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Olena BORYSIAK,
Liubomyr POBEREZHNYI

CLIMATE-NEUTRAL IMMANENCE OF SUSTAINABLE RESOURCE USE OF ENTERPRISES: METHODOLOGICAL PREREQUISITES FOR CREATING AGRO-ENERGY CLUSTERS

Abstract

Climate change and the scarcity of natural resources necessitate a reevaluation of corporate behavior and enterprise ecosystem towards resource efficiency and climate neutrality. Particular importance is given to rethinking the content and components of the sustainable resource use paradigm based on cross-sectoral interaction. In the context of transitioning to a low-carbon economy, which involves the decarbonization of energy through the diversification of renewable energy sources, including the processing of agrobiomass (energy plant resources) into biofuels, the creation of agro-energy clusters becomes a priority for strengthening energy and environmental security. The aim of the article is to theoretically and methodologically substantiate the convergence of the sustainable resource use paradigm under conditions of corporate climate neutrality, to elucidate the climate-neutral immanence of sustainable resource use of enterprises, and to determine the methodological prerequisites

Borysiak Olena, Doctor of economic sciences, senior Lecturer, West Ukrainian National University, Ternopil, Ukraine. ORCID: 0000-0003-4818-8068 E-mail: o.borysiak@wunu.edu.ua
Poberezhnyi Liubomyr, Doctor of engineering sciences, professor, Helmut Schmidt University, Hamburg, Germany. ORCID: 0000-0001-6197-1060 E-mail: lubomyrpoberezhny@gmail.com

for the creation of agro-energy clusters based on resource efficiency and climate neutrality. The main provisions of modern resource concepts of sustainable development in the energy market have been systematized. A scientific contradiction in the area of resource use and climate neutrality has been noted. It has been found that the basis for distinguishing the climate-neutral immanence of sustainable resource use of enterprises is the principles of the circular economy, inclusive development, and cross-sectoral interaction of enterprises. Considering this, the methodological prerequisites for the creation of agro-energy clusters include the principles of resource concepts, integration methods for incorporating the climate component into eco-energy security, optimization approaches to resource utilization, principles of transitivity in organizational innovation processes, and climate innovation in eco-energy management of enterprises. The assertion of climate-neutral immanence in sustainable resource utilization by enterprises indicates the formation of a climate paradigm of sustainable resource use in the energy market. Consequently, there is a need to conduct scientific investigations to define indicators for achieving systemic-process effects and to develop organizational-innovative tools for the management mechanism of functioning climate agro-energy clusters.

Key Words:

climate change; bioenergy; bioeconomy; energy plant resources; agrobiomass; enterprise ecosystem; energy security; environmental security; climate agro-energy clusters; cross-sectoral interaction; low-carbon development.

JEL: O13, Q20, Q21, Q41, Q42.

1 figure, 20 references.

Gratitude

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Problem Statement and Literature Review

In the context of climate change, the challenge of ensuring accessibility and rational use of resources is currently consolidating enterprises towards transitioning to conscious consumption and forming climate leadership. Balanced resource utilization is considered through the principles of circular economy, inclusive development, and cross-sectoral interaction. In the context of bioenergy development, this coevolution of conceptual positions transforms into practical solutions for the creation of agro-energy clusters.

The implementation of the 17 Sustainable Development Goals, adopted by the United Nations General Assembly in 2015, has effectively signaled a reboot of the ontological thinking of the global community and its unity in achieving sustainable development as an opportunity for self-preservation and self-renewal. It also considers the principles of sustainable development as a paradigm in scientific evolution, which involves balanced development of socio-economic systems based on the harmonization of socio-natural values. The introduction of such development occurs as a result of synergy among all components of existence and, as noted by Halchynska (2019), «encompasses theories of the noosphere, dynamic equilibrium, balances, processes of market system development, etc., ensuring the preservation and reproduction of creative functions of natural systems with the achievement of a consolidated synergistic effect to improve quality of life and the natural environment, support socio-natural homeostasis through harmonizing laws, mechanisms of self-development of nature and society, and preservation of socio-natural gene pool» (Halchynska, 2019).

In the current stage of economic theory development, resources are considered through the prism of globalization, alter-globalization, and glocalization processes. Specifically, Zvarych (2018) points out that «alongside the positive outcomes of integration, interaction, and cooperation, globalization generates acute systemic problems: widening gap between centers of wealth and poverty; social costs of integration for developing countries; labor resource crisis and mass layoffs in developed countries; global environmental degradation; uncertainty regarding the strategic implications of the negative consequences of the scientific and technological revolution; spread of international terrorism; displacement and destruction of local cultures; crisis of democracy. Alternative globalization, as a movement or socio-economic phenomenon, is aimed precisely at addressing these exacerbated or created problems by globalization processes» (Zvarych, 2018).

It should be noted that other researchers (Koziuk et.al., 2020) consider aspects of resource provision through the lens of ethnic identities in accordance with the tenets of resource mobilization theory («concerning the utilitarian logic of the rational agent; explaining the policy of individual behavior of individuals; ethnic fractionalization denotes the preference of an ethnic group for its own values and goals,

as well as attempts to disregard the values and goals of other groups» (Koziuk et.al., 2020)), relative deprivation theory («explaining the emergence of political violence due to frustration – the discrepancy between the expectations of social groups and their realitiess» (Koziuk et.al., 2020)), and political opportunities theory («emphasizing the existence of political space through political rights, channels, discussions, and the potential of economic agents, enabling various ethnic groups to pursue their political opportunities for full or partial protection of their interests» (Koziuk et.al., 2020)). The focus of researchers is on the development of the decoupling concept, which involves «separating economic growth, resource consumption, and environmental impact» (Vatchenko & Svystun, 2019; Ivanov et al., 2020; Sotnyk & Kulyk, 2014). In turn, we consider glocalization to play a balancing role in the global-alterglobal value dichotomy, serving as a kind of barometer for achieving balance in accessing resources and rational resource use. In scientific literature (Sotnyk & Kulyk, 2014), glocalization is interpreted as «the process of global-local interaction» (Sotnyk & Kulyk, 2014). In the academic environment (Zaverbnyi, 2019; Borysiak et al., 2022), taking into account international experience in transforming the energy market, the ecological component in the energy policies of enterprises is emphasized, advocating for the integration of renewable energy sources into the energy balance. Koziuk & Dlugopolskyi (2016), analyzing scholarly works on defining the category of «ecologization», highlight the specifics of «ecologization of national economies, which allows meeting the needs of the current generation without compromising the ability of future generations to meet their own needs, the importance of environmentally oriented investments, and conducting risk assessments related to environmental actions» (Koziuk & Dlugopolskyi, 2016). Researchers have also «confirmed the hypothesis that the public good of a «clean environment» is not solely the embodiment of preferences of economic agents with high income levels, as high institutional quality enables the implementation of environmental programs and regulatory effectiveness in the long term, and the heavy burden of environmental regulation does not affect the competitiveness of national economies. instead, environmental education emerges as a crucial factor in advancing the prosperity of a new welfare state» (Koziuk & Dlugopolskyi, 2016).

Lozychenko (2022) emphasizes the growing trend of scientific investigations into the development of economic systems in the conditions of nonstationarity and unpredictable fluctuations. The need to diversify renewable energy sources by utilizing agrobiomass as a raw material for biofuel production underscores the necessity of identifying the climate-neutral essence of sustainable resource utilization as a foundational principle for defining methodological prerequisites for creating agro-energy clusters.

Considering this, ***the aim of the article*** is to theoretically and methodologically substantiate the convergence of the sustainable resource use paradigm under conditions of climate neutrality of enterprises, to clarify the climate-neutral immanence of sustainable resource use of enterprises and to define the methodological prerequisites for creating agro-energy clusters based on resource efficiency and climate neutrality.

Methodology

The methods of epistemological, ontological, system analysis, induction, deduction are included in the methodological basis of the research. The idea of the formation of sustainable resource use in the energy market in terms of resource efficiency and climate neutrality of enterprises is formulated, which is based on the systematization and integration of the main provisions of modern resource concepts of sustainable development in the energy market. Using the method of dialectical cognition, the inconsistency between resource usage and climate neutrality was ascertained. The application of the optimization approach to resource usage, taking into account the principles of transitivity of organizational and innovative processes and climate innovation in environmental and energy management allowed us to single out the principles of circular usage of resources, cross-sectoral interaction for the creation of agro-energy clusters.

Research Results

«Since April 2021, measures have been implemented in Ukraine to comply with the second EU directive on renewable energy (RED II), which involves issuing guarantees of origin for electricity from renewable sources, as well as guarantees of origin for biomethane and hydrogen according to European standards» (Guarantees of origin of «green» energy: a roadmap for action). The issue of enhancing the integration of renewable energy sources into the energy supply chain has gained particular significance in Ukraine due to the destruction by Russian missiles of 40% of the national energy infrastructure. On March 16, 2023, the European Commission launched the «New European Bauhaus initiative to rebuild Ukraine in partnership with Ukrainian organizations, which includes a module aimed at ensuring sustainable and inclusive recovery of Ukraine, particularly by integrating closed-loop principles into the post-war development strategy, exploring solutions for smart distributed networks, autonomous energy, and chemical/physical material recovery» (The new European Bauhaus: launching a capacity-building programme to start rebuilding Ukraine).

«The bioenergy market (biofuel market, bioenergy production) is part of the energy market based on alternative energy sources and has the following structure: the market of generating capacities (biomass energy, biofuel), the market of heating and cooling systems based on biomass combustion, and the market of transportation fuel (biodiesel, bioethanol). The available biomass potential enables Ukraine to increase production of key types of biofuels such as: solid biofuels, liquid motor fuels (biodiesel and bioethanol), biogas from agricultural waste

and other organic residues, biomass for heat production and further industrial processing into solid fuels» (Halchynska, 2019; Borysiak, 2021).

The complexity of integrating the climate component into the energy and agricultural sectors, which in turn poses a challenge for transforming energy and agriculture towards low-carbon development, lies primarily in achieving non-economic (decarbonization, low-carbon) effects. Ensuring the modern process of forming the organizational-economic mechanism for managing renewable energy resources, including ensuring the production and transportation of agro-raw materials (energy crops) as biomass for biofuel production, involves taking into account the prospective vectors (concepts) of economic growth. «According to the concept of the new norm, the following characteristics of the «new norm» will occur: a pronounced slowdown in economic growth compared to the previous decade; high unemployment rates, exacerbated debt problems; significant market uncertainty and a further shift in global economic activity towards developing markets» (Koziuk et.al., 2020). Another aspect is the assertion of «alterglobal principles of sustainable society as subsidiarity (consideration of community interests in the use of local resources), common heritage, economic diversity, ecological resilience of the planet's life support system, support for biodiversity and food security» (Zvarych, 2016). Such shifts in principles of economic development indicate the need to create conditions for «inclusive sustainable growth» (Zvarych, 2016). in the agro-energy sectors through the development of the bioeconomy, which involves the inclusion of all stakeholders in this process and ensuring the interests of all. Considering this, we propose detailing the prerequisites and features of the architecture of climate policy in the energy market as a way to integrate the climate component into enhancing eco-energy security and the «green» recovery of Ukraine.

In this context, at the current stage of forming a welfare society, an intriguing yet dualistic approach is addressing the alignment of economic and ecological interests. The foundation of the inverted U-shaped curve (S. Kuznets environmental curve), which describes the relationship between environmental pollution and economic growth, is based on the idea that during the early stages of industrial development, environmental degradation occurs as economic growth progresses. Later, after reaching a certain point, further economic growth leads to environmental improvement. At the same time, increasing wealth inequality stimulates higher emissions, whereas conversely, pollution levels decrease more rapidly if economic growth is accompanied by income inequality reduction (Dlugopolskyi, 2017). «It has been established that low ethnic fractionalization and high quality of state institutions dominate in countries with predominantly high environmental quality, and vice versa» (Dlugopolskyi, 2017).

«In this context, the application of a glocalization approach is crucial for addressing the development of climate policy for sustainable energy development» (Kozhushko, 2023; Borysiak, 2022; Borysova et al., 2021). «In particular, addressing the issue of resource provision and responsible consumption of natu-

ral resources is considered through the strengthening of regions, 'the spread of globalization processes through the network of city-regions, inclusion in the development process of the global economy of systems and mechanisms whose actions are limited by certain regional frameworks', substantiating this with the provisions of bioregionalism, according to which regional policy should ensure the acquisition and management of the heritage received by the population of a certain territory or place of residence from their ancestors» (Krysovatyy et al., 2019).

For the effective and balanced functioning of the energy system based on resource efficiency and climate neutrality, through increasing the share of energy from renewable sources in the energy supply chain, the development of an appropriate management mechanism for building climate policy in the energy market is necessary.

In particular, the foundation of such a mechanism is the construction of an innovative algorithm for climate management in the green energy transmission chain through the formation of agro-energy clusters. Moreover, such data indicate the necessity to develop a management model for providing «green» energy services through the use of modern marketing tools for service promotion. Special emphasis is placed on the role of economic agents (stakeholders) in developing corporate climate policies in the energy market. The justification for sustainable development as a paradigm rests on the active implementation of resource concepts over the past decade. These include population welfare, circular economy, green economy, inclusive economy, innovative economy, smart specialization, and the co-evolution of humans and nature. These concepts aim to balance social, ecological, and economic values in addressing enterprise resource provisioning through principles of sustainable, safe, and waste-free consumption. Additionally, they involve developing various indices to assess resource adequacy levels, such as indices for quality of life, public health protection, and decarbonization. Furthermore, the application of «synergetic methodology as a system of concepts concerning the interconnected world, its socio-natural essence, integrity; balanced spheres of societal life and livelihood» is utilized during scientific investigations (Halchynska, 2019). According to the authors of this methodology, «across its entire spectrum of social, ecological, and economic aspects, it aims to ensure synergistic resilience of the national economy amid global crises: environmental, social, and economic» (Halchynska, 2019).

It should be noted that natural resources are characterized by features such as scarcity and variability. Considering this, as well as the relevance of developing measures for balanced resource use of enterprises amid global climate change, we propose applying an optimization approach to enterprise resource management. This involves selecting methods, technologies, sourcing, and consumption practices that minimize the anthropogenic impact on the environment (low-carbon footprint) while maximizing economic and social benefits (resource accessibility, value addition). This approach aims to identify the methodological prerequisites for creating agro-energy clusters and to indicate the climate-neutral

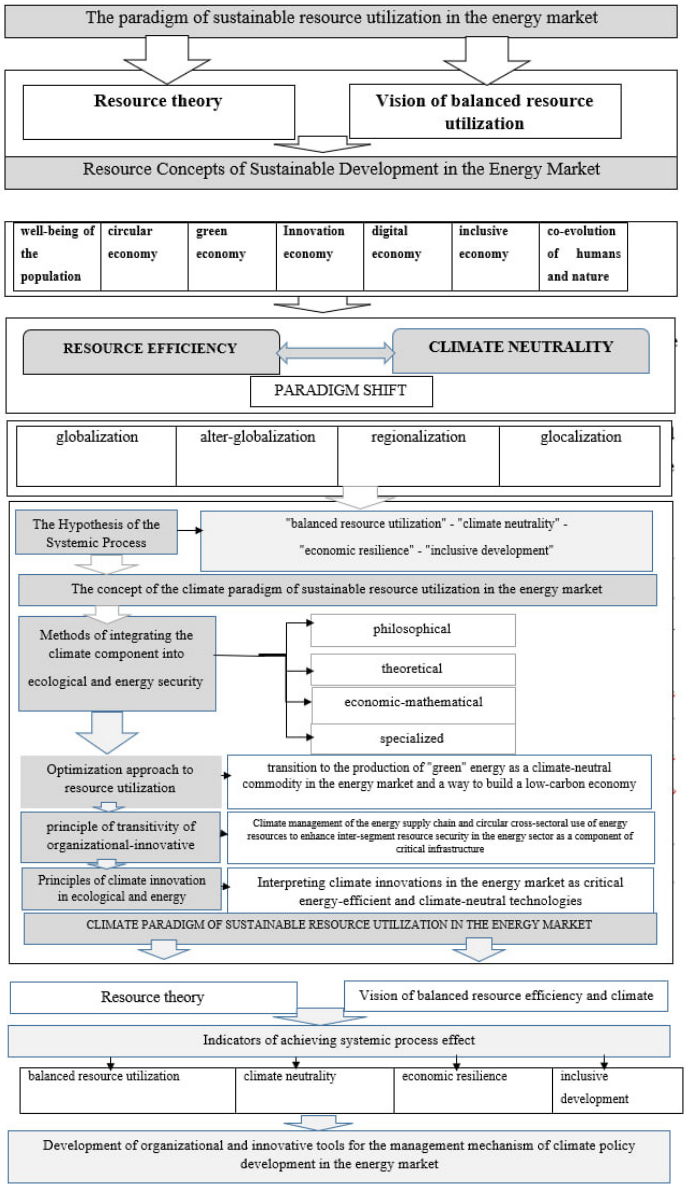
immanence of sustainable resource use and the patterns shaping a new paradigm in sustainable resource management. We believe that the advantage of applying an optimization methodology to research the aspects of climate-neutral immanence sustainable resource management across various life domains, as opposed to the synergistic methodology based on the synergistic resilience of ecological, social, and economic development, lies in considering the contemporary trend of socio-economic evolution in the conditions of turbulence, uncertainty, unpredictability, and necessitating the consideration of bifurcation (possible deviations from the predicted state), the exploration of alternative options, and the optimization of choices towards resource efficiency. It is noteworthy that the intensive evolution of the resource concept chain in recent decades has been accompanied by efforts to develop measures aimed at enhancing climate security for enterprises, bolstering the energy component of national security, and transitioning towards liberalization. Specifically, this includes adopting a combined approach that integrates climate change mitigation with strategies for climate change adaptation and resilience. In light of this, we argue that the implementation of sustainable development concepts across diverse domains should adhere to the principle of transitivity in organizational and innovation processes. This principle posits that the level of resource efficiency should function as an indicator in any individual activity or interaction across sectors (intersectorality), aimed specifically at cultivating intersectoral resource potential to foster development in other domains (intersectoral resource security).

As a result, in the context of bolstering national security and intensifying alterglobalization processes, addressing the issue of securing energy resources should be considered through the prism of the climate-neutral essence of sustainable resource management by enterprises. This serves as a foundation for identifying methodological prerequisites for creating agro-energy clusters, advancing bioenergy, and enhancing cross-sectoral resource security. In the transition towards achieving climate neutrality for enterprises, we believe that forming a new paradigm of sustainable resource utilization in the energy market involves shifting priorities towards developing market segments that are based not only on energy efficiency and bolstering energy security, but also on ensuring ow-carbon use of energy resources by enterprises. The developmental trends of enterprises in the energy market necessitate the establishment of a climate paradigm for sustainable resource use in the energy sector. This paradigm focuses on the sustainable growth of energy market enterprises as ecosystems and enhances the climate resilience of eco-energy security through the transitivity of organizational and innovative energy supply processes based on circular economy principles and inter-sectoral cooperation. This framework serves as a launching pad for transitioning towards a low-carbon economy.

Considering this, Figure 1 illustrates a methodology for developing sustainable resource use in the energy market, focusing on resource efficiency and enterprise climate neutrality, which includes:

Figure 1

Methodology for forming sustainable resource use in the energy market under conditions of resource efficiency and climate neutrality of enterprises



Source: developed by the authors

1) examination of the sustainable resource utilization paradigm in the energy market based on resource theory as a vision of balanced resource management;

2) integration of resource concepts into the paradigm of sustainable resource use in the energy market includes elements such as population welfare, circular economy, green economy, decoupling, inclusive economy, innovation economy, smart specialization, coevolution of humans and nature, and others;

3) identification of resource efficiency and climate neutrality phenomena within enterprises in the energy market;

4) assessment of the development of a new paradigm for sustainable resource use in the energy market under conditions of resource efficiency and climate neutrality of enterprises;

5) finding a scientific solution for shaping a new paradigm of sustainable resource use in the energy market, focusing on resource efficiency and climate neutrality of enterprises. This involves exploring theoretical aspects of globalization, alter-globalization, regionalization, and glocalization processes to achieve balanced resource access and rational resource utilization by enterprises;

6) proposing a hypothesis on the interconnectedness of «balanced resource utilization», «climate neutrality», «economic resilience», and «inclusive development» in bolstering the eco-energy security of enterprises and facilitating the transition to a low-carbon economy;

7) justification of the idea of forming a climate paradigm of sustainable resource use in the energy market as a new vision of balanced resource management based on resource efficiency and climate neutrality of enterprises through such theoretical and methodological insights:

- utilizing philosophical, theoretical, economic-mathematical, and specialized methods to explain the theoretical proposition of integrating the climate component into ecological and energy security, and to develop climate policies for enterprises in the energy market;
- applying an optimization approach to resource utilization in energy enterprises to transition to the production of «green» energy as a climate-neutral commodity in the energy market, thereby building a low-carbon economy;
- integrating the principle of transitivity in organizational-innovative processes into the climate management of the energy supply and consumption chain. This forms the basis for the circular use of cross-sectoral resource potential to develop other industries, thereby strengthening the inter-sectoral resource security of energy enterprises as a component of critical infrastructure;

- implementing the principle of climate innovation in the ecological and energy management of enterprises to recognize climate innovations in the energy market as critical technologies that are both climate-neutral and energy-efficient;
- introducing optimization indicators to assess the effectiveness of implementing the climate paradigm of sustainable resource utilization in the energy market, such as the level of resource efficiency of enterprises, their resilience to climate innovations, which forms the basis for achieving systemic-process effects like «balanced resource utilization», «climate neutrality», «economic resilience», and «inclusive development». This strengthens the ecological-energy security components of enterprises and facilitates the transition to a low-carbon economy.

8) proposing a theoretical and methodological position on the need to establish organizational-innovative tools for implementing a management framework for developing climate policy in the energy market.

Therefore, the scientific novelty lies in the developed methodology for establishing sustainable resource use in the energy market under conditions of resource efficiency and climate neutrality of enterprises. This methodology is based on the systematization and integration of key principles from modern sustainable development concepts in the energy market. It includes proposing a hypothesis as a scientific contradiction regarding the mismatch between resource use and climate neutrality, which forms the basis of the climate paradigm. It also involves applying methods to integrate the climate component into ecological-energy security, using an optimization approach to resource use, and introducing principles of transitivity in organizational-innovative processes and climate innovation in ecological-energy management. These elements form the foundation for shaping the climate paradigm of sustainable resource use in the energy market, defining indicators for achieving systemic-process effects, and developing organizational-innovative tools for the management framework of climate policy development in the energy market.

The introduction of the methodological principles of the study on forming a new paradigm of sustainable resource utilization in the energy market involves combining systemic and synergetic approaches in developing a management framework for advancing the climate policy of enterprises in the energy market. The methodological basis of this approach lies in the possibility of developing a unified system of models for climate-neutral economic functioning within the framework of cross-sectoral cooperation based on transitivity. This approach aims to further develop the ecological-energy management of enterprises by improving the processes of production, supply, and consumption of renewable resources, transitioning to the principles of a circular economy, building a low-carbon economy, and strengthening the energy security of enterprises.

Conclusions

The availability of energy resources holds strategic importance for enterprises. Diversification of energy sources contributes to their stable development. In light of this, ensuring access to resources aims to enhance the competitiveness of enterprises through expanding cross-sectoral cooperation.

In the context of transitioning to a low-carbon economy, which involves decarbonizing the energy sector through diversification of renewable energy sources, including biomass processing (energy plant resources) into biofuels, priority lies in the formation of agro-energy clusters to strengthen energy and ecological security. It is particularly important to reconsider the content and components of the sustainable resource utilization paradigm based on cross-sectoral interaction. The systematization of key principles of modern resource concepts for sustainable development in the energy market and the identification of scientific contradictions regarding the discrepancy between resource utilization and climate neutrality have led to the recognition of the climate neutrality immanence in sustainable resource management by enterprises. This is based on the principles of circular economy, inclusive development, and cross-sectoral enterprise interaction. Methodological foundations for the creation of agro-energy clusters include the principles of resource concepts, integration methods of the climate component into eco-energy security, optimization approaches to resource utilization, principles of transitivity in organizational innovation processes, and climate innovation in eco-energy management of enterprises. In this context, it is crucial to implement the principles of the climate paradigm for sustainable resource utilization in the energy market. This involves developing corporate climate policies based on cross-sectoral collaboration, such as creting agro-energy clusters, to strengthen the eco-energy security of enterprises and facilitate the transition to a low-carbon economy. In particular, it is crucial to conduct future scientific research to define indicators of achieving systemic-process effectiveness and to develop organizational-innovative tools for the management mechanism of climate agro-energy clusters.

References

Borysiak, O. (2021). Peculiarities of digital transformation in the promoting climate policy of alternative energy enterprises. *SworldJournal, 8(4)*, 83-89.

Borysiak, O., Mucha-Kuś, K., Brych, V., & Kinelski, G. (2022). *Toward the Climate-Neutral Management of Innovation and Energy Security in Smart World*. Berlin, Germany: Logos Verlag Berlin GmbH.

Borysiak, O.V. (2022). Determination of the factors for positioning «green» energy as a climate neutral product in the energy market. *SWorldJournal, 13(2)*, 50-56. https://doi.org/10.30888/2663-5712.2022-13-02-034

Borysova, T., Monastyrskyi, G., Borysiak, O., & Protsyshyn, Yu. (2021). Priorities of Marketing, Competitiveness, and Innovative Development of Transport Service Providers under Sustainable Urban Development. *Marketing and Management of Innovations*, *3*, 78-89. http://doi.org/10.21272/mmi.2021.3-07

Dlugopolskyi, O. (2017). Ecological component of sustainable development: from theory to implementation. *The world of finance, 4 (53)*, 7-23.

Guarantees of origin of «green» energy: a roadmap for action [in Ukrainian]. *State Agency on Energy Efficiency and Energy Saving of Ukraine*. https://www.kmu.gov.ua/news/garantiyi-pohodzhennya-zelenoyi-energiyi-dorozhnya-karta-dij

Halchynska, Yu. M. (2019). *Development of the Ukrainian bioenergy market on the basis of marketing* [Unpublished doctoral dissertation]. National university of Life and Environmental Sciences of Ukraine. https://nubip.edu.ua/sites/default/files/u145/dis_galchinska.pdf

Ivanov, S.V., Vatchenko, O.B., Svystun, K.O., Vatchenko, B.S., & Razumova G.V. (2020). Decoupling analysis of the Ukrainian economy in terms of its sustainable development [in Ukrainian]. *Science and innovation, 16(3)*, 3-14. http://dspace.nbuv.gov.ua/handle/123456789/184843

Kozhushko, L., Brych, V., Borysiak, O., Rokochynskiy, A., & Frolenkova, N. (2023). Assessing the climate-neutral investment projects in the context of environmental protection and energy security. *Journal of European Economy,* 22(1), 111-126, https://doi.org/10.35774/jee2023.01.111.

Koziuk, V. V., & Dlugopolskyi, O. V. (2016). Ecologisation in the newest paradigm of the welfare state [in Ukrainian]. *Sustainable development of the country in the framework of European integration*: Theses of the international university scientific and practical conference of students, postgraduates and young scientists of the Zhytomyr State Technical University (Zhytomyr, 27 October 2016). http://eztuir.ztu.edu.ua/bitstream/handle/123456789/5542/139.pdf?sequence=1

Koziuk, V., Hayda, Yu., Dluhopolskyi, O., & Kozlovskyi, S. (2020). Ecological Performance: Ethnic Fragmentation versus Governance Quality and Sustainable Development. *Problemy Ekorozwoju, 15(1)*, 53-64. http://r.donnu.edu.ua/bitstream/123456789/722/1/KSV_S_2020_6.pdf

Koziuk, V. V., Dlugopolskyi, O. V., Haida, Y. I., Ivashuk, Y. P., Shymanska, O. P., Voznyi, K. Z., & Dlugopolska, T. I. (2019). *The ecological dimension of the welfare s*tate (V. V. Kozyuk.Ed.) [in Ukrainian].Kyiv: Lira-K Publishing House

Krysovatyy, A., Savelyev, Ye., & Voitseshchuk A. [et al.] (2019). *Sustainable development of Ukraine in the context of the formation of a new world economic and financial order* [in Ukrainian]. Ternopil: Osadtsa Y. V.

Lozychenko, O. M. (2022). The current state of research in the field of economic system development under conditions of non-stationarity [in Ukrainian]. *Challenges of Contemporary Transformations. Series: Economics and Management*, 1(4). https://doi.org/10.54929/2786-5738-2022-4-03-01

Sotnyk I.M., & Kulyk L.A. (2014). Decomposition analysis of economic growth and environmental impact in the regions of Ukraine [in Ukrainian]. *Economic Journal-XXI, 7-8*, 60-64.

The new European Bauhaus: launching a capacity-building programme to start rebuilding Ukraine [in Ukrainian]. *Press and information team of the Delegation to UKRAINE*. https://www.eeas.europa.eu/delegations/ukraine

Vatchenko, O.B., & Svystun, K.O. (2019). Decoupling in economics – essence, definition and types [in Ukrainian]. *Economic space, 141*, 5-24. http://www.prostir.pdaba.dp.ua/index.php/journal/article/view/3

Zaverbnyi, A. S. (2019). Economic policy of Ukraine in the field of energy in the context of European integration [Unpublished doctoral dissertation]. Lviv Polytechnic National University.

Zvarych, R. E. (2018). *Economic imperatives of the processes of alterglobalisation* [Unpublished doctoral dissertation]. Ternopil National Economic University.

Zvarych, R.Ye. (2016). Alterglobal principles of society's sustainability [in Ukrainian]. *Scientific Bulletin of the International Humanitarian University. Series: «Economics and Management», 21*, 27-31. http://dspace.wunu.edu.ua/handle/316497/12054