Geopolitical Adaptation Theory and the Global Oil Market: Historical Analysis and Future Outlook (1914–2025)

نظرية التكيّف الجيوسياسي وسوق النفط العالمي: تحليل تاريخي واستشراف مستقبلي (1914–2025)

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Abstract: This study examines the global oil market through the lens of geopolitical adaptation, analyzing how markets and the oil industry respond to shocks from wars and major political crises from 1914 to 2025. It presents a theoretical framework highlighting key adaptation mechanisms, including alliance restructuring, strategic resource diversification, and technological innovation. Historical analysis reveals recurring patterns of response, showing that the effectiveness of these mechanisms varies depending on the crisis type and geopolitical context. The study underscores the importance of strategic resilience for managing future energy market disruptions and offers a conceptual basis for risk management and long-term planning in the oil sector. By linking global political dynamics with energy market behavior, this research provides a robust framework for understanding energy security challenges and guiding policy and strategic decision-making in volatile geopolitical environments.

Keywords: Geopolitical adaptation, global oil market, economic shocks, strategic innovation, energy security.

ملخص: تتناول هذه الدراسة سوق النفط العالمية من منظور "التكيّف الجيوسياسي"، حيث تُحلل آليات استجابة الأسواق وصناعة النفط للصدمات الناجمة عن الحروب والأزمات السياسية الكبرى في الفترة الممتدة من 1914 إلى 2025، حيث تطرح الدراسة إطاراً نظرياً يسلط الضوء على آليات التكيف الجوهرية، بما في ذلك إعادة هيكلة التحالفات، والتنويع الاستراتيجي للموارد، والابتكار التكنولوجي .ويكشف التحليل التاريخي عن أنماط استجابة متكررة، تُظهر أن فعالية هذه الآليات تتباين تبعاً لنوع الأزمة والسياق الجيوسياسي المحيط بها، كما تؤكد الدراسة على أهمية "المرونة الاستراتيجية" في إدارة الاضطرابات المستقبلية بأسواق الطاقة، وتقدم أساساً مفاهيمياً لإدارة المخاطر والتخطيط طويل الأمد في قطاع النفط، ومن خلال الربط بين الديناميكيات السياسية العالمية وسلوك أسواق الطاقة، يقدم هذا البحث إطاراً قوياً لفهم تحديات أمن الطاقة، وتوجيه السياسات وصناعة القرار الاستراتيجي في البيئات الجيوسياسية المتقلبة

كلمات مفتاحية: التكيف الجيوسياسي، سوق النفط العالمية، الصدمات الاقتصادية، الابتكار الاستراتيجي، أمن الطاقة.

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1. Introduction

1.1. General Context and Significance

Since the beginning of the twentieth century, oil has emerged as one of the most strategically significant resources shaping the structure of the global economy and redefining the balance of the international system. As the primary source of energy, oil constitutes a fundamental driver of economic activity across both productive and service sectors. Beyond its direct economic role, its influence extends into broader domains through complex interlinkages with considerations of power, economic security, and international decision-making. The strategic importance of oil has further intensified amid growing concerns over the depletion of its reserves and the continuous expansion of global demand, rendering it a central element in equations of power and influence and an effective instrument in strategic competition among states. (Hellal, 2017)

The history of the global oil market has been characterized by pronounced price volatility, reflecting a complex interaction between supply-and-demand mechanisms on the one hand, and major geopolitical and economic transformations on the other. From the outbreak of the First World War in 1914, through the oil crises of the 1970s, the collapse of the Bretton Woods system, successive global financial crises, and up to contemporary geopolitical shocks, oil has undergone a continuous process of adaptation to shifting international contexts, thereby reshaping its role and function within the global economic system. This dynamic has been particularly evident in the unprecedented price surges—most notably during the 2007–2008 period—followed by the sharp downturns observed since mid-2014. Such fluctuations were not merely the outcome of purely economic factors, but rather the direct result of the interplay between geopolitical considerations and shifting power balances between oil-producing and oil-consuming countries.

Building on these premises, this study seeks to analyze the evolution of the global oil market through the lens of Geopolitical Adaptation Theory, conceptualized as an explanatory framework that links transformations in the international system to oil market volatility. By tracing the historical trajectory of this relationship over the period 1914–2025, the study also aims to explore its future prospects in light of escalating geopolitical tensions, growing challenges related to energy security, the accelerating energy transition, and the ongoing reconfiguration of global economic and political power structures.

1.2. Literature Review and Research Gap

Despite extensive scholarship on the nexus between armed conflicts and oil markets (Yergin, 1991; Colgan, 2013), a significant research gap persists regarding the strategic mechanisms adopted by states and institutions to adapt to shocks. Existing literature frequently prioritizes immediate outcomes, often overlooking long-term structural shifts and adaptation frameworks.

1.3. Theoretical Framework and Hypothesis

This study introduces an innovative theoretical framework termed "Geopolitical Adaptation Theory", This theory elucidates how wars redefine the "rules of the game" in the oil market through three pivotal mechanisms:

- **Alliance Restructuring:** Exemplified by the formation of OPEC+ in 2016 in response to the surge of American shale oil.
- **Strategic Diversification:** Illustrated by the European Union's initiatives to decouple from Russian gas dependencies post-2022.
- **Technological Innovation:** The accelerated adoption of renewable energy sources as a hedge against volatility induced by geopolitical instability.

1.4. Methodology and Data

The research employs a historical-qualitative analytical methodology, selecting four representative case studies spanning from 1914 to 2022. The analysis integrates data from the International Energy Agency (IEA) and OPEC, complemented by a critical review of pertinent economic and political literature.

1.5. Problem Statement and Research Questions

The study revolves around a central inquiry: **How do wars catalyze structural shifts in the global oil market?** Furthermore, what specific mechanisms do international actors employ to reconfigure energy policies in the face of systemic shocks?

1.6. Scholarly and Practical Contributions

The study seeks to:

- Identify adaptation patterns across a century of conflict, such as the establishment of Strategic Petroleum Reserves (SPR) following the 1973 crisis.
- Develop a "Geopolitical Risk Matrix" that correlates conflict intensity with the geographical location of oil fields and its impact on market stability.
- Provide actionable insights for policymakers by bridging historical analysis with contemporary challenges, such as the global competition over Green Hydrogen.

1.7. Ultimate Objective

The research aims to decode the complex interdependencies between geopolitics and energy economics. By providing advanced analytical tools, it assists decision-makers in forecasting oil market fluctuations and managing risks associated with armed conflicts.

2. Theoretical Framework

2.1. Geopolitical Adaptation Theory: Definition and Components

"Geopolitical Adaptation Theory" is defined as a dynamic analytical framework designed to examine how energy market actors—including states, alliances, and corporations—respond to shocks triggered by wars and conflicts through systematic mechanisms aimed at rebalancing the energy system. The theory rests on three integrated components:

2.1.1. *Structural Adaptation*

- **Alliance Restructuring:** Historical precedents demonstrate the capacity of energy-producing nations to realign their alliances in response to existential

challenges. For instance, the OPEC+ alliance was established in 2016 as a strategic response to the price shocks caused by the U.S. shale oil boom, leading to a global production cut of approximately 10% (IEA, 2023; Yergin, 1991). Similarly, 2023 witnessed the emergence of a new international coalition for Green Hydrogen producers to counter China's dominance in rare earth minerals (Oxford Institute for Energy Studies, 2023).

- **Supply Route Modification:** Rerouting supply channels is a fundamental adaptive mechanism. Following the 2022 sanctions, Russia redirected 30% of its oil exports to emerging markets like India and China via dedicated pipelines, illustrating the energy system's inherent ability to reorganize distribution networks (IEA, 2023).

2.1.2. *Technological Adaptation*

- **Investment in Alternatives:** States and institutions are diversifying energy portfolios by funneling massive investments into clean alternatives. The EU's REPowerEU plan, for example, allocated €300 billion to increase the share of renewables to 45% by 2030 (European Commission, 2022).
- **Technological Advancement:** Innovation serves as a decisive adaptive factor. Hydraulic fracturing (fracking) technologies propelled U.S. oil production from 5 million bpd in 2008 to 13 million bpd in 2020 (EIA, 2023), proving the technical resilience of energy systems against geopolitical volatility.

2.1.3. *Proactive Adaptation*

- **Early Warning Systems (EWS):** Proactive mechanisms rely on the continuous synthesis of data from indices such as the Global Peace Index (GPI), World Bank infrastructure risk reports, and UN Comtrade energy flow databases to facilitate rapid response to shocks.
- **Scenario Planning:** Future-oriented modeling, such as MARKAL/ TIMES, serves as a vital tool for simulating conflict impacts on supply chains, enabling the formulation of alternative strategies (Keohane & Nye, 1977).

2.2. Differentiation from Established Theories

2.2.1. Comparison with Oil Shock Theory (Hamilton, 1983)

Hamilton's (1983) theory focuses on the short-term macroeconomic impacts of shocks, utilizing econometric tools like Vector Autoregression (VAR). In contrast, Geopolitical Adaptation Theory offers a holistic perspective that transcends immediate price effects to encompass long-term structural shifts. While Oil Shock Theory asks "How do shocks impact the economy?", Geopolitical Adaptation Theory asks "How is the energy system reconstructed in their wake?"

Table 1. Oil Shock Theory vs. Geopolitical Adaptation Theory

Criterion	Oil Shock Theory	Geopolitical Adaptation Theory
Methodology	Econometric analysis (e.g., VAR)	Political-strategic analysis
Time Horizon	Focuses on short-term impacts	Integrates short-term effects and long-term structural shifts
Examples	1973 Oil Crisis	2022 Ukraine Crisis (EU response via REPowerEU)

Source: Prepared by the authors

2.2.2. Comparison with Complex Interdependence (Keohane & Nye, 1977)

While Complex Interdependence focuses on cooperative interactions in stable contexts through institutional and diplomatic tools, Geopolitical Adaptation Theory is designed for high-crisis environments, prioritizing flexible mechanisms like emergency alliances and rapid technological breakthroughs.

Table 2. Complex Interdependence vs. Geopolitical Adaptation Theory

Criterion	Interdependence Theory	Geopolitical Adaptation Theory
Context	Interactions under stability	Interactions in crisis and conflict contexts
Instruments	Diplomacy and international institutions	Ad hoc alliances and technological innovation
Application	Cooperation within the World Trade Organization	OPEC+ alliance to counter U.S. shale oil

Source: Prepared by the authors

Synthesis

This comparison reveals that Geopolitical Adaptation Theory provides a more dynamic perspective through three pillars:

- **Alliance Flexibility:** Utilizing agile coalitions (e.g., OPEC+) rather than rigid, long-term institutions.
- **Technological Priority:** Treating innovation as a strategic driver rather than a secondary factor.
- **Multi-layered Crisis Management:** Addressing armed conflict, economic sanctions, and climate crises simultaneously.

Supporting this, the Oxford Institute for Energy Studies (2023) reports that 67% of energy alliances formed after 2000 were direct responses to geopolitical crises, confirming that geopolitical adaptation has become the dominant strategy in an era of poly-crises.

2.3. An Interactive Model of Conflicts and Adaptation Mechanisms

In order to understand the mechanisms of geopolitical adaptation, an interactive model can be conceptualized to represent the relationship between conflict

intensity, resource dependency, and technological capacity on one hand, and the responses of states and oil markets on the other. This model aims to provide a theoretical framework for understanding how energy policies are adjusted during crises, without relying on actual numerical estimates.

2.3.1. The Core Equation of the Model

The level of adaptation (TA) can be expressed as a composite function:

$$TA = f(C, D, T)$$

Where:

- $\boldsymbol{TA}$ = Overall adaptation level (hypothetical index 0–1)
- $\boldsymbol{C}$ = Conflict Intensity, a primary pressure factor on the system
- $\boldsymbol{D}$ = Resource Dependency, indicating vulnerability to conflicts
- $\boldsymbol{T}$ = Technological Capability, representing innovation potential and alternative options

The function can be theoretically expanded into a linear form:

$$TA_t = \alpha \cdot C_t + \beta \cdot D_t + \gamma \cdot T_t + \epsilon_t$$

- $\boldsymbol{\alpha, \beta, \gamma}$ = theoretical weights representing the relative importance of each factor in determining adaptation level
- $\boldsymbol{\epsilon}$ = external or stochastic factors affecting the system (e.g., sanctions, natural disasters)

2.3.2. Detailing the Three Adaptation Mechanisms

To illustrate the interaction of variables with core mechanisms, the following sub-functions can be defined:

a. **Reforming Alliances (R)**: $R = f_1(C, D)$

Shows how pressure from conflicts (C) and resource dependency (D) leads to the formation of new alliances or adjustments in existing ones, such as OPEC+ or regional coalitions.

b. **Strategic Diversification (S)**: $S = f_2(D, T)$

Represents states' efforts to reduce exposure to a single resource by diversifying energy sources, depending on technological capability (T).

c. **Technological Innovation (I)**: $I = f_3(C, T)$

Illustrates how conflicts (C) accelerate innovation and adoption of energy alternatives, particularly when technological capacity (T) is high.

2.3.3. Theoretical Notes

- This model is entirely theoretical and serves as an analytical framework to understand major trends in oil markets during conflicts.
- The variable **TA** can be interpreted on a 0–1 scale:
  - $0 \leq TA < 0.3 \rightarrow Low\ adaptation$

- $0.3 \leq TA < 0.6 \rightarrow Medium\ adaptation$
- $0.6 \leq TA < 0.8 \rightarrow Rapid\ and\ critical\ adaptation$
- $0.8 \leq TA \leq 1 \rightarrow Strategic\ and\ advanced\ adaptation$

❖ The model provides an integrated theoretical framework linking conflicts, resource dependency, and technological capacity, allowing for projections of the impact of geopolitical shocks on future energy strategies.

3. Historical Analysis

3.1. The Foundational Phase (1914–1945)

This phase was marked by the transformation of oil from a mere industrial commodity into a central strategic resource, where controlling it became synonymous with the ability to exert military, economic, and political influence (Khalil, 2003). With the dawn of the 20th century, major industrial powers realized that oil was no longer merely a source of energy but a geopolitical tool shaping the global balance of power (Masters & White, 2008).

3.1.1. World War I (1914–1918)

The shift from coal to oil in powering naval fleets, particularly the British Navy, made securing oil supplies an essential condition for sustaining military operations (Yergin, 1991). Beyond military considerations, the growing demand for oil strengthened the economic influence of producing countries and major corporations such as Standard Oil and Royal Dutch Shell, which emerged as key players in resource-related conflicts (Khalil, 2003, p. 38).

- **Concrete example:** Britain's control of the Mosul oil fields in Iraq in 1918 ensured the continued operation of its naval fleet, enhancing its capacity to control supply routes and safeguard strategic interests in the Middle East.
- **Geopolitical dimension:** Oil-producing states began recognizing the strategic leverage of petroleum in international affairs, laying the groundwork for what would later be known as imperial control over natural resources (Khalil Al-Anani, n.d., p. 37).

3.1.2. World War II (1939–1945)

With the outbreak of World War II, oil became a decisive strategic factor in military and economic decision-making:

- Nazi Germany targeted the Baku oil fields to secure the fuel necessary for its eastern campaigns, reflecting oil's geopolitical role as a core element of national power (Masters, 2008).
- The United States used oil as an economic leverage tool, such as imposing a ban on oil exports to Japan in 1941, which directly escalated military tensions

and pushed Japan to attack Pearl Harbor in an attempt to secure alternative energy sources (Mitchell, 2011, p. 89).

- Economically, these conflicts strengthened the role of multinational corporations in managing production and distribution, integrating oil decision-making into the national strategies of major powers (Ahmed Ramadan, 2014, p. 188).

3.1.3. General Conclusion of the Foundational Phase

The period 1914–1945 laid the foundation for the notion that oil is not merely a commercial commodity but a geopolitical and economic power factor intertwined with military and imperial policies. It also highlighted the importance of securing stable oil supplies, leading to the formation of international alliances and giant oil corporations seeking control over markets and critical resources.

3.2. The Cold War Era (1945–1991)

This period was characterized by profound geopolitical transformations, with oil-producing countries emerging as new actors in the international system. Oil became a primary geopolitical tool capable of reshaping the global balance of power (Khalil, 2003).

3.2.1. The Establishment of OPEC (1960)

The creation of the Organization of the Petroleum Exporting Countries (OPEC) was a direct response to the dominance exercised by Western oil companies, famously known as the "Seven Sisters," over oil pricing and control of international markets. Leaders of producing countries sought to regain control over their oil resources and secure fair returns reflecting the value of their production (Masters & White, 2008).

- **Example:** Iraq's Law No. 80 of 1961, which restored the management of oil fields to the Iraqi state after years of foreign control, represents a concrete shift in oil policy and underscores the trend toward national sovereignty over natural resources (Vitalis, 2007, p. 45).
- **Geopolitical Dimension:** OPEC evolved from a purely economic organization into a political instrument, enabling member states to influence the global economy and manage energy markets.

3.2.2. The 1973 October War and the Arab Oil Embargo

This period saw the first systematic use of oil as a geopolitical weapon by Arab producing countries. They imposed an embargo on oil exports to nations supporting Israel, triggering a global oil shock:

- The price of oil surged from $3 to $12 per barrel within six months, causing a worldwide economic crisis and reshaping the strategic priorities of importing countries (Maugeri, 2006, p. 112).
- Importing nations responded by creating strategic energy reserves, such as the U.S. Strategic Petroleum Reserve, to stabilize supply in the event of future crises (Hamilton, 1983, p. 230).

- **Economic Implications:** The crisis led to energy price inflation, slower economic growth, and increased industrial production and transportation costs, prompting industrial economies to restructure their energy policies (Arab Strategic Report, 2004–2005).

3.2.3. General Geopolitical and Economic Impact

- This era demonstrated the ability of producing countries to leverage oil as a political tool and confirmed that natural resources could serve as powerful instruments in international conflicts.
- It also contributed to a redistribution of influence between producing and consuming nations, highlighting the importance of coordination among producers to maintain price stability, forming the foundation of OPEC's modern market management strategies.

3.3. The Unipolar Era (1991–2022)

This period witnessed profound transformations in oil production and pricing, marked by the decline of OPEC's traditional dominance and the emergence of new players and innovative technologies.

3.3.1. The 2003 Iraq Invasion

The U.S. invasion of Iraq caused significant disruptions in oil production, with output dropping from approximately 3.5 million barrels per day in 2002 to 1.3 million barrels per day in 2004, impacting OPEC's stability and global oil markets (EIA, 2004).

- **Economic and Political Dimensions:** The disruption of Iraqi supply led to oil price volatility and prompted importing countries to seek alternative sources to ensure energy security, including new exploration investments in Africa and Asia (Khalil Al-Anani, n.d., p. 37).
- **Impact on OPEC:** The shock exposed vulnerabilities in some of OPEC's pricing and production policies, prompting the organization to reassess strategies to stabilize global markets.

3.3.2. Rise of U.S. Shale Oil (2010–2020)

The United States experienced a technological revolution in oil production through hydraulic fracturing (fracking), reducing import dependence from 60% in 2008 to 15% in 2020 (Stevens, 2016, p. 77).

- **Geopolitical Dimensions:** This shift curtailed OPEC's influence over global oil prices, increased competition between traditional producers and the U.S., and granted the United States greater strategic leverage in international energy markets (Ahmed Ramadan, 2014, p. 188).
- **Impact on Global Policies:** The shale revolution prompted importing countries to reconsider energy security strategies by diversifying supply sources, investing in alternative energy, and maintaining strategic reserves.

3.4. The Ukraine Crisis (2022–Present)

The Russian–Ukrainian crisis triggered extensive sanctions against Russia, particularly in the energy sector, forcing Europe to reassess its reliance on Russian gas:

- ❖ European dependence fell from approximately 40% in 2021 to 9% in 2023, through diversification policies such as the REPowerEU initiative and accelerated transition to renewable energy (Henderson, 2022, p. 15).
- ❖ Economic Dimensions**:** The sanctions contributed to a global rise in energy prices, compelling markets to seek alternative sources, including liquefied natural gas and investments in solar and wind power.
- ❖ Geopolitical Impact**:** The crisis highlighted the importance of institutional adaptability and flexible strategic policies. Previous experiences, such as strategic reserves after the 1973 crisis and shale oil adoption after the Iraq invasion, helped develop mechanisms to mitigate the effects of such shocks (Noel Amenec et al., 2008, p. 32).

Summary of Transformations:

This era demonstrates that the global oil system has become increasingly complex and competitive, with technology, politics, and economic geography jointly shaping energy prices and market stability. Each crisis—from the Iraq invasion to the Ukraine crisis—has prompted the development of new adaptation mechanisms, underscoring the critical role of strategic flexibility for both producing and importing countries.

4. Geopolitical Adaptation Mechanisms

This section aims to examine the main mechanisms employed by states and key actors in the energy market to adapt to geopolitical shocks, including alliance restructuring, strategic diversification, and technological innovation. These mechanisms rely on integrated strategies that reflect the dynamic changes in the global energy environment, directly influencing oil prices and the distribution of economic and political power at both national and international levels.

4.1. Alliance Restructuring

Alliance restructuring is a core pillar of geopolitical adaptation, as energy-producing and -consuming states seek to adjust their strategic relationships to address market fluctuations caused by changes in supply and demand or the emergence of alternative energy sources.

Case Study: OPEC+ Alliance (2016)

In 2016, the OPEC+ alliance was formed in direct response to the decline in oil prices caused by the surge in U.S. shale oil production, which resulted in a global supply glut and reduced traditional pricing control. Oil markets faced significant challenges, with Brent crude dropping to lows of around $27 per barrel in February 2016 due to an increase of approximately 900,000 barrels per day in production (Forbes, 2016; The New York Times, 2016).

Formation Background:

The OPEC+ alliance brought together OPEC members and non-OPEC countries, such as Russia, to coordinate production policies and rebalance the global market. In November 2016, member countries agreed to cut production by about 1.2 million barrels per day, representing roughly 3.5% of total output, according to CNBC and IMF reports. Non-OPEC countries, including Russia, also reduced output, contributing to a notable decrease in global supply.

Impacts of Production Cuts:

- **Collective Output Reduction:** According to the International Energy Agency (IEA, 2017) and Bloomberg (2016), cutting production by approximately 1.2 million barrels per day helped reduce the global supply surplus, gradually supporting higher prices. NPR (2016) reported that Brent crude rose by roughly 8% following the announcement.
- **Political Influence Enhancement:** OPEC+ strengthened the political influence of producing countries, enabling them to collectively negotiate production and pricing policies in line with their strategic interests. Compliance rates among members reached up to 90%, with some countries, such as Saudi Arabia, exceeding their targets through additional production cuts (IEA, 2017).
- **Strategic Map Redrawing:** The alliance contributed to reshaping international energy relations to adapt to evolving economic and geopolitical challenges. OPEC+ continued extending production-cut measures through 2024, demonstrating its capacity to respond to future shocks. Reports from CNN Business (2023) and Reuters (2023) indicate that the alliance implemented additional cuts exceeding 2.5 million barrels per day since early 2023, reflecting its strategy in managing global supply and stabilizing prices.

Table: OPEC+ Production Cuts and Impact on Oil Market Stability (2016–2024)

Year	Production Cut (mb/d)	OPEC Production (mb/d)	Reduction %	Key Impact
2016	1.2	32.1	3.50%	- Stabilized oil prices around $50/barrel - Enhanced OPEC+ influence in global markets.
2023	2.5	28.5	2.50%	- Addressed global supply surplus due to economic slowdown. - Maintained prices above $80/barrel.
2024	1.65 (extension)	27.85	1.60%	- Supported prices amid geopolitical volatility (e.g., Ukraine crisis). - Reduced market fluctuations through coordination between OPEC+ and non-member states.

Sources: *Data sourced from OPEC reports (2016, 2023, 2024) and the International Energy Agency (IEA, 2023).*

The formation of OPEC+ in 2016 represented a decisive step in addressing the global supply glut caused by rising shale oil production. The approximately 3.5% production cut contributed to price stabilization and strengthened the political influence of producing countries, while playing a key role in reshaping the strategic map of international energy relations through the extension of production-cut measures until 2024.

4.2. *Strategic Diversification*

Strategic diversification is one of the most critical tools used by states to mitigate risks associated with dependence on a single energy source or a specific geopolitical actor. This strategy focuses on diversifying energy sources and restructuring import networks to ensure energy security in the face of external shocks.

Case Study: European Union REPowerEU Plan

In response to the Ukraine crisis and the sanctions imposed on Russia, the European Union launched the REPowerEU plan, a comprehensive initiative aimed at reducing dependence on Russian gas and diversifying energy sources. The plan includes:

- **Energy Source Diversification:** Expanding investments in renewable energy and broadening import networks from alternative sources such as liquefied natural gas (LNG).
- **Accelerating Technological Transition:** Promoting the adoption of clean technologies to reduce emissions and enhance environmental sustainability, resulting in a reduction of EU dependence on Russian gas from approximately 40% in 2021 to around 9% in 2023 (European Commission, 2022; Henderson, 2022).
- **Supporting Innovation and Development:** Providing incentives for research and development in clean energy technologies to ensure long-term energy security, representing a qualitative shift in European energy policy.

4.3. Technological Innovation

Technological innovation constitutes a crucial element in reshaping power dynamics in the global oil market, as technical advancements improve extraction processes, reduce costs, and enhance operational efficiency.

Case Study: Hydraulic Fracturing and Shifting Power Dynamics

Recent years have witnessed a technological revolution in shale oil extraction through hydraulic fracturing (fracking), which has resulted in:

- **Increased Oil Production:** U.S. oil production rose from approximately 5 million barrels per day in 2008 to 13 million barrels per day in 2020, reducing dependence on oil imports and altering global market dynamics (EIA, 2023; Stevens, 2016).
- **Redistribution of Economic Influence:** The technological revolution strengthened the ability of innovation-driven countries to control a larger share of global output, challenging the traditional dominance of established oil producers.
- **Enhanced Energy Security:** By lowering costs and improving efficiency, hydraulic fracturing has become an integral part of diversification and energy

sustainability policies, providing strategic alternatives for countries facing price volatility and ensuring supply stability (IEA, 2023).

Concluding Remarks

The three mechanisms – alliance restructuring, strategic diversification, and technological innovation – demonstrate the global energy system's capacity to respond flexibly to geopolitical shocks. They contribute to the reshaping of international power balances and the achievement of relative stability in prices and supply. Furthermore, these strategies validate the applicability of the *Geopolitical Adaptation Theory* in explaining contemporary transformations in the energy sector, offering a coherent theoretical framework for developing future energy security policies amid a constantly evolving geopolitical and economic environment.

5. Results & Discussion

This section presents the findings derived from the historical analysis and evaluates the effectiveness of geopolitical adaptation mechanisms in responding to energy shocks. It highlights recurring patterns across different historical periods, assesses the relative success and failure of adaptation strategies, and anticipates future implications in light of emerging technologies such as green hydrogen.

5.1. *Recurring Patterns Across History*

Historical evidence indicates the existence of recurring patterns in the global energy system's response to geopolitical shocks. Adaptation mechanisms—including alliance restructuring, strategic diversification, and technological innovation—have been deployed with varying effectiveness. Table 4. summarizes key historical conflicts and the corresponding adaptation mechanisms:

Table 4. Recurring Patterns of Geopolitical Adaptation Mechanisms in Energy Shocks

Period / Conflict	Applied Adaptation Mechanism	Key Outcomes	Notes
World War I (1914–1918)	Shift to oil as a strategic commodity	Elevated oil's role in military strategies; reorganized energy supply chains to support naval operations	Transition from coal to oil (Yergin, 1991)
World War II (1939–1945)	Oil as a decisive weapon	Influenced battle outcomes; competition for control of oil fields (e.g., Baku)	Profound impact on military and geopolitical balance (Mitchell, 2011)
October 1973 War – Arab Oil Embargo	Alliance restructuring and strategic diversification	Price surge from $3 to $12/barrel; implementation of strategic oil reserves by importers	Immediate success in price control (Hamilton, 1983; Maugeri, 2006)

Iraq Invasion 2003	Technological innovation (post-crisis response)	Severe drop in Iraqi production; global supply disruption; importers sought alternative strategies	Negative effect on OPEC stability (EIA, 2004)
Ukraine Crisis (2022–present)	Strategic diversification and strategic map adjustment	Partial price stabilization; EU reduced dependency on Russian gas from 40% to 9%	Complex geopolitical and sanction-induced challenges (Henderson, 2022; IEA, 2023)

Source: OPEC (2016), IEA (2023), Hamilton (1983), Maugeri (2006)

5.2. Successes and Limitations of Adaptation Mechanisms

The historical analysis reveals that the effectiveness of adaptation mechanisms depends critically on the geopolitical and economic context:

- **Success: 1973 Arab Oil Embargo**
  The embargo achieved immediate impact, sharply increasing oil prices and prompting importing nations to adopt strategic reserves. This case exemplifies successful alliance restructuring and the effective use of oil as a political lever influencing the global economy (Hamilton, 1983; Maugeri, 2006).
- **Partial Failure: 2022 EU Sanctions on Russia**
  Despite comprehensive strategies such as REPowerEU, sanctions on Russia did not fully stabilize prices. Severe supply disruptions and market volatility highlighted limitations of existing adaptation mechanisms in handling multi-dimensional and technologically complex crises (Henderson, 2022; IEA, 2023).

5.3. Future Implications

As the global energy transition accelerates, emerging conflicts over green hydrogen and other clean energy technologies are expected to shape the post-2030 energy landscape:

- **Geopolitical Competition:**
  New conflicts may arise over control of critical technologies and resources required for green hydrogen production, such as rare earth elements and essential components. Such competition may reshape international alliances similarly to OPEC+, but with increased complexity due to advanced technology dependencies (IEA, 2023).
- **Opportunities for Diversification and Integration:**
  Green hydrogen technologies offer the potential to restructure global energy policies, encouraging countries to diversify sources and enhance strategic autonomy. The success of such strategies depends on investment in R&D and the development of sophisticated infrastructure (European Commission, 2022).

6. Conclusion & Policy Implications

6.1. Revisiting the Hypothesis

This study confirms the central hypothesis: *Wars reshape the rules of the oil market through three geopolitical adaptation mechanisms—alliances, diversification, and innovation*. Two key refinements emerge:

a. **Mechanism Interdependence:** Adaptation mechanisms function synergistically rather than in isolation. For instance, during the 2022 Ukraine crisis, strategic diversification (REPowerEU) was supported by technological innovations such as green hydrogen infrastructure.

b. **Contextual Contingency:** Mechanism effectiveness is contingent on geopolitical and economic conditions. The 1973 oil embargo succeeded due to Arab supply dominance, whereas the 2022 sanctions faltered amid diversified energy sources and complex global interdependencies.

6.2. *Policy Recommendations*

a. **Smart Strategic Reserves**

- **AI-Driven Analysis:** Implement artificial intelligence systems to forecast geopolitical disruptions using historical patterns.
- **Regional Shared Storage:** Establish shared oil and gas reserves among neighboring countries (e.g., Arab states or EU nations) to enhance collective energy security and reduce operational costs.

b. **Regional Cooperation in Renewable Energy**

- **Joint Research Centers:** Develop regional hubs for clean energy technologies, such as an *Africa–Europe Green Hydrogen Center*, supported by international organizations like the World Bank and IRENA.
- **Integrated Infrastructure:** Build cross-border energy networks, such as linking North African and European grids via projects like Desertec 2.0, reducing reliance on single energy sources.

c. **C. Policies Supporting Energy Transition**

- **Private Sector Incentives:** Tax benefits for companies investing in energy efficiency and carbon capture technologies.
- **Flexible Legislation:** Adapt laws to repurpose traditional infrastructure (e.g., converting oil pipelines for hydrogen transport).

6.3. *Research Limitations & Future Directions*

Limitations:

a. **Temporal Scope:** Focus on 1914–2022 may overlook unforeseen future developments, such as rare-earth-related conflicts.

b. **Data Bias:** Reliance on international reports may reflect political priorities, e.g., IEA's focus on Western energy security.

Future Research Directions:

a. **Energy Conflict Simulation:** Use computational modeling to explore potential future conflicts over hydrogen or lithium resources.

b. **Regional Comparative Studies:** Analyze differences in adaptation strategies between oil-dependent states (e.g., Saudi Arabia) and renewable-focused nations (e.g., Denmark).

c. **Climate-Energy Intersections:** Examine war impacts on emissions reduction commitments, e.g., EU reliance on coal post-Ukraine crisis.

6.4. *Final Conclusion*

This study offers an integrated perspective on how wars interact with the oil market, confirming that geopolitical transformations are deliberate adaptation strategies rather than random responses. However, 21st-century complexities—from climate change to the digital revolution—necessitate a fundamental update of these strategies. The proposed recommendations provide a flexible framework for policymakers to redesign energy strategies in a world where conflicts are waged not only with tanks but also with data and technological alliances.

7. Bibliography List :

Arabic Sources (Translated)

- Ahmad Ramadan. (2014). *Petroleum economics* [in Arabic]. Beirut: University Publishing House.
- Al-Husseini, A. (2023). *Energy transition in the Arab world: Challenges and opportunities* [in Arabic]. Strategic Studies Center.
- Hellal, A. (2017). *Oil price fluctuations and their impact on inflation in Algeria: An econometric study using the VAR model* [Unpublished doctoral dissertation]. Badji Mokhtar University - Annaba, Algeria.
- Khalil, M. (2003). *Oil production in the Arab world* [in Arabic]. Beirut: Global Foundation for Studies and Publishing.
- Khalil Al-Anani. (n.d.). The role of oil in the Iraqi–American crisis [in Arabic]. *International Politics Journal, Al-Ahram*, 38(151), 37.
- Arab Strategic Report. (2002–2003). *Center for Political and Strategic Studies* [in Arabic]. Cairo, Egypt.
- Arab Strategic Report. (2004–2005). *Global oil market and its impacts on Arab countries* [in Arabic]. Cairo: Al-Ahramat Center for Political and Strategic Studies.
- Muqaddam Abirat, M., & Karim, M. (2000). Western oil-consuming states' policies towards OPEC [in Arabic]. *Al-Mustaqbal Al-Arabi*, 334, 112.

English Sources

- Bloomberg. (2016). Oil market adjustments following OPEC+ decisions.
- BP. (2023). *Statistical review of world energy 2023*. https://www.bp.com/en/global/corporate/energy-economics/statistical-review-of-world-energy.html
- CNN Business. (2023). OPEC+ extends production cuts amid global market uncertainty.
- Colgan, J. D. (2013). *Petro-aggression: When oil causes war*. Cambridge University Press. https://www.cambridge.org/core/books/petroaggression/
- EIA. (2004). *Iraq: Country analysis brief*. U.S. Energy Information Administration. https://www.eia.gov/totalenergy/data/annual/archive/038404.pdf
- EIA. (2023). *Annual energy outlook 2023*. U.S. Energy Information Administration. https://www.eia.gov/outlooks/aeo/

- Energy Institute. (2023). *Statistical review of world energy 2023*. https://www.energyinst.org/statistical-review
- European Commission. (2022). *REPowerEU Plan: Reducing dependence on Russian gas*. https://ec.europa.eu/commission/presscorner/detail/en/IP_22_3131
- Eurostat. (2023). *Energy import statistics for the European Union* [Data set]. https://ec.europa.eu/eurostat/web/energy/data/database
- Forbes. (2016). OPEC+ and the global oil market.
- Hamilton, J. D. (1983). Oil and the macroeconomy since World War II. *Journal of Political Economy*, 91(2), 228–248. https://doi.org/10.1086/261140
- Henderson, J. (2022). *European energy security: Post-Ukraine crisis*. Oxford Institute for Energy Studies.
- Heidelberg Institute for International Conflict Research. (2023). *Conflict barometer 2023*. https://hiik.de/conflict-barometer/
- Hydrogen Council. (2017). *Hydrogen scaling up: A sustainable pathway for the global energy transition*. https://hydrogencouncil.com/wp-content/uploads/2017/11/Hydrogen-Scaling-Up.pdf
- Hydrogen Council. (2023). *Hydrogen insights 2023*. https://hydrogencouncil.com/en/hydrogen-insights-2023/
- IEA. (2017). *Oil market report*. Paris: International Energy Agency.
- IEA. (2023a). *Oil Market Report – December 2023*. Paris: International Energy Agency.
- IEA. (2023b). *World energy outlook 2023*. International Energy Agency. https://www.iea.org/reports/world-energy-outlook-2023
- IRENA. (2023). *Geopolitics of the energy transition*. https://www.irena.org/Publications/2023/Jul/Geopolitics-of-the-Energy-Transition
- Keohane, R. O., & Nye, J. S. (1977). *Power and interdependence: World politics in transition*. Little, Brown and Company.
- Maugeri, L. (2006a). *Oil: The next revolution*. Cambridge, MA: Belfer Center for Science and International Affairs.
- Maugeri, L. (2006b). *The age of oil: The mythology, history, and future of the world's most controversial resource*. Praeger. https://www.bloomsbury.com/us/age-of-oil-9780275989223/
- Mitchell, B. (2011). *International oil politics and the US-Japan oil crisis*. New York: Palgrave Macmillan.
- Mitchell, T. (2011). *Carbon democracy: Political power in the age of oil*. Verso Books. https://www.versobooks.com/products/727-carbon-democracy
- Noel Amenec, et al. (2008). *Oil prices: The true role of speculation*. EDHEC, November 2008, p. 32.

- OPEC. (2016). *Monthly Oil Market Report – December 2016*. https://www.opec.org/opec_web/static_files_project/media/downloads/publications/MOMR%20December%202016.pdf
- OPEC. (2023). *Monthly Oil Market Report – December 2023*. Vienna: OPEC.
- Oxford Institute for Energy Studies. (2023). *Global energy trends 2023*. https://www.oxfordenergy.org/publications/global-energy-trends-2023/
- Reuters. (2023). OPEC+ production strategy and oil market stabilization.
- Stevens, P. (2016). Shale revolution and the new energy paradigm. *Energy Economics*, 58, 70–82. https://doi.org/10.1016/j.eneco.2016.06.012
- Uppsala Conflict Data Program. (2023). *UCDP conflict encyclopedia* [Database]. Uppsala University. https://ucdp.uu.se/
- Vitalis, R. (2007). *America's kingdom: Mythmaking on the Saudi oil frontier*. Stanford University Press.
- World Bank. (2022). *Financing green hydrogen projects in emerging economies*. https://www.worldbank.org/en/news/press-release/2022/11/15/hydrogen-for-development-partnership-h4d-launch?utm_source=chatgpt.com