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Nikytenko D. V. [1; ORCID ID: 0000-0003-4989-0879],
Doctor of Economics, Professor

[1]*National University of Water and Environmental Engineering, Rivne*

GLOBAL OIL MARKET: MICROECONOMIC ASPECT

The global oil market remains one of the most significant and strategically important sectors of the world economy. As a fundamental commodity, oil plays a crucial role in shaping macroeconomic dynamics while also reflecting core principles of microeconomics such as supply, demand, elasticity, pricing mechanisms, and consumer behavior. This article explores the structure and functioning of the global oil market through a microeconomic lens, examining the forces that influence price formation, market equilibrium, and competitive structures. Particular attention is paid to the additional factors affecting the oil market in Ukraine, including geopolitical challenges, energy policy transformations, technological shifts, and integration into global energy networks. The article also discusses future development trends of the oil sector amid the global energy transition and increasing emphasis on sustainability.

Keywords: oil market; microeconomics; supply and demand; Brent; energy security; geopolitical risks.

Problem Statement. The oil market occupies a central position in the global economy, influencing not only energy security but also industrial production, transportation, and international trade. As one of the most traded commodities in the world, oil serves as a fundamental input for economic growth and geopolitical strategy. Understanding the functioning of this market requires an integration of both macroeconomic and microeconomic perspectives.

From a microeconomic point of view, the oil market represents a complex system characterized by interactions among producers, consumers, governments, and intermediaries, all responding to price signals, cost structures, and shifts in demand and supply. Unlike many other commodities, oil markets are also shaped by strategic behavior, market power, and non-market factors such as geopolitical conflicts, environmental regulations, and technological innovations.

For Ukraine, the dynamics of the global oil market are especially significant. As a country with limited domestic oil production and a high

level of dependence on imports, Ukraine's energy security, industrial competitiveness, and economic stability are deeply tied to the global oil environment. Furthermore, the transition to a low-carbon economy introduces new challenges and opportunities for Ukraine's integration into global energy systems.

Analysis of Research and Publications. The issues of developing theoretical and practical aspects of the organization, functioning, and regulation of the oil market were addressed by well-known scientists, such as Hamilton J. [1], Charfeddine L. et al. [2], Baumeister C. et al. [3], Alqahtani A. et al. [4], and others. Among domestic scientists, it is worth noting L. Galchinsky, [5], O. Khamova [6]. However, it should be noted that the oil market remains an understudied object for domestic science in the context of new challenges, which was Russia's military aggression against Ukraine

Objective. The aim of this article is to analyze the global oil market through the lens of microeconomic theory and to identify additional factors influencing its development in Ukraine. The research objectives include: (1) defining the theoretical foundations of oil market functioning; (2) analyzing its structure, competition, and pricing mechanisms; (3) identifying key global trends and shocks; and (4) examining Ukraine-specific determinants and potential strategies for adaptation.

Presentation of Research Material. The oil market offers a clear application of fundamental microeconomic principles, illustrating how supply and demand, market structures, elasticity, marginal cost, and consumer behavior shape equilibrium outcomes and pricing strategies. At its core, microeconomics examines how individual economic agents – households, firms, and governments – make decisions about resource allocation in the face of scarcity. The oil sector, as a high-demand but finite resource market, is an excellent case for applying these theoretical tools.

The demand for oil is derived demand – it arises not from the direct consumption of oil itself, but from the services and products it enables, such as transportation, electricity generation, and industrial production. Demand is highly sensitive to macroeconomic cycles, consumer preferences, and technological changes. For example, global economic growth leads to higher transportation needs, increasing oil demand, whereas the development of electric vehicles reduces it. Estimating the quantity demanded function for crude oil requires a rigorous empirical approach, integrating economic theory with econometric techniques. The

demand for crude oil is derived from its role as a primary input in energy production, transportation, and industrial processes. According to microeconomic theory, the quantity demanded (Q_d) is a function of multiple endogenous and exogenous variables:

$$Q_d = f(P, P_{sub}, P_{comp}, Y, T, E, G, S), \quad (1)$$

where:

P – Price of crude oil (per barrel), expected to exhibit an inverse relationship with Q_d (law of demand);

P_{sub} – Prices of substitute energy sources (e.g., natural gas, renewables), where higher P_{sub} increases Q_d;

P_{comp} – Prices of complementary goods (e.g., refining costs), which may reduce Q_d if they rise;

Y – Income level (GDP or per capita income), typically exhibiting a positive relationship with Q_d;

T – Technological advancements, which may reduce Q_d through improved energy efficiency;

E – Environmental regulations, often reducing Q_d via policies promoting alternatives;

G – Government interventions (e.g., subsidies, taxes), which can either stimulate or suppress demand;

S – Seasonal factors, accounting for cyclical variations in demand.

The supply of oil depends on geological availability, exploration and extraction technologies, production costs, and geopolitical factors. Unlike many goods, oil supply is also significantly influenced by strategic decisions of major producers and cartels, most notably the Organization of the Petroleum Exporting Countries (OPEC). This creates a partially oligopolistic market structure with coordinated supply policies aimed at stabilizing or influencing prices.

The quantity supplied of crude oil (Q_s) is expressed as a function of key microeconomic variables:

$$Q_s = f(P, P_{inputs}, T, E, G, F, N, O), \quad (2)$$

where:

Q_s – Quantity of crude oil supplied (e.g., barrels per day).

P – Price of crude oil (per barrel) – the primary determinant, with a direct relationship (higher prices incentivize greater production).

P_{inputs} – Prices of inputs (e.g., labor, drilling equipment, energy costs) — an inverse relationship (higher input costs reduce supply).

T – Technology and extraction efficiency – a direct relationship (advances lower production costs and increase supply).

E – Environmental regulations and costs (e.g., carbon taxes, emissions standards) – an inverse relationship (stricter regulations raise costs and reduce supply).

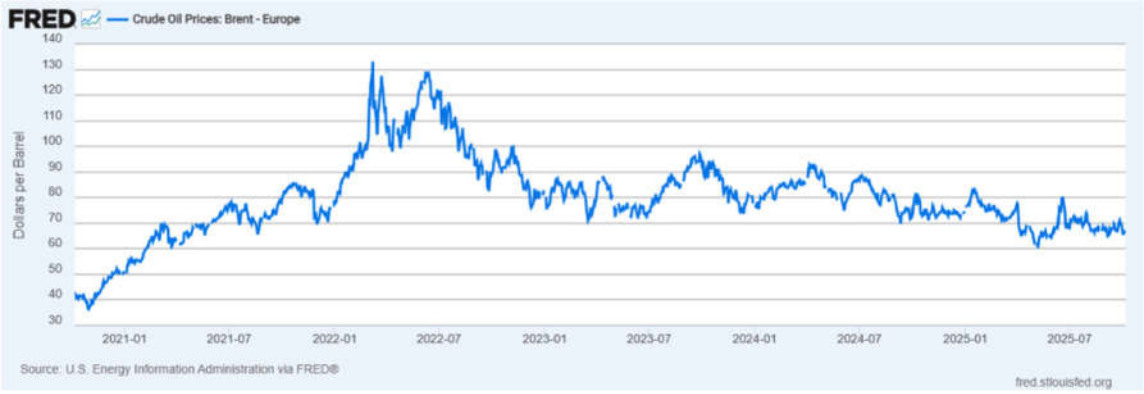
G – Government policies (e.g., subsidies, taxes, production quotas) – can either increase (subsidies) or decrease (taxes/quotas) supply.

F – Future price expectations – if producers expect higher future prices, they may withhold supply today (storage or reduced production).

N – Number of suppliers (e.g., entry/exit of firms, geopolitical stability) — more suppliers increase market supply;

O – Decision of OPEC/OPEC+. OPEC (Organization of the Petroleum Exporting Countries) acts as a cartel, collectively deciding to restrict supply to maintain higher prices or to expand supply.

Many studies find a close relationship between oil prices and macroeconomic expectations/activity. Sharp increases in oil prices have often reduced real GDP in oil-importing countries [1; 7]. In contrast, economic growth expectations (leading indicators, PMI, CLI) often coincide in time with movements in oil demand – that is, an increase in growth expectations is associated with an increase in Brent prices (due to higher expected demand). However, causality is complex: sometimes oil price movements cause a deterioration in expectations (due to supply shocks), sometimes a change in expectations (demand) precedes the price movement. Structural VAR analyses decompose these effects into «supply», «demand», and «risk» shocks. Therefore, the conclusion is that although an empirical interaction exists, its direction and strength depend on the period, the indicator of expectations, and the type of oil supply shock.



Picture. Crude Oil Prices: Brent – Europe (DCOILBRENTEU) [8]

Oil demand tends to be price inelastic in the short run – consumers and industries have limited alternatives. They cannot quickly substitute

oil in transportation and industry, so even significant price changes have limited immediate effects on consumption. The beginning of 2022 with the Russian-Ukrainian war was an example of this: the crude oil price increased to 130$ per barrel from an average 80–85$ per barrel. However, over the long term, elasticity increases as technological advancements enable substitution with renewable energy, electric vehicles, and improved efficiency.

On the supply side, elasticity is constrained by geological and infrastructural factors. Developing new oil fields or expanding refining capacity takes time and investment, leading to lagged supply responses. This limited elasticity on both sides contributes to oil price volatility.

The global oil market is highly interconnected, with a complex network of producers, refiners, traders, and consumers. Understanding its structure requires examining production, trade flows, pricing mechanisms, and market segmentation. The oil market can be segmented by type (light vs. heavy, sweet vs. sour), region (Middle East, North America, Europe, Asia-Pacific), and function (upstream production, midstream transportation, downstream refining). Each segment has distinct cost structures and competitive dynamics, impacting profitability and market strategies. The marginal cost of oil production varies widely across regions (Saudi Arabia – $8.98 per barrel; Iraq – $10.57; Russia – $10–$20; Norway – $21; US – $24; Nigeria – $28.9–48) [9], influencing the competitive position of producers. The leading oil producers include Saudi Arabia, Russia, the United States, and Iraq. These countries together account for a significant share of global supply. Their production decisions heavily influence global prices, as the market responds to any changes in output. Low-cost producers like Saudi Arabia can profit even at lower prices, while high-cost producers rely on higher price levels.

Crude oil is traded internationally through several benchmarks: Brent (North Sea), WTI (West Texas Intermediate), and Dubai/Oman. In a competitive market, the price tends to gravitate around the marginal cost of the most expensive unit required to meet demand. Oil`s prices are determined by futures contracts on global exchanges, reflecting expectations of supply, demand, geopolitical risks, and policy decisions, forming forward-looking price signals.

The global oil market exhibits characteristics of both oligopoly and monopolistic competition. OPEC's coordinated production decisions demonstrate cartel-like behavior, influencing supply and stabilizing prices. For instance, coordinated production cuts by OPEC+ (OPEC plus non-OPEC allies) can stabilize prices during demand shocks, while

unexpected geopolitical events can create supply disruptions (Table 1). However, the rise of non-OPEC producers (e.g., U.S. shale oil) has increased competition and reduced OPEC's market power. This interplay reflects microeconomic models of strategic interaction, including game theory, where firms anticipate and respond to rivals' production decisions.

Table 1

Simplified Quarterly Timeline of Key OPEC+ Decisions

Quarter (Year)	**OPEC+ decision (summary)**	**Net change (bpd)**
Q1 2021	Management of COVID cuts	0
Q2 2021	Continued management of cuts; markets recovering gradually.	0
Q3 2021	OPEC+ agreed monthly output increases of +400,000 bpd starting Aug 2021 (phase-out of prior deep cuts).	+400,000 (monthly increases)
Q4 2021	Continued monthly +400k bpd increases	+400,000 (monthly)
Q1 2022	Small, rule-based increases continued; market monitoring amid demand recovery.	incremental monthly increases
Q2 2022	Regular monthly policy reviews; modest increases as per earlier schedule.	incremental
Q3 2022	OPEC+ maintained monthly moderation; market volatility (Russia/Ukraine shock begins to matter).	0 / adjustments as needed
Q4 2022	Announced production moderation/adjustments amid geopolitical uncertainty; some voluntary adjustments later in year.	0 / targeted adjustments
Q1 2023	Surprise voluntary cuts by some members (early Apr 2023 announcements and May 2023 additional voluntary cuts)	~ -1.16 mln (Apr voluntary) + other voluntary cuts later
Q2 2023	OPEC+ and several members confirm further voluntary reductions (total voluntary adjustments rising).	Voluntary cuts accumulate (~ -1.16 mln + other measures)
Q3 2023	Market monitoring; OPEC+ prepares decisions for autumn meetings; additional coordination.	0 / continuation
Q4 2023	Nov 30, 2023: Several OPEC+ countries announce additional voluntary cuts totaling 2.2 mln bpd (announced end-Nov/early-Dec).	-2,200,000 (total voluntary cuts announced by several members)

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Continuation of the table 1

Q1 2024	OPEC+ extends and enforces voluntary cuts; some members maintain curbs to support prices.	-2,200,000 (continued phased approach)
Q2 2024	OPEC+ prolongs cuts; in June 2024 reports indicate extension of deep production cuts into 2025 (gradual phase-out planned).	-2,200,000 (extended)
Q3 2024	Cuts remain in place; monitoring of demand and inventory conditions.	-2,200,000 (ongoing)
Q4 2024	Dec 5, 2024 decision: planned gradual and flexible return of 2.2 mbpd starting 1 Apr 2025 (i.e., a controlled unwind policy decided in Dec 2024).	plan to unwind (timing set)
Q1 2025	Implementation planning; in April 2025 eight OPEC+ countries reaffirmed adjustments and readiness to lift some voluntary cuts given a healthier outlook.	start of phased adjustments planned
Q2 2025	May–Jun 2025: OPEC decision to implement a production adjustment of 411,000 bpd in July 2025 from June 2025 required production level as part of the phased return of 2.2 mbpd.	+411,000 (adjustment for July from June baseline in phased return)
Q3 2025	July–Aug 2025: further monthly increases announced in the phased unwind (examples: Aug 2025 acceleration reported later with additional monthly increases totaling several hundred thousand bpd across months).	incremental increases (e.g., +548k in Aug reported in market news)
Q4 2025 (to Oct 2025)	Oct–Nov 2025: modest further increases — e.g., +137,000 bpd announced for November (Oct 2025 reporting). Overall policy: continue gradual unwind but remain flexible to market conditions.	+137,000 (Nov 2025) and other monthly increases earlier in 2025

Formed by the author on the basis [10–19]

This table highlights major announced production adjustments and the big policy moves (monthly +400k phase-out in 2021; surprise voluntary cuts in 2023; large voluntary 2.2 mbpd cuts end-2023; planned gradual unwind starting 2025; staged increases in 2025).

Consumer demand for oil-based products is driven by the utility derived from transportation, heating, and industrial goods. According to the law of diminishing marginal utility, the additional satisfaction from consuming more oil-based services decreases over time, affecting consumption decisions. Furthermore, behavioral economics highlights that consumer responses to oil prices are not purely rational – expectations, habits, and perceptions of future price trends significantly influence demand.

Oil markets are inherently volatile due to supply constraints,

political instability, technological changes, and natural disasters. Short-term shocks can cause dramatic price fluctuations, while long-term trends, such as decarbonization policies, shape investment and production strategies. The key global trends and shocks in the oil market and microeconomic mechanisms are presented in Table 2.

Table 2

Major Shocks and Microeconomic Mechanisms on the Global Oil Market (2020–2025)

Shock / Trend	Microeconomic Mechanism	Effect on Price / Demand / Supply	Example
COVID-19 pandemic (2020)	Negative demand shock; collapse of transport & industry	Prices plummeted; demand fell by >9 mb/d (average ~102 mb/d	WTI fell below $0 (April 2020); global surplus ~1 billion barrels
OPEC+ coordinated cuts (2020–2022)	Collusive supply reduction to restore equilibrium	Price stabilization; supply elasticity controlled	Record 9.7 mb/d cut in May 2020; Brent recovered to >$50
Post-COVID rebound (2021–2022)	Positive demand shock; rising income elasticity	Rapid price rise due to inelastic short-run supply	Brent rose $50 → $85; recovery in Asia and the U.S.
Russia–Ukraine war (2022)	Geopolitical supply shock	Sharp short-term price spike; trade re-routing	Brent >$130; EU bans Russian crude; «shadow fleet» grows
Energy transition & ESG pressure (2022–2025)	Structural substitution; policy-driven reduction of fossil demand	Long-run decrease in expected demand; price volatility from uncertainty	EU Green Deal, U.S. IRA, China's «dual-carbon» policy
Investment under-supply (2015–2025)	Supply rigidity due to capital scarcity	Higher equilibrium prices; persistent volatility	Global upstream CAPEX ↓ 25% since 2014; tight supply buffers
OPEC+ voluntary cuts (2023–2025)	Strategic output management	Maintains Brent >$80–90 bbl.; supports fiscal stability	2.2 mb/d voluntary cuts (Nov 2023); extensions into 2025
China's reopening (2023)	Income and industrial demand surge	Boosted global demand; price support despite high stocks	+1.5 mb/d increase in Asian demand (IEA 2023)

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Continuation of the table 2

High interest rates (2023–2024)	Increased cost of oil storage and financing	Lower speculative demand; moderated price rallies	Fed and ECB tightening reduced futures buying
Renewables and efficiency (2020–2025)	Technological substitution; lower marginal utility of oil	Gradual flattening of the demand curve (lower elasticity)	Growth of the Electronic Vehicle market > 10 million units (2024)

Formed by the author on the basis [12–19]

The global oil market between 2020 and 2025 has experienced a series of structural transformations and cyclical shocks that reshaped both supply and demand mechanisms. The COVID-19 pandemic triggered an unprecedented collapse in consumption, followed by a steep recovery driven by post-lockdown industrial and transport demand. This recovery phase coincided with tightening investment in upstream sectors, which created structural undersupply and increased price volatility.

From the supply side, OPEC+ emerged as the dominant coordinating force, utilizing adaptive production management – first through historic cuts in 2020, and later through gradual phase-outs (+400 kb/d monthly) and renewed voluntary reductions (2.2 mb/d from late 2023). Such behavior reflects the group's attempt to maintain market equilibrium in the face of external shocks and a shifting geopolitical landscape.

On the demand side, the growing focus on decarbonization and the green transition initiated long-term substitution effects. Industrial and policy signals – the EU Green Deal, U.S. Inflation Reduction Act, and China's dual-carbon strategy – began to redefine global expectations about «peak oil demand», projected around the early 2030s. Consequently, the oil market's elasticity to price and income shocks became asymmetric: demand responded less to high prices but more to policy and technological changes.

Geopolitical fragmentation further accentuated market bifurcation. The Russia–Ukraine war re-channeled trade flows, increasing transaction costs and creating a dual-price system between «regulated» and «shadow» barrels. Simultaneously, rising interest rates and the financialization of commodities have strengthened the role of speculative and macroeconomic factors in price formation.

Overall, the 2020–2025 period can be characterized as one of adaptive stabilization amid structural transformation: OPEC+ regained influence, OECD demand plateaued, and developing economies –

particularly in Asia and the Middle East – became key marginal consumers. The balance between price stability and supply discipline shifted toward managed coordination rather than market self-adjustment.

From a microeconomic perspective, the global oil market increasingly resembles a managed oligopoly, where large producers act as strategic players balancing between profit maximization and market-share retention. Price-setting behavior within OPEC+ reflects elements of collusive equilibrium – maintaining prices above competitive levels while avoiding destructive competition. At the same time, short-run elasticity of demand remains low, amplifying the impact of temporary shocks and speculative expectations on prices. The emergence of alternative energy technologies and policy-driven substitution effects introduces a new layer of dynamic market competition between fossil and renewable sources. This interaction transforms the traditional demand function for oil: long-run demand becomes more sensitive to non-price factors such as regulation, innovation, and consumer preferences. So, structural uncertainty – geopolitical risks, environmental constraints, and financial volatility – reinforces the role of expectations in price formation. In the long term, these expectations shape investment behavior, making the oil market a prime example of how macroeconomic shocks, market power, and behavioral responses interact in an evolving global equilibrium.

Ukraine's oil market operates within a globalized framework but is shaped by a set of domestic and regional conditions that influence supply, demand, pricing, and strategic behavior.

Geopolitical risks remain one of the strongest determinants of oil and oil product market dynamics in Ukraine. The ongoing war and associated disruptions to logistics and infrastructure significantly affect the cost of imports and the stability of supplies (table 3). Moreover, sanctions against Russia and reorientation toward EU energy markets have forced Ukraine to diversify supply routes and strengthen cooperation with alternative suppliers, including Azerbaijan, Kazakhstan, and Western Europe.

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Table 3

Ukraine's Petroleum and Other Liquids Production and Consumption

Year	2018	2019	2020	2021	2022	2023	2024	2025
Consumption, thousand bbl/d	241,8	263,5	227,9	241,9	190,1	190,1	194,3	198,2
Production, thousand bbl/d	58,4	62,0	61,2	61,5	18,3	7,2	7,1	32,2

Formed by the author on the basis [20–21]

Ukraine's geographic position makes it a critical transit country for oil and petroleum products. However, outdated infrastructure and wartime damage to pipelines, storage facilities, and refineries limit efficiency and raise operational costs. Investments in modernization and expansion of storage capacity are essential for increasing resilience and competitiveness.

The state plays a decisive role in shaping oil market conditions through taxation, excise duties, environmental regulations, and strategic reserves policies. Ongoing reforms aimed at liberalizing the energy market, improving competition, and aligning national legislation with EU standards are reshaping incentives for both domestic and foreign participants.

Exchange rate volatility and inflation significantly influence the price of imported oil. Since Ukraine is heavily dependent on external supplies, fluctuations in the hryvnia-dollar exchange rate translate directly into changes in retail fuel prices. High inflation erodes consumer purchasing power, shifting demand patterns toward more energy-efficient solutions and alternative fuels.

Conclusions. The global oil market is a complex and dynamic system that can be effectively analyzed through the lens of microeconomic theory.

The future of the global oil market is shaped by profound structural changes, technological innovation, and policy shifts. Although oil remains a vital resource for the global economy, its strategic role is undergoing transformation as the world transitions toward sustainable energy systems. Decarbonization policies and the expansion of renewable energy sources are redefining long-term demand for oil. International commitments under the Paris Agreement aim to reduce greenhouse gas emissions, prompting investments in solar, wind, and hydrogen technologies. This trend gradually reduces oil's share in the global

energy mix, pressuring producers to diversify and innovate. The integration of digital technologies – including AI, IoT, and predictive analytics – is transforming oil production, transportation, and trading. Enhanced data-driven decision-making reduces costs, improves safety, and optimizes supply chains, making the industry more competitive and resilient to shocks.

For Ukraine, the global oil environment is more than a background condition – it is a decisive factor in energy security, industrial competitiveness, and macroeconomic stability. By adapting to global trends, modernizing infrastructure, and pursuing strategic diversification, Ukraine can mitigate risks and seize new opportunities arising from the ongoing transformation of the global energy landscape. Future oil market dynamics present both risks and opportunities for Ukraine. On the one hand, dependence on imported oil makes the country vulnerable to price volatility and geopolitical disruptions. On the other hand, strategic investments in infrastructure, diversification of supply sources, and participation in green energy initiatives can enhance energy security and economic resilience. The integration of Ukraine's energy sector into European markets further accelerates these processes and aligns national policy with broader global trends.

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Нікитенко Д. В. [1; ORCID ID: 0000-0003-4989-0879],
д.е.н., професор

[1]*Національний університет водного господарства та природокористування, м. Рівне*

ГЛОБАЛЬНИЙ РИНОК НАФТИ: МІКРОЕКОНОМІЧНИЙ АСПЕКТ

У статті здійснено комплексний аналіз розвитку світового нафтового ринку в контексті сучасних мікроекономічних процесів і глобальних структурних трансформацій. Досліджено особливості функціонування світового нафтового ринку та визначено чинники, що формують його динаміку в сучасних умовах глобальної нестабільності. Проаналізовано закономірності розвитку ринку нафти в контексті основних мікроекономічних категорій – попиту, пропонування, конкуренції та цінової еластичності. Висвітлено роль провідних міжнародних організацій, таких як ОПЕК та Міжнародне енергетичне агентство, у регулюванні обсягів видобутку, підтриманні балансу між попитом і пропонуванням та стабілізації цінової динаміки на світовому рівні.

Розглянуто еволюцію ринку нафти під впливом технологічних інновацій, зростання ролі відновлюваних джерел енергії, а також посилення екологічних вимог до енергетичного сектору. Проведено статистичний аналіз динаміки цін на нафту марки Brent у 2000–2024 рр., а також тенденції зміни обсягів споживання енергоресурсів в Україні.

Особливу увагу приділено аналізу впливу глобальних шоків та трендів – пандемії COVID-19, енергетичної кризи 2022 року та військової агресії Російської Федерації проти України, декарбонізація – на трансформацію нафтового ринку. Визначено, що в умовах війни для України ключового значення набуває проблема енергетичної безпеки, зокрема зменшення імпортозалежності та пошук альтернативних джерел енергопостачання.

Ключові слова: ринок нафти; мікроекономіка; попит і пропонування; Brent; енергетична безпека; геополітичні ризики.

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