia's share less than 10% and stable prices, was achieved without re-engagement. It is expected that a potential re-exposure could result in risks regarding for example potential supply cuts in a very cold winter or sudden regulatory constraints (IEA, 2024b). A second source of risk is legal and contractual. Several historical agreements have been suspended or pushed into arbitration, complicating price formulas and contracts' performance. So, new legal frameworks would probably be required in case of re-engagement (Henderson and Chyong, 2023). These should include clear and strict remedies for non-performance, which in turn could raise transaction costs and reduce cost-effective advantages. A third risk stems from politics and sanctions. Even before 2022, Russia's energy sector faced constraints related with sanctions. These affected upstream finance,

technology transfer and export logistics. According to the US EIA analysis, sanctions have limited foreign investment in Russia's upstream, especially in Arctic and shale developments, making financing projects more difficult. It is also highlighted that in 2015 Europe still relied heavily on Russia, with over 30% of its gas imports and nearly 30% of its crude imports coming from Russia (U.S. EIA, 2016). Therefore, any re-engagement would need an adapted sanctions framework, which adds risk and conflicts in agreements.

Market dynamics would also be affected, pointing out the need of caution. It is supported that the new LNG capacity will reduce structural tightness in the gas market through the decade. It is also expected that by 2030 Russian total exports will have remained 30-40% lower than before the war, as seen in Figure 34 (BP, 2024). Thus, Russia will depend less on Europe and more on Asia for its exports compared to pre-war levels. Indeed, Europe's alternatives – such as LNG, Norway, North Africa and Azerbaijan – are improved in both volume and flexibility. Although Russian flows rose slightly last winter, Europe's market balance was maintained thanks to high storage and stable enough prices (IEA, 2024b). Therefore, considering current demand levels, the added value of importing more Russian pipeline gas is limited.

Figure 34: *Russian Natural gas exports*



Source: BP (2024)

Oil is also part of Russia's fossil fuel exports to Europe. Oil is a global commodity, with deep markets and multiple shipping routes. In 2015, almost 30% of Europe's crude oil was coming from Russia. Crude oil prices are less affected by the transport routes

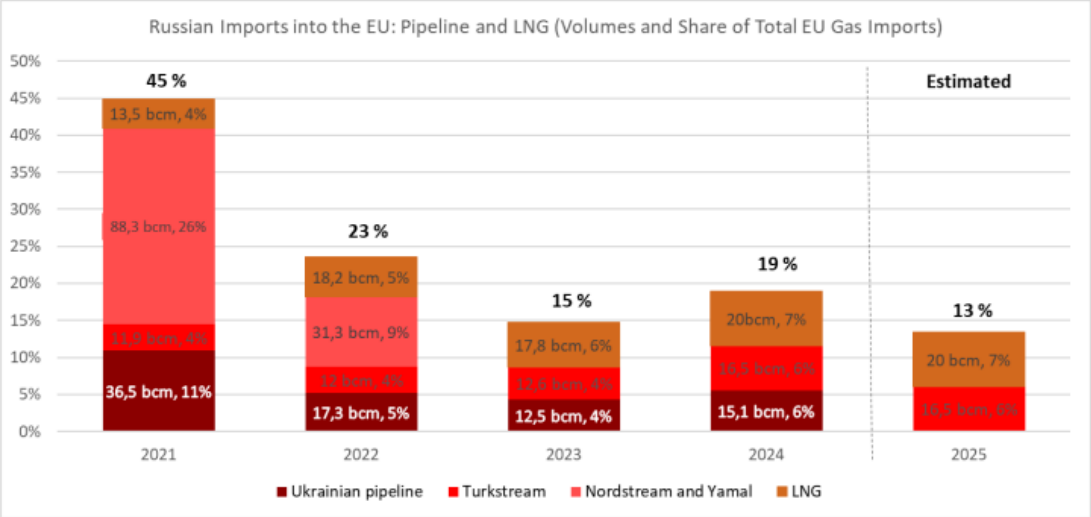
than gas, because crude shipping costs are far lower than LNG shipping costs (Pascual, 2015). Consequently, any cost-effective oil re-engagement would provide little additional benefit beyond what global trading already provides. But, like gas, it would also carry the same sanctions and policy uncertainties. As BP argues, an increase in LNG supply is expected, which means that Europe's marginal cost relief form re-engagement would be limited for oil (BP, 2024).

All in all, the main benefits from re-engagement are primarily based on providing flexibility and short-term price relief during periods of tight supply, if used occasionally. However, these benefits are limited by infrastructural and contractual conditions, as well as by the rapid expansion of alternative supply sources (IEA, 2024a; ENTSOG, 2024; Henderson and Chyong, 2023). Among the risks, the possibility of supply interruption is included, which could lead to severe consequences during cold winters. Additionally, legal and contractual uncertainties are included that could increase transaction costs. Apart from them, risks beyond trade could be created by the exposure to policies and sanctions. Finally, there is the danger of Europe's strategic lock-in, where energy transition and flexibility – which are Europe's keys for resilience since 2022 – could be slowed down by short-term agreements (IEA, 2024b; Henderson and Chyong, 2023). Overall, it is suggested that the net present value of broad re-engagement is small compared to the risks. Regarding the cases for targeted, conditional agreements, they seem conditional and narrow. Indeed, Europe's current system appears sufficient without re-engagement, as long as storage levels and demand-side flexibility are maintained (IEA, 2024a; IEA, 2024b; ENTSOG, 2024; BP, 2024; Henderson and Chyong, 2023).

5.3 Assessing the influence of US policy and global energy field

Since 2022, Europe's probability to re-engage with Russia on energy has decreased significantly. Yet, it is important to weigh both the possible benefits and associated risks. During 2024, Russian pipeline gas supplied around 10% of Europe's demand, whilst the transit via Ukraine ended on 1 January 2025 (see Figure 35). More than half of Europe's LNG imports came from the United States, highlighting a fundamental shift in supply (IEA, 2025). In 2024, Russian gas deliveries were still around 52 bcm, mainly through LNG and remaining non-Ukrainian routes. But it is reported that new regasification and interconnection projects are about to further reduce dependence (European Commission, 2025). However, a full prohibition of Russian gas cannot be fully implemented yet due to legal, commercial and timing challenges. The EU's immediate goal is the reduction of dependence (Ason, Fulwood and Yafimava, 2025). It is recalled that the "re-engagement" is used here to describe restricted and conditional purchases, especially LNG under hub-indexed terms, rather than a total return to pre-2022 long-term pipeline dependence.

Figure 35: *Russian imports into the EU, pipeline and LNG, volumes and share of total EU gas imports*



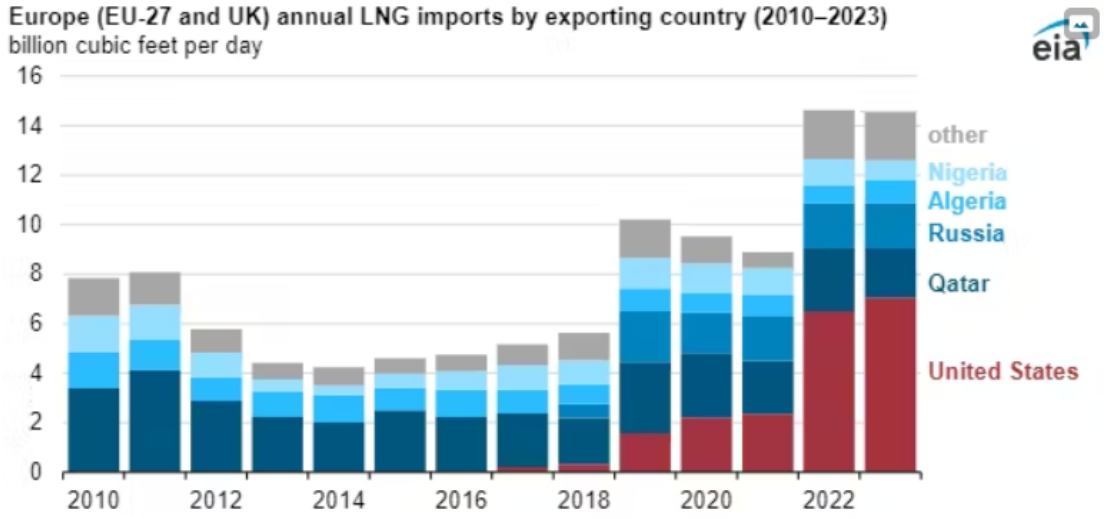
Source: European Commission (2025)

The main benefit of a conditioned re-engagement is the extra flexibility, which could reduce costs in short-term and smooth volatility during tight global LNG supply. Additional Russian gas could provide a safeguard against external shocks, like Atlantic storms, rising Asian demand or delays in new projects. However, this would require transparent hub-based pricing and cover by agreements with strong emergency suspension clauses. This could be considered more as adding a marginal supply option for buyers, rather than restoring Russia's dominant supplier role. As geopolitical studies indicate, the more flexible and liquid the trade becomes (through the growth of LNG and trading hubs), the more the bargaining power shifts from pipeline-based sellers to flexible buyers (Grigas, 2017). Since 2022, Europe has expanded its LNG capacity and interconnections, meaning that any potential Russian

gas supply could be replaced quickly if market or political problems appeared (European Commission, 2025; IEA, 2025).

Another, more straightforward benefit is the globally competitive pressure. Limited, conditional Russian volumes, priced through liquid hubs, could put pressure on other suppliers, including US exporters (IEA, 2025). As a result, the offering of more competitive commercial terms would be achieved. Moreover, the global gas market has been reshaped over the past years, most notably by the rise of the US as a major LNG supplier (see Figure 36), thanks to the shale boom. This shift has provided the market with availability and contract flexibility, enabling consumers to negotiate better terms and reduce price discrimination (O'Sullivan, 2017).

Figure 36: *Europe's annual LNG imports by exporting country, 2010-2023*



Source: Oil & Gas Journal (2024)

On the other hand, there are strategic, legal, political and systemic risks. At the strategic level, Europe would be re-exposed, even if partially, to a counterparty that had previously used energy relationships as a geopolitical leverage (Blackwill and Harris, 2016). Specifically, the main concern is not just dependence, but the re-creation of an advantage for the supplier, who could cause disruptions for political leverage. Economic tools, including energy supplies, are often used by states for coercion. These tactics are most effective when targeted at partners with strong commercial and financial ties. At the legal and political level, EU's goal is to gradually shift from managing the dependence to ending it. The Commission outlines a pathway to further reduce Russian gas. In parallel, it is indicated that an EU-level ban is being actively designed, but it may involve exemptions or a phased approach (European Commission, 2025; Ason, Fulwood and Yafimava, 2025). Therefore, any new deals come with a real risk of law changes. Stricter regulations in the future could make contracts unusable, while member states would face significant costs.

There is also risk related to the system. A rapid or extensive re-engagement could slow down diversification projects that significantly enhance resilience. New

regasification capacity and cross-border interconnections are expected (European Commission, 2025). Letting Russian gas re-enter and replace these assets would reduce the backup capacity that has been carefully established. Another factor is cohesion. Even if the re-engagement was regarded as a commercial step, the renewed Russian flows could be seen as a threat to wider security goals (Blackwill and Harris, 2016; Ason, Fulwood and Yafimava, 2025). This could affect the durability of contracts and the unity of EU energy policy. Besides, the difference on what member states consider as a security threat could result in further political instability.

The impact of US policies and global energy influence is distinct but interactive. In short, the feasibility and legal/financial risk of re-engagement is shaped by US policy, while the economic desirability is determined by global market conditions. On the policy side, sanctions, export controls and financial measures are used by the US (Blackwill and Harris, 2016). These can increase the compliance costs of dealing with sanctioned companies or infrastructure, including the energy field. Even if EU's and US' sanctions may differ in detail, US influence is amplified by dollar's dominance and global banks. This may discourage any potential interest in long-term supply contracts connected with Russian entities (Blackwill and Harris, 2016). On the supply side, the US has become Europe's largest LNG supplier. In 2025, more than half of Europe's LNG imports come from US projects, while further global capacity is expected to increase market liquidity this decade (IEA, 2025). Therefore, the combination of plentiful US supply and sanctions' framework reduces the need and the room for a potential re-engagement.

LNG market can be affected in many ways. The timing of new LNG projects, weather conditions and Asia's demand elasticity are key factors of Europe's import conditions. Thanks to the existing regasification capacity expansion, Europe will be able to absorb more LNG cargoes through this decade (IEA, 2025). As a result, prices are moderated and the added value of using pipelines is less than in 2010s. Additionally, regional diversification plays an important role. East Mediterranean's gas is not expected to be the dominant power in terms of volume, but it is still a valuable option. For example, LNG through Idku's or Damietta's plants (see Figure 37) enhances buyers' position, since flexibility improves bargaining power (Bowden and Golan, 2024). For years, Brussels have treated the East Med as a diversification tool, using platforms and diplomacy. While pipeline projects face commercial and political obstacles, LNG routes remain practical and less vulnerable to geopolitical risks (Bowden and Golan, 2024).

Figure 37: *Eastern Mediterranean gas fields*

Source: World Bank (2019)

Taking into account the aforementioned, three practical implications for a potential re-engagement arise. First, with more global LNG supplies coming and Europe's infrastructure expansion, buyers have more power in market. In this way, Russian gas could only re-enter under Europe's term (short contracts, hub-based pricing, and strict emergency clauses), so as diversification is promoted, not undermined (Grigas, 2017). Second, US policy could raise the costs. If sanctioned companies or assets are involved in contracting, shipping or financing, the risks (legal, reputational and financial) rise sharply due to the way sanctions interact with the international financial system. Simultaneously, Europe is provided with options by the large supply of US LNG (Blackwill and Harris, 2016; IEA, 2025; O'Sullivan, 2017). Third, the decisive constraint may come from EU internal law and politics. Any potential re-engagement should be limited, reversible and fit within the broader framework that points towards a phase-out (European Commission, 2025; Ason, Fulwood and Yafimava, 2025).

In conclusion, a limited, conditional and transparently priced re-engagement could potentially provide Europe with marginal cost and security benefits at certain times. But this could only work if Europe maintained its progress made since 2022 and its

credible exit options. In other words, contracts should be indexed to liquid trading hubs, run for short or medium terms and include emergency stop clauses with predefined triggers. Also, infrastructure commitments that lock in gas volumes over Europe's decarbonisation timelines should be avoided (IEA, 2025; European Commission, 2025). In addition, it is important to keep investing in regasification and interconnectors, while maintaining regional options such as East Med LNG in the mix, so as alternative options remain real rather than just theoretical (Bowden and Golan, 2024; European Commission, 2025). In contrast, vulnerabilities that Europe has worked to remove would be re-created in case of signing large, long-term agreements that push out alternatives. Besides, such agreements would conflict with the global LNG expansion through the 2020s (Blackwill and Harris, 2016; IEA, 2025).

5.4 Conclusion

The literature reviewed in this thesis indicates that Europe can meet its energy security needs without re-establishing significant dependencies. Across the references considered, electrification, domestic renewables, stronger grids, and demand-side flexibility are associated with higher strategic value than renewed exposure to imports from Russia. In this framework, any potential re-engagement—if considered—would likely be limited and temporary. Finally, energy transition and the broader argument for resilience through diversification play a crucial role in Europe's energy strategy.

6 Conclusions and future perspectives

In this thesis, the energy relationship between Europe and Russia has been analysed. It started as a practical agreement based on pipelines and long-term contracts but turned into a form of interdependency and strategic leverage. It had been something more than transporting gas. Both bargaining power and political flexibility were shaped by these physical routes and contractual design. Disruptions during the 2000s exposed the risks, but the 2022 breakdown made Europe's structural vulnerabilities impossible to ignore. As a result, the system adapted under pressure, and what once had been seen as a stable commercial trade, was converted into a challenge to the EU's security of supply.

A central finding is that infrastructure and market organisation were just as important as high-level politics. Direct pipelines that bypassed transit countries offered greater reliability but also gave leverage to the supplier. Limited cross-border interconnections made it harder to share risks across the system. In addition, buyers' flexibility was restricted by legacy terms, like oil-indexation and destination restrictions, even when alternatives were technically available. These locks-ins have been gradually counteracted by the EU's internal market rules, reverse-flow capability and hub-based trading. Even so, the 2022's system's physical and contractual setup made rapid diversification difficult and uneven across Member States.

Security of supply and decarbonisation have been set as central goals by the EU's policy response. The measures under REPowerEU and the broader Energy Union architecture were not entirely new, but a practical acceleration of an existing direction. Interconnectors, storage requirements and market coupling shifted from technical details to strategic core. In this model, security is achieved via flexibility in three main ways: physically (grids, storage, reverse flows), contractually (hub-based sourcing, LNG portfolios) and operationally (demand-side participation). The logic is cumulative. Each marginal improvement in interconnection, storage optimisation or flexibility leads to reduced dependency to any single supplier or route.

The risk was underscored by macroeconomic signals during 2021-2022. Price spikes were felt by households and energy-intensive industries. But later, high storage levels and improved hub liquidity resulted in a more stabilised situation. The practical lesson is that diversity of supply is necessary but insufficient unless the system can also redirect flows in real time. Stocks, interconnections and the ability to redirect fuels between regions play a crucial role in transforming optionality into resilience.

The energy transition is not a separate agenda but the structural solution to the security problem. The European Green Deal (notably the EU Taxonomy) promotes investment to the expansion of renewables, networks and flexibility of resources. The Clean Energy Package's market design (shorter imbalance periods, scarcity pricing, locational signals) supports variable power generation. National Energy and Climate Plans (NECPs) support continuous improvement. Social policies (e.g. Fit for

55) address distributional impacts to preserve political durability. If these challenges – regarding permitting, grid development, flexibility, critical materials – are handled effectively, then Europe will move away from volatile fuel costs risks towards more manageable, operational risks.

The benefits and challenges of the energy relationship between Russia and Europe are also discussed in this thesis. On the benefits' side, the most important gains are reduced vulnerability to single-supplier coercion, protection from fossil fuels' price volatility (as renewables have low and predictable operating costs) and the added advantages of cutting emissions. On the challenges' side, there are transitional and managerial difficulties. One is ensuring adequacy and real-time flexibility as variable renewables expand. Another is avoiding new lock-ins by over-investing in long-lived gas infrastructure. A further challenge is maintaining public acceptance regarding costs and benefits. Besides, the just-transition dimension is a core element of long-term system's reliability, not an add-on.

Within the same period, Europe's available range of short-term options was widened by transatlantic relations. The combination of the EU's liberalised gas market and destination-flexible, free-on-board (FOB) LNG, priced through liquid hubs, resulted in further security. This contribution was made possible by earlier European investments in regasification capacity, interconnectors and reverse-flow systems. In effect, flexibility was transformed into resilience thanks to market design and infrastructure. As gas demand will be reduced by electrification and efficiency, LNG will be shifting from a basic fuel to a backup buffer. Although it remains valuable, it seems to become time-limited in strategic terms.

This thesis also evaluated, based on practical/cost-effective grounds, whether a limited, conditional, strict energy re-engagement with Russia could be justified. The potential benefit is primarily economic in periods of tight supply: pipeline gas on historic routes can sometimes be cheaper than LNG and might help reduce TTF's price volatility. However, this benefit seems occasional rather than lasting in a system marked by lower EU demand and a major expansion of global LNG capacity. In parallel, the risks – non-commercial disruptions, legal uncertainty, exposure to sanctions and the danger of rebuilding structural dependence – remain ongoing. Europe entered recent winters with high storage levels and supply supported by diversified LNG and Norwegian flows. In this setup, the added security of supply value of renewed Russian pipeline gas is limited and depends largely on extreme weather or long-lasting global disruption.

These arguments point towards a conclusion. A very strong path to Europe's security of supply seems to be the one that promotes climate goals and competitiveness. It involves accelerating electrification, anchored in high shares of domestic renewables. Also, stronger transmission and cross-border interconnectors are required. Furthermore, flexibility of resources (from storage to demand response) needs to be expanded. Finally, gas should probably play more a temporary, declining, backup role, than remain a long-standing structural pillar. Simultaneously, shocks during the

transition can be mitigated by preserving diversification in global gas markets. However, new fossil fuel commitments should be addressed very carefully, because their economic lifespan might outlast their security value. Moreover, the marginal value of imported fossil fuels and the vulnerability to external and policy risks are decreased by each additional interconnection, storage upgrade and expanded renewable capacity.

Future perspectives have been also discussed and presented with official evidence. In the short-term, ensuring high storage levels, flexibility (without over-investing in long-term gas contracts), faster permitting and grid upgrades can result in new renewable projects and cross-border energy flows. In the medium-term, reliability could be achieved by focusing on deeper integration of the power sector, greater digitalisation and fuller market coupling. Across all stages, social measures – such as targeted protection for vulnerable consumers, support for workers and regions in transition and cost transparency – should be part of the system's reliability, not external side quests. The focus stays on diversification and rules-based markets. For the EU, cooperation with the US is most valuable when Europe's choices are strengthened. Also, regional options, like LNG from the Eastern Mediterranean, can help with Europe's integral transition.

In closing, the impact of Europe's previous energy interdependency had clear effects, signaling a new model that promotes energy transition and protection of the environment. Decarbonisation, market integration and security are not separate goals, but interconnected elements of a single, strong strategy. For Russia, the shift away from Europe brings expenses and delays that depend on its infrastructure and the size of other markets. For Europe, the path is challenging but promising: a system based on domestic primary energy, strong interconnections and flexible operation seem to be a credible path to reduce external leverage. Whilst, at the same time, long-term economic and climate goals are achieved.

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