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**“Geopolitical Disruptions and Energy Rebalancing in Maritime
Transport After 2022: A Study of Global Route Shifts and Future
Challenges”**

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Sofia Kassavou



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2. ABSTRACT

This thesis examines how geopolitical disruptions after 2022 reshaped maritime energy transportation with focus on oil and gas industry. 2022 marked the year of many geopolitical events, with Russian-Ukraine war and the escalating tensions in the region of Middle East leading to important rebalancing in terms of energy flows, maritime transportation and global trade. This necessitated the adaption of regions and states at local and global level.

The study aims at analyzing the transition of pre 2022 maritime energy flows to the new global system of energy trade. Efficient driven energy logistics were replaced by resilient focused models, which guarantee security at times of change.

This thesis, therefore, will try to disciplinary combine energy with geopolitical disruptions and how these lead to the rebalancing of energy in maritime transport. This combination will explore the dynamics of energy security, trade patterns, international relations and strategic dependencies in the post-2022 international environment.



3. TABLE OF CONTENTS

Chapter 1: Introduction.....	7
1.1 Importance of maritime transport in energy supply chains and energy flows.....	8
1.1.1 The role of chokepoints and the challenges.....	8
1.2 How Geopolitical shocks led to rebalancing in shipping routes?	11
1.3 Objective of thesis.....	13
Chapter 2: Literature Review.....	13
2.1 Maritime Energy Transport before 2022.....	13
2.2 Geopolitical Events After 2022.....	14
Chapter 3: Methodology.....	18
3.1 Research Questions.....	18
3.2 Research Methods.....	18
Chapter 4: Results.....	19
4.1.1 Ukraine Invasion & Sanctions on Russian Oil& Gas.....	19
4.1.2 Russia's Pivot to Asia.....	23
4.1.3 Middle East Risk Zones.....	24
4.1.4 Arctic Routes.....	25
4.2 Analysis of Route Rebalancing.....	27
4.2.1 Pre vs. Post-2022 Flows: Key shifts in volumes and destinations.....	27
4.2.2 Europe: US & Qatar LNG replacing Russian pipeline gas.....	28
4.2.3 Russia: Diversification via sea routes to China/India.....	29
4.2.4 Asia-Pacific: Rising intra-Asian trade; Middle Corridor rail-sea combo...31	
4.2.5 Green energy in shipping.....	31
4.2.6 The IMO decision.....	33
4.3 Future Challenges and Scenarios.....	34
4.3.1 Geopolitical Uncertainty: Future sanctions, Red Sea threats.....	33
4.3.2 Infrastructure Stress: Port bottlenecks, regasification capacity limits.....	35
4.3.3 Environmental Trade-Offs: Longer routes = more emissions.....	36
4.3.4 Technological: Need for smarter routing, digital twins.....	37
Chapter 5: Discussion.....	38



5.Introduction.....	38
5.2 Link between geopolitical events and rebalancing main findings.....	38
5.3 Regional impacts (winners-losers)	40
5.4 Resilience vs efficiency tradeoff.....	42
Chapter 6: Conclusion.....	43
6.1 Summary of findings.....	43
6.2 Answer to main question.....	45
6.3 Limitations, Strategic recommendations & Directions for future research... 	46
6.4 Final Remarks.....	48
Bibliography	49

List of Figures

Figure 1: Daily transit volumes of petroleum and other liquids through world maritime oil chokepoints (million barrels per day) (2023)

Figure 2: Map of daily transit volumes of petroleum and other liquids through world maritime oil chokepoints (million barrels per day) (1H25)

Figure 3: Imports of natural gas in gaseous state by partner, 2025

Figure 4: Imports of liquefied natural gas by partner, 2025



Chapter 1: Introduction

Energy has long been the backbone of economic activity and a driver of development. From basic needs to more complex industrial processes, energy keeps supporting progress and development. The transportation of energy sources and specifically oil and gas relies heavily on maritime routes. Therefore, maritime transportation plays a critical role in ensuring energy security at global level.

Energy security is defined by the 4 A's framework: 1) Accessibility, 2) Affordability, 3) Acceptability and 4) Availability. "Affordability" refers to the prices of energy, what the consumer can pay to get access to energy. The prices of energy have a degree of volatility due to many external factors such as market fluctuations and geopolitical disruptions. "Acceptability" highlights the sustainable production methods. Climate change and environmental problems have risen concerns regarding the impact energy production and consumption has on the environment. "Availability" relates to the energy sources which are scarce and limited while the demand is increasing disproportionately. Lastly, "accessibility" refers to energy supply being accessible to the consumers. Accessibility means being able to overcome all the obstacles, geographical, political and guarantee the efficient transportation of energy supply to consumers (Guevara, 2024).

The energy sources such as oil and gas are produced in specific regions and need to be distributed around the world. A large share of energy resources is concentrated in specific regions like Russia, UAE and Middle East. Energy's transportation from producers' regions to consumers is considered a significant trade activity (Anthony, 2022). But how is this energy efficiently transported? Pipelines like the Trans Adriatic Pipeline (TAP) provide a reliable transportation in continental regions, but they cannot cover long distances, they are limited at reach and geographical coverage (Trans Adriatic Pipeline (TAP), n.d.). On the other side, shipping historically has been central to global trade and is still a key means of transportation of goods and more specifically of energy sources. This entails that maritime transportation is a key distributor of energy sources and a catalyst for the availability of energy in the world. This marks maritime transport as a dual hat leader, not only in economic development, but also in global energy security.



A central concept of this thesis is “energy rebalancing.” In this study, energy rebalancing refers to the redistribution and reconfiguration of global energy flows, supply sources, trade relationships and transportation routes in response to changing geopolitical conditions. The term goes beyond the simple rerouting of vessels or the replacement of one energy supplier with another. It describes a broader adjustment of the global energy system, involving changes in where energy is sourced, where it is transported, which markets absorb it, and which maritime routes and infrastructure are used to facilitate these flows. In the post-2022 context examined in this thesis, energy rebalancing is therefore understood as the adaptation of states and energy markets to geopolitical disruptions through diversification of suppliers and destinations, changes in maritime routes and transportation modes, and the restructuring of strategic energy dependencies. Ultimately, it reflects a broader shift from a system primarily driven by cost and logistical efficiency towards one in which resilience, diversification and security play an increasingly important role.

1.1 Importance of maritime transport in energy supply chains and energy flows

Maritime transport constitutes one of the most critical pillars of global economy, underpinning international trade and securing continuous movement of goods and resources all around the world. Among the various commodities transported by sea, energy products hold a significant percent (EIA, 2025). In this context, both energy-importing and energy-exporting states are highly dependent on energy shipping routes. The importing- countries rely on the supply of energy for the coverage of their basic needs of their population and export-countries rely on energy transportation in terms of economic development since it is in many cases their basic pillar of economic activity.

More specifically, it is estimated that 80% of the total volume of global trade is transferred by the sea and the 70% of energy trade is transferred by the sea (UNCTAD, 2025). Maritime transport in the energy sector connects the producers with the consumers. There is a concentration in reserves of natural resources, in the Middle East for example, where oil production reached 30% globally in 2024 and natural gas production reached 17% (IEA, 2025). This must be distributed to other regions for use.



1.1.1 The role of chokepoints and the challenges

Chokepoints are a critical part of shipping routes which are exposed to vulnerabilities and risks arisen from global geopolitical events and great power competition (Oksana, 2025). In a more precise definition provided by the Energy Information Administration: “Chokepoints are narrow channels along widely used global sea routes that are critical to global energy security”. The world’s energy transportation relies heavily on the reliability of those transit lanes (Oksana, 2025). This underlines that energy flows are highly dependent on the free passage of ships through these straits.

For energy trade the two most crucial chokepoints in terms of volume are the Strait of Hormuz and the Strait of Malacca (EIA, 2024). The Strait of Hormuz connects the Persian Gulf with the Gulf of Oman and is in the heart of Middle East, the region that is leader in the production of oil and gas with total oil flows reaching around 21 million b/d in the first quarter of 2025, which translates in the 20% of global petroleum liquids consumption (EIA, 2024). The same percentage of 20% represents the global LNG trade that transited the Strait of Hormuz at the same period (EIA, 2024), making it the one of the world’s most important oil chokepoints (EIA, 2024). The Strait of Malacca links the Indian Ocean and the Pacific Ocean, it opens the door to Asia and is the shortest sea route between Middle East and Asia (EIA, 2024). It is estimated that for the first quarter of 2025, around 23 million b/d of oil transited the Strait of Malacca representing the 29% of total maritime oil flows (EIA, 2024). The fact that crude oil accounts annually for around 70% of total oil flows via the Strait makes it the world’s largest oil chokepoint in terms of volumes (EIA, 2024). Their strategic importance lies to the approximately 44 million barrels per day that pass through the two straits (EIA, 2024).

Apart from the two Straits mentioned above, there are several ones like the Suez Canal and the Bab el-Mandeb Strait, which are important for oil trade as well (EIA, 2024). The Suez Canal and the Bab el Mandeb are strategic oil routes that connect the Persian Gulf with Europe. The first quarter of 2025 total oil shipments accounted for 6% of total oil seaborne trade, but that was half of the flows transited before 2022 (EIA, 2024). This indicates their vulnerability to geopolitical disruptions arisen from Red Sea



crisis and the Houthis attacks (EIA, 2024). The picture below shows the volume passing the chokepoints globally in 2023.

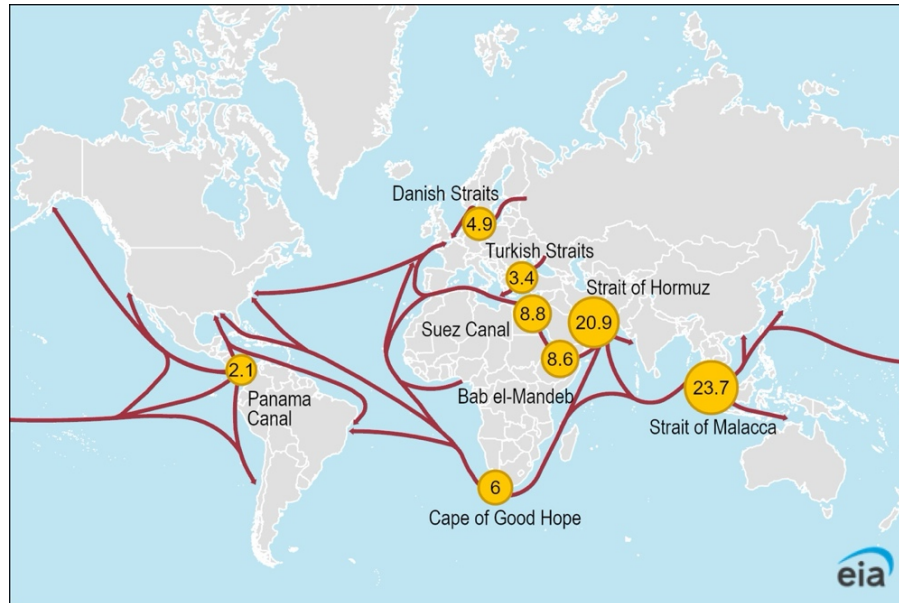


Figure 1: Daily transit volumes of petroleum and other liquids through world maritime oil chokepoints (million barrels per day) (2023) (EIA,2024)

Those great volumes of energy trade passing through them highlight the geopolitical importance of these straits which face challenges regarding their weaponization (Medunic, 2021). Those pivotal nodes can be weaponized by states as a means of hard power when blocking the traffic, or soft power when threatening to interrupt the navigation (Medunic, 2021). Weaponization means whether attacking the ships, blocking the passage, threatening to attack or close the passage, even interrupting digital communication and infrastructures is included (Kok Wey, 2025). States that are geographically located close to those passages or that exert global influence have interest in weaponizing the straits in order to keep control over global markets, trade and economy (Platias,2025). Russia for example after the invasion to Ukraine attacked not only to ships, but also to Ukrainian ports in the Black Sea. The Ukrainian army also attacked to Russian ports and placed sea mines to hinder Russian naval operations, creating a dangerous environment for navigation and increasing prices (Platias,2025).

Weaponization of network connections is a way to achieve policy objectives. The famous Alfred Thayer Mahan once said, “whoever rules the waves, rules the world”. States have realized that controlling the lanes of global trade translates in controlling



the economic development and wealth of a state, but more specifically when it comes to energy related trade, they control the security of the state (Medunic, 2021).

The weaponization of energy chokepoints results in disruptions in energy supply chains and flows. The inability of oil or natural gas to transit a major energy chokepoint, like the Strait of Hormuz which accounts for 20% of today's global oil & gas supplies, equal to 600 billion dollars (Neufeld, 2025), or the Strait of Malacca, even in a temporarily basis could create major inefficiencies. Supply delays, rise of shipping costs, longer distances could result in an increase of world energy prices (EIA, 2024). In this case, domino effect is taking place. Energy holds a critical role in industry, transportation, agriculture and other vital industries beyond electricity. The whole economy is being at risk. This interdependence leads to inflation and rises in price of products and services in general (Milewska and Milewski, 2022). The figure below unravels the contradiction with 2023 after those chokepoints are being weaponized and the free passage is disrupted. As indicated below the passage from the Suez Canal the Bab el-Mandeb Strait is almost half than that on 2023 and the trade volume from the Cape of Good Hope has increased from 6 to 9 million barrels passing per day.

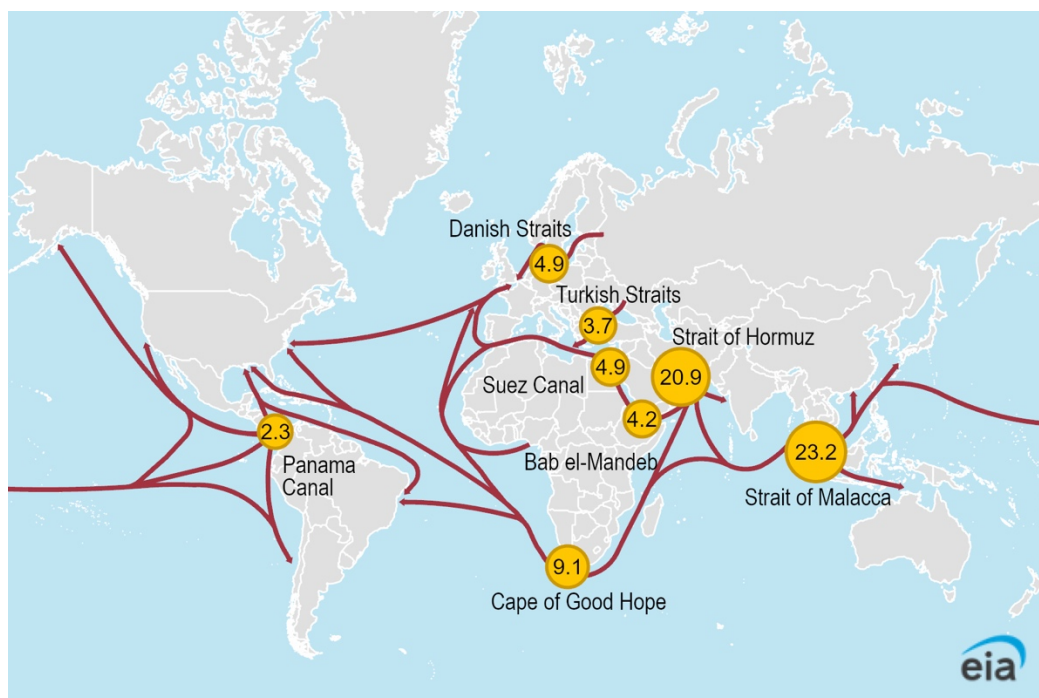


Figure 2: Map of daily transit volumes of petroleum and other liquids through world maritime oil chokepoints (million barrels per day) (1H25) (EIA, 2026)



1.2 How Geopolitical shocks led to rebalancing in shipping routes?

Geopolitical shocks encompass a wide range of events that threaten international relations. Based on a definition they represent “*Sudden, significant disruptions to international relations, trade or security that generate rapid and substantial uncertainty for global business operations*” (ESG → Sustainability Directory, 2025). Geopolitical shocks can include war, escalations, conflicts, political instability or even policy shifts and changes in governmental powers (ESG → Sustainability Directory, 2025). In this context, the war in Ukraine and the conflict escalation in Middle East represent such geopolitical shocks.

When geopolitical shocks arise, global trade and economy suffer consequences and the whole operational system is heading towards shifts (Yanai, 2024). Modern trade, with that high interconnectivity and complex network of supply chains, facilitates transportation needs, but at the same time exposes the network to vulnerabilities mainly related to geopolitical instabilities. Those geopolitical instabilities or tensions often cause disruptions and inefficiencies like port closures, tariffs, sanctions, higher transportation costs, delays and the weaponization of chokepoints (Yanai, 2024). The first sectors to be influenced is trade and economy, with energy trade and energy security being at the forefront. Geopolitical shocks come with geopolitical risks.

Geopolitical risks lie in many categories and can have major impact at a global scale. Trade wars and protectionism, tariffs, quotas can disrupt trade flows (Yanai, 2024). Sanctions and embargoes can limit the access to main markets and suppliers. Political instability, conflicts, pandemics and health crises are also main sources of volatility in trade flows (Yanai, 2024). Disruptions could be linked to natural disasters and climate change as well. While geopolitical events cause the phenomenon of “ripple effect” it is clear how one action, event, tension can lead to chain reactions (Yanai, 2024). Shipping trade, relied on chokepoints can be disrupted from geopolitical events blocking the free passage in critical straits for energy flows (Nautilus Shipping, 2024). Shipping routes are often weaponized and highly dependent on geopolitical events. Therefore, a geopolitical event can put at risk a shipping routes and lead to a rebalancing in transportation. The complexity and interdependence in maritime networks are related with vulnerability and resilience, which influence the efficacy of flows and



transportation. The year 2022 marked a change in geopolitics and shipping routes with the war in Ukraine and the Red Sea crisis.

To conclude, shipping routes are not just logistical pathways, they are geopolitical instruments used to put pressure or shape policies and international relations. The power a state has over controlling shipping routes of key importance is huge. To give an example, if a critical shipping passage like the Suez Canal closes, it has major consequences for global trade and economy. More specifically, on the incident in Suez Canal in 2021 which remained closed for 6 days more than 400 ships were redirected, which led to a damage of 9,6 billion euros (Tran et al., 2024). This alone, shows how much power those straits and passages have and the reason both why they are used as geopolitical means of pressure and why their free passage is essential for global trade.

1.3 Objective of thesis/ Key Questions

Against this background, it is evident that geopolitical instability holds a crucial role in shaping the conditions under which energy transport operates. The weaponization of maritime choke points, the imposition of sanctions and the outbreak of armed conflicts have exposed global energy maritime routes to risks and have highlighted the vulnerabilities of energy supply chains. A systemic analysis is needed to underline how geopolitical disruptions have reshaped energy shipping flows and routes especially after 2022, when two of critical importance geopolitical events took place with the first being Russia- Ukraine armed conflict and the second one, the escalating tensions in the Middle East.

To acquire a holistic view, the research will focus on the rebalancing on energy shipping routes and the emergence of new maritime corridors under the influence of geopolitical disruptions. The study will address some key questions regarding the major geopolitical shocks after 2022 that affected energy shipping routes and how those have been rebalanced across regions. In addition, it will be analyzed which regions were more affected and why, what are the emerging risks and logistical/technological challenges that have arisen nowadays and are related to green transition and security as well. Finally, the way those challenges and disruptions can be dealt with will be an extra key question which will be answered through this analysis.



The main questions will be:

- 1) How geopolitical disruptions after 2022 reshaped maritime energy transportation routes and flows?
- 2) To what extent did the weaponization of strategic maritime chokepoints affect global energy security and maritime trade efficiency?
- 3) How did Europe and the global energy market adapt to the post-2022 energy rebalancing?

2.1 Maritime Energy Transport before 2022

Before 2022 the architecture of global maritime energy transport had been shaped by decades of economic integration, regional imbalances in energy production and consumption, and the strategic importance of a limited number of maritime chokepoints (Connelly, Teter and Cret, 2023). This period was characterized by relative stability in energy flows, although punctuated by localized crises, tanker incidents, and episodic geopolitical tensions. The global system relied on predictable shipping routes, well-established supplier–consumer relationships, and a maritime security environment largely guaranteed by the United States and its allies.

From a practical point of view before 2022, fossil fuels dominated the global energy mix. According to the International Energy Agency (IEA), the oil consumption accounted for about 30% globally, coal 27% a relatively significant percentage taking into consideration the need for clean energy and less carbon dioxide emissions. Natural gas was at 24% and renewables constituted only around 10% of global consumption. Mainly focus were given on efficient maritime transport. Efficiency meant time and cost reduction followed by the adoption of new technologies (Review of Maritime Transport 2021, 2021). On top of that the maritime energy trade flows had been established with Russia being the main supplier of pipeline gas on Europe with less emphasis in LNG imports from sea trade. Middle East faced a relative stability with shipping flows being navigating in the seas.



2.2 Geopolitical Events After 2022

The year 2022 marked a significant turning point in geopolitics. From the beginning of the year the established balance within the international system started to unravel (MUHİTTİN, 2023). The outbreak of wars and attacks highlighted the fragility of the existing order, signaling a shift towards a more polarized and volatile world. The main regions that faced those challenges were Europe with the war in Ukraine and Middle East with tensions in Israel and Gaza. Those two regions played an important role in shaping the geopolitical landscape after 2022 with disruptions in supply chain and energy flows.

Russian-Ukraine war

In February 2022, Russia attacked Ukraine. This war was seen coming months ago and to fully understand the reason why Russia moved to this invasion is needed a deep analysis. This thesis won't be analyzing in depth the roots of this conflict but will attempt to briefly give a hint in understanding the events that took place. After the end of the Cold War and the dissolution of the Soviet Union, Ukraine stood as an independent state in the global ecosystem (Platias, 2025). The feeling of the West that prevailed over the Soviet Union was diffused in the global system. The USA and the capitalism dominated in the global system. They tried to expand their zone of influence and include former Soviet Union's states. This intention was obvious from the fact that the West and NATO were open to discussions regarding Ukraine's accession to the alliance (Πλατιάς, 2025). The prospect of Ukraine's accession to NATO generated significant concern within the Russian Federation (Πλατιάς, 2025). The West's intention to extend its sphere of influence over the countries of the former Soviet Union and the Warsaw Pact raised concerns not only as far as Russia's national security is concerned, but also its international status and prestige. As a result, Russia acted and from 2014 with the annexation of Crimea made it clear that would intervene in any way to retrieve its position and influence over Ukraine specifically. That is what led to a full invasion in Ukraine in February 2022 (Πλατιάς, 2025).

The invasion of Russia to Ukraine triggered one of the biggest energy crises in Europe. Prior to 2022, the European Union used to import the 45% of its gas from Russia (European Commission, 2023). That meant that Russia was the main exporter



of natural gas in Europe. Following the invasion, sanctions were imposed and EU's decisions to cut any commercial or other activity with Russia led to a reduction on Russian oil and gas imports. EU with RePowerEU Plan reduced Russian LNG imports by 26% reaching the final imports to 19% in 2025 (European Commission, 2025). Those imports were mainly transported via pipelines the main was the NordStream1, Yamal and Brotherhood. The construction of Nord Stream 2 highlighted the high interconnection with Russia and the growing dependence. The Nord Stream 2 even completed never commissioned in view of the Russia-Ukraine war and all other pipelines were set unfunctional with the events that occurred. The sudden reduction of flows via pipelines led to a surge in maritime transport and the need for diversification of supplies (www.planete-energies.com, 2025). In view of that need, alternative suppliers like the United States, Qatar and Norway were addressed to fill in the gap caused by Europe's decision to secure energy independence from Russia.

The war in Ukraine is still ongoing counting the 4th year. Since the outbreak of the war, supply chains were disrupted and trade and economy negatively influenced at a global scale. Apart from sanctions and the rupture in diplomatic relations that led to a rebalancing of energy, the war itself with attacks on the Black Sea and main ports of Ukraine disturbed shipping and trade as well. The way the shipping lines unfolded will be examined in a next chapter (Platias, 2025).

Middle East

Apart from the Russian-Ukraine conflict, geopolitical events in the Middle East region influenced maritime transport, which were linked to security threats in key maritime chokepoints. A long-standing conflict which escalated in 2023 was that between Israel and Gaza. The conflict between those two countries is one of the most violent worldwide and dates back more than a century ago (BBC, 2025). The dispute concerns land and borders issues. The escalation came with a full invasion of Israel in the Strip of Gaza with the claim of destroying Hamas, the terrorist group which controls Gaza (BBC, 2025). In this conflict many states in the Middle East got involved leading to a wider crisis in the region. In 2025, a ceasefire had been signed between the two



rivalry parties by US's initiatives, encouragement and mediation. Yet, whether it is going to be applied or broke will be proved in the future (Quillen, 2025).

These tensions triggered the involvement of other states in the region as mentioned before, with Iran and paramilitary groups being involved in the conflict as well (Crisisgroup.org, 2025). Iran openly positioned itself alongside Gaza and expressed its support to the Palestinian people. Houthis, a paramilitary organization in Yemen, supported by Iran intervened in an indirect way by attacking ships in the Red Sea in the name of solidarity to Palestinian people (Yandell, 2024). At the same time Iran's support to Palestine was expressed in hindering shipping in the key chokepoint of Strait of Hormuz, where is passing 30% of global energy trade (UN Trade and Development in a way to put pressure in Isarel's actions (UNCTAD), 2026). In this context, Iran indirectly participated in the conflict between Israel and Gaza with the escalation resulting from US airstrikes in Iran's nuclear facilities. Iran's nuclear program has been for decades a main issue of conflict between the two states with US trying to change the dynamics and stop any nuclear development in the name of addressing a security dilemma (Hurst, 2022). Iran's diplomatic tool in responding to these attacks on 2023 was the closure of the Strait of Hormuz (Heiran-Nia, 2026). The crisis that followed was linked to the Gaza war and had major impact on energy prices and shipping routes (MENA FCV ECONOMIC SERIES BRIEF, 2025). Therefore, the tensions in the region were not limited between Israel and Gaza. Iran which faces USA's threats, weaponized the Strait of Hormuz to protect its interests and Houthis in Yemen threat the Red Sea passage to support Gaza and Iran. Iran is indirectly linked to the disruptions in Red Sea, where passes 12% of global trade as well via Houthis Group, that operates and acts as Iranian Proxy (Israr and Ghani, 2025). More specifically, Houthis Group is responsible for the attacks in more than 190 ships between 2023-2025 affecting more than 60 nations (Sainz, 2025). Tensions in the region and attacks on them put at risk the safe navigation of vessels. Apart from the Straite of Hormuz, the Suez Canal is a key route for passing to the Red Sea. It is the canal which connects the Mediterranean and consequently Europe to the Middle East (Kamali et al., 2024) (Strait, 2025). It is the shortest maritime route between Europe and Asia towards India and the Pacific Ocean. In this area one more important chokepoint is the Bab al -Mandeb Strait, which connects



the Red Sea with the Gulf of Aden and the Indian Ocean. It is the continuation of the route that begins with the Suez Canal and allows ships to have shorter and less costly travels (EIA, 2024).

The above, highlight the increasing geopolitical instability and the consequences it has for global energy supply chains and maritime trade. The weaponization of chokepoints, the rebalancing of energy transportation after 2022 makes evident the transformation that maritime industry has undergone. Traditional models of energy transport and security are no longer sufficient. The war in Ukraine and the Middle East escalation did not only disrupt energy supply, but they also led to a rebalancing of energy transportation and rerouting of shipping lines with new dependencies, trade patterns and risks. Out of this understanding critical questions arise regarding the adaptability, dependency, energy security, resilience and efficiency of energy maritime trade and the future challenges of the sector.

Chapter 3: Methodology

3.1 Research Questions

The aim of this study is to analyze the rebalancing of energy transportation caused by the geopolitical events after 2022. It is of great importance to interlink the geopolitical events with global disruptions in maritime oil and gas transportation. Geopolitical disruptions and their impact will be examined under a holistic approach. This thesis will not attempt only to give facts and analyze the events per se. The interconnection of those geopolitical events, after 2022, with the rebalancing of energy and maritime rerouting will be the focus. The interdisciplinary approach will attempt to illustrate how those geopolitical events influence global maritime energy trade, to what extent and what future challenges arise.

3.2 Research Methods

The research is based on secondary qualitative and quantitative data. The sources include academic articles, surveys, institutional reports, policy papers and statistical databases which interpreter both at a theoretical and numerical level the situation and



events examined in this thesis. More specifically, International Energy Agency (IEA). U.S. Energy Information Administration (EIA), UNCTAD, European Commission and the International Maritime Organization (IMO), in combination with additional maritime and energy organizations constituted key sources of this analysis. The above key sources provided both qualitative and quantitative information and data which resulted in a more comprehensive understanding of the geopolitical, economic and maritime energy transportation landscape.

The methodological framework of the thesis is based on case-study analysis of two geopolitical events that took place after 2022, the war in Ukraine and the tensions in the Middle East. The period and the cases were selected due to their direct influence on energy rebalancing, security and maritime transportation. The analysis examines how those geopolitical events triggered changes in energy flows, maritime transportation, trade diversification and the emergence of alternative shipping routes.

The analysis begins with a general introduction on geopolitics and continue with a deep dive in the analysis of the two critical geopolitical events after 2022 which shifted energy flows in maritime transportation. The aim is to connect those geopolitical disruptions with the rebalancing in energy maritime trade. To justify and conclude the above, the analysis and examination include the events, key changes in policies and international relations and statistics that depict those changes at numerical level.

This research is subject to certain limitations. The geopolitical events examined are still ongoing and even more intensified. The war in Ukraine continues, the Middle East tensions are still escalating. As a result, some statistical data, development, trade patterns may change.

Chapter 4: Results

4.1.1 Ukraine Invasion & Sanctions on Russian Oil & Gas

After 2022 the war in Ukraine had major consequences especially for Europe, which was significantly dependent on Russian oil & gas. Oil and gas in a percentage of 33% and 24 % accordingly accounted for more than half of Europe's energy supply and until 2022, 45% of total gas imports and 27% of oil imports were coming from Russia (Duggal, 2025). This highlights the dependence EU had on Russian oil and gas imports



in order to be productive and secure. In the name of its independence EU imposed sanctions and voted packages with long-term view to cut energy supplies from Russia.

In that context, EU managed to reduce its dependence on Russian oil and gas, more specifically gas imports fell by 26 % from 45% to 19% and oil imports by 25% from 27% to 3 % (Duggal, 2025). EU found other suppliers to secure its energy mix. The US and Norway along with other states like Kazakhstan, Algeria, United Kingdom replaced Russian imports. In 2025 as the graphs demonstrate below, the EU's main supplier of petroleum oils was the United States and Norway. When it comes to natural gas Norway was the largest supplier with a percentage of 50% and as far as LNG is concerned United States account for close to 58% of LNG imports (ec.europa.eu).

To achieve its objective, the EU adopted several packages of sanctions, 19 in precise number, against Russia, aiming to assert its independence from Russian fossil fuels and support Ukraine in response to the hostile actions of Russia (European Commission - European Commission, 2025a). By the term sanctions, we mean multilateral measures, usually adopted from international organizations as whole, otherwise they could be considered “countermeasures” or “retribution” (Χατζηεμμανουήλ, 2025). Sanctions generally include diplomatic and economic sanctions such as travel bans, limits in economic interactions or access to funding, trade embargoes and communication disruptions. Since 1990, states and international organizations approached sanctions with different practices, more targeted and results oriented (Χατζηεμμανουήλ, 2025). The two new approaches include the known “smart” or “targeted” sanctions and the named “listing” of individuals or entities subject to them. The fact that civilians and the whole population of a state was subject to hard sanctions that could plague inevitably their life and promote the instability and destruction of the economy, led to this “reconstruction” of the term. Trade embargos, which were until the 90s the most frequent choice when it comes to sanctions have the opposite results. In contrast, smart sanctions, more customized targeted to people or industries more important are the key to efficiency and proportionality when it comes to foreign policy (Χατζηεμμανουήλ, 2025).

This is the way EU responded to the crisis arisen from Russian invasion to Ukraine in 2023. The EU as an entity, voted for the packages at the expense of Russian fossil fuels and consequently economic development. The RePowerEU was the response to



Russian invasion to Ukraine (European Commission, 2022). The main target was to phase out Russian fossil fuels imports, and how could EU do that? First of all, by diversifying its energy suppliers, secondly by saving energy and last but not least by promoting the production of clean energy and compelling turn to renewables (European Commission, 2022). This strategy by EU was at the context of forbidding the trade with Russia of products that are critical for the funding of this illegal action of entering Ukraine. Energy was a way for EU to put pressure to Russian economy due to the high percentage of fossil fuels exports value in the GDP, but at the same time Russia was able to weaponize its energy sources exported to EU.

Russia is the second largest producer of natural gas after USA and the world's largest natural gas exporter (International Energy Agency, 2022). In 2022 fossil fuels made up almost 64% of Russian total exports which accounted for almost 254 billion dollars with EU being the largest buyer of Russian oil and gas. Before the war, Russia was supplying EU with approximately 45% of gas and 27% of oil. The results of the sanctions so far, which are still in power and enhanced by the 19th package of sanctions, were the minimization of oil and gas imports from Russia. More specifically, oil fell to 2% from 29% in 2021 and gas imports were reduced by 30%, from 48% in 2021 to 17% (Reuters Staff, 2025). Totally, the value of EU imports regarding oil and gas decreased from 124 billion dollars in 2022 to 25 billion dollars in 2025 (Pomerleau and Jensen, 2025). The trade between the two parties regarding gas was mainly via pipelines, but as far as oil products are concerned, the main way of transport was seaborne trade. The sanctions imposed in Russian exports in the energy sector paid off and EU as an alternative energy supplier enhanced the relations and trade with USA. USA became the main source of oil and gas replacing Russia and filling the gap arisen from the new situation (ec.europa.eu, 2026). At the same time EU achieved the goals regarding the energy demand, increase of the shares of renewables in the EU energy mix and reduced energy demand. The dependence on Russia fell from 45% to 18% (Baselovic, 2025). This reduction was realized via the transition from Russia being the largest importer of energy products in EU to USA. After the EU sanctions, USA was there to replace Russia (Cooban, 2023). In 2025 USA remained the largest supplier of both oil and LNG in EU. Norway and Kazakhstan follow USA in energy products trade with EU. For 2025,

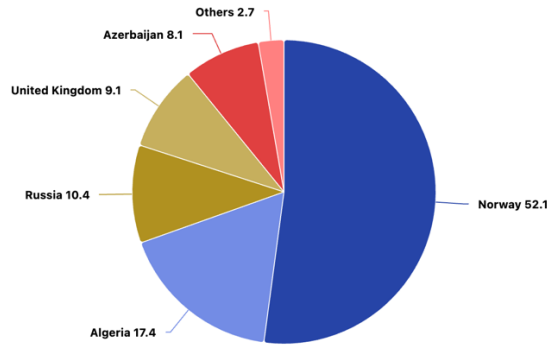


Norway was the largest importer for Europe of natural gas in gaseous state representing 52% of total natural gas imports (ec.europa.eu, 2026). The graph below illustrates this statistic.

Imports of natural gas in gaseous state by partner, 2025

(%)

Share in value



Source: Eurostat database (Comext) and Eurostat estimates

eurostat

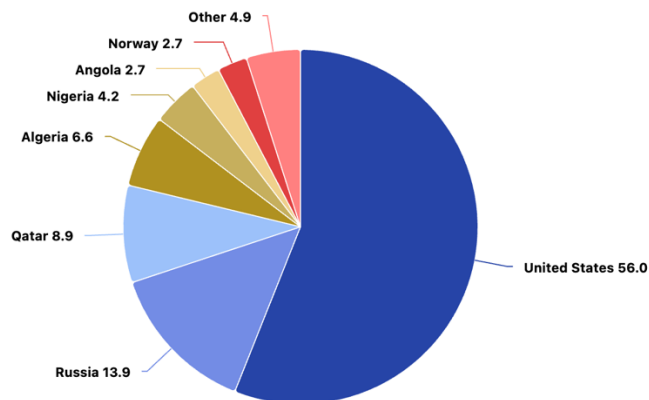
Figure 3: Imports of natural gas in gaseous state by partner, 2025 (ec.europa.eu, 2026)

For liquefied natural gas, the US proved to be the partner with the largest share for LNG imports in 2025 (ec.europa.eu, 2026).

Imports of liquefied natural gas by partner, 2025

(%)

Share in value



Source: Eurostat database (Comext) and Eurostat estimates

eurostat

Figure 4: Imports of liquefied natural gas by partner, 2025 (ec.europa.eu, 2026)



Russia's Shadow Fleet

The measures EU took to reduce dependence from Russian imports and to harm Russian economy to stop funding the war in Ukraine led to the emergence 'shadow' fleet of Russian tankers (Raghunandan, 2025b). The appearance of the "shadow fleet" was due to the sanctions which included price cap and limitations in oil trade in European ports. Russia in order to avoid the sanctions found other indirect means to face this challenge. Russia's shadow fleet plays a very important role in sustaining Russian oil exports and bypassing EU sanctions. But how is this achieved via the "shadow fleet" and what does EU in order to be effective and resilient in this tactic?

In May 2024, around 400 vessels were transporting Russian oil with one fourth of them being "shadow" tankers. Out of that "shadow" tankers around 30% were 20 years old indicating their incompatibility with international security and safety standards (Raghunandan, 2025b). In its efforts to avoid the price cap invested around 10 billion dollars to develop its shadow fleet (Caprile and Leclerc, 2024). The strategy was to shift tankers that previously were owned by Russian entities to new companies based mainly in the United Arab Emirates. In this category they are 90 tankers involved. Another tactic was to buy vessels 15 years old or more that they would be beyond their insurance age (Caprile and Leclerc, 2024). This category included around 100 vessels. Third and last strategy included the acquisition of vessels 20 years old from both shadow and clear fleets, so 200 ships were at this category (Caprile and Leclerc, 2024). In this way Russia uses other state's flags, avoids insurance and takes advantage of the multiple levels of ownership and management to sail in the sanctions of the West. The fleet uses many tactics to achieve its targets and transport oil freely. The STS (Ship-to-ship transfers) and AIS (Automation identification system) blackouts or spoofing are two main tactics to evade sanctions (Caprile and Leclerc, 2024). The number of Russia's shadow fleet raised to a total of 557 with key destinations India, China and Turkey (Caprile and Leclerc, 2024). This shadow fleet poses and many risks and threats which could be navigational, environmental or maritime operational (Caprile and Leclerc, 2024). The last EU sanctions package, the 19th, has a primary target on the shadow fleet. EU added to the listing 117 more vessels, which are banned from accessing EU ports or receiving services. At the same time EU investigates flag states to make sure shadow tankers do not use their flag to sail (Finance, 2025).



4.1.2 Russia's Pivot to Asia

Russia's multilevel reaction to EU sanctions packages included apart from the development of the "shadow fleet", the redirection of its energy exports to emerging markets that took advantage of the lower Russian oil and gas prices. The Russian energy exports landscape changed drastically. The starting point of this turn was dated back to the end of the Cold War and the Collapse of the Soviet Union, when Russia realized that the new US-dominated world was less friendly to her (Bratersky, 2018). The Asia-Pacific region was perceived as a chance for Russia to develop economically and at the same time play an important role in the development of a new international system where Russia could exert power (Bratersky, 2018). This strategy started back then but was intensively the last years after the invasion to Ukraine when the West turned its back and closed the doors for Russian cooperation (Kawato et al., 2025).

Russia after being blocked from energy markets activated its diplomatic expansion in the Asia to redirect its energy exports (Dr. Sutandra Singha, 2025). Asia is the region with the most significant growth the last decade with China and India being in the spotlight. Those two countries have population that moves from lower to middle class indicating the need for more energy use and their economic development based on industrial production is constantly increasing (Paul and Mas, 2016). In 2025, more that 80% of Russia's crude oil was distributed to Asia & Oceania, an increase of 100% compared to 2020 (HIDAYAT, 2026). It is worth mentioning that India is one of the fastest developing economies with rising energy demand and the world's most populous country in the world accounting for 1,46 billion people, requiring energy sources to keep up with the development and the vast needs of its population (World Bank Group, 2026). Its oil imports represent more than 85% and after 2022 it has become the second largest importer of Russian energy accounting for almost 60 billion dollars in 2024 (tradingeconomics.com, n.d.).

After EU sanctions on December 2022, new potential buyers stepped in to take advantage of the low-cost Russian energy supplies. For the last 3 years China has been the main buyer of Russia's coal and crude oil exports representing 42% and 47% accordingly (Katinas, 2025). India follows China in these two categories with 20 %and 38% (Katinas, 2025). More specifically, based on the last data on October 2025, China



remained the largest buyer importing 44% of Russia's export revenues making 5.8 billion euros. India followed with 3.1 billion euros mainly coming from crude oil which has been 80% of India's purchases with 11% monthly increase. India before 2022 purchased only 2% from Russia due to its higher freight costs. The EU sanctions and the imposed price cap of 60 dollars per barrel on Russia's seaborne crude oil made India one of the key buyers of discounted Russian oil. The third largest buyer was Turkey with 3 billion euros. Overall, seaborne energy trade was accelerated towards China, India and Asia in general.

4.1.3 Middle East Risk Zones

Middle East risk zones include Red Sea and the escalation arising in 2023. Before the conflict in Gaza and the Hamas attack on Israel on 2023, 12% of global trade was passing through the Suez Canal (Courtneil, 2024). As far as the Bab-el Mandeb Strait is concerned in 2023, approximately 8.5 million barrels per day of crude oil were passing through (Coface, 2025) and around 4.3 million b/d also were transited that year (EIA, 2024).

Since the onset of the war in Gaza the Houthis have initiated almost 500 attacks on shipping which impacted the traffic in the Red Sea (International Crisis Group, 2025). Due to the Israel-Gaza war oil tanker transportation volume was decreased, especially for ships that pass through Red Sea. This decrease due to the conflict had as a result an increase in prices. 12% of oil and 8% of LNG transported by sea normally passes through the Suez Canal. After the conflict escalated, the number of ships passing the Suez Canal fell around 50%, from 75 to 32 per day, indicating the fear of the ships to navigate through it (Helwa and Al-Riffai, 2025). This decrease in the navigation of ships from the Suez Canal caused the increase in the passage in the Cape of Good Hope. This redirection of 89% of the ships has led to increased costs, delays and of course carbon emissions. This increase follows the additional 3,500 nautical miles that the ships have to sail in order to avoid the Suez Canal (Helwa and Al-Riffai, 2025). This has many effects in the fuels and insurance costs as well. The new reality has increased maritime transportation costs by 300% (Helwa and Al-Riffai, 2025). The photo below shows the difference in routes. A noted the Cape of Good Hope necessitates the round of Africa in order to bypass the Suez Canal and Red Sea. The amount of crude oil and oil



products transferred by the Cape of Good Hope had increased by 50% the first quarter of 2024 in comparison with 2023 average due to the disruption in Middle East (EIA, 2024). This translates in an additional cost of 1\$ million per trip for the extra fuels only (Courtneil, 2024).

Overall, geopolitical disruptions in Middle East region create instability and the rerouting of shipping lines, which avoid the risk zones and opt for safe routes even though they tend to be less cost and time effective.

4.1.4 Arctic Route

In this constantly evolving world new routes emerge from natural phenomena as well such as the ice melting. Climate change and global warming create an opportunity and a threat at the same time for new sea corridors in the Arctic, and especially the Northern Sea Route. The Arctic is hotter now than in the last 2000 years marking the beginning of this new era in maritime transportation (Humpert, 2011). Until late 90s the Arctic was full of ice, difficult to sail with high risk and limited ice-free period. The last decades there has been an interest in the route, taking into consideration the ice melting and the longer periods that ships can sail in the arctic waters. On top of that, the fact that in recent years there has been the rapid development of oil and LNG projects in West Siberia has enhanced the geopolitical and diplomatic dimension of the route. It is considered as a corridor to bring energy sources to Europe and Asia fastest and with lower costs (Grzybowski, 2025). The Yamal LNG projects in the Port of Sabetta highlights the importance that the NSR would acquire in near future with Europe being the largest export market based on the data and relations of the time. Yet, the equilibrium has changed, and Asia has replaced Europe and the West in 2025. Russia and China are the main presences in the NSR area and numbers prove that too (Van Hussen et al., 2020).

The NSR is the shortest maritime route connecting northwest Europe to northeast Asia in terms of transport distance, since it is in average 30-50% less, and in terms of sailing time 14-20 days (Björn Gunnarsson and Moe, 2022). It is indicative the fact that from Rotterdam to Shanghai one ship should sail via the Suez Canal more than 10.500 miles, around the Cape of Good Hope around 14.000 miles (which is now a solution for the disruptions analyzed above caused by tensions in Middle East), and through



NSR over 8.000 miles (Grzybowski, 2025). The distance of the NRS is 5.600 kilometers and include the Russian internal waters, the territorial sea, the adjacent zone, and the exclusive economic zone. Therefore, Russia is the costal state which is responsible for the management and administrative systems. The Arctic is an integral part of Russian identity and the base of its fossil fuel economy (Wishnick, 2025). In this context, it is stated in the article 124 of the Federal Law that the NSR is “*a historically established national transport corridor of the Russian Federation*”, with Russia being the state regulating the navigation to all routes of NSR. Therefore, vessels wishing to navigate through the NSR need to ask for permission from Russia. More specifically, the main Directorate of the Northern Sea Route Federal State Budgetary Institution is responsible for handling requests for permission.

Restrictions remain regarding the use of NRS such as the seasonal navigability and the lack of infrastructure, given the fact that the area is neither residential nor developed in terms of infrastructure and ports.

China is a country that has expressed its polar interests long ago from 1990s in the Arctic. In 2010 China initiated discussions for cooperation with Russia announcing its Polar Silk Road that would be connecting the Arctic with the Belt and Road Initiative. Ever since there has been discussions, scientific collaboration which have been intensified after the full-scale war in Ukraine that strengthened the relationship between Russia and China (Wishnick, 2025). It is indicative that more than 90% of shipping traffic in the NSR in 2023 is directed to China, with crude oil representing a 70% of the cargo (Wishnick, 2025). China's long-term goals related to energy security led her to the Arctic route taking into consideration its dependence in the Strait of Malacca. China is the world's largest energy consumer representing 25% of global energy consumption and 15% of oil used globally. More specifically in 25 years, China's energy needs have reached 15 mb/d from 3.5mb/d (Dosson, 2025). Except for the largest energy consumer state, China is the world's largest importer as well given that 80% of its oil is imported. All China's imports pass from the Strait of Malacca, meaning its energy security is dependent on the free maritime trade passing this chokepoint (Dosson, 2025). An alternative energy supply route for China could be the Arctic and the Northern Sea Route, that is why China is paying so much attention to having access to this route.



To conclude, the emergence of new corridors was a combination of geopolitical events and rebalancing in terms of power, trade energy, and of climate change that initially gave this opportunity.

4.2 Analysis of Route Rebalancing

4.2.1 Pre vs Post 2022 Energy Flows

Prior to 2022 and the geopolitical shocks analyzed above, global energy flows were characterized by relative stability, existing infrastructure and efficiency-oriented maritime logistics. Energy routes emphasized in cost minimization, short distances and safe chokepoints. Between 2015 and 2019, significant emphasis was placed on renewable energy investments and environmentally sustainable maritime transportation. This translated in the growing importance of LNG and cleaner shipping technologies (UNCTAD, 2016).

After 2022, global perspective on maritime energy flows changed. The global system faced the challenges and disruptions of the geopolitical events that generated doubts regarding globalization, which was supported the last decades (Yan and Piao, 2025). High levels of interconnection and dependence proved to be volatile and fragile in difficult times. Companies and governments rejected the previous models of just-in time reliance and started considering the adoption of other uncertain factors as well. The mindset was redesigned from efficiency to resilience and continuity (Review of Maritime Transport, 2022). Factors such as supply chain resilience and environmental sustainability were combined with Cost-optimization solutions. Balance between cost and factors of instability and supply security needed to be taken into consideration (Review of Maritime Transport, 2022). More specifically for LNG shipping network, a structural change was made after the Russian-Ukraine conflict.

4.2.2 Europe: US & Norway LNG replacing Russian pipeline gas

Europe after Russia's invasion to Ukraine and the sanctions imposed towards Russia needed to find alternative suppliers, other states that could replace Russia in the LNG



and other energy products. Russia's imports to Europe in terms of pipeline gas dropped from 40% in 2021 to 11% in 2024 and totally for gas both transported via pipeline and LNG to 19% of total EU gas imports (European Council, 2025). This reduction was a result of the sanctions packages which included the ban on Russian imports and the overall reduction in gas consumption in EU generally (European Council, 2025). EU managed to achieve a reduction of 19% in the demand of natural gas during those 3 years (European Council, 2025). As far as oil is concerned, back in 2021 Russia supplied 27% of EU's oil, a percentage that fell to 3% in 2025 (Consilium, 2019). In June 2025, the European Commission proposed the gradual end of Russian imports to EU, meaning to totally ban LNG and gas imports from Russia by the end of 2027 (European Council, 2023).

The above results were not easy to be achieved in that short period of time. The RePowerEU plan focused on declining Russian LNG and oil imports but targeted to other means as well to reach its target. The filling of gas storage capacity, the boost to renewable energy sources (European Council, 2023), which reached 25% of EU's final energy consumption in 2025 (European Environment Agency, 2023) and the diversification of its energy supplies, were key steps that EU took to limit its dependence on Russian imports (European Council, 2023). Those suppliers that replaced Russia were the three countries below: Norway, United States and Qatar. The EU is highly dependent on LNG, which is primary imported at a percentage of 90% (Strategic Perspectives, 2024).

Norway was the most significant supplier of natural gas to EU providing about 51% of EU's imports in the second quarter of 2025 (ec.europa.eu, 2025). As far as LNG is concerned, the United States were the largest exporter of LNG in EU in 2024 offering almost half of the total EU's imports. The 45% of US LNG imports and the fact that US imports were more than doubled in 2024 compared to 2021 is indicative of how much geopolitical events changed the situation in Europe. This 45% reached 55% in 2025. US also traded oil with the EU at a percentage of 17% in 2024 (European Commission - European Commission, 2025). Norway and US are the main alternatives to Russian dependency.



4.2.3 Russia: Diversification via sea routes to China/India

Russia's diversification in sea trade and especially in oil and gas products was a necessity after the 2022 geopolitical events. China and India were the key buyers of Russian oil and gas due to the EU sanctions in combination with the constantly emergence of rising needs in those countries. As far as Sino-Russian relations is concerned the cooperation between the two countries has been strengthened, with Russian oil and gas exports accounting for a significant percentage of China's imports (Neufeld, 2025b). More specifically, out of around 11 million barrels of crude oil imported per day in China in 2024, the 2,2 million were shipped from Russia. This indicates that Russia stands as the largest exporter of crude oil to China (Neufeld, 2025b). It is indicative that China's share of Russian oil imports has risen especially after the war in Ukraine and EU sanctions, from around 15% in 2018-2021 to 21,5 % in 2024, meaning an increase of 6% (joehawkes joehawkes, 2025). In that context, one more point of cooperation between the two countries is the Northern Sea Route (Intellinews.com, 2025). As already mentioned, this new corridor unfolds as a way for both Russia and China to face their dependences and strengthen their presence in the global ecosystem. The fact that Russia has diversified its routes and focused on Asia and China specifically is reflected in the shipping traffic in the NSR. Data show that in 2023 more than 90% of the shipping traffic in this corridor was heading towards China with crude oil accounting for 70% of the cargo, iron 15% and LNG 3.5% (Wishnick, 2025). It is indicative that on October 2025 Russia and China signed a deal to advance the Arctic Development in the Northern Sea Route. The main objective was the commercialization of the NSR in order to facilitate faster connection between Asia and Europe (Myrbekk, 2025). Shipping trials in the Arctic have already started with a Chinese containership completing the transit in 4 days meaning 20 days less compared to around 40 days that would be needed via the Suez Canal (Myrbekk, 2025). There has been a growing interest in the Arctic in general from other states as well with US, Canada and South Korea expressing potential involvement in the region. With those indications Arctic seems to be the next area of competition for great powers in the international system (Myrbekk, 2025).



Russia-India relations have been accelerated the last decade with the growing demand for oil and gas of the developing India. According to US Energy Information Administration “In 2023, India was the third-highest consumer of petroleum and other liquids, behind the United States and China” (www.eia.gov, 2023). In 2023 Russian oil imports accounted for 34% and this was a great scale up in comparison to pre 2022 war period when Indian imports of Russian oil were negligible (Wishnick, 2025). The after war low Russian price was attractive for India. Prior to the Russian invasion to Ukraine Russian oil imports accounted for around 2,5% of India’s total oi imports. Russia became India’s largest supplier of crude oil and condensate in 2024, providing almost 39% of the country’s total imports as indicated in the graph below as well. The US and EU sanctions imposed in 2022 influenced the price of Russian oil and gas with oil caps and gave the opportunity to India with the continuously growing needs to buy discounted Russia crude, boosting its intake more than sixfold to around 740.000 b/d. By 2023, India’s imports of Russian crude more than doubled reaching nearly 1,8 million b/d (U.S. Energy Information Administration, 2020).

4.2.4 Asia-Pacific: Rising intra-Asian trade; Middle Corridor rail-sea combo

The Asia - Pacific region is emerging as the center of global energy demand accounting for more than 50% of global energy demand growth (www.woodmac.com, 2024). In this region China and India, the most populated countries worldwide facing the economic development emerge as largest marginal buyers of crude oil and LNG with Japan and South Korea following and being dependent on maritime energy imports (Reuters Staff, 2026a). Geopolitical shifts have influenced trade patterns with the war and sanctions. Externally, Russia has been a key emerging supplier of energy in the region alongside US, Saudi Arabia and United Arab Emirates. Sanctions and regional development have enhanced the intra-Asian trade. Energy, trade and geopolitical dynamics are changing, and Asia becomes a hub of supply and demand.

4.2.5 Green energy in shipping

Geopolitical events, green energy and rebalancing of energy flows are highly interconnected. The change in energy flows entailed a turn towards shipping. Shipping



faced the need as well to modernize and limit its environmental impact. Reducing greenhouse gas emissions from ships has been a priority given that international shipping is responsible for almost 3% of global anthropogenic emissions with estimations to rise by 50% until 2050. Every year ships carrying 10 billion tons of cargo emit almost 1 billion tons of greenhouse gases (Solórzano, 2024). The above percentage might even differentiate given sea routes are changing and geopolitical events are interrelated. Green energy in shipping refers not only in ships themselves but the entire value chain of shipping and maritime transport that needs to decarbonize including ports, fuels, ships' construction.

Under this prism, green energy in shipping is not only an environmental transition, but also a major geopolitical shift influencing maritime routes. Green and alternative fuels, renewable energy infrastructure will shift the current balance. States investing in green fuels such as ammonia, hydrogen and others investing in renewable port infrastructure will gain an important market share and competitive advantage leading to a shift in maritime routes. Australia is investing billions of dollars within the 2024 National Hydrogen Strategy to produce clean hydrogen with minimum target the production of 0.5 Mtpa by 2030 and 15 Mtpa by 2050 (Geoscience Australia, 2025) aiming at expanding its exporting capabilities given the proximity to Asia's major energy markets but the targets set for neutrality as well. Saudi Arabia as well, despite its domination in oil, holding around 1/5 of world's total reserves (IEA, n.d.), seeks to remain key global player in energy industry and exporting power. Following the climate change and carbon neutral policy and decisions adopted at a global scale, Saudi Arabia is building the world's largest green hydrogen ammonia plant with target to produce more than 1 million tons of green ammonia annually exporting to European and Asian markets (Acwapower.com, 2022). Chile is also pursuing large -scale hydrogen production with vision to become a top global exporter until 2040 and leverage its geographical position to access supply global markets (Green Hydrogen Organisation, n.d.).

Such developments and investments aim at creating a whole new supply chain and maritime corridors that will emphasize in alternative fuels rather than hydrocarbons and fossil fuels. At a global level more and more countries, organizations and forums highlight the turn towards green energy. The EU has already imposed the Emissions



Trading System (ETS) which sets a cap as far as greenhouse gas emissions is concerned and finds application in shipping. The REPowerEU plan have set ambitious targets for hydrogen imports aiming at reaching 10 million tons of domestic production and 10 million tons of imports by 2030 (EUROPEAN COMMISSION, 2022). This results in new maritime relationships between Middle East, North Africa, Australia and Europe (EUROPEAN COMMISSION, 2022). In addition to that, globally, ports are heading towards becoming green bunkering hubs in view of the continuous need for green fuels and practices in shipping. In that context, the port of Singapore, one of the biggest worldwide, handling more than 50 million tons of bunkering demand annually intends at being a global hub for green methanol and ammonia bunkering, taking into consideration the IMO framework and targets which predict that around 5-10% of the worlds fleet shall line up with green fuels by 2030 (CHARTING A SUSTAINABLE MARITIME FUTURE CONTENTS, 2024).

New supply chain needs arise from this new reality that generates geopolitical implications as well. Fossil fuel exporters face the need and pressure at the same time to diversify and invest in green fuels if they want to be competitive. This is the case of Saudi Arabia mentioned above. However, some critical chokepoints for world's seaborne trade and especially energy trade, such as the Straite of Hormuz and the Suez Canal might face a loss given, they are key points for oil routes. Demand for oil and gas is unlikely to fall in very low levels. Oil and gas' share in global energy mix might mark a fall in accurate numbers, but given the demographic increase and financial development globally, energy needs will face a significant increase. Despite of that, green energy in shipping undoubtably formulates new energy dependencies and maritime trade patterns.

To connect the environmental and green energy issue with the core of this thesis, the rebalancing of energy maritime transportation and energy flows has environmental consequences as well. The need to avoid dangerous chokepoints and differentiate shipping routes entails longer and more costly travels. This means increased fuel consumption and higher greenhouse gas emissions.



4.2.6 The IMO decision

Based on the above the IMO plays an important role in this green energy transition. The International Maritime Organization (IMO) is the specialized agency of the United Nations, the one that highlighted Maritime's need to be included in this decarbonization process (www.imo.org, n.d.). The Paris Agreement in 2015 did not refer to shipping in terms of targets and application of the agreement (Gerdes, 2020). In 2023, all 173 countries agreed to reduce greenhouse gas emission by 20-30% by 2030 and 70% by 2040. This strategy highlights the intention and necessity of shipping to follow international trends and decarbonization processes aiming at lining up with sustainability. The vision lies in the reduction of GHG emissions from international shipping while promoting a just transition (IMO, 2023). Regulatory requirements are the ones shaping the context of decarbonization in shipping. From 2023 onwards there are certain indexes that need to be included such as the Energy Efficiency Design Index for existing ships and the Carbon Intensity Index (IMO, 2023). The above will help in understanding and meeting the target goals set for 2040 (IMO, 2023). The score of the indexes will require ships to have better performance regarding route optimization, fuel efficiency and speed. In general, measures to reduce GHG emissions need to promote investments as well in alternative fuels and new technologies (IMO, 2023).

Even though international organizations seek to enhance the framework for the green transition in shipping, geopolitical events and the consequences they have do not facilitate this effort. The rebalancing of energy and the longer routes with emphasis in shipping set at the forefront of the discussion the need to apply the IMO decision and adopt environmentally friendly policies.

4.3 Future Challenges and Scenarios

4.3.1 Geopolitical Uncertainty: Future sanctions, Red Sea threats

The global system is characterized from instability and uncertainty. After Cold War and the establishment of a multipolar world, instability and periodic insecurity have been



dominant in international relations (World Economic Forum, 2026). As already seen after 2020 there have taken place major events with war, sanctions, threats and risk being present the last 6 years. Until 2026, the war in Ukraine keeps unfolding, tensions in Gaza and Middle East remain and are even more escalating with Iran- US and Israel war, US' claims for Greenland and the Arctic are clearer than ever (World Economic Forum, 2026). All above, indicate the fragility and transformation the world is undergoing at a geopolitical level. Those events are still on process making the geopolitical landscape uncertain. In terms of energy, the vulnerability of supply chains, routes, chokepoints and even production are on the spotlight with infrastructure and security being a priority (World Economic Forum, 2026).

4.3.2 Infrastructure Stress: Port bottlenecks, regasification capacity limits

The year 2022 marked the rapid reconfiguration of global energy trade which placed significant stress on maritime and port infrastructure (Xulu, 2026). This posed structural and viability issues and limitations in seaborne energy trade. Port bottlenecks and regasification capacity limits influenced and transformed energy shipping routes. The rebalancing of energy flows Europe was the region that needed more than anyone else to adopt (Xulu, 2026). European ports faced the necessity to extend their regasification terminals as Russian gas transported via pipelines decreased sharply. LNG carriers replaced the Russian pipelines gas, which spoke the demand for port infrastructure able to meet the needs of this new reality. After 2022 the demand for energy and LNG reached a pick as well due to the restart of the economy after COVID-19 lockdowns which slowed down energy needs and economic development.

Having said that, global regasification capacity reached 970 MTPA across 48 markets until April 2023 with an increase of 31.2 MTPA from 2022. This increase translates in nine new import terminals and three expansion projects with one of the largest taking places in Thailand (International Gas Union, 2023). Europe had to move to a rapidly build-out of LNG regasification terminals which would allow the replacement of Russian oil with imports from seaborne trade (European Gas Hub | Insights to the European natural gas industry, 2025). Europe's LNG imports increased by 60% between 2021 and 2023 making it a central pillar for its energy security (IEA,



2023). Construction of new or extensions in existing European regasification stations followed this turn to liquefied gas imports. Europe was the region with the higher evolution and higher capacity additions at 14,5 MTPA in 2023 with total 20 MTPA. By the end of 2024, this capacity reached 21 MTPA. So, Europe had to prepare for the next era of its energy supply with imports from alternative suppliers being a priority in the event of Russian-Ukraine conflict.

Exporters had to extend their capacity in LNG liquefaction and export terminals, like Qatar and the US, to be able to respond to the global demand. US LNG exports increased by 15% between two years, 2021-2023, with the liquefaction plans, port infrastructure and shipping availability being pressured. The rebalancing in the global energy trade flows posed challenges to states exporting oil and gas, since Russia had to diversify its exports and redirect them towards Asia with Arctic traffic increasing, which meant longer distances and voyages with tanker capacity and availability being stressed.

4.3.3 Environmental Trade-Offs

Geopolitical events have environmental trade-offs. Those trade-offs lie in two main axes, the first one is longer routes, and the second one is the shadow fleet and the risk for environmental consequences (Caprile and Leclerc, 2024).

Geopolitical disruptions often limit the sea routes available to sail. Shipping companies take into consideration dangers and risks when choosing maritime routes. Critical choke points for global trade, which facilitate shorter and lower cost trade are weaponized by states aiming at political or diplomatic outcomes. Those points are of strategic importance, and states tend to negotiate by using them as their comparative advantage. This is the case of Iran with the Strait of Hormuz and Red Sea crisis. Other geopolitical events, like wars or sanctions, also, shape the maritime routes. When such international shocks take place, shipping companies face the challenge of avoiding any risk at sea. Therefore, they tend to bypass chokepoints of high risk in periods of tension and turn to alternative routes focusing on safety over efficiency. For example, many ships with tensions in Red Sea chose as an alternative the Cape of Good Hope which increased by far the time travelled and fuels needed. This turn leads as well to longer



routes meaning more GHG emissions. It is indicative that in 2023 oil cargo distances reached a peak with long-term highs which means ships travelled longer distances (IMO,2023).

Longer routes are not only a result of avoiding risky choke points but also diversification of trade flows. This is the case of the conflict between Russia and Ukraine where Russia's exports diversified to other states. To reach the alternative import states, ships from Russia had to travel longer distances towards Asia, instead of using pipelines to head in Europe. At the same time, Europe turned to other supplies to cover its energy needs. This situation is another parameter of how geopolitical disruption case environmental tradeoffs (IMO,2023).

The second axis is the development of shadow fleet as the aftermath of the war in Ukraine which is also putting in danger the environment. The shadow shipping consists of 1.400 tankers, almost 20% of oil global fleet that transfers illegally cargo to sanctioned markets (Platias and Bertzeletou, 2025). From an environmental perspective, those ships are not aligned with global requirements, are too old and lack the necessary maintenance. The way they trade, by deactivating their GPS systems and moving to ship-to-ship transfers multiplies the possibility of accidents that cause environmental disasters, with 50 incidents having already been mentioned including fires and oil leakages (Platias and Bertzeletou, 2025).

4.3.4 Technological: Need for smarter routing, digital twins

Technological evolution and digital tools are necessary to be integrated in shipping. These technological tools help not only routing and navigation, but also traffic and port management which makes more efficient maritime trade (IMO, 2025). Digitalization in shipping is also important in environmental terms (IMO, 2023). Digital tools may be energy-saving as well, enabling the whole decarbonization process in shipping. Given that maritime industry is undergoing strong pressure to operate in a smarter, cleaner and efficient way, technological tools could facilitate this process. One of those tools is digital twin for smarter routing (Cetasol Experts, 2025).



Smarter routing refers to an intelligent process via which is selected the optimal path based on data in a network (Tencentcloud.com, 2025). In shipping industry is key in achieving more efficient, sustainable and reliable trade. Digital twin is a real-time, data-driven tool which mirrors the behavior and condition of a vessel taking into consideration many parameters (Cetasol Experts, 2025). These parameters could be weather conditions, regulatory issues, operational constraints in real-time data combined with historical data. This combination allows route optimization, vessel management, fuel savings and measurable emission reduction (Danelec.com, 2023). The adoption of this system could have tangible impact in operations and vessel optimization helping in shaping strategies and cost- saving measures. Fuel consumption metrics, emission regulations, weather data integration, voyage performance analytics and finically cost-saving strategies strengthen the performance cost (Danelec.com, 2023). In the above geopolitical events could be taken into consideration to predict or immediately adopt to global shifts and rerouting, when necessary, with the less possible cost. Apart from cost saving impact, digital twin can lead to significant GHG emissions and energy savings when applied to both vessels and ports. Therefore, both environmental and geopolitical risks could be mitigated to some extent.

Chapter 5: Discussion

5.1 Introduction

The above analysis indicates the extent to which geopolitics are interlinked to global trade and more specifically highlights trade disruptions as key factors in shaping the sea energy flows. The dominant share of seaborne energy trade entails that disruptions in maritime energy routes result in inefficiencies beyond logistics, affecting energy security, economic stability and international relations.

The geopolitical shocks that emerged after 2022, the war in Ukraine and tensions in the Middle have highlighted the vulnerabilities of the interconnected supply chains. The geopolitical events analyzed above did not only lead to a disruption on existing energy flows but created new dependencies and reshaped the energy maritime routes. This is



translated in a structural change of the maritime energy system. The turn from efficiency to resilience demonstrated that after 2022 security concerns and geopolitical instability are fully integrated in future policy making.

5.2 Link between geopolitical events and rebalancing main findings

Based on what has been examined so far, geopolitical events have been used as a means of political exercise with the example of Iran and Red Sea attacks and at the same time they have caused major disruptions on global trade as a result of the war between Russia and Ukraine. No matter what way they are used, geopolitical events lead to the rebalancing of energy flows.

The war in Ukraine is a geopolitical event with huge consequences in international relations, global economy, trade and shipping lines (Bijsterbosch, Falagiarda and Žídeková, 2025). In the energy sector, a rebalancing in energy flows occurred, followed by rebalancing in shipping routes. Europe's energy model was restructured in the event of the war. The heavy dependency on Russian pipeline gas and oil turned out to be a vulnerability, when sanctions were imposed and alternative solutions needed to be found. That shift of Europe's imports resulted in an increase in seaborne energy trade and maritime energy transportation especially from the United States, Norway and Qatar (European Council, 2025). Russian pipeline oil and gas was substituted by shipping transportation. Therefore, shipping routes were strategically of higher importance, ports and terminals played a more significant role for Europe's energy security and at the same time transportation costs increased while maritime routes were put at risk. This turn towards shipping and ports is unraveled from the European Commission framework around EU Ports Strategy and the five pillars to support the competitiveness, security, sustainability of Europe's ports (Mobility and Transport, 2026).

This war did not only affect Europe's trade patterns but Russia's and Asia's as well. The redirection of exports increased maritime energy transportation from Russia's side with main destinations Asian countries, primarily China and India (Hasan, 2026). This pivot towards Asia was facilitated by the discounted prices, arisen from west sanctions,



the expansion of maritime routes with NSR being more accessible and the development of shadow fleet. Sanctions' effects lie in the geographical redirection of energy flows with new maritime corridors, higher transportation cost and increased environmental risk.

In parallel, the tensions in Middle East and Red Sea crisis highlighted the geopolitical disruption caused at critical maritime choke points. The attacks on vessels and the threats of disruption in the Strait of Hormuz and Bab al-Mandeb, critical nodes especially for energy trade, forced shipping companies to reroute their ships around the Cape of Good Hope with significant consequences (Eia.gov, 2024). Transit time, cost transportation including fuel consumption and insurance costs increased, while trade emissions and environmental footprint increased as well (IMO,2023). This outcome strengthens the consideration that maritime energy routes are based on security as well not only efficiency, meaning safe shipping transportation is equally important to efficient maritime trade (UNCTAD, 2025).

To summarize, the above geopolitical events after 2022 with mainly referral to the war on Ukraine and Middle East escalation, proved the major consequences they could have to maritime routes, energy flows diversification and redirection, increased energy cost, environmental risk, resilience focused decision making and strategic autonomy.

5.3 Regional impacts: Winners and Losers

Global decisions lead to regional effects. Whatever is happening at a global scale immediately influences regions as far as trade is concerned. At a local level the rebalancing from the war in Ukraine and Middle East crisis proved to have winners and losers. Below follows an analysis regarding the main players in global system. USA, Europe, Russia, China, India and Middle East.

The European Union emerges as the number one affected region in terms of energy security and trade. The dependency in Russian oil and gas brought European Union at a dead end. Europe managed to reduce Russian dependency and diversify its energy imports to guarantee its member state's energy security. The transition that took place even though enhanced EU' long-term strategic autonomy, resulted in higher energy cost



and the establishment of another dependency, that of US (Europa.eu, 2025). At the same time, Europe turned to seaborne imports instead of pipeline ones, highlighting the necessity for port infrastructure and exposure to higher risk with increased transition economic cost. This shift created a new dependency specifically on the United States, which took advantage of the situation and increased natural gas exports towards Europe. It is indicative that in the third quarter of 2025, the United States remained the largest partner for EU imports of liquefied natural gas (Europa.eu, 2025). This new dependency raises questions regarding the sustainability and long-term EU's energy security given the diversification strategy it needs to follow.

At the same time Russia faced the sanctions and the loss of EU market. Russia needed to redirect its exports and find alternative countries to replace EU market. The prices of Russia oil and gas fell significantly, with oil's price cap at 60 dollars per barrel and a reduction of 18% in 2025, the highest since 2020 (Reuters Staff, 2026). Asian countries were the ones covering their increasing domestic demand with oil and gas in lower price from Russia. This has also elevated the importance of maritime corridors since both Europe's and Russia's trade patterns turned to shipping transportation for imports and exports accordingly (Raghunandan, 2026). In the case of Russia, the emergence of the shadow fleet occurred as a dangerous shipping practice which generated among others, high environmental and safety risks (Caprile and Leclerc, 2024).

The United States as stated above was one of the most benefitted countries out of those geopolitical events after 2022. They managed to become EU's first LNG supplier and expanded energy exports in general strengthening this way their geopolitical influence. US leveraged the geopolitical disruptions and consequences to become more strategically advantaged in international relations.

China and India were two states with significant positive results from this change in energy trade. Both managed to become Russian oil and gas importers, buy discounted energy to cover domestic needs and strengthen internally energy security (Kulakhmetov, 2024). China, took advantage of the situation to promote its interests in shipping trade, moving towards deeper cooperation with Russia for the Arctic routes



(Raspotnik, 2025), an important issue for China which tries to reduce dependence on US controlled Malacca Strait.

Lastly, Middle East crisis with Red Sea attacks and the tensions in the region, had main consequences for global energy trade. As highlighted previously, the rerouting of vessels was necessary to avoid the risk in the region, which had impact in the transit time, cost and environment. The region generally remains a key player and energy supplier but raises security issues concerning passage risk and long-term reliability of the existing chock points.

5.4 Resilience vs efficiency tradeoff

The bet nowadays, after having experienced this situation form 2022 onwards is how to maintain both resilient and efficient trade routes. Last decades, the main focus lied on how to be efficient, globalization secured worldwide transportation of goods without barriers. The efficiency reflected on saving time, optimizing costs and reducing environmental impact. However, in many cases security issues were ignored because of geopolitical tensions and instability. This is the case of the geopolitical shocks arisen form 2022, which exposed the vulnerability and volatility of energy supply chains when face sanctions and security threats.

The rebalancing of energy maritime trade brought to the spotlight the need for diversification of suppliers and rerouting of shipping lines which entails risen transportation costs, emission and further infrastructure developments. This is the exact opposite of the efficiency target mentioned above, this new reality lies in resilience and how this relationship between the two adopts to the challenges of the time.

The optimization of supply chains brings to the spotlight the need to focus not only on efficiency but resilience as well (Bos and Baarsma, 2025). Efficiency targets deliver short-term gains but exposes the trade in times of disruption. Resilience grants a long-term stability and agility in hard and complex international environments (Bos and Baarsma, 2025). Even though, the global interest has been focused on resilience, efficiency remains and the core business. The combination of the two is desired and a balance that would bring the highest results in terms of both security, cost reduction and



time efficiency. Technological tools play a crucial role towards this direction with routing systems, digital twin and port digitalization offering cost effective solutions (Danelec.com, 2023).

To conclude, the resilience-efficiency tradeoff is indicative of a general undergoing transformation in the shipping and maritime industry. Especially for energy trade, energy security has boarder dimensions nowadays. States do not only anticipate access to cheap energy resources, but also the ability to adopt to geopolitical shocks and ensure the availability of suppliers in line with environmental objectives. This ends up in a much more complex supply chain system with higher transportation cost and frequent need rerouting of vessels. The current geopolitical landscape and the new reality necessitate resilience-driven policies and decisions to be competitive and viable (Bos and Baarsma, 2025). It is no longer a matter of choice but a necessity.

Chapter 6: Conclusion

6.1 Summary of findings

This thesis examined how geopolitical disruptions after 2022 have reshaped the global energy maritime routes and flows. The interdisciplinary study aimed at touching all aspects and offering a holistic analysis around the geopolitical events and the interrelation with energy trade. Therefore, the examination of all facts under the prism of economics, international relations, energy trade and shipping routes had to be taken into consideration to end up in safe conclusions.

As highlighted from the very beginning the base of everything is the importance of shipping trade in the world's economy and state's security. Shipping allowing goods to be transferred via sea routes makes it the backbone of global economy. To interrelate it with energy, oil and gas are being transferred via ships (EIA, 2025). More specifically, the 80% of energy trade is transferred by the sea, which reflects how energy is dependent on shipping and the opposite (UNCTAD, 2025). As far as geopolitical events are concerned, for many years geopolitics have been shaping international relations, policies, unions, wars, diplomacy and economy. Geopolitical events always had an important role in international security and global system (Afonso, Alves and Monteiro,



2024). The globalization strengthened even more the role and effects of geopolitical events. Higher levels of dependency led to a more interconnected reality. This is why geopolitical disruptions nowadays affect in a more evident way the states, the economy and lead to destabilization on a regional or global scale (Afonso, Alves and Monteiro, 2024).

The first important finding of this thesis concerns the vulnerability of highly interconnected energy supply chains. This was highly witnessed after the 2022 war in Ukraine. Until then, Europe and the world seemed to have chosen a trade pattern of cost minimization, efficiency, stable long-term contracts and geographically optimized routes (Guarascio, Reljic and Zezza, 2025). The war in Ukraine shifted the situation, it exposed the fragility of this method and turned this reality around. In the face of Ukraine war, Europe diversified its suppliers and interrupted every trade relation it had with Russia. Europe was highly dependent on Russian oil and gas, primary source of energy to ensure its security (Guarascio, Reljic and Zezza, 2025). The war influenced energy flows and set the ground for a new trade pattern. Europe's energy import strategy shifted towards maritime transport, which gained importance in the name of energy security (Guarascio, Reljic and Zezza, 2025).

The second key finding relates to the geographical rerouting and rebalancing of energy. The results from this war shifted global energy chains, as both Europe and Russia attempted to find alternative markets. The redirection of energy flows had two dimensions. The first one, reflects Europe's decision to cut any relations with Russia to not fund the war and its parallel need to replace energy imports from Russia with other suppliers (European Council, 2025). Those suppliers were US, Qatar and Norway which diversified the energy trade scene (Eurostat, 2026). The second dimension lies in Russia's need to redirect its exports. The fact that Russia was excluded from Western energy markets did not eliminate its export capacity, it just highlighted the need to find alternative buyers for its energy products. Those buyers came from Asian markets with China and India being the more strategic ones (Henderson, 2024). This new reality led to the development of new maritime corridors such as the Arctic and Indo-Pacific routes. The rerouting and rebalancing of energy transportation arisen from this geopolitical event illustrate that events like that are able of reshaping trade patterns with longer distances, higher cost and environmental risk.



The third important finding is the strategic role of maritime chokepoints which can be either weaponized or obstructed (Medunic, 2021). The escalation in the Middle East and Red Sea region underscored the vulnerability of those narrow passages like the Strait of Hormuz, the Suez Canal and the Bab al-Mandeb. Under the prism of the geopolitical events after 2022 those chokepoints played a critical role in reassuring the efficient and resilient passage of ships. The rerouting of vessels due to the uncertainty and risk of crossing those passages opted for a longer route and pass around the Cape of Good Hope with major economic and environmental consequences (Courtnell, 2024).

That been said geopolitical disruptions lead to energy rebalancing, energy rebalancing in terms of supplier and transportation.

6.2 Answer to main questions

The first and main question was “How geopolitical disruptions after 2022 reshaped maritime energy transportation routes and flows”? The analysis demonstrated that the Russia-Ukraine war and the escalations in the Middle East were major geopolitical shocks that transformed the landscape of energy flows and the security of energy maritime transportation. With the war in Ukraine there was a systematic shift in Europe which started importing oil and gas from the USA and other alternative suppliers, that meant that pipeline gas was almost eliminated and replaced by shipping transportation, which acquired an important role in the global economy (ec.europa.eu, 2026). Shipping energy trade was reinforced as well from Russia’s side, this rebalancing of energy led to new corridors and export markets from Russia’s side with the Arctic and Indo Pacific routes being the center of attention. At the same time, Russia’s redirected energy exports headed towards Asian markets accelerating the importance of maritime corridors (Dr. Sutandra Singha, 2025). All Russian energy flows towards Europe via pipeline were replaced in from shipping and new exports were supported by shipping as well.

The second sub question was “How did the weaponization of strategic maritime chokepoints affect global energy security and shipping efficiency”? Important energy



maritime chokepoints like the Strait of Hormuz, the Suez Canal and the Bab-el-Mandeb Strait have affected security, efficiency and costs in terms of shipping trade (EIA, 2024). The Houthis Red Sea attacks led to a rerouting of vessels around the Cape of Good Hope, highlighted the vulnerabilities of maritime transportation lanes and indicated how they can be used to put geopolitical pressure (EIA, 2024).

Last sub question was about “how did Europe and global energy markets adapt to the post-2022 energy rebalancing”. Europe responded to the emerging crisis with the REPowerEU plan which set as a priority the decoupling of its economy from Russian energy imports (European Commission, 2022). The diversification of suppliers entailed a transition from pipeline gas to LNG. Global markets as well faced the turn towards shipping energy transportation. Russia’s new energy trade partners enhanced shipping energy trade and contributed to the rise of maritime LNG transportation. Generally, global energy markets headed towards more resilient strategies to ensure energy security.

To conclude, geopolitical disruptions after 2022 led to the rebalancing of energy flows and maritime transportation leading to a systemic shift in terms of dynamics and energy trade. Geopolitics impact world trade and economy with states and markets adapting to the new challenges.

6.3 Limitations, Strategic recommendations and Directions for future research

This study has limitations arising from the fact that geopolitical events don’t stop. While this study provides important information and analysis of how geopolitical disruptions after 2022 reshaped global maritime energy trade and flows, limitations also need to be acknowledged.

First of all, the study relied mainly in secondary data sources from international organizations, academic literature and other publications. Even though, those sources are reliable and widely recognized, geopolitical events evolving everyday may change some data and situations. In this context, the analysis considers as a starting point 2022 and the war in Ukraine which limits the examined time. All the changes occurred from the events analyzed in this thesis in maritime energy trade are still ongoing and under



transition. Some long-term effects of this transformation are not yet fully uncovered. In addition to the above, this thesis uses a qualitative analysis focusing on geopolitical interpretation instead of approaching a quantitative modeling. There are some statistical indicators and data used to support the analysis, but econometric and simulation models, like indexes, are not included. Therefore, the conclusions concern mainly strategic implications and not quantitative projections.

Despite the limitations mentioned, the above thesis provides valuable insights on how geopolitics affected energy flows and maritime energy transportation after 2022. The analysis highlights how geopolitical shocks led to transformations in global trade patterns, international relations and energy security, while at the same time revealed the importance of maritime chokepoints and infrastructure in maintaining energy supply stability. The analysis underlines several recommendations that address towards three directions.

The first are policymakers and especially within the European Union. The war in Ukraine proved the fragility and vulnerability of energy security within Europe. This means that diversification of suppliers is essential to acquire energy dependency and flexibility in times of crisis. Replacing one supplier with another is not a solution. Resilience is built on maintaining a diversified portfolio of energy suppliers, promoting investments in LNG infrastructure and energy storage systems and focusing on renewable energy technologies that will promote EU's future resilience and energy transition.

The second angle is shipping industry which is highly interconnected with geopolitical shocks and energy transportation. Executives, decision and policy makers in shipping industry need to adjust in the geopolitical disruptions occurring each time. Shipping companies need to take into consideration potential rout disruption and the need for rerouting of vessels, chokepoints instability and attacks, environmental and economic costs. Shipping industry faces inefficiencies in this evolving geopolitical landscape, that is why executives in this sector need to be aware of the future challenges. Technological developments, the adoption of digital navigation systems and route optimization can be preliminary measures protecting companies. Environmental issues need to be taken into consideration as well with decarbonization initiatives being at the center of sustainable practices.



At an international point of view, institutions, international organizations and governments need to strengthen their cooperation to address the challenges in maritime energy security.

6.4 Final Remarks

To sum up, after 2022 maritime energy transport changed fundamentally. The war in Ukraine, the instability in the Middle East led to the emergence of new maritime corridors and to a redirection of energy flows, which influenced the energy market globally. New energy flows replaced the old ones, and energy flows were redirected globally with the danger arising from critical chokepoints for energy trade.

In the view of the above, maritime energy transport is no longer based on an efficiency and cost-optimization model. Geopolitical disruptions highlighted the need to take into consideration safety, resilience and diversification issues to reassure the security of energy flows. The energy-importing states seek secure and sufficient energy flows with diversification of suppliers being a priority. At the time, exporting states needed to adjust in the geopolitical situation of each time. In this context, longer and more complex maritime routes have generated economic, environmental and strategic challenges. Geopolitical disruptions entail environmental risks as well that jeopardize the efforts and progress of the IMO decision.

Looking forward, geopolitical uncertainty, instability and shocks are expected to dominate the international system and markets. Especially, for maritime energy trade and flows those are going to be defined from the geopolitical disruptions.



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