

Legal aspects of Ukraine's energy transition during war and European integration: Implications for sustainable development

Ihor Yakushev ^{1*} , Petro Hlamazda ² , Larysa Shevchuk ¹ , Oksana Starchuk ¹ , Iryna Novosad ³ 

¹Department of Civil Law Disciplines, Lesya Ukrainka Volyn National University, Lutsk, UKRAINE

²Department of Theory and History of State and Law, Lesya Ukrainka Volyn National University, Lutsk, UKRAINE

³Department of Constitutional, Administrative and International Law, Lesya Ukrainka Volyn National University, Lutsk, UKRAINE

*Corresponding Author: yakushev.igor@vnu.edu.ua

Citation: Yakushev, I., Hlamazda, P., Shevchuk, L., Starchuk, O., & Novosad, I. (2026). Legal aspects of Ukraine's energy transition during war and European integration: Implications for sustainable development. *European Journal of Sustainable Development Research*, 10(1), em0356. <https://doi.org/10.29333/ejosdr/17496>

ARTICLE INFO

Received: 31 Jul. 2025

Accepted: 27 Oct. 2025

ABSTRACT

Integration aspirations, integrating green energy into socioeconomic processes is essential for further sustainable development. The purpose of this study is to characterize the main legal aspects of the green transition in Ukraine. An analysis of modern legislative acts and relevant literature was conducted. The collection of sources is formed based on the PRISMA approach. A total of 59 sources were processed. The 7 post-2022 legislative acts analysis shows Ukraine is focusing on renewable energy sources (RES) auctions and energy storage. The research used the method of comparative analysis. The results determined that the legal regulation of RES in Ukrainian realities is related to the European integration of Ukraine and the consequences of Russian aggression. A list of strategies and main legal rules regulating green energy and RES is also defined. RES's significant role in forming sustainable economic development is also characterized. The conclusions indicate a direct impact of renewable energy on ensuring the stable growth of the energy sector of Ukraine, through mechanisms for ensuring energy sustainability and the future sustainable development of the economy.

Keywords: economic sustainability, energy security, energy storage systems, environmental regulation, green economy, renewable energy sources

INTRODUCTION

Successful economic development comprises a range of critical factors, among which the stable operation of the energy sector stands out. Fossil fuel sources serve as the primary energy resource, with dependency on natural gas and oil being one of the main contributors to the ongoing environmental crisis. Modern researchers have established that future energy demand will only increase. They propose addressing this issue not solely through reliance on finite, non-renewable sources (Kappner et al., 2023; Koval et al., 2022). Accordingly, recent years have witnessed positive transformations worldwide in expanding renewable energy capacities (Dunn et al., 2018; Kurepina, 2023; Rodinova et al., 2024). Renewable energy is an alternative method for addressing growing energy challenges. Furthermore, it has been identified as a means to prevent further consequences of climate change (Mhlanga & Ndhlovu, 2024; Olujobi et al., 2023; Vanegas Cantarero, 2020).

Contemporary scholars also recognize that the green transition in Ukraine is an integral part of the national sustainable development strategy and a response to global

challenges (Devterov et al., 2024). In the Ukrainian context, the green transition refers to the comprehensive transformation of the economy and society towards environmental sustainability, climate neutrality, and energy efficiency (Kumar, 2024). These challenges include climate change, economic dependence on traditional energy sources, and modernizing the energy infrastructure. However, the primary research issue lies in the fact that various legal challenges accompany this process. Notably, insufficient legislative regulation of renewable energy sources (RES) and difficulties integrating international standards into national legislation represent significant obstacles (Kurepina, 2023; Rodinova et al., 2024). Additionally, the role of innovations, particularly in digitalization, is pivotal in this context (Klynovyi et al., 2023). Considering the challenges posed by the war, there are also issues related to stimulating investments in "green" energy. In the Ukrainian context, "green" energy generally refers to energy produced from renewable sources such as solar, wind, hydro, and biomass. While nuclear energy is considered low-carbon and plays a strategic role in Ukraine's energy mix, it is not typically classified as "green" due to concerns over radioactive waste and safety (Myronenko et al., 2017). Ukraine's energy

transition plans are distinct from those of other conflict-affected nations like Syria or Yemen due to the influence of the wartime backdrop. Before 2022, green tariffs—fixed above-market rates guaranteed by the state for electricity generated from renewable sources such as solar, wind, and biomass—were Ukraine's primary tool for encouraging investment in renewable energy. Law no. 555-IV ("on alternative energy sources") and its ensuing changes, which supported feed-in tariffs and streamlined connection processes, changed the legal landscape. However, legislative priorities changed following the full-scale invasion on 24 February 2022. The main points of emphasis were energy decentralization, critical infrastructure resilience, and alignment with the EU's green deal and REPowerEU policy. Notably, wartime law has shifted from incentivization to strategic sustainability by introducing steps to promote energy security, attract private-public collaborations, and lessen reliance on imported fossil fuels.

This situation is primarily linked to deficiencies in national legislation in this sphere and insufficient investment in this promising sector of the economy (Cherniavsky et al., 2024). Another complication to this research problem is the requirement to formulate a new state energy policy. Ukraine's commitment to European integration drives interest in the European experience of alternative energy development and the implementation of various related programs.

Therefore, considering the above aspects, this research problem is significant and timely, as challenges persist despite the adoption of legal acts, complicating the implementation of specific RES projects. The scientific novelty and originality of this study are determined in several interrelated dimensions.

First, the study focuses on the legal aspects of Ukraine's "green" transformation in the context of a full-scale war. Although the existing literature considers the development of renewable energy in peacetime or in economies in transition, there is currently no clear legal analysis that would study the role of war realities, namely the destruction of infrastructure, the need for decentralization and the growth of security threats, in changing the regulatory environment. Thus, the case of Ukraine is a unique case, different from other countries affected by conflicts, as the process of European integration and bringing the legal framework into line with EU standards is taking place at the same time.

Second, the study goes beyond the descriptive approach to the development of renewable energy and contributes to the science by assessing the adaptability and sustainability of national legislation. The focus is on the transformation of legal and institutional mechanisms: incentive models (e.g., feed-in tariffs) and sustainability and security strategies, reflecting the shifting priorities of legal policy in wartime. This approach is rarely used in contemporary academic writing, where legislation is usually considered in a stable context.

Third, the paper offers an important perspective on the intersection of military energy governance and European integration. Ukraine's commitments under the EU association agreement and its focus on the EU's green deal and REPowerEU program create an unprecedented case of harmonizing domestic energy legislation with supranational standards in the context of active armed conflict. This study contributes to understanding the opportunities and gaps that exist in

Ukraine's current legislation. In this way, the article advances the discussion on sustainable development and links legal reforms in Ukraine's energy sector directly to the goals of increasing resilience, achieving climate neutrality, and post-war recovery.

Accordingly, this study will focus on analyzing the existing legal framework governing the green transition in Ukraine and its impact on sustainable development. This descriptive study aims to examine and analyze the main legal aspects of the green transition in Ukraine and characterize their current influence on the country's sustainable development. The analysis will include exploring the existing legislation, assessing its effectiveness, and identifying key issues and gaps that must be addressed to ensure sustainable development.

The main objectives are as follows:

1. Review the academic literature on the implementation of green energy sources (including renewable and low-carbon technologies) and their role in Ukraine's green energy transition.
2. Analyze Ukraine's current legislation related to green energy transition and the development of RES.
3. Assess the impact of recent innovative legislative acts on promoting sustainable development through the expansion of green energy in Ukraine.

LITERATURE REVIEW

Green energy remains one of the key areas of development for the modern economy, particularly in Ukraine. Legal regulation plays a decisive role in successfully implementing RES in the context of global climate change and the need to ensure energy security. This review analyzes three scientific papers on the legal aspects of green energy development and its impact on Ukraine's energy sustainability. Cherniavsky et al. (2024) examined the impact of RES on Ukraine's energy sustainability. The paper emphasized the importance of legal mechanisms for promoting the use of green energy and integrating international standards at the national level. Martyn et al. (2024) highlighted strategic directions for the development of Ukraine's energy sector through the introduction of RES. Particular attention was paid to the legal aspects of developing strategies that promote environmental safety and sustainable development. Petlenko (2024) analyzed the financial aspects of green energy and their impact on Ukraine's energy security. He emphasized the need for legal regulation to attract investment in RES and create favorable conditions for developing a green economy. Kurbatova et al. (2020) highlighted the significance of government policies in supporting the development of RES in developing economies, with particular attention paid to Ukraine. The business and industrial sectors are considered when discussing economic strategies aimed primarily at encouraging electricity production from RES (Yermolenko et al., 2022).

The outlined mechanisms may include "green tariffs," credit programs in the RES sector, and tax and customs incentives (Kamri et al., 2024). Bondarenko et al. (2023) characterized the role of contemporary green initiatives in ensuring the stable functioning of Ukraine's energy sector.

Researchers have also focused on evaluating the impact of incentive mechanisms on deploying renewable energy generation capacities (Kuzemko et al., 2022). Meanwhile, Redko et al. (2023) analyzed the primary strategies for innovative development in the fuel and energy sectors of Ukraine and the EU. Gryshchenko et al. (2021) outlined critical contemporary legal trends, while Masyk et al. (2023) examined the specifics of energy security in Ukraine and Europe, providing a comprehensive comparative analysis.

The study by Trushkina et al. (2021) presents the fundamental conceptual framework for developing Ukraine's national energy system within the scope of the EU's green deal. Yermakov and Kostetska (2022) also described fundamental changes and environmental challenges in green economy implementation policies. The critical aspects of decentralizing Ukraine's policies to achieve sustainable development are presented in the study by Zaiets et al. (2022). Moreover, Pereira et al. (2022) assessed the impact of the Russia-Ukraine war on effectively achieving sustainable development goals. Ciot (2023) explored the influence of the war on implementing the EU's green deal. Integrating EU standards into Ukraine's legal framework is detailed in the work of Miniailenko and Chornovol (2023).

However, there is academic agreement in two recent studies that the role of green electricity in Ukraine's overall energy consumption remains marginal (Cherniavsky et al., 2024; Kuzior et al., 2021). This minimal contribution persists despite government efforts to encourage the development of RES and introduce favorable conditions for renewable energy projects (Gorokhova et al., 2020; Kopytsia, 2021). Given this situation, this study will address the primary challenges impeding the widespread adoption of renewable energy. Furthermore, while the analyzed works reveal certain aspects of the legal application of alternative energy sources, they fail to comprehensively cover Ukraine's transition to a renewable energy system.

This study addresses this gap by examining Ukraine's green energy transition through a review of relevant legislation, academic discourse, and recent legal innovations, with particular focus on their contribution to promoting sustainable development.

METHODOLOGY

This study belongs to the category of quantitative research, with a descriptive design at its core. This type of research aims to provide a detailed depiction of a phenomenon without conducting an in-depth analysis of its causes or consequences. The study collects and systematizes contemporary scientific materials related to Ukraine's green transition. The primary goal of this descriptive research is to present an accurate overview of the green transition process using evidence from scientific literature and Ukrainian legislation.

This descriptive research relies on objective, primarily quantitative data. The study employs a descriptive approach to systematize and describe the legal framework for Ukraine's green transition. The sample source comprises various materials, including legislative acts (focusing on contemporary laws and updated versions of older regulations)

and diverse scientific literature, such as journal articles, international conference proceedings, and book chapters. The selection of scientific literature prioritized publication dates and ensured that materials were published in strictly peer-reviewed journals.

The study employs the PRISMA approach, encompassing stages such as identifying and screening scientific studies, culminating in data analysis. Critical bibliometric databases, Web of Science and Google Scholar, were initially selected to search for relevant sources. Preliminary research identified seven contemporary legislative acts related to energy sector regulation in Ukraine ($n = 7$). Within the bibliometric databases, 829 articles were retrieved using keywords such as Ukraine, legal aspects, green energy, Ukrainian law, development, and regulation. The literature search was confined to the 2019-2024 time frame, with filters set to include only review articles.

Following the initial retrieval, duplicate records were removed (165 articles). The subsequent screening process applied specific exclusion criteria to ensure relevance and quality. Articles were excluded based on the following reasons:

1. Irrelevance to the legal dimension of green transition policies or energy regulation (107 articles)—studies that focused exclusively on technical, engineering, or purely economic aspects without addressing regulatory or legal frameworks.
2. Lack of thematic alignment based on abstract and keyword analysis (243 articles)—publications that did not mention Ukraine or failed to address broader issues of legal regulation, renewable energy law, or the green transition within policy or legislative contexts.
3. Non-compliance with publication criteria, such as non-peer-reviewed sources, editorials, opinion pieces, or papers published in journals with no clear peer-review policy.
4. Inadequate language requirements—studies published in languages other than English without a sufficiently detailed English abstract (less than 200 words).
5. Authorship threshold exceeded—publications with more than six authors were excluded to maintain consistency and ensure academic accountability.
6. Insufficient methodological transparency—studies lacking a clear description of methodology or empirical foundation were excluded.

The final set of sources included only those that met all five inclusion criteria and passed the multi-stage PRISMA review process, ensuring thematic relevance and methodological rigor (Figure 1).

This study uses not only legal analysis, but also a multi-perspective approach. It also includes data from secondary sources, including previously conducted interviews and field research conducted by other scholars and international organizations. This approach allowed for an indirect assessment of the implementation of legal norms and the problems faced by stakeholders in practice. In particular, along with the analysis of regulatory acts and literature regulating the energy transition in Ukraine, economic indicators (investment volumes, dynamics of renewable energy

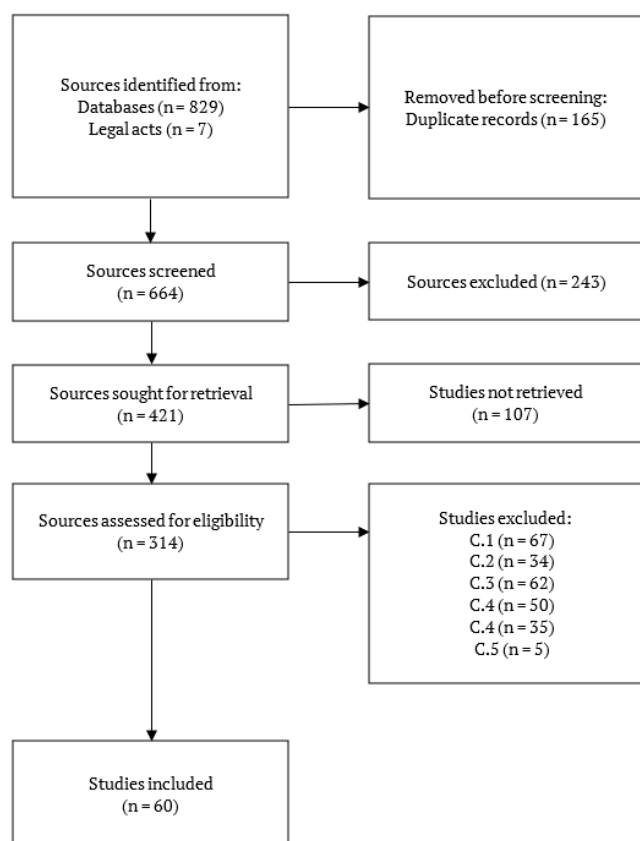


Figure 1. PRISMA flow chart (Source: Authors' own elaboration)

development, costs of its deployment), social aspects (participation of local communities in the development of energy clusters, the problem of energy poverty and access to energy), as well as a comparative measurement with countries that have experienced energy sector transformation in times of crisis and conflict (in particular, the Balkans and the countries of Central and Eastern Europe) were also taken into account. Such a combination of legal, economic, social and institutional analysis made it possible to avoid reducing the study to a purely legal framework and provides a more holistic understanding of the processes of Ukraine's energy transition during the war.

The study used a methodical, systematic strategy to analyze current legislative acts and scholarly material successfully. Comparative analysis and systematization are among the techniques used. All the data were first arranged in structured Excel tables to aid the analytical process. This made it possible to compare and summarize information effectively, especially regarding essential ideas like decarbonization, green energy, and alternative sources.

The first table, which included fields like author, year of publication, nation, and significant results, gave a methodical summary of academic research on the evolution of the energy sector. This framework made spotting common green

transition tendencies among various nations easier. A second table focused on elements such as author, year of publication, types of alternative energy sources, environmental regulation (green economy), key challenges, and overall conclusions. This enabled a more detailed description of the main directions of environmental legislation and the implementation of alternative energy initiatives in Ukraine. Using the comparative method, the study compared the features of Ukraine's green transition with practices observed in other countries. This was achieved by comparing the findings of Ukrainian researchers with those of scholars from different nations.

RESULTS

Ukraine currently possesses significant potential in critical types of renewable energy; however, these still account for only a minor share of the country's overall energy balance.

In 2019, Ukraine ranked among the top ten countries worldwide in terms of renewable energy development rates. By 2020, it was among the top five European countries in the solar energy sector's growth. Since 2017, investments in renewable energy projects in Ukraine have consistently exceeded those in fossil fuel projects. This effect is also noticeable after the start of hostilities (see [Table 1](#)).

By 2021, the Ukrainian energy sector faced Uncertainty. On the one hand, the government began fulfilling commitments outlined in the "memorandum of understanding on resolving problematic issues in Ukraine's renewable energy sector" (adopted in 2020), including initiating debt repayments owed to renewable energy producers. On the other hand, there were attempts at the state level to declare the so-called "green tariff" either illegal state aid or unconstitutionally approved support (Omelchenko, 2022). At the same time, the government has directed significant efforts to develop the outdated nuclear energy infrastructure. For example, this is evidenced by the adoption of the state program for the further development of the nuclear industrial complex until 2026. The onset of large-scale military invasion left the renewable energy sector uncertain, exacerbated by military actions and the damage and occupation of critical energy infrastructure (Bondarenko et al, 2023). Nevertheless, despite these challenges, the renewable energy system demonstrated growth. In particular, the 2021-2022 gas crisis highlighted the potential for bioenergy development in Ukraine. Against the backdrop of exceptionally high gas prices, bioenergy's potential became crucial, as it could address part of the gas deficit in producing thermal or electrical energy (Kirin et al., 2023; Miniailenko & Chornovol, 2023). Consequently, 21 MW of biogas plants were commissioned in 2021, doubling the capacity installed in 2020.

Regions such as Crimea, Dnipro, Odesa, Kherson, Zaporizhzhia, Kharkiv, and Chernihiv exhibited notable growth in the installed capacity of solar power facilities.

Table 1. Results of stimulating and using energy produced from renewable sources in Ukraine for 2014-2024 (Ukraine Energy Profile)

Year	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Percentage (%)	3.9	4.9	5.9	6.7	7.0	8.1	9.1	n/d	n/d	9.5	n/d

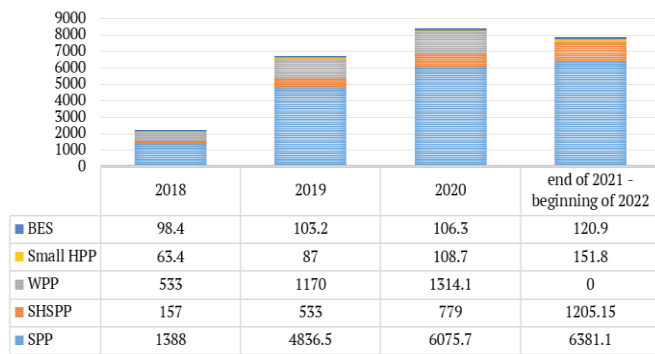


Figure 2. Dynamics of the development of the RES in Ukraine in recent years (2018-2022) (Adapted from Omelchenko, 2022)

Figure 2 illustrates the critical performance indicators of the renewable energy sector, reflecting its development dynamics in Ukraine from 2018 to late 2021 and highlighting the capacity growth of various power plant types.

The solar power plants (SPP) indicator demonstrates an increase in capacity from 1,390 MW in 2018 to 6,380 MW by the end of 2021. Small home SPP also experienced rapid growth, particularly in 2021 (1,210 MW). Wind power plants increased their capacity from 530 MW in 2018 to 1,670 MW by the end of 2021. Small hydropower plants also expanded from 63 MW in 2018 to 152 MW in 2021. Finally, bioenergy power plants gradually increased from 98 MW in 2018 to 121 MW in 2021. These data highlight the steady development of Ukraine's renewable energy sector over recent years (**Figure 2**).

As illustrated in **Figure 2**, SPP are the most prevalent, supported by various modern legal initiatives. However, the development of the wind energy sector is also notable. Considering the growth in the installed capacity of wind energy facilities, the most advanced regions in this field include Kherson, Luhansk, Odesa, Mykolaiv, Donetsk, Zaporizhzhia, and Ivano-Frankivsk (see **Figure 3**).

The practical dimension of legal regulation can be clarified from the analysis of interviews and sociological research conducted in previous years. In particular, according to the results of surveys organized by the Ukrainian Renewable Energy Association and the Razumkov Center in 2020-2021, the majority of investors in the "green" energy sector noted problems with untimely payments under the "green tariff" and the instability of regulatory policy. Studies by international organizations also showed key risks. For example, in 2022, experts from the International Finance Corporation in a series of interviews with Ukrainian RES producers noted that the biggest problem remains the integration of new facilities into the outdated energy infrastructure, which was not designed for a large number of decentralized capacities (Hryhoriev et al., 2024). Besides, interview participants emphasized that the adoption of laws on energy storage and the development of balancing systems opens up opportunities for the stable integration of RES in the post-war period.

It is worth mentioning separately the results of qualitative research conducted in communities where local renewable energy projects are being implemented. As evidenced by interviews with local government representatives in 2023 (provided in the reports of the USAID energy security project),



Figure 3. Map of wind energy facilities (2018-2022) (Adapted from Omelchenko, 2022)

decentralized solar and bioenergy installations have become critical elements of ensuring energy sustainability during the period of massive shelling.

An important decision made during the wartime period was the European Commission's approval in 2022 of the REPowerEU plan, which prioritized the development of renewable and alternative energy sources as a matter of overriding public interest.

In addition, a significant wartime legislative development was the adoption of Ukraine's law "on amendments to certain laws of Ukraine concerning the development of energy storage systems". This law facilitates the large-scale construction of energy storage systems (EES) in Ukraine, which is critical for the stability of its complex energy system. It also allows renewable energy producers to exit balancing groups independently and sell electricity across various market sectors. Law no. 7427, passed in 2022, addressed "the impossibility of regulating relationships within the natural gas market ..." (Kovalenko et al., 2023; Naumenkova et al., 2022). Moreover, the Ministry of Energy resumed implementing "green" auctions. On 2 August 2022, a resolution was adopted, establishing a schedule for auctions in 2023.

From 2 July 2023, Law of Ukraine No. 3141-IX (2023) came into effect, outlining strategic directions in the energy sector. This law aims to implement regulation no. 1227/2011, designed to ensure integrity and transparency in wholesale energy markets in line with Ukraine's European integration aspirations. Thus, it can be concluded that the current innovative legislation is directed toward aligning Ukraine's energy market with European principles of operation while maintaining integrity. Notably, the law also identifies critical violations related to abuse within the energy market.

At the end of July 2023, Law of Ukraine No. 3220-IX (2024) was adopted, introducing significant changes in the renewable energy sector and fostering the development of the "green" energy sector. One key innovation was the introduction of a particular market premium for electricity generators using RES. This mechanism provides flexibility for alternative energy producers, allowing them to choose an optimal support system. This approach is expected to facilitate the flexible integration of renewable energy. According to new estimates,

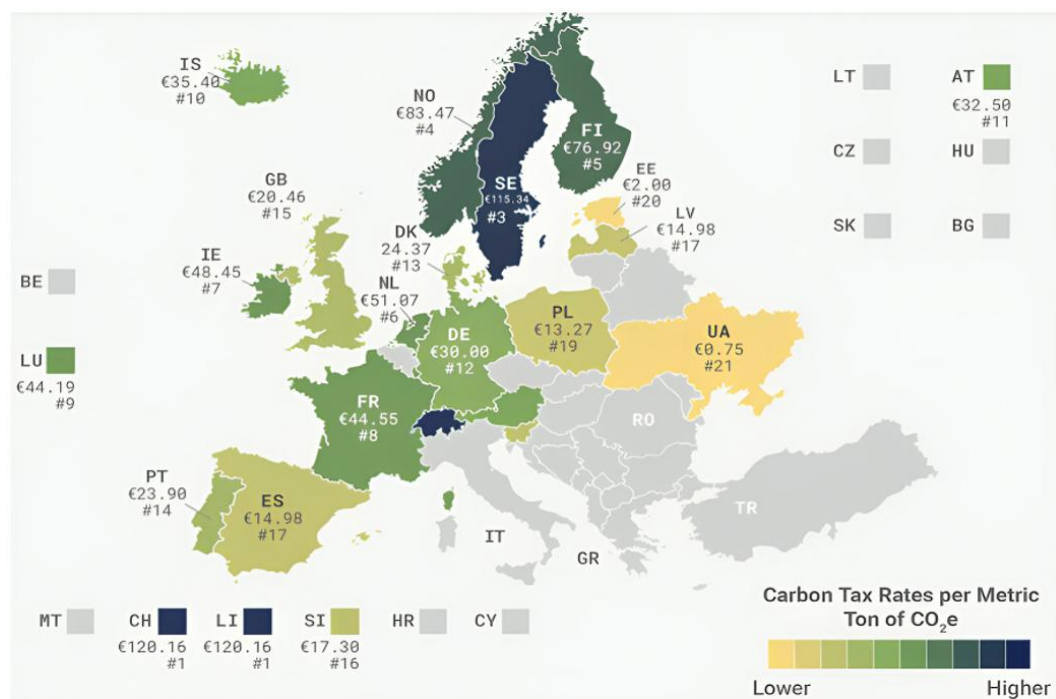


Figure 4. Carbon tax rates (Center Eco Consulting, 2023)

starting in 2025, Ukraine will undergo a significant reform of its state support mechanism for renewable energy through changes to the terms of the “green tariff.” This tariff, which has long been the main incentive for investing in SPP, will gradually be reduced and transformed into new market-based support instruments. In 2025, the green tariff for private households will be 13.2-euro cents per 1 kWh, and for large industrial SPP, 14.5-euro cents per 1 kWh. However, after this year, the tariff will no longer apply to new investments, which means a transition to other mechanisms for stimulating the development of RES. Significant changes will affect various categories of energy market participants. These changes have several potential implications for Ukraine’s energy market:

- (1) a decrease in the attractiveness of investing in new SPP under the old support model and
- (2) increased competition in the electricity market.

According to Cabinet of Ministers Resolution No. 924, establishing the national energy and climate plan (NECP) in 2023 initiated a significant innovation in the energy sector. Scholars recognize this initiative as a vital step towards European integration and meeting obligations under the energy community. This document is a critical legislative foundation for decarbonizing Ukraine and achieving carbon neutrality (Law of Ukraine No. 924-2023-p, 2023).

It is also worth noting that in July 2021, the Ukrainian government approved a new nationally determined contribution to the Paris Agreement. This document aimed to reduce greenhouse gas emissions by 35%. Since 2022, the carbon tax has increased from 10 to 30 UAH/t CO₂. Despite this increase, Ukraine’s carbon tax rate remains the lowest in Europe (see Figure 4).

Simultaneously, Ukraine’s economic strategy for 2030 identifies decarbonization and developing RES as critical areas for transforming the national economy. According to the plans outlined in this strategy, the share of RES in energy production

is expected to increase to 25% by 2030 (Omelchenko, 2022). The average carbon tax rates in a few chosen nations are shown in Figure 4. However, Ukraine’s place in this context is still undeveloped. Ukraine’s present carbon pricing is symbolic, with a cost of only 35 UAH per ton of CO₂ (€0.75), well below the EU average of €50 to 100 per ton under the EU ETS and related carbon border adjustment mechanism (CBAM) requirements, even though the country has had a basic carbon tax mechanism in its tax code since 2011. Furthermore, Ukraine has not yet established a legally binding framework or a fully operational carbon market that aligns with the energy taxation directive or the EU’s green deal.

This disparity indicates a larger legislative weakness: the lack of a market-based carbon pricing system jeopardizes the nation’s capacity to meet the decarbonization objectives outlined in the NECP.

The key policies regarding the green transition were adopted following the full-scale invasion. Table 2 presents the main legislative acts concerning RES enacted from the second half of 2022 to 2023.

Consequently, the documents above highlight the positive decisions made during the war and reflect the government’s recognition of the significance of RES. Forming a modern economy and adhering to the principles of energy efficiency policy establish prerequisites for sustainable development. Notably, in United Nations documents, sustainable development is defined as a stage in societal progress that enables the current generation’s needs to be met without compromising the opportunities available to future generations (Petrushenko et al., 2022).

In the context of harmonizing Ukrainian energy legislation with EU law, it is advisable to analyze the compliance of national regulations with the latest EU regulatory acts, in particular regulation 2023/1542 on batteries and waste batteries (known as the new battery law) and the CBAM

Table 2. Key legislative acts regulating the renewable energy sector adopted since the beginning of the full-scale invasion

Name	Description	Year
REPowerEU Plan	Renewable energy development has been identified as a priority.	2022
Law of Ukraine “on amendments to certain laws of Ukraine regarding the development of energy storage systems”	The development of energy storage systems enables RES producers to sell electricity on the market.	2022
Law of Ukraine No. 2479-IX “on the peculiarities of regulating relations in the natural gas market and the heat supply sector during martial law and the subsequent restoration of their functioning”	The impossibility of regulating relations in the natural gas market.	2023
Resolution of the Cabinet of Ministers of Ukraine No. 232 “on amendments to the resolutions of the Cabinet of Ministers of Ukraine No. 420 of May 23, 2018, and No. 1175 of December 27, 2019”	Sets the auctions for 2023 and indicative quotas	2022
Law of Ukraine No. 3141-IX	Integrity and transparency of the wholesale energy market	2023
Law of Ukraine No. 3220-IX	Defines changes in renewable energy, introduces a market premium for RES electricity producers	2024
Resolution of the Cabinet of Ministers of Ukraine No. 924 “some issues of implementing a pilot project on obtaining critically important industrial equipment (means of production) in the form of humanitarian aid”	The creation of the NECP has been initiated.	2024

(regulation 2023/956). On the one hand, the EU’s new battery law establishes comprehensive rules on eco-design, supply chain transparency, traceability, and mandatory producer responsibility. Ukrainian legislation currently lacks a specific legal framework regulating EES to the same extent, particularly regarding procedures for the safe collection, reuse, and recycling of batteries. Ukrainian rules for connecting to power grids still do not fully consider the energy storage needs and integration of such systems, creating a legislative gap compared to European approaches to the circular economy in energy (Romaniuk et al., 2024). On the other hand, CBAM is gradually introducing requirements for the decarbonization of products in key energy-intensive sectors, which will directly affect Ukrainian exporters to the EU. As of 2024, Ukraine still does not have a full-fledged legal mechanism for verifying the carbon footprint of products, which is critical to avoiding trade barriers during the full implementation of CBAM 2026.

Modern approaches to studying sustainable development paradigms reshape the understanding of investment and public policy. For example, energy policy is crucial for industrial development, preserving biodiversity, protecting public health, and ensuring equitable access to energy resources. When balanced policies are implemented, the critical aspects of the functioning of the fuel and energy system that contribute to sustainable development include its interconnections with the economic system and its alignment with environmental interests. Moreover, the operation of sustainable development emphasizes long-term solutions, enhancing the ability to address ecological challenges effectively.

Therefore, the development of renewable energy in Ukraine is not a temporary phenomenon, caused only by the needs of wartime, but forms fundamental trends that will determine the strategic direction of the state’s energy policy in the coming decades. First, the accumulated potential in the field of solar, wind, bio- and hydropower provides the opportunity for rapid recovery and increase in the share of renewable energy in the national energy balance in the post-war period (Oderiy et al., 2024). Even during the war, there has been an increase in investments in bioenergy and the launch of new facilities, which indicates the sustainability of the sector. This means that after the end of hostilities, renewable

energy will become a key driver of reconstruction and economic growth.

Secondly, the legislative changes adopted in 2022–2024 are strategic in nature and are not limited only to emergency regulation during martial law (International Energy Agency, 2024). Such solutions as the development of EES, the introduction of market premiums and the preparation for the reform of the “green tariff” mechanism from 2025 form the basis of a new long-term energy market model. Its main characteristics are competition, transparency and sustainability, which will allow Ukraine to gradually integrate into the European energy space and meet its climate commitments (Khrystova et al., 2024). Thirdly, post-war reconstruction will require significant investments in the modernization and decentralization of the energy system. In this context, the legislative initiatives considered in the article on energy security, the storage market, the reform of the renewable energy support system and harmonization with EU legislation will have archival value, as they will remain basic guidelines for future reforms. The experience of adapting energy law in wartime will be used in peacetime as an example of the system’s resilience and ability to function even in crisis circumstances.

DISCUSSION

This study aimed to characterize the critical legal aspects of regulating Ukraine’s green transition and assess its impact on sustainable development. Accordingly, the first objective focused on analyzing specialized academic literature. The review of 32 relevant peer-reviewed articles and policy papers published between 2015 and 2024 revealed growing academic interest in Ukraine’s green energy transition. Among them, 21 studies addressed the implementation challenges of renewable or alternative energy sources in general (Pasha, 2022; Svitlichnyy, 2023), while only 7 specifically examined the legal and regulatory framework guiding this process. This quantitative disparity underscores the relevance of focusing on legal dimensions in this study, as also emphasized by researchers such as Kurbatova et al. (2020), Myronenko et al. (2017), Petlenko (2024), and Redko et al. (2023).

The next objective was to identify the critical legal documents governing the implementation of green energy within Ukraine's legal framework. It was found that, before 2022, the issue of energy conservation was inadequately represented in legislative initiatives, with notable efforts even being made to abolish the so-called "green tariff." However, following the onset of the large-scale Russian invasion, interest in alternative energy sources grew significantly. This is evidenced by legislative acts adopted between 2022 and 2023. These developments facilitate a gradual transition towards sustainable development, as highlighted in numerous studies (Shulga et al., 2022; Tokarchuk, 2022; Yevdokimov et al., 2020).

It is crucial to keep in mind that the changing global perspective on sustainable development has spurred scholarly debates, revealing several influencing elements that become more important in different contexts. Although the literature has extensively documented these characteristics, the focus of this study is on their applicability in the Ukrainian context and their consequences for the nation's transition to green energy.

First and foremost, Ukraine's sustainable development depends heavily on the economy. Ukraine's economic sustainability depends on the development of various types of capital: natural, industrial, human, and social. They form the basis for energy efficiency and the development of green technologies (Diachenko et al., 2022; Lutsiak et al., 2020). Enhancing these capitals helps Ukraine's ability to draw in foreign investment and promote innovation in the fields of renewable energy.

Second, considering Ukraine's abundance of natural resources and biodiversity, the environmental component is very significant. Both fulfilling international environmental commitments and sustaining economic activity depend on protecting ecosystems and natural capital (Lvova, 2024; Moroz et al., 2021; Myronenko et al., 2017). To protect ecological integrity and facilitate a sustainable green transition, Ukraine must effectively manage population pressures and resource demands.

The third important dimension is social. This is democracy, equality, and people's access to basic services—education and medicine. Without this, it is difficult to ensure public support and fairness in the implementation of green policies (Devterov et al., 2024; Ikwuka et al., 2024; Krawczyńska et al., 2024). Global energy trends, such as decarbonization and alternative energy sources, have become especially relevant for Ukraine amid Russia's aggression, which has disrupted sovereign energy security, damaged critical infrastructure, and complicated energy trade and self-reliance, as further discussed in the next paragraph. These conclusions align with the findings of other researchers, who note that traditional energy development models are in a state of crisis due to challenges such as missile strikes on critical infrastructure, the seizure of numerous energy facilities, and difficulties in the transit and processing of energy resources (Chomać-Pierzecka et al., 2023). Against this backdrop, a gradual transition to a green economy appears to be a viable step for stabilization and subsequent development.

Although the adoption of new laws after 2022 has demonstrated Ukraine's desire to harmonize with European

energy policy and support renewable energy, their actual effectiveness remains mixed. For example, the law "on amendments to certain laws of Ukraine concerning the development of energy storage systems", adopted in 2022, was a notable step towards stabilizing the energy system, but its implementation is slow due to a lack of investment and the absence of clear technical standards for the integration of storage systems. Similarly, Law of Ukraine No. 3141-IX (2023) aimed at ensuring transparency in the wholesale energy market, introduced important mechanisms, but did not eliminate long-standing problems with payment delays and market abuse, as reported by industry participants. The most recent Law of Ukraine No. 3220-IX (2024) introduced a market premium mechanism as an alternative to the "green tariff" (a fixed payment to producers of renewable energy). Despite the flexibility of this approach, its effectiveness can only be assessed after 2025, when the current feed-in tariff model will be phased out.

However, it is worth noting that the development of renewable energy projects in Ukraine faces a number of bureaucratic restrictions that reduce the investment attractiveness of the industry. At the regional level, the key problems remain the complex and lengthy procedures for approving land allocations and connecting new facilities to the electricity grid. Researchers indicated that investors emphasize the coordination of technical conditions for connection, which can take from six months to two years. Thus, this creates significant risks for the implementation of projects.

In addition, in many communities, the level of awareness of local governments with the requirements of the latest legislation remains low, which affects the emergence of additional delays in issuing permits. During the war period, restrictions related to security, inspections, and prioritization of the restoration of critical infrastructure were added to these barriers, which caused a number of investors to actually freeze their projects.

Thus, despite the existence of modern legislative mechanisms, the actual implementation of projects at the regional and investor levels is complicated by significant bureaucratic obstacles. This, in turn, will require further harmonization of procedures with EU practices and deregulation.

RES will be a key factor in restoring the economy and the well-being of citizens after the war. Additionally, further advancements and the implementation of ambitious green energy development plans are crucial for Ukraine's European integration aspirations, as indicated in the findings of this study. These assertions are supported by other researchers (Humeniuk, 2023; Pavlenko et al., 2020). Considering the EU's modern environmental policies, the issue of climate change will only gain importance, making international commitments to decarbonization an essential aspect of Ukraine's legal framework (Goldthau & Youngs, 2023; Shvets et al., 2020). The complete restoration of lost thermal generation capacity is not in line with Ukraine's vision for the future. The construction of a more decentralized system has already begun, driven by energy security rather than solely by sustainability considerations. Extensive generating facilities are easier targets for attacks. The Ukrainian government has issued

recommendations to accelerate the implementation of distributed generation (local energy systems such as rooftop solar panels or small turbines). For instance, small modular gas turbines and rooftop solar panels with storage in administrative buildings, hospitals, schools, households, and businesses. By early 2024, nearly 1,500 MW of consumer-installed solar photovoltaic systems had been installed, and their deployment continued steadily. Researchers highlighted Ukraine's significant potential for biogas and biomethane production. Incentives for investment in biogas and biomethane plants (including cogeneration) could provide an alternative to natural gas-based district heating systems and increase the resilience of heat supply in the face of current gas supply security risks. This could have an impact on gas import dependency. According to the industry group, two biomethane production plants are operating in Ukraine, several are under construction, and ten new facilities are planned to open in 2024-2025 (Kozlovskyi et al., 2023.). This work could be based on the 2023 memorandum of understanding between the EU and Ukraine on strategic partnership in biomethane and hydrogen.

Against this background, the experience of post-conflict or low-resource states such as Kosovo may offer valuable insights for Ukraine. For instance, Kosovo has successfully attracted international wind power investment despite significant domestic energy infrastructure limitations. The Bajgora Wind Park (102.6 MW), co-financed by Enlight Renewable Energy, SOWI Kosovo, and international institutions such as the EBRD, became the most significant foreign direct investment in Kosovo's energy sector. The earlier Kitka Wind Farm (32.4 MW) was also funded with EBRD support. In 2024, Kosovo launched its first competitive auction for 100 MW of wind capacity. It is part of a long-term target to install 1.6 GW of renewable energy capacity by 2031, including 600 MW from wind power (Gjukaj et al., 2024; Sotnyk et al., 2023). Although Ukraine has a significantly higher technical potential for wind energy, investment is hindered by war-related risks, legislative uncertainty, and an unstable regulatory environment. By comparison, Kosovo demonstrates that even smaller economies can foster renewable development through transparent auctions, stable policy signals, and partnerships with international financial institutions. These lessons could inform Ukraine's approach to accelerating post-war green recovery and decentralized energy development, especially in alignment with EU green energy strategies. For this reason, Ukraine should consider the legal experience of EU countries, which have legislatively anchored the transition to a green economy and introduced penalties for non-compliance.

Although legal aspects remain the key analytical core of the study, the results show that considering Ukraine's energy transition exclusively through the prism of legislative changes is insufficient. No less important are the economic sustainability (ensuring investment flows and financial mechanisms in the face of military risks), the social component (overcoming energy poverty, reducing territorial disparities in access to clean energy, developing public initiatives), as well as institutional governance (coordination between central government, local governments, international partners and the private sector). Comparison with the experience of other post-conflict states, in particular

the Western Balkans showed that combining legislative reforms with targeted economic incentives and public sector involvement significantly increases the long-term effectiveness of energy transformations. Thus, Ukraine's energy transition should be considered as a process of harmonization with the EU *acquis* (the body of EU law that Ukraine must adopt) and as a socio-economic and institutional transformation that integrates legal, economic, and social factors.

Finally, from a broader perspective, the results of the study become important in view of the global trends of decarbonization and European integration of Ukraine. Fulfilling the requirements of CBAM, adapting to the EU's green deal and forming a national carbon quota market will not only strengthen Ukraine's position in international markets, but will also determine the development of industry and energy for decades to come. This means that the conclusions drawn in the article have not only a current practical dimension, but also a long-term scientific and archival value, as they allow us to evaluate Ukraine's experience as a unique example of combining military challenges with a course for sustainable development and European integration.

Given the methodology employed, this research has certain limitations. As a descriptive study, it outlines individual phenomena and does not delve deeply into cause-and-effect relationships. Furthermore, a notable limitation is the reliance on contemporary English-language literature while neglecting sources in other languages. However, this does not diminish the overall significance of the study and provides opportunities for future research. In subsequent studies, the focus will be on incorporating a broader range of sources and employing empirical research methodologies.

CONCLUSIONS

Ukraine possesses significant potential for renewable energy; however, as of today, renewables account for only a tiny fraction of the country's overall energy balance. An analysis of current documents adopted since the onset of the full-scale Russian invasion highlights the relevance of legal regulation of green energy in the modern Ukrainian context. This is underscored by Ukraine's economic strategy 2030, which identifies decarbonization and developing RES as critical directions for economic transformation.

The reviewed legislative acts indicate positive decisions made during the war, reflecting an understanding by state authorities of the importance of alternative energy sources, decarbonization, and the broader adoption of green energy concepts. Adherence to the principles of energy efficiency policy thus establishes the fundamental prerequisites for sustainable development.

It has been determined that Ukraine's legislative framework in the energy sector is likely to undergo further improvement as part of the country's ongoing European integration and the adoption of international agreements.

Policy Recommendations

To address the legislative gaps identified through this study's analysis of Ukraine's green energy transition and to

accelerate the deployment of RES, the following improvements are recommended: amending grid connection rules to better accommodate ESS; formally recognizing ESS within national energy strategies; providing targeted economic incentives and streamlining permitting processes; and establishing regulatory sandboxes to foster innovation in green technologies.

These recommendations directly respond to the study's objectives of analyzing Ukraine's legal framework and assessing its impact on sustainable development. By implementing these measures, Ukraine can strengthen the legal support necessary for advancing its green transition, enhance energy security, and promote sustainable economic growth.

Promising avenues for further research include evaluating the practical effects of recent legislative acts on RES development, energy security, and regulatory mechanisms, thereby continuing to build on the findings and aims outlined in this study.

Author contributions: **IY:** conceptualization, methodology, supervision, project administration, writing – review & editing; **PH:** data collection, formal analysis, validation, investigation, visualization, writing – original draft; **LS:** data collection, formal analysis, validation; **OS:** investigation, visualization, writing – original draft; **IN:** data collection, formal analysis, validation. All authors have agreed with the results and conclusions.

Funding: No funding source is reported for this study.

Ethical statement: The authors stated that the study was conducted in accordance with ethical standards for human research and approved by the Ethics Committee of Lesya Ukrainka Volyn National University on 12 March 2024 (Approval code: LUVNU-EC-2024/03-12). All participants provided informed consent prior to participation.

AI statement: The authors stated that generative AI tools (ChatGPT, GPT-5) were used exclusively for language editing, formatting, and proofreading. The authors take full responsibility for the study's design, data, analysis, and conclusions.

Declaration of interest: No conflict of interest is declared by the authors.

Data sharing statement: Data supporting the findings and conclusions are available upon request from corresponding author.

REFERENCES

- Bondarenko, V., Pokynchereda, V., Pidvalna, O., Kolesnyk, T., & Sokoliuk, S. (2023). Green economy as a prerequisite for sustainable development: Analysis of international and Ukrainian experience. *European Journal of Sustainable Development*, 12(1), Article 221. <https://doi.org/10.14207/ejsd.2023.v12n1p221>
- Center Eco Consulting. (2023). How much does a ton of CO₂ cost in Ukraine and the world and what will the fulfillment of the requirements of the CBAM regulation look like. *Center Eco Consulting*. <https://center-ltd.com.ua/en/2023/11/21/how-much-does-a-ton-of-co2-cost-in-ukraine-and-the-world-and-what-will-the-implementation-of-the-requirements-of-the-cbam-regulation-look-like/>
- Cherniavsky, A., Borychenko, O., Pobigaylo, V., Savchenko, L., & Dudnikov, S. (2024). Impacts of renewable energy on Ukraine's energy sustainability. *Nativa*, 12(2), 285-293. <https://doi.org/10.31413/nat.v12i2.17414>
- Chomać-Pierzecka, E., Gąsiński, H., Rogozińska-Mitrut, J., Soboń, D., & Zupok, S. (2023). Review of selected aspects of wind energy market development in Poland and Lithuania in the face of current challenges. *Energies*, 16(1), Article 473. <https://doi.org/10.3390/en16010473>
- Ciot, M. (2023). The impact of the Russian-Ukrainian conflict on green deal implementation in central-southeastern member states of the European Union. *Regional Science Policy & Practice*, 15(1), 122-143. <https://doi.org/10.1111/rsp3.12591>
- Devterov, I., Tokar, L., Silvestrova, O., Lozo, O., & Poperechna, G. (2024). Philosophical dimensions of digital transformation and their impact on the future. *Futurity Philosophy*, 3(4), 4-21. <https://doi.org/10.57125/FP.2024.12.30.01>
- Diachenko, V., Diachenko, N., Suray, I., Novachenko, T., & Vasiurenko, O. (2022). Modern trends of innovative activity ensuring growth and sustainable development of the economy of Ukraine. *Scientific Horizons*, 25(7), 31-42. [https://doi.org/10.48077/sci-hor.25\(7\).2022.31-42](https://doi.org/10.48077/sci-hor.25(7).2022.31-42)
- Dunn, A., Calais, M., Lee, G., & Pryor, T. (2018). Why EVs? A comparison of alternative fuels to help Australia regain energy security. In A. Sayigh (Ed.), *Transition towards 100% renewable energy* (pp. 109-118). Springer. https://doi.org/10.1007/978-3-319-69844-1_10
- Gjukaj, A., Shaqiri, R., Kabashi, Q., & Rexhepi, V. (2024). Renewable energy integration and distributed generation in Kosovo: Challenges and solutions for enhanced energy quality. *AIMS Energy*, 12(3), 686-705. <https://doi.org/10.3934/energy.2024032>
- Goldthau, A. C., & Youngs, R. (2023). The EU energy crisis and a new geopolitics of climate transition. *JCMS: Journal of Common Market Studies*, 61(S1), 115-130. <https://doi.org/10.1111/jcms.13539>
- Gorokhova, T., Mamatova, L., & Muterko, H. (2020). The development of bioeconomics in Ukraine as an element of transformation government strategy of sustainable development. *Management Theory and Studies for Rural Business and Infrastructure Development*, 42(3), 279-287. <https://doi.org/10.15544/mts.2020.27>
- Gryshchenko, I. M., Denysova, A. V., Ovsianikova, O. O., Buha, H. S., & Kiselyova, E. I. (2021). Means for control over the activities of public authorities by civic democratic institutions: The conceptual framework analysis. *Cuestiones Políticas*, 39(69), 796-811. <https://doi.org/10.46398/cuestpol.3969.49>
- Hryhoriev, Y., Lutsenko, S., Shvets, Y., Kuttybayev, A., & Mukhamedyarova, N. (2024). Predictive calculation of blasting quality as a tool for estimation of production cost and investment attractiveness of a mineral deposit development. *IOP Conference Series: Earth and Environmental Science*, 1415, Article 012027. <https://doi.org/10.1088/1755-1315/1415/1/012027>

- Humeniuk, Y. M. (2023). Green finance strategies for post-war Ukraine: A global review. *Actual Problems of International Relations*, 157(1), 42-52. <https://doi.org/10.17721/apmv.2023.157.1.42-52>
- Ikwuka, O. I., Eleje, L. I., Iheanacho, E. C., & Onyebuchi, A. C. (2024). Teacher's attitude towards the use of digital technologies for capturing students' data in secondary schools in Imo State, Nigeria. *Futurity of Social Sciences*, 2(4), 39-54. <https://doi.org/10.57125/FS.2024.12.20.03>
- International Energy Agency. (2024). Ukraine's energy security and the coming winter: An energy action plan for Ukraine and its partners. *International Energy Agency*. <https://www.iea.org/reports/ukraines-energy-security-and-the-coming-winter/ukraines-energy-system-under-attack>
- Kamri, A. M., Utami, A. N., Hasnawati, A., Avifa, S., Raissa, F., Amirah, S., & Asmaliani, I. (2024). Comparison of the safety effects of antiplatelets on the kidneys in patients with vascular disease. *Futurity Medicine*, 3(2), 4-17. <https://doi.org/10.57125/FEM.2024.06.30.02>
- Kappner, K., Letmathe, P., & Weidinger, P. (2023). Causes and effects of the German energy transition in the context of environmental, societal, political, technological, and economic developments. *Energy, Sustainability and Society*, 13, Article 28. <https://doi.org/10.1186/s13705-023-00407-2>
- Khrystova, T., Pyurko, V., Pyurko, O., Arabadzh-Tipenko, L., Oleksenko, R., Melnyk, S., Protsenko, A., & Gorna, O. (2024). Bioecomedicine as a social determinant of the sustainable development of society. *Journal of Infrastructure, Policy and Development*, 8(8), Article 6338. <https://doi.org/10.24294/jipd.v8i8.6338>
- Kirin, R., Yevstihnieiev, A., Vyprytskyi, A., & Sieriebriak, S. (2023). Legal aspects of mining in Ukraine: European integration vector. *Mining of Mineral Deposits*, 17(2), 44-52. <https://doi.org/10.33271/mining17.02.044>
- Klynovyi, D. V., Moroz, V. V., Kovtun, O. A., & Danylchuk, H. B. (2023). Transformation of the national financial system of Ukraine: Comprehension and ways of integration to sustainability. *IOP Conference Series: Earth and Environmental Science*, 1254, Article 012119. <https://doi.org/10.1088/1755-1315/1254/1/012119>
- Kopytsia, I. (2021). The legal regulation of climate change in Ukraine: Issues and prospects. *Journal of Environmental Law and Policy*, 1(1), 105-119. <https://doi.org/10.33002/jelp001.05>
- Koval, V., Borodina, O., Lomachynska, I., Olczak, P., Mumladze, A., & Matuszewska, D. (2022). Model analysis of eco-innovation for national decarbonisation transition in integrated European energy system. *Energies*, 15(9), Article 3306. <https://doi.org/10.3390/en15093306>
- Kovalenko, V., Kolb, O., Bondarenko, O., Boldizhar, S., & Marko, S. (2023). Exploring the legal dimensions of environmental policy within the framework of Ukraine's sustainable development strategy. *Grassroots Journal of Natural Resources*, 6(3), 46-62. <https://doi.org/10.33002/nr2581.6853.060304>
- Kozlovskyi, S., Kulinich, T., Mazur, H., Khadzhyinov, I., & Kozlovskyi, V. (2023). Forecasting the competitiveness of the agrarian sector of Ukraine in the conditions of war and European integration. *Bulgarian Journal of Agricultural Science*, 29(5), 774-783.
- Krawczyńska, D., Hadasik, B., Ryczko, A., Przedworska, K., & Kubiczek, J. (2024). Pursuing European green deal milestones in times of war in Ukraine—A context of energy transition in Poland. *Economics and Environment*, 88(1), 736-759. <https://doi.org/10.34659/eis.2024.88.1.736>
- Kumar, N. (2024). Innovative approaches of e-learning in college education: Global experience. *E-Learning Innovations Journal*, 2(2), 36-49. <https://doi.org/10.57125/ELIJ.2024.09.25.03>
- Kurbatova, T., Sotnyk, I., Kubatko, O., Baranchenko, Y., Arakpogun, E. O., & Roubik, H. (2020). State support policy for renewable energy development in emerging economies: The case of Ukraine. *International Journal of Global Environmental Issues*, 19(1/2/3), 26-53. <https://doi.org/10.1504/IJGENVI.2020.114864>
- Kurepina, O. (2023). Legal regime stimulating economic activities: Convergence of Ukrainian legislation with EU law based on SDGs. *Revista Amazonia Investiga*, 12(70), 32-43. <https://doi.org/10.34069/ai/2023.70.10.3>
- Kuzemko, C., Blondeel, M., Dupont, C., & Brisbois, M. C. (2022). Russia's war on Ukraine, European energy policy responses & implications for sustainable transformations. *Energy Research & Social Science*, 93, Article 102842. <https://doi.org/10.1016/j.erss.2022.102842>
- Kuzior, A., Lobanova, A., & Kalashnikova, L. (2021). Green energy in Ukraine: State, public demands, and trends. *Energies*, 14(22), Article 7745. <https://doi.org/10.3390/en14227745>
- Law of Ukraine No. 3141-IX. (2023). On making changes to some laws of Ukraine regarding the prevention of abuse in wholesale energy markets. *Ukrainean Government*. <https://zakon.rada.gov.ua/laws/show/3141-20#Text>
- Law of Ukraine No. 3220-IX. (2024). On making changes to some laws of Ukraine regarding restoration and "green" transformation of the energy system of Ukraine. *Ukrainean Government*. <https://zakon.rada.gov.ua/laws/show/3220-IX#Text>
- Law of Ukraine No. 924-2023-p. (2023). On the formation of the interdepartmental working group on preparation of proposals and recommendations for the development of the national energy and climate plan. *Ukrainean Government*. <https://zakon.rada.gov.ua/laws/show/924-2023-p#Text>
- Lutsiak, V., Lavrov, R., Furman, I., Smitiukh, A., Mazur, H., & Zahorodnia, N. (2020). Economic aspects and prospects for the development of the market of vegetable oils in a context of formation of its value chain. *Montenegrin Journal of Economics*, 16(1), 155-168. <https://doi.org/10.14254/1800-5845/2020.16-1.10>
- Lvova, I. (2024). Constitutional law matters of sustainable development under martial law: The case of Ukraine. *Studia Prawnicze*, 2(228), 5-22. <https://doi.org/10.37232/sp.2023i>

- Martyn, A., Novakovska, I., Medynska, N., Hunko, L., & Kolosa, L. (2024). Implementation of renewable energy sources as strategic direction for development of Ukraine's energy sector. In S. Boichenko, A. Zaporozhets, I. Shkilniuk, & A. Yakovlieva (Eds.), *Studies in systems, decision and control* (pp. 83-98). Springer. https://doi.org/10.1007/978-3-031-76650-3_6
- Masyk, M., Buryk, Z., Radchenko, O., Saienko, V., & Dziurakh, Y. (2023). Criteria for governance' institutional effectiveness and quality in the context of sustainable development tasks. *International Journal for Quality Research*, 17(2), 501-514. <https://doi.org/10.24874/ijqr17.02-13>
- Mhlanga, D., & Ndhlovu, E. (2024). The Russia-Ukraine war, global energy supply, and sustainable development. In D. Mhlanga, & E. Ndhlovu (Eds.), *The Russia-Ukraine conflict and development in Africa* (pp. 263-280). Springer. https://doi.org/10.1007/978-3-031-63333-1_16
- Miniailenko, I., & Chornovol, N. (2023). Implementation of EU sustainable development goals in the economy of Ukraine. In K. Chichulina (Ed.), *Ecological, economic and financial transformation of Ukraine in cooperation with the EU: Challenges and prospects* (pp. 74-85). RS Global Sp z OO. <https://doi.org/10.31435/rsglobal/055-5>
- Moroz, G. V., Grytsan, O. A., Vivcharenko, O. A., & Kobetska, N. R. (2021). Relationship between economic growth and environmental pressures (legal aspects). *International Journal of Agricultural Extension*, 9(4), 127-139. <https://doi.org/10.33687/ijae.009.00.3728>
- Myronenko, M., Polova, O., Prylutskyi, A., & Smoglo, O. (2017). Financial and economic aspects of bioenergy development in the context of providing energy independence of Ukraine. *Problems and Perspectives in Management*, 15(4), 243-253. [https://doi.org/10.21511/ppm.15\(4-1\).2017.08](https://doi.org/10.21511/ppm.15(4-1).2017.08)
- Naumenkova, S., Mishchenko, V., & Mishchenko, S. (2022). Key energy indicators for sustainable development goals in Ukraine. *Problems and Perspectives in Management*, 20(1), 379-395. [https://doi.org/10.21511/ppm.20\(1\).2022.31](https://doi.org/10.21511/ppm.20(1).2022.31)
- Oderiy, O., Orobets, K., Brynzanska, O., Veklych, V., & Shpiliarevych, V. (2024). The impact of EU criminal law policy on the prevention of transnational environmental crime. *Pakistan Journal of Criminology*, 16(3), 1155-1172. <https://doi.org/10.62271/pjc.16.3.1155.1172>
- Olujobi, O. J., Okorie, U. E., Olarinde, E. S., & Aina-Peleto, A. D. (2023). Legal responses to energy security and sustainability in Nigeria's power sector amidst fossil fuel disruptions and low carbon energy transition. *Heliyon*, 9(7), Article e17912. <https://doi.org/10.1016/j.heliyon.2023.e17912>
- Omelchenko, V. (2022). Renewable energy sector of Ukraine before, during and after the war. *Razumkov Center*. <https://razumkov.org.ua/statti/sektor-vidnovlyuvanoyi-energetyky-ukrayiny-do-pid-chas-ta-pislya-viyny>
- Pasha, A. M. (2022). Criminal procedure and forensic aspects of mutual legal assistance between states in criminal matters: Experience of Ukraine and the Republic of Azerbaijan. *Cuestiones Políticas*, 40(72), 591-607. <https://doi.org/10.46398/cuestpol.4072.35>
- Pavlenko, O., Aghayev, A., Adrwi, K. A. A. M., Shivarov, A., Rubel, O., & Sabadash, V. (2020). A dynamic approach to the study of institutions in green economy: Macroeconomics, regions and industries. *International Journal of Global Environmental Issues*, 19(1/2/3), 243-262. <https://doi.org/10.1504/ijgenvi.2020.10037585>
- Pereira, P., Zhao, W., Symochko, L., Inacio, M., Bogunovic, I., & Barcelo, D. (2022). The Russian-Ukrainian armed conflict will push back the sustainable development goals. *Geography and Sustainability*, 3(3), 277-287. <https://doi.org/10.1016/j.geosus.2022.09.003>
- Petlenko, Y. (2024). Financing green energy for enhancing energy security in Ukraine. *Financial and Credit Activity Problems of Theory and Practice*, 2(55), 161-172. <https://doi.org/10.55643/fcaptop.2.55.2024.4299>
- Petrushenko, M., Burkynskyi, B., Shevchenko, H., & Baranchenko, Y. (2022). Towards sustainable development in a transition economy: The case of eco-industrial parks in Ukraine. *Environmental Economics*, 12(1), 149-164. [https://doi.org/10.21511/ee.12\(1\).2021.13](https://doi.org/10.21511/ee.12(1).2021.13)
- Redko, K., Borychenko, O., Cherniavskyi, A., Saienko, V., & Dudnikov, S. (2023). Comparative analysis of innovative development strategies of fuel and energy complex of Ukraine and the EU countries: International experience. *International Journal of Energy Economics and Policy*, 13(2), 301-308. <https://doi.org/10.32479/ijeep.14035>
- Rodinova, N., Pylypchuk, N., Domashenko, S., Havrylyuk, I., & Androsovykh, A. (2024). Ukrainian economy in the era of digital branding: Risks and opportunities. *Futurity Economics & Law*, 4(4), 4-19. <https://doi.org/10.57125/FEL.2024.12.25.01>
- Romaniuk, M., Orobets, K., Herasymenko, O., Brynzanska, O., & Petkov, V. (2024). The practice of qualifying environmental crimes at critical infrastructure facilities in the criminal justice of EU countries. *Journal of Lifestyle and SDGs Review*, 5(2), Article e02561. <https://doi.org/10.47172/2965-730x.sdgsreview.v5.n02.pe02561>
- Shulga, I., Shynkaruk, N., Shyti, S., & Antypov, I. (2022). The role of energy directives in ensuring EU energy security and the problems of implementation in Ukrainian legislation. *Journal of Policy & Governance*, 2(1), 1-14. <https://doi.org/10.33002/jpg020101>
- Shvets, I., Hrabovenko, O., Dotsenko, S., & Nesterenko, V. (2020). Results of the experimental research of the medium speed diesel engine work on soybean oil. In *Proceedings of 24th International Scientific Conference: Transport Means 2020* (pp. 671-675). Kaunas University of Technology.
- Sotnyk, I., Kurbatova, T., Kubatko, O., Prokopenko, O., & Jarvis, M. (2023). Managing energy efficiency and renewable energy in the residential sector: A bibliometric study. *Problems and Perspectives in Management*, 21(3), 511-527. [https://doi.org/10.21511/ppm.21\(3\).2023.41](https://doi.org/10.21511/ppm.21(3).2023.41)

- Svitlichnyy, O. (2023). Climate policy of Ukraine in the context of the European green course: Theoretical and legal aspect. *Visegrad Journal on Human Rights*, 5, 104-112. <https://doi.org/10.61345/1339-7915.2023.5.14>
- Tokarchuk, D. (2022). The concept of energy efficient and environmentally safe components of sustainable development of rural areas and agricultural enterprises. In *Global trends and prospects of socio-economic development of Ukraine* (pp. 257-270). Baltija Publishing. <https://doi.org/10.30525/978-9934-26-193-0-9>
- Trushkina, N., Pahlevanzade, A., Pahlevanzade, A., & Maslennikov, Y. (2021). Conceptual provisions of the transformation of the national energy system of Ukraine in the context of the European green deal. *Energy Policy Journal*, 24(4), 121-136. <https://doi.org/10.33223/epj/144861>
- Vanegas Cantarero, M. M. (2020). Of renewable energy, energy democracy, and sustainable development: A roadmap to accelerate the energy transition in developing countries. *Energy Research & Social Science*, 70, Article 101716. <https://doi.org/10.1016/j.erss.2020.101716>
- Yermakov, O., & Kostetska, I. (2022). Environmental challenges of the green economy: Case of Ukraine. *IOP Conference Series: Earth and Environmental Science*, 1111, Article 012002. <https://doi.org/10.1088/1755-1315/1111/1/012002>
- Yermolenko, V., Hafurova, O., Deineha, M., Novak, T., & Shovkun, Y. (2022). Legal aspects of the use of renewable energy sources and the implementation of the concept of "green economy" in Ukraine in the context of sustainable development strategy. In A. Zaporozhets (Ed.), *Systems, decision and control in energy III* (pp. 373-389). Springer. https://doi.org/10.1007/978-3-030-87675-3_23
- Yevdokimov, Y., Pasyevin, O., Dehtyarova, I., Derykolenko, O., Bozhkova, V., & Melnyk, L. (2020). The system of indicators for alternative energy development in the context of the green economy. *International Journal of Global Environmental Issues*, 19(1/2/3), 70-92. <https://doi.org/10.1504/ijgenvi.2020.10037575>
- Zaiets, O., Kovalenko, T., Shokha, T., Vlasenko, Y., & Pozniak, E. (2022). Ukrainian reform of decentralization processes consolidating the sustainable development: Environmental and legal aspects. *Grassroots Journal of Natural Resources*, 5(2), 104-120. <https://doi.org/10.33002/nr2581.6853.050207>