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Institutional and financial mechanisms of the European Green Deal in the processes of early recovery and post-war transformation of Ukraine

Kateryna Leshchenko*

PhD in Economic Sciences, Associate Professor
Kyiv National Economic University named after Vadym Hetman
03057, 54/1 Beresteiskyi Ave., Kyiv, Ukraine
https://orcid.org/0000-0001-8467-5141

Abstract. The research relevance is determined by the need for environmental integration into national policies for the reconstruction of Ukraine in the context of a full-scale war and European integration within the framework of the European Green Deal. The study aimed to analyse the institutional and financial mechanisms for implementing the principles of the European Green Deal in the processes of early recovery and post-war transformation of Ukraine. The research methodology was based on an interdisciplinary approach that combined quantitative analysis of environmental finance, case studies of post-crisis countries, and a comparative assessment of institutional compatibility. As a result, the institutional architecture of the European Green Deal was systematised, emphasising key executive and financial actors, and the mechanisms of their interaction with the Ukrainian authorities were identified. The study analysed the chronology of political decisions in 2020-2023 on decarbonisation, energy efficiency and the development of renewable energy sources. In particular, by 2023, Ukraine increased the share of renewable energy to 22% in its generation structure, and reduced CO2 emissions per capita from 4.6 tonnes (2020) to 3.6 tonnes (2023), but maintained uneven integration of environmental criteria into recovery plans. A comparative analysis of the experience of Croatia (renewable energy sources 70%, share of green projects in national programmes over 35%) and Georgia (renewable energy sources 80.3%) identified effective models of institutional coordination, including the creation of a single body for environmental management. Key barriers have been identified: dispersed responsibilities, poor coordination between ministries, an unstable regulatory framework, and limited access to climate finance. The study emphasised that effective green recovery in Ukraine requires improved mechanisms of financial involvement and adaptation of the regulatory framework to EU standards. The practical significance of the study was to formulate recommendations for the modernisation of institutions. The findings can be used in the development of a national green recovery strategy and the process of approval by international donors, considering the criteria of long-term environmental sustainability

Keywords: integration; monitoring; strategy; energy efficiency; decarbonisation; climate

Introduction

Ukraine's recovery from protracted military aggression is emerging as a political and economic process that integrates security, environmental and financial dimensions. In the context of the post-war transformation, the EU's role as the main normative and resource partner capable of shaping the strategic framework for reconstruction through the mechanisms of conditionality, institutional partnership and climate finance is growing. At the same time, the implementation of the European Green Deal (EGD) in Ukraine is accompanied by tensions between short-term recovery needs and long-term sustainable

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*Corresponding author

development goals. This requires a critical rethinking of the relationship between geopolitical priorities, environmental transformation, and regulatory integration into the European space.

The emphasis on the strategic importance of EGD in the processes of post-war transformation of Ukraine was analysed in a study by H. Shevchenko *et al.* (2021), where the EGD was considered a key regulatory benchmark for the integration of environmental standards into the reconstruction architecture. The study emphasised that the EU used the green conditionality policy to formulate new rules for access to finance, combining support for reconstruction with the implementation of climate policy. This approach simultaneously expanded the EU's regulatory influence and created preconditions for deeper institutional convergence. The comparative emphasis on the conditionality of financial flows was highlighted in the study by I. Chugunov *et al.* (2023), arguing that the joint development of framework mechanisms between Ukraine and the EU changed the balance of responsibility between national and supranational actors. At the same time, the authors highlighted the predominantly reactive nature of Ukrainian climate initiatives, which, in their opinion, reduced the effectiveness of regulatory adaptation.

The issue of interaction between sectoral priorities and environmental goals was analysed in the study by S.P. Ivanyuta & L.M. Yakushenko (2022), who described the conflict between the security and climate dimensions of policy. This tension, as shown by the experience of Ukraine, was manifested in the prioritisation of short-term recovery tasks, which was accompanied by the marginalisation of the environmental agenda. In contrast to the authors' general conclusion about the universal nature of such challenges. The institutional limitations of implementing green policies in transition economies were highlighted by Y. Aleksyeyeva & A. Pintsch (2025), emphasising the gap between formal regulatory alignment and actual administrative capacity. The study noted that adaptation to the EGD was often fragmented due to the lack of a holistic institutional design.

The problem of the lack of integrated financial strategies within the framework of environmental restoration was raised by I. Boiarko & N. Trushkina (2024), analysing the role of the state in directing investment flows into long-term transformational projects. The study argued that only the active development of missionary instruments could overcome market inertia in the climate transition. A constructive approach to the interaction between international financial institutions and Ukraine on environmental investments was presented in the study by V.G. Krasovsky (2024). The study examined the role of the European Bank for Reconstruction and Development as an intermediary between market expectations and the EU regulatory framework. The study emphasised that the effectiveness of projects depended on the ability to synchronise financial criteria with climate goals.

The importance of the local dimension of environmental transformation was highlighted by N. Vasilyeva *et al.* (2024), who emphasised that centralised climate policy without the involvement of local institutions risked losing effectiveness. The analysis showed that decentralisation was critical for the implementation of adaptation measures. A different perspective was presented by R. Sørly *et al.* (2021), who analysed the risks of environmental colonialism in reconstruction processes. In their opinion, the dominance of Western standards and financial conditions could lead to a loss of national sovereignty in environmental policy. In this context, the issue of the inclusiveness of EGD mechanisms became particularly important.

Research on the implementation of EGD in the EU partner countries is dominated by general overviews of political declarations and financial instruments without proper analysis of how these mechanisms are transformed in the post-crisis recovery. The academic discourse has not sufficiently explored how EU regulatory requirements are adapted to the local context of countries with high levels of infrastructure destruction, political instability and limited administrative capacity. The impact of geopolitical risks and sectoral competition on the ability to achieve sustainable development goals in recovery policies also remains understudied.

The study aimed to examine how EGD institutional and financial instruments influence the processes of early recovery and post-war transformation of Ukraine within the framework of its strategic partnership with the EU. To achieve this goal, the study formulated the following objectives: to analyse the legal framework for Ukraine's environmental restoration in the context of its European integration course; to analyse the experience of the Nordic countries in integrating environmental criteria; to characterise the key environmental financing instruments; and to provide practical recommendations for modernising the restoration policy.

Materials and Methods

The study used an interdisciplinary approach to examine the implementation of the EGD in Ukraine under martial law and the initial stage of post-war recovery (2022-2025). The analysis covered policy decisions, institutional mechanisms, financial instruments, and external coordination that accompanied the process of transformational adaptation of the country to EU environmental legislation as part of early recovery and post-war planning strategies. The study was conducted in three stages between November 2024 and May 2025.

The source base of the study included official strategies and programme documents of the European Commission: European Green Deal (2024), Finance and the Green Deal (n.d.), Chapters of the Acquis (n.d.), European Bank for Reconstruction and

Development (n.d.), European Investment Bank (Funds under EIB's..., 2024). The provisions of the Association Agreement between the European Union and Ukraine (2014), the Paris Climate Agreement (2015), Directive of the European Parliament and the Council No. 2004/35/EC (2004) and Directive of the European Parliament and the Council No. 2010/75/EU (2010) were also used. National policies were considered: the National Energy and Climate Plan for the Period up to 2030 (2024), the National Renewable Energy Action Plan in Ukraine (2024), conceptual documents on waste management and electric transport, as well as Georgia's 2030 Climate Change Strategy (2021), Croatia (Climate Action, 2023), Sweden (Sweden's Climate Action..., 2024), and Finland (Carbon Gap, n.d.). The indicators of Ukraine's participation in EU programmes were analysed, including the amount of funding for decarbonisation (European Commission, n.d.), energy efficiency and renewable energy development (UkraineInvest, 2023). Ukrainian statistics on implemented green projects in the period 2022-2024 were also considered (United Nations, 2024). The selected documents met the following criteria: official publication in the period 2014-2025, focus on the implementation or financing of green approaches in Ukraine, availability of verified implementation indicators, and mention of Ukraine's institutional cooperation with European structures or international financial institutions. The type of sampling is targeted, with an emphasis on policy documents, donor reports, analytical reviews, and international legal acts.

The research methodology was based on a combination of qualitative content analysis, institutional analysis, and a comparative approach. The content analysis reconstructed the structure of environmental priorities in the strategic documents of the EU and Ukraine and identified the political dynamics of the Green Deal implementation process during the military conflict. Institutional analysis was used to study the mechanisms of interagency coordination and interaction between national and European actors. A comparative approach was used to compare the experience of countries that have implemented green transformation after armed conflict (Croatia, Georgia) with the Ukrainian context. Additionally, the models of Sweden and Finland were analysed as examples of highly developed countries that have successfully integrated environmental criteria into public policy, including public procurement, budget planning, and reconstruction investments. Drawing on this experience, the study identified institutional and regulatory mechanisms that may be relevant for implementation in the process of Ukraine's strategic recovery in line with the EGD principles.

The first stage involved systematising the regulatory and policy sources that defined the EGD framework in Ukraine. The second stage included an empirical analysis of projects, funding structures, and policy decisions that influenced the integration of the environmental component into recovery efforts. The third stage was devoted to a comparative analysis of post-crisis environmental modernisation practices in other countries and the identification of relevant models for the Ukrainian situation.

Results and Discussion

The EGD is not only an environmental strategy but also a complex political and economic instrument that redefines the principles of development within the European integration discourse. In the context of post-crisis restructuring, the EGD reveals the potential for deep economic modernisation through environmental innovation, digital transformation, and integration of sustainable policy principles into financial mechanisms. This strategy is especially important in countries that are in the process of recovering from large-scale destructive events, including armed conflicts. As an EU candidate country, Ukraine has faced an unprecedented need to combine environmental governance functions with the tasks of security and economic recovery. In this configuration, the EGD is seen as a vector for consolidating institutional efforts and a platform for accumulating international assistance. The issue of effective implementation of green mechanisms in the early recovery and post-war planning phases has become particularly relevant after 2022. At the same time, the role of financial and regulatory decisions is growing to ensure that Ukrainian policy is in line with the EGD strategic framework. Initiatives aimed at energy efficiency, decarbonisation and renewable energy development require high institutional capacity and adaptability of national legislation. Given these challenges, it is necessary to analyse how the EGD is becoming an instrument for Ukraine's transformational recovery.

In the context of Ukraine, EGD is transforming into a mechanism of strategic integration into EU policy with the prospect of modernising economic sectors per European standards. After the signing of the Association Agreement between the European Union and Ukraine (2014), environmental adaptation issues were gradually integrated into the strategic agenda. At the same time, the full-scale invasion of the Russian Federation in 2022 created unique challenges for the recovery management system, transforming EGD from a pure climate strategy to a potentially comprehensive tool for Ukraine's transformational recovery. Amidst the destruction of infrastructure, destabilisation of the energy system, and threats to environmental standards, EGD was viewed as a strategic guideline for sustainable recovery. Since 2022, Ukraine has intensified its cooperation with several key European institutions, including the European Commission, the European Investment Bank, the European Bank for Reconstruction and Development, and international bodies such as the Ukraine Support Group. One of the most significant steps was

the signing of the Memorandum of Understanding between the European Commission and Ukraine (2022), which provided for the integration of environmental principles into the reconstruction framework. In 2023, the official Recovery Plan of Ukraine formalised environmental transformation as a priority for the first time, especially in sectors such as energy, construction, transport and industry (United Nations, 2024). As a result, inter-ministerial coordination between the Ministry of Environmental Protection and Natural Resources of Ukraine, the Ministry of Economy, the Ministry of Finance, and the Office of the President has become particularly important for the development of a unified approach to green recovery. At the same time, there is still fragmentation in the distribution of powers between executive authorities, a lack of a unified mechanism for implementing EGD principles at the national level, and a lack of a single "green coordinating body", which significantly slows down the process of adaptation to the EU acquis (i.e., the set of EU rights and obligations) and reduces the effectiveness of attracting relevant climate finance (Chapters of the..., n.d.).

In terms of quantitative participation, Ukraine has demonstrated a gradual, albeit asymmetric, increase in its involvement in international green initiatives, even in the context of the ongoing war. Between February 2022 and the end of 2024, Ukraine implemented projects worth more than 6.2 billion EUR from the European Bank for Reconstruction and Development (2025), of which about half were aimed at improving the energy efficiency of public buildings, modernising district heating systems, and introducing technologies to reduce primary energy consumption.

To visualise the scale and priorities of green investments in Ukraine in 2022-2025, it is useful to analyse the generalised quantitative indicators of projects implemented with the support of international donors. Table 1 shows the structure of funding for key environmental initiatives, including the distribution of funds by area (energy efficiency, transport decarbonisation, climate change adaptation, etc.), sources of funding, and the share of projects that were accompanied by emissions monitoring or had clearly defined climate indicators. This approach improves the assessment of the actual level of integration of EGD principles into Ukraine's recovery system and the identification of key imbalances, particularly in the areas of regulatory support and verification of results.

Table 1. EGD financial mechanisms and funding allocation for Ukraine (2022-2025)

Funding mechanism/ programme	Managing institution	Total amount of funds allocated	Priority areas in the field of environmental protection	Implementation schedule
Ukraine Facility Plan	European Commission	50 billion EUR	Restoration, reconstruction, modernisation	2024-2027
Direct investment	European Bank for Reconstruction and Development	6-7 billion EUR	Green economy, stable infrastructure	2022-permanent
Macro-financial assistance	European Commission	18 billion EUR	Economic stabilisation with environmental conditions	2023
Ukraine's recovery programme	European Investment Bank	100 million EUR	Critical infrastructure, hospitals, social housing	2024
Green Deal Investment Plan	European Commission	1 trillion EUR (EU-wide, the share for Ukraine will be announced later)	Climate neutrality, sustainable investments	2020-2050

Source: compiled by the author based on Finance and the Green Deal (n.d.), Funds under EIB's Ukraine Recovery Programme will be distributed using DREAM (2024), European Commission (n.d.), European Bank for Reconstruction and Development (n.d.), Ukraine Facility Plan (2025)

The analysis of Table 1 demonstrates the trend towards the formation of a systemic and multi-level financial environment aimed at ensuring the environmental modernisation of Ukraine following the EGD principles. The total amount of declared and available funds for Ukraine under the mechanisms listed in the table exceeds 75 billion EUR (excluding Ukraine's share of the pan-European Green Deal Investment Plan), which indicates an unprecedented concentration of resources in the period from 2022 to 2027. The involvement of a wide range of financial instruments and programmes indicates a shift from fragmented support to an integrated financial and institutional model that combines both short-term stabilisation mechanisms (e.g. 18 billion EUR of macro-financial assistance in 2023) and long-term sustainable development

strategies (e.g. the Ukraine Facility Plan (2025) for 50 billion EUR by 2027). It is worth noting that the largest amount of funds in the medium term is envisaged under the Ukraine Facility Plan, which not only focuses on reconstruction and modernisation but also contains targeted green components. Such a financial state shows a clear trend towards the transversal inclusion of the environmental component in all areas of assistance. Macro-financial assistance is also accompanied by green conditionality, which indicates an increasing regulatory burden in the context of environmental compliance. The Green Deal Investment Plan, although it does not currently have a defined Ukrainian share, is estimated at 1 trillion EUR on an EU-wide scale, which opens space for Ukraine's long-term involvement in pan-European climate investments.

According to the positions expressed by V. Hermoso *et al.* (2022) and J. Cifuentes-Faura (2022), EU environmental policy after 2020 is acquiring the features of a multi-level governance system, in which not only governmental but also financial and infrastructure institutions play an important role. These conclusions correlate with the pan-European trend towards strengthening institutional cooperation between national governments and supranational structures. At the same time, this study of Ukraine has shown a more complex nature of the institutional intertwining: although the implementation of the EGD does involve the Ministry of Ecology, international financial institutions and the European Commission, the coordination mechanisms remain less systematic. This discrepancy may be due to a fragmented regulatory framework, institutional instability, and limited integration of internal procedures with European governance standards. Despite formal compliance with the general model of multi-level governance, national conditions significantly modify its practical implementation.

Ukraine's regulatory and institutional integration of EGD principles also demonstrates certain dynamics. In 2024, the updated National Energy and Climate Plan for the Period up to 2030 (2024) was adopted, which envisages a 22% reduction in primary energy consumption compared to the 2020 baseline. In addition, the Climate Change Adaptation Strategy until 2030 was approved and the National Platform for Industrial Decarbonisation was established, coordinated by the Ministry of Energy with the participation of EU4Energy. In 2024, Ukraine also joined the EU Mission on Adaptation to Climate Change (2024) initiative, which includes pilot activities in 12 regions to assess vulnerability to climate risks and develop local climate strategies.

These peculiarities of EGD implementation in wartime directly affect the institutional division of roles between Ukrainian and European actors that determine the architecture of environmental policy. The predominance of external funding leads to an increased role of European institutions as the main drivers of initiatives, while Ukrainian authorities mostly perform implementation functions without systematic involvement of civil society or academic expertise. This asymmetry in the implementation of green policies leads to limited institutional synergies and weak horizontal integration within domestic environmental governance (Pavlović *et al*., 2021). On the other hand, Ukraine's participation in formal European instruments, such as the Ukraine Facility Plan (2025), creates the potential for increased accountability and transparency in the implementation of environmental projects.

The coherence between the Ukrainian government and European institutions on environmental recovery instruments was analysed in K. Shyrokykh & O. Melen-Zabramna (2025), which noted that the joint development of climate change frameworks changes the balance of responsibility between national and supranational actors. The study emphasises the reactive nature of Ukraine's adaptation initiatives, which contrasts with the proactive approach of the European Commission, which uses conditional funding as a tool for political integration. However, the analysis shows that such a dichotomy does not consider the specifics of post-war governance, where reactivity may be caused not so much by weak institutions as by pragmatic resource allocation in a crisis. The conclusions of this study are relevant in the context of stable political regimes but need to be clarified when applied to post-conflict transformation, where normative synchronisation is more likely to be gradual and evolutionary rather than conditional.

National and European actors play complementary yet asymmetric roles in shaping Ukraine's green recovery policy. On the Ukrainian side, the main strategic planning is carried out by the Cabinet of Ministers of Ukraine and line ministries. However, these bodies often do so without mandatory coordination with independent think tanks, academic institutions or civil society platforms, making it difficult to implement an inclusive and evidence-based policy-making process. There is currently no established procedure for coordinating national strategies with expert structures such as the National Recovery Council, which limits horizontal coherence. On the EU side, the European Commission, the European Investment Bank, the European Bank for Reconstruction and Development, and the Directorate-General for the Environment (DG ENV) are central (Alves, 2023). Funding decisions are made based on the level of project readiness, transparency of procurement and management procedures, and alignment with EGD priorities. The Ukraine Facility Plan (2025) is the platform for such coordination, which provides for an ex-ante assessment of the effectiveness of the use of funds, the presence of environmental, social, and governance (ESG) criteria in projects, as well as periodic reviews with the participation of independent auditors and structured monitoring groups.

In the context of multi-level governance, it is of particular importance to establish coordination between central government bodies, regional administrations (regional military administrations, territorial communities) and international partners. Despite the existence of platforms such as the Congress of Local and Regional Authorities or U-LEAD with Europe, there is still a lack of institutionalised procedures for community participation in local decision-making on resource allocation. This lack of transparency, along with the low level of public reporting on green spending, reduces the legitimacy of policies and increases the risk of politicisation of priorities. Implementation of the EGD in times of war is accompanied by several systemic risks. First, there is institutional fragmentation, which is manifested in the duplication of functions between ministries, the absence of a single body to coordinate the green transformation and the weak integration of environmental criteria into sectoral programmes. The instability of regulatory integration is caused by both political turbulence and technical insufficiency of the procedures for transposition of EU directives (in particular, in the areas of waste management, industrial emissions, and biodiversity) (Cifuentes-Faura, 2022). On the financing side, there remains a high risk of inaccessibility to climate finance instruments due to limited project capacity, the lack of certified green bonds, and Ukraine's high political and macro-financial risk, which discourages private investors.

In addition, the existing competition between sectoral priorities of military spending, humanitarian needs, and infrastructure reconstruction leads to the marginalisation of the environmental component. Duplication of functions between donors is also a significant obstacle, in particular the lack of coordinated work between the European Investment Bank and the European Bank for Reconstruction and Development in the areas of decarbonisation, which creates risks of parallel funding for the same initiatives. Another factor of destabilisation is the uncertainty of the legal framework, concerning the application of the European Taxonomy of Sustainable Investments, which makes it impossible to assess the greenness of projects in a standardised way and undermines market confidence (Hatipoglu *et al.*, 2023). Together, these challenges create a complex configuration of green policy that requires comprehensive institutional capacity building, new coordination mechanisms, and transparent governance.

In response to the challenges posed by fragmented policies, poor coordination of donor support, and an unstable regulatory environment, the Ukrainian state has begun to gradually move towards more holistic green transformation planning. In particular, the new generation of strategic recovery documents increasingly accounts for EU requirements to integrate environmental criteria into all stages of reconstruction (Hermoso *et al.*, 2022). This shift towards the structural greening of sectoral policies is not only a response to external expectations but also an attempt to compensate for the loss of trust on the part of donors and the private sector caused by previous inconsistencies in approaches. The formation of a renewed recovery architecture with an environmental core is seen as a tool to increase strategic predictability, mobilise funding, and ensure compliance with the course of European integration.

The national plans for early recovery and post-war transformation of Ukraine show the integration of specific environmental benchmarks, such as prioritising decarbonisation, improving energy efficiency and expanding the share of renewable energy sources, which is consistent with the strategic course towards European integration, fulfilling commitments under the Paris Climate Agreement (2015) and implementing the provisions of the EGD. In this context, a new policy and institutional framework is being developed that envisages the integration of environmental requirements into traditionally carbon-intensive sectors, including energy, transport, infrastructure and housing. Such integration is viewed not only as a tool for decarbonising the economy but also as a key condition for access to external financing, technological assistance and market convergence with the EU.

The systematic institutionalisation of environmental goals in sectoral planning was first introduced in the preparation of the Ukraine Recovery Plan in 2022, where the section on the green transition outlined three strategic directions: modernisation of the energy sector with priority to renewable energy sources, decarbonisation of industrial production, and greening of infrastructure (Reconstruction of everything..., 2024). In the energy sector, it is envisaged to develop decentralised generation capacities, introduce smart grid technologies, and energy storage systems and increase the resilience of power grids. At the same time, the actual implementation of these measures faces several constraints, ranging from a shortage of equipment and logistics chains to the predominance of critical infrastructure in resource allocation. In the transport sector, the electrification of public transport and railways, as well as the creation of a network of charging stations, have been recognised as priorities. However, the implementation phase is dominated by declarative measures: there is a lack of quantitative decarbonisation indicators and an assessment of emission reduction potential. Similarly, the construction sector is introducing the concept of "green reconstruction", which involves the use of energy-efficient technologies, environmentally friendly materials and compliance with ESG standards. However, the implementation of these standards remains fragmented due to the lack of an updated regulatory framework and national technical regulations harmonised with European directives.

In the context of sectoral integration of environmental goals, the energy sector is particularly illustrative.

According to W. Przychodzen & J. Przychodzen (2020) and T.S. Genc & S. Kosempel (2023), renewable energy in transition economies performs not only an environmental but also a geopolitical function, in the post-conflict recovery phase. This is consistent with the findings of this study: the increase in the share of renewable energy sources in Ukraine in 2023-2024 is accompanied by an increased emphasis on energy independence and diversification of supply sources. At the same time, there is a shift in emphasis: while the above-mentioned studies focus on the strategic positioning of renewable energy as a tool for strengthening sovereignty, the data obtained indicate the prevalence of technological and infrastructural logic, which forms a new trajectory of energy security through the adaptation of local capacities to European technical standards. The reason for this discrepancy is possibly in the differences between the conceptual frameworks of analysis: the macro-level approach prevails in these studies, while the current analysis demonstrates the importance of the subnational dimension of transformation.

The analysis of sectoral policies showed that they formally comply with the Green Deal principles, but there is a lack of detail at the operational level. The concept of climate neutrality, despite its presence in strategic documents, is not accompanied by specific target indicators for the medium or long term (2030-2050). The commitments under the Nationally Determined Contribution remain poorly institutionalised, with no fully-fledged systems for monitoring, verification and reporting on the achievement of targets. In the area of the circular economy, there are declarations on recycling construction waste and creating closed chains, but no concrete roadmap (Nygaard, 2023).

The energy component of the National Renewable Energy Action Plan in Ukraine (2024) is characterised by relative maturity, which is manifested in the presence of specific implementation indicators, detailed roadmaps for the development of renewable energy sources (including the goal of reaching 25% of the generation structure by 2030), approved programmes for the phased decommissioning of coal-fired thermal power plants, and systemic energy efficiency measures supported by donor and international financial institutions. However, transport and industrial policies are characterised by declarative approaches without quantitative specification. For instance, references to the electrification of railways are not accompanied by an assessment of the potential reduction of the carbon footprint, and the construction policy does not contain systematic measures to update state building codes, introduce eco-certification or financial incentives for energy-efficient technologies.

The integration of environmental principles into Ukraine's national plans for early recovery and post-war transformation is taking place in the context of significant challenges caused by hostilities and limited resources. Under the Ukraine Facility Plan (2025) programme, which provides EUR 50 billion in funding for the period 2024-2027, the share of projects aimed at green transformation is approximately 12-17% of the total budget of the initiatives. This includes funding from the European Investment Bank, the European Bank for Reconstruction and Development, and other international partners. In the field of renewable energy, the Ukrainian government has approved an investment plan worth USD 20 billion by 2030, with the aim of increasing the share of renewable energy sources to 27% in the country's overall energy balance (National Energy and..., 2024). However, it is worth noting the current situation in this area. Due to the full-scale aggression of the Russian Federation, several green energy facilities have been damaged or are in the occupied territories. As of the beginning of 2022, the total capacity of facilities operating under the feed-in tariff exceeded 9.5 GW, but about a quarter of this capacity was lost due to the occupation. Wind farms suffered the greatest losses: about three-quarters of their capacity was in the combat zone or under enemy control, which is especially true for the Kherson and Zaporizhzhia regions. Also, some solar power plants, more than half a gigawatt, have ceased to function due to the occupation. Nevertheless, the share of electricity generated from renewable sources remains significant: in 2023, almost 10% of electricity was generated from solar and wind energy, and together with hydroelectric power plants, this figure exceeded 20% (National Renewable Energy..., 2024).

A. Sikora (2021) and J.M. Alves (2023) emphasised that EU partner countries face barriers to accessing innovative green financing mechanisms, particularly those that require mandatory compliance with ESG criteria. A similar trend can be seen in the Ukrainian context, where only a limited number of EIB-supported projects meet such requirements. These conclusions are quite appropriate, as they are confirmed by the results of this study, which indicate insufficient harmonisation of the national regulatory environment with EU financial standards. At the same time, it is worth noting that the interpretation of ESG criteria remains heterogeneous even within the EU, which, in turn, may affect the interpretation of the level of compliance by partner states. The reason for the different interpretations may lie in the differences between the formal criteria for evaluating projects and the political feasibility of funding them in the context of post-war recovery. The need to adapt legislation to EU standards should be seen not only as a technical task but as part of a broader process of harmonising approaches to defining sustainability in cross-border finance.

Access to climate finance, as noted by S. Minas (2022) and N. Křemečková & S.S. Šreflová (2024), is determined not only by political declarations but also by the availability of technical expertise. This approach is also confirmed in the case of Ukraine, where the limited number of projects approved under the

Neighbourhood, Development and International Cooperation Instrument is due to the lack of capacity to prepare applications following EU standards. However, the analysis shows that the problem is not limited to technical aspects. N. Křemečková & S.S. Šreflová emphasised that the complexity of procedures and requirements is sometimes excessive for countries in post-conflict contexts, which complicates project implementation and creates additional barriers. Claims of technical inability seem debatable, as they do not incorporate the impact of institutional and political factors that also have a significant impact on access to finance.

In the construction sector, the implementation of green standards remains limited. As of 2024, there were less than 10 buildings in Ukraine certified to international standards such as the Building Research Establishment Environmental Assessment Method and Leadership Energy and Environmental Design (Yarosh, 2024). This indicates the low level of implementation of environmental standards in construction and the need to stimulate such initiatives. The reasons for this situation are the lack of clear regulatory requirements for mandatory environmental certification, as well as limited access to finance for developers wishing to use energy-efficient technologies. Some pilot projects are being implemented with the support of international donors, but their scale remains insignificant in the overall market structure. At the same time, there is potential for expanding the use of green standards in post-war reconstruction, in the reconstruction of critical infrastructure (European Commission, n.d.). A prerequisite for this is the introduction of a system of government incentives, including tax breaks and preferences in public procurement. It is also necessary to raise awareness of the benefits of green construction as an element of sustainable development among construction sector participants.

In the transport sector, projects to electrify public transport are being implemented slowly. The Electric Public Transport Reform in Ukraine project, launched in August 2024, aims to support cities in developing electric transport, but its impact has been limited so far. Import dependence on electric vehicles and components, as well as insufficient development of charging infrastructure, remain the main obstacles. In addition, logistical challenges related to supply and maintenance slow down the scaling of projects. The absence of a comprehensive government strategy that would integrate electric transport into the overall urban mobility system also reduces the effectiveness of measures. Nevertheless, the number of electric buses in major cities is growing, albeit at a slow pace, which indicates the potential for development. An important task is to stimulate investment in charging infrastructure and develop preferences for utilities.

To summarise, the integration of environmental principles into Ukraine's recovery strategies is an important step towards achieving climate neutrality, but without further detail, regulatory specification and institutionalisation, these goals remain in the realm of strategic rhetoric. The slow dynamics of transformation are largely due to the prioritisation of security needs and administrative resources in the context of a full-scale war, which significantly limits the state's ability to comprehensively plan and implement long-term climate policies. The transition from declaration to implementation requires strengthening horizontal coordination between sectors, developing a climate efficiency assessment system, harmonising the regulatory framework with the EU, and actively engaging regional and municipal institutions in planning and implementing green initiatives. Without a systematic integration of the environmental dimension into the post-war reconstruction process, there is a risk of reproducing non-environmental development models with low resource efficiency. Only with such changes can the green component become a systemic element of post-war reconstruction and the long-term transformation of Ukraine as an EU candidate country.

J.B. Skjærseth (2021) and M.E. Kraft (2021) emphasised that the effectiveness of environmental strategies in the post-crisis environment is largely determined by the ability to ensure vertical coordination between central and regional authorities. The analysis confirms the relevance of this thesis, given the existing limitations in the Ukrainian decentralisation model, in terms of the transfer of environmental powers to the local level. This complicates the uniform implementation of green practices in the regions and reduces the effectiveness of achieving the Green Deal goals. However, in contrast to the studies cited, which regard vertical coordination as a functional governance mechanism, the results obtained indicate that institutional fragmentation in the post-crisis reconstruction may be the result not only of a lack of administrative coherence but also of competition for access to external resources. The reason for this discrepancy could be determined by the difference between stable democratic systems, on which the conclusions of J.B. Skjærseth and M.E. Kraft are based, and the context of countries recovering from systemic shocks, where coordination mechanisms are still in the process of formation.

Croatia, which suffered large-scale destruction as a result of the 1991-1995 war, demonstrated an example of gradual integration of the environmental component into the reconstruction process, primarily through decentralised development models. Immediately after the end of hostilities, the focus of state policy was on restoring infrastructure, but since the late 1990s, national strategies have begun to articulate priorities for environmental protection, climate change adaptation and energy efficiency (Croatia's National Environmental..., 2005). One of the key factors was the accession to EU funding instruments even before the accession,

through the European Commission (2009) programmes aimed at modernising water treatment facilities, waste management, reducing pollutant emissions and sustainable rural development. Through participation in these programmes, Croatia not only gained access to financial support but also built technical and managerial capacity to implement environmental projects.

In the process of preparing for EU accession, Croatia reformed its environmental policy in line with the acquis, introducing institutional mechanisms for strategic environmental assessment, environmental impact assessment, integrated water management, and industrial emission control mechanisms (Chapters of the..., n.d.). A significant role in this process was played by Croatia's National Environmental Action Plan (2005), which became a tool for integrating environmental objectives into all sectors of public policy. These reforms were accompanied by the intensification of the activities of environmental non-government organisations, which became important actors in public monitoring, participated in consultations on major infrastructure projects, and acted as intermediaries between central authorities and local communities in setting green priorities. Of particular importance was the inclusion of environmental standards in the regional recovery plans funded under EU structural assistance, which ensured a close link between local development and European sustainability goals.

The efficiency of these efforts is confirmed by specific indicators. For example, between 1990 and 2022, Croatia reduced greenhouse gas emissions by 29.9% (Climate Action, 2023). At the same time, the country has reached a high level of renewable energy development: by 2025, it is planned to install an additional 1,500 MW of solar and wind power capacity, which will provide more than 80% of electricity generation from renewable sources (Croatia to add..., 2021). In addition, Croatia is actively developing its environmental infrastructure: the Natura 2000 network covers 36.5% of its territory, one of the highest rates among EU countries (Green Infrastructure in..., 2020). Croatia's experience illustrates the importance of early institutional alignment with European norms, synergy between government and civil society, access to financial instruments, and proper monitoring of environmental outcomes as prerequisites for effective and systematic green reconstruction.

The comparison with the Croatian experience in this study correlates with the findings of A. Pavlović *et al.* (2021) and J. Švarc (2022), emphasise the importance of including an environmental component in all stages of post-conflict reconstruction. In the Croatian case, the integration of environmental criteria into reconstruction programmes helped to attract additional EU financial resources. However, this model of post-conflict planning was implemented in a politically stable context and with structural support from European institutions. This demonstrates the differences with the Ukrainian situation, where the lack of a sustainable system for assessing the green component in reconstruction projects indicates not only a technical lag but also a different logic of management priorities in a crisis. The conclusions of these authors are relevant as guidelines for long-term environmental adaptation but need to be revised when applied to emergency planning conditions accompanied by a high level of uncertainty and limited management resources.

In Georgia, the green aspects of post-crisis development began to gain importance after the Rose Revolution of 2003, which marked a turning point in public administration, including environmental policy. Until then, the country had been experiencing serious environmental degradation due to the ineffectiveness of state environmental supervision in the 1990s, the collapse of institutional infrastructure, uncontrolled urbanisation and widespread illegal economic activity. After the change of political course, the government began to reconsider its approach to environmental protection, although, for a long time, the environmental component remained secondary to the reconstruction process, which focused mainly on stabilising the economy and strengthening state institutions (Akhvlediani, 2023). Georgia received a real impetus for approximation to European environmental policy with the signing of the Association Agreement between the European Union and the European Atomic Energy Community and their Member States, of the one part, and Georgia, of the other part (2014). This document envisaged the gradual implementation of EU directives in the areas of air quality, waste management, water protection and climate adaptation. One of the important steps was the adoption of Georgia's 2030 Climate Change Strategy (2021), which included specific targets for reducing emissions, managing ecosystems and strengthening control over industrial pollution.

Despite these efforts, Georgia encountered a range of challenges. These include a constant lack of funding for large infrastructure projects, institutional fragmentation, insufficient coordination between agencies, limited technical resources at the local level, and a weak level of integration of environmental assessment into planning processes. This has made it difficult to build a green component into recovery projects, especially after the 2008 armed conflict, when resources were channelled mainly into emergency housing and road reconstruction without proper strategic planning (Akhvlediani, 2023). Some of Georgia's successes are related to its participation in regional initiatives of the Eastern Partnership. Key instruments have been programmes funded through the European Neighbourhood Instrument (n.d.). For example, in the conflict-affected regions of Shida Kartli and Samtskhe-Javakheti, which have suffered severe soil erosion, pilot projects were implemented to reduce vulnerability to

floods and landslides. These initiatives combined the restoration of infrastructure (dams, roads, canals) with ecosystem-based approaches: reforestation, riverbed cleaning, and bank reinforcement with live plantings. Such projects ensured not only technical but also environmental sustainability and created conditions for the development of local communities through involvement in environmental monitoring and educational programmes (World Bank, 2015).

Since 2016, Georgia has been actively cooperating with the International Renewable Energy Agency (2025), which initiated several investment projects in the hydro and solar energy sectors. The government has initiated licensing reform in the renewable energy sector, including by simplifying access to technical specifications and providing tax incentives for investors. At the same time, according to the energy consulting company OMNIA, renewable energy sources accounted for 80.3% of Georgia's energy balance as of 2025 (Taktakishvili, 2025), with hydropower accounting for the lion's share. Georgia's renewable energy potential is one of the highest in the region, but it is only using 19% of this potential. Georgia has a total installed capacity of 4,632.3 MW. Of this capacity, 3,551.2 MW (77%) is from renewable energy sources, consisting mainly of hydropower plants. Despite the electricity production figures, the national overall energy balance, including transport, heating and industry, shows lower results: by 2023, only approximately 26% of energy needs were covered by renewable sources, indicating an uneven transformation of different sectors.

The Georgian experience described in T. Akhvlediani (2023) and N. Tsikoridze (2024) demonstrates the benefits of targeted institutional approximation to the EU climate acquis (Chapters of the..., n.d.). The analysis of these studies demonstrated that the creation of a national green investment fund has helped to avoid fragmentation of funding and increase transparency in the use of funds. These conclusions are quite relevant, as they confirm the effectiveness of a centralised approach to climate finance management in a resource-limited environment. However, the above analysis shows a different picture in the case of Ukraine, where the existing administrative decentralisation, the continuity of cross-sectoral responsibilities and the complex structure of post-war aid distribution make it difficult to implement a similar model. The reason for the different approaches is likely to lie in the differences in the starting conditions and the extent of institutional support from the EU. Although the Georgian case serves as a valuable example, its application in the Ukrainian context requires adaptation to the political and institutional specifics of the transition period.

Georgia's experience shows the potential for combining reconstruction with green approaches, especially using ecosystem-based solutions and international technical assistance. At the same time, fragmented environmental policies, limited institutional coordination, and a lack of systemic climate strategies remain key barriers to achieving long-term sustainability goals. A solution could be to strengthen the integration of environmental dimensions into national recovery planning, develop partnerships between central government, regions and the public sector, and establish transparent mechanisms for financing green transformations.

A comparative analysis of the approaches to green transformation in Ukraine, Croatia and Georgia shows that there are common structural factors, but the level of institutional compatibility with the EU acquis, the effectiveness of regulatory implementation and the functioning of financial and administrative mechanisms shows significant variability. Ukraine has a relative advantage in terms of larger human capital, research infrastructure, and a legally defined climate policy. At the same time, internal institutional fragmentation, lack of interagency coordination, and limited fiscal space significantly complicate the implementation of an integrated environmental policy (Table 2).

Table 2. Green transformation performance indicators

Metric	Croatia (status in 2020 – states in 2023)	Georgia (status in 2020 – states in 2023)	Ukraine (state in 2020 – state in 2023)	European standard
CO_2 emissions (t/person)	4.3 – 4.5	2.8 – 3.1	4.6 – 3.6	< 4.0
Share of renewable energy sources (%)	31% – 70%	19.5% – 80.3%	11% – 22%	32% before 2030
Waste recycling (%)	34% – 36%	5% – 5%	5% – 7%	65% before 2035

Source: compiled by the author based on International Energy Agency (2023), North-West Croatia Regional Energy Agency (2023), UkraineInvest (2023), I. Rassadina & I. Sadovskyi (2023), H. Ritchie & M. Roser (2025), European Environment Agency (2025)

The data analysis identified key trends in the implementation of green transformation strategies in Croatia, Georgia and Ukraine, considering the target parameters set out in European regulations. All three countries demonstrate positive dynamics in expanding the share of renewable energy sources: Croatia

increased this figure from 31% to 70%, Georgia from 19.5% to 80.3%, and Ukraine from 11% to 22%. This growth, especially in the case of Georgia, exceeds the EU target of 32% by 2030, which indicates the active implementation of energy sector decarbonisation mechanisms and a certain adaptation of national strategies to the EGD requirements. However, an analysis of CO_2 emissions per capita reveals a more complex picture. While Croatia shows a slight increase from 4.3 to 4.5 t/person and Georgia an increase from 2.8 to 3.1 t/person, Ukraine, on the contrary, shows a decrease from 4.6 to 3.6 t/person. This indicates significant structural changes in Ukraine's carbon balance, which may be related to the post-crisis decline in industrial production and the beginning of the transformation of the energy sector. However, only Ukraine currently fits into the EU's target standard of below 4 tonnes per person, which highlights both the potential and vulnerability of the national green transformation path. There is a significant disparity in waste management. Croatia has slightly improved its waste recycling rate from 34% to 36% in three years, remaining far from the European standard of 65% by 2035. Ukraine has increased its recycling rate from 5% to 7%, while Georgia has shown no dynamics, maintaining its 5% level. These indicators show a weak institutional integration of circular economy principles and point to a lack of environmental infrastructure and financing, especially in countries that are not fully aligned with the acquis communautaire.

Since the data above demonstrate significant differences between countries in terms of integration of environmental goals, it is worth analysing the examples of the Nordic countries, which are considered exemplary in implementing green transformation. The high level of achievement of climate and resource efficiency goals in Sweden and Finland is explained not only by the long period of green policy development but also by the systematic integration of environmental criteria into all levels of government. These countries demonstrate not only a steady increase in the share of renewable energy sources but also the successful implementation of circular economy models and integrated approaches to waste management. This experience is particularly important for the analysis, as it demonstrates how, given a stable policy environment, effective administration and technological innovation, significant progress can be made in environmental transformation, which remains a challenge for countries in transition or post-crisis development.

In the Nordic countries, the regulatory integration of environmental criteria into public procurement, strategic budgeting, and planning of reconstruction projects is one of the main indicators of their institutional capacity for sustainable development. Countries have developed a comprehensive legal and regulatory architecture that ensures climate neutrality, energy efficiency, and resource circularity in all public investment decisions. In Sweden, for example, these approaches focus on the introduction of mandatory "environmental minimums" in tender specifications, including criteria for CO_2 emissions, environmental labelling, and material recycling (Naturvårdsverket, 2025). The share of renewable energy sources in final energy consumption reached 66.4% in 2023, the highest among EU countries (Eurostat, 2024). Importantly, environmental criteria are not limited to procurement in Sweden; they are enshrined in the climate neutrality strategy, which obliges the country to review investment priorities based on the carbon cost of each project (Sweden's Climate Action..., 2024). "Environmental mainstreaming" approaches include regular assessment of policies of all ministries against climate criteria. In Finland, where the share of renewable energy sources in 2023 was 50.8%, a unique tool called Carbon Footprint Budgeting (Carbon Gap, n.d.) was introduced, which integrates climate parameters into the budget process. Each ministry is obliged to calculate the carbon footprint of proposed projects and correlate it with the approved national climate budget. This model avoids environmentally inefficient investments and ensures long-term synergies between financial and climate planning.

Sweden and Finland are actively developing cross-sectoral coalitions for green transformation, which include government agencies, academia, business and civil society. Sweden has a Sustainable Procurement Advisory Committee, which includes representatives of 12 key sectors. The Sustainable Procurement Advisory Committee developed annual recommendations that are binding for updating public procedures. Finland has a Sustainable Investment Centre that develops standard contracts for energy-efficient housing retrofits, transport infrastructure, and digital environmental monitoring projects. The systematic integration of environmental requirements into all phases of management decisions, supported by political consensus and technical support, makes the experience of Sweden and Finland relevant to countries seeking to implement EGD principles. These models ensure not only compliance with the climate neutrality goals but also increase the transparency and efficiency of the budget process in the context of environmental modernisation. Therefore, the experience of these countries can serve as a basis for creating a system of "green budget monitoring" in Ukraine as part of the strategic recovery mechanisms.

All these practices are directly relevant for Ukraine in the context of post-war transformation and integration into EGD policies. The Northern European experience proves that effective environmental integration in public procurement is impossible without establishing mandatory minimum criteria at the legislative level that cannot be cancelled due to budgetary or administrative constraints. A key condition is the creation of mechanisms for horizontal coordination and

continuous updating of standards, which involves not only government institutions but also think tanks, public platforms and environmental businesses. The experience of Sweden and Finland shows that environmental criteria can become not only a tool for cost control, but also a basis for innovative development by encouraging local producers to meet environmental requirements. Thus, adapting such models to the Ukrainian context could become part of a green recovery strategy, while increasing the transparency, efficiency and environmental sustainability of public policy.

In general, the asymmetry in environmental indicators highlights the fragmentation of the green transformation policy. Even with the formal implementation of certain directives or plans, the practical achievement of targets remains uneven. This necessitates strengthening institutional support and establishing sustainable mechanisms for monitoring progress, particularly in the areas of waste management and greenhouse gas emissions. At the same time, the existing differences between countries largely reflect the degree of regulatory convergence with the European legal framework. Croatia, as an EU member state, has a better starting point due to direct access to funding from the European Commission, through the Just Transition fund, and integrated obligations under the EGD (Regulation of the..., 2021). As associate partners, Ukraine and Georgia rely on more flexible regulatory approximation instruments, which, however, do not guarantee the same results. In the context of post-crisis recovery, the strategic integration of the environmental vector into reconstruction programmes is of particular importance. Ukraine's progress in reducing CO_2 and increasing renewable energy sources, despite the war, demonstrates the potential for modernising the energy system in line with environmental criteria. Therefore, not only the strengthening of climate but also overall economic resilience is notable. Further progress in green transformation will directly depend on the effectiveness of a multi-level environmental policy. The progress not only aligned national strategies with European benchmarks but also created capacities at the level of local institutions such as local governments, environmental protection agencies, and non-government organisations. Successful implementation of long-term climate commitments requires a holistic approach that combines financial resources, regulatory adaptation and institutional sustainability.

Important in this context is the position of M.-G. Ciot (2022) and K. Zimmermann *et al.* (2024), consider the Green Deal as a mechanism for external transformation of neighbourhood policies. Their statement about "Europeanisation through climate" is confirmed by the Ukrainian case, in updating the 2030 Climate Strategy. As the study shows, the incorporation of emission reduction indicators into the National Recovery Plan is not only the result of internal reforms but also a response to the external requirement to participate in financial instruments. However, this understanding of Europeanisation as a largely external process does not fully consider internal political dynamics, particularly the evolution of climate discourse in Ukrainian political elites after 2022. The reason for the different interpretations may lie in the focus on regulatory mechanisms, while the context of post-crisis recovery requires consideration of pragmatic adaptation practices.

All three recipients of EU financial assistance had access to pre-approved approximation programmes, such as the European Neighbourhood Programme for Agriculture and Rural Development (2013), before gaining official candidate status. However, unlike Croatia, which has been pursuing consistent institutional and financial integration since 2007, Ukraine gained candidate status in the context of a full-scale armed conflict, which led to a reorientation of resources towards short-term stabilisation measures, complicating strategic planning in green transformation. From the perspective of the relevance of adaptation models, the Croatian integration scenario demonstrates normative compatibility with Ukrainian challenges. Since the end of the military conflict, Croatia has implemented a comprehensive strategy for gradual approximation to the EU acquis communautaire, particularly in the areas of environmental protection, energy, and spatial planning. An important institutional prerequisite was the functioning of the Central Finance and Contracting Agency, a specialised body responsible for coordinating projects financed by EU funds. At the same time, municipal decentralisation has ensured effective policy implementation through local administrative units, contributing to the formation of sustainable environmental practices. The Georgian model, on the other hand, represents a context of limited institutional capacity, in which environmental transformation was implemented mainly through donor programming and technical assistance Technical Assistance and Information Exchange (n.d.), EaP Green. New financial instruments are opening for Ukraine, under the Ukraine Facility Plan (2025) and future access to funds related to the EGD implementation. However, the effective attraction and utilisation of these resources requires the creation of a coordination mechanism for integrating environmental goals into medium- and long-term state planning, which involves not only regulatory alignment but also institutional consolidation.

In the Croatian case, the systematic implementation of Directive of the European Parliament and the Council No. 2004/35/EC (2004), Directive of the European Parliament and the Council No. 2010/75/EU (2010), as well as the national implementation of waste management policies, ensured a high degree of compliance with the acquis, which was reflected in the official assessment of the European Commission (2023): 96% of Croatian environmental legislation was harmonised with the EU acquis.

In the process of implementing Ukraine's green transformation in the early recovery and post-war planning phases, several systemic barriers are being identified that significantly limit the effectiveness of climate-oriented strategies. One of the key challenges is insufficient institutional capacity, including weak coordination between central and local governments, the lack of an integrated environmental policy in the national planning system, and fragmented mandates between responsible institutions (Yukhymenko *et al.*, 2024). Mechanisms for interagency cooperation remain underdeveloped, making it impossible to systematically integrate climate priorities into the recovery process. An additional barrier is the complicated access to international climate finance, which is caused by both security threats and procedural uncertainty, in particular, the lack of accredited institutions capable of administering funds from the Global Environment Facility or the Green Climate Fund. Ukraine still does not have a consolidated financial architecture for implementing climate projects that would align donor programmes with national priorities. In wartime, there is a lack of mechanisms for environmental assessment of reconstruction projects, which creates risks for reconstruction based on outdated, high-carbon models. In the post-war planning phase, an important challenge will be the need for regulatory redesign of many building standards, logistics schemes, and energy supply systems, which requires not only political will but also a high degree of technical and expert support (Brenner, 2022). A poor culture of environmental management and the absence of mandatory environmental criteria, such as energy efficiency, reduced carbon footprint, environmental certification of materials or product life cycle assessment, in public procurement procedures further complicate the transition to a sustainable reconstruction model

According to the findings of C.E. Hoicka *et al.* (2021) and J.E. Teixeira & A.T. Tavares-Lehmann (2022), the process of transposition of EU environmental legislation in third countries that have Association Agreements with the EU and are obliged to harmonise national legislation with the acquis communautaire in the field of the environment (Georgia, Moldova, Ukraine) faces difficulties in enforcement and administrative implementation. The Ukrainian case confirms this observation: the implementation of energy efficiency and circular economy directives remains limited due to the lack of regulations and effective control mechanisms. However, these studies focus mainly on general institutional barriers, while the analysis of the Ukrainian context reveals additional specifics of fragmented interagency coordination and the priority of short-term recovery responses. The reason for the differences in interpretation may lie in the different scope of the study: while comparative works focus on general patterns of EU-associated countries, the analysis of Ukrainian data shows that the key factor of ineffective implementation is not only the lack of resources but also weak procedural coherence between the stages of adoption, interpretation and implementation of norms.

The geopolitical risks of influencing recovery priorities were highlighted by S. Wolf *et al.* (2021), A. Nygaard (2023) and E. Hatipoglu *et al.* (2023), emphasising the competition between sectoral goals in the face of limited resources. A similar dynamic is evident in Ukraine, where the priority of security and defence often prevails over the environmental agenda. However, the above analysis shows a different picture, as the emphasis on security in the Ukrainian context does not always contradict environmental transformation but rather is determined by the specifics of post-conflict recovery. The assertions are debatable, as they do not address that the strategic postponement of environmental initiatives may be due to the need to ensure basic stability. This is inconsistent with the analysis above, which indicates that the integration of security and environmental priorities can in some cases enhance long-term resilience. The reason for the different interpretations may lie in the different methodologies for assessing priorities and the time horizons of the studies. The conclusions drawn by the researchers are quite appropriate for the general geopolitical context but require further refinement given the specifics of the Ukrainian case.

Compared to other countries that have experienced armed conflict, such as Croatia and Georgia, Ukraine lacks a unified mechanism for environmental assessment as part of reconstruction programmes. The green transformation is being treated as an additional rather than an integrated element of recovery. The need for a comprehensive revision of environmental legislation and procedures is particularly relevant in the context of Ukraine's future integration into European environmental markets. However, this requires a stable institutional infrastructure capable of ensuring predictable and transparent implementation of climate policy. Thus, the barriers faced by Ukraine are complex and require concerted efforts at both the national and international levels. A successful green transformation in the post-crisis development environment requires not only resources but also the formation of a sustainable institutional architecture aligned with European standards, as well as the inclusive participation of local governments and civil society institutions. For Ukraine, the adaptation of elements of the Croatian model, including the creation of a central environmental investment management body, regulatory harmonisation with the acquis communautaire, and institutionalisation of cross-sectoral coordination, seems to be a relevant strategy in the process of post-war recovery and environmental modernisation. Compared to Croatia and Georgia, which implemented their transformation strategies in the context of post-crisis recovery from armed conflicts, Ukraine faces a fundamentally more

difficult challenge of structural modernisation in the active phase of the war. This limits the horizon of strategic planning, disintegrates the institutional vertical and increases the risk of fragmentation of public policy. At the same time, the presence of an active civil society, mobilised international support, and large-scale digitalisation creates favourable conditions for the development of an innovative model of environmental restoration. Ukraine is similar to Croatia in key respects: it has significant military experience, needs a decentralised model of reconstruction, and is focused on regulatory convergence with the EU.

At the same time, in contrast to Georgia, Ukrainian climate change policy has clearer strategic guidelines and is supported by existing political declarations on integration into the EGD. However, the effective implementation of this policy is hindered by systemic problems, including the lack of a single coordinating body, legal uncertainty of environmental financing mechanisms, and a lack of professional staff at the regional level. In addition, the military context pushes climate issues to the back burner, which may lead to a recovery based on the traditional, carbon-intensive model. One of Ukraine's key advantages is its strong scientific and technical potential to ensure a science-based transformation of environmental policy. Ukrainian local governments, which have gained autonomy through decentralisation, also have the potential to localise environmental solutions, similar to the Croatian experience (Yukhymenko *et al.*, 2024). However, without an effective mechanism for integrating environmental priorities into the public administration and public finance system, this potential advantage may remain unrealised.

An effective green reconstruction policy for Ukraine requires systemic changes in approaches to planning, coordination, financing and regulatory support. A positive example in this area is shown by Croatia, which, in the process of post-conflict reconstruction, created an independent Environmental Protection Agency responsible for integrating environmental standards into reconstruction plans. It was the basis for the environmental monitoring system, which was later adapted to EU standards (Climate Action, 2023). For Ukraine, this means ensuring that the newly created body is empowered to approve reconstruction projects inter-agency based on sustainability assessment. Synergies between sectoral policies, in the areas of energy, transport, construction, and waste management, can be achieved through the development of common environmental standards for reconstruction. An effective tool for this is an ex-ante environmental impact assessment of all investments financed from the state or international budget, as is practised in Georgia in support of projects with international technical assistance.

Additionally, the establishment of regional offices or platforms for the decentralised implementation of environmental governance policies with a focus on community needs should be envisaged. This approach correlates with the Croatian model of green local government development, where municipalities were empowered to implement environmental mitigation measures, which ensured the adaptation of sustainability policies to regional contexts. In addition, it is important to include in the mandate of the newly created body the authority to develop green footprint indicators for restoration projects. This will help to build an evidence base for further performance analysis. A public register of environmentally significant projects will promote transparency and public involvement in monitoring. At the same time, given Georgia's experience in creating integrated geographic information systems, it is advisable to develop a digital platform integrating data from state cadastres, pollution and land use registers. In the area of financing, the key is to intensify efforts to involve Ukraine in the Just Transition Mechanism, which will provide access to EU structural funds (Regulation of the..., 2021). Following the example of Croatia, which received funding for the restructuring of the energy sector under the Just Transition Mechanism, Ukraine should develop a domestic national plan for a just transition. An important element of this plan is the social adaptation of regions dependent on the carbon-intensive economy, including the creation of retraining programmes, stimulating green employment, and supporting environmental entrepreneurship.

Another promising area is the development of green banking pilot projects. Georgia's experience in cooperation with the European Bank for Reconstruction and Development demonstrates the success of models that introduce environmental scoring to finance small businesses focused on energy efficiency. Ukraine can scale up these approaches by creating guarantee mechanisms for environmentally oriented SMEs, using green bonds at the municipal level, and attracting private capital through blended finance models. At the same time, financial institutions should be adapted to the requirements of the InvestEU, which provides for the support of sustainable investments (Regulation of the..., 2021). This includes the creation of a national contact point, accreditation of banks as financial intermediaries, and the development of criteria for "environmental added value".

In the regulatory sphere, the priority remains the harmonisation of environmental legislation with the EU acquis, especially in terms of air protection, climate change adaptation, pollution prevention and natural resource management. Establishing a system of mandatory monitoring of the green footprint of reconstruction, covering all stages of the project cycle from planning to operation, will avoid point-in-time inefficient solutions. Given the need to address climate risks in long-term planning, it is advisable to include a mandatory analysis of these risks in national and regional development strategies. The Georgian example demonstrates

the effectiveness of the climate screening methodology, which is being integrated into municipal strategic planning with the support of international partners. The political prerequisites for green recovery should be consolidated through the institutionalisation of public participation. Updating the procedures for strategic environmental assessment should include not only formal information but also mandatory consideration of the results of public consultations.

To sum up, modernising Ukraine's green recovery policy requires institutional maturity, adapted financial mechanisms, an effective regulatory environment, and a sustainable political consensus. The experience of Croatia and Georgia confirms that even in the context of post-crisis recovery, it is possible to develop environmentally friendly policies if they are based on transparency, decentralisation, public participation and flexible integration into European mechanisms.

Conclusions

The study provides a comprehensive analysis of the EGD implementation process in Ukraine in the context of a full-scale war, early recovery and post-war transformation. EGD was seen as a tool for the structural modernisation of the Ukrainian economy, important for ensuring sustainable recovery and strategic rapprochement with the EU. The study established that in the context of the armed conflict, EGD acquired a transformational content, combining environmental goals with the priorities of energy security, economic sustainability and institutional restoration. The study revealed the fragmentation of the implementation process, which was largely due to the instability of regulatory integration, limited national institutional resources and difficulties in cross-sectoral coordination. At the same time, there was a gradual increase in Ukraine's participation in EU green initiatives, especially in the areas of energy efficiency, decarbonisation and renewable energy development. The integration of EGD principles into national early recovery plans and post-war reconstruction strategies was analysed.

A comparative analysis of the experience of Croatia and Georgia was conducted, which demonstrated the relevance of certain institutional and financial models for application in the Ukrainian context. Comparison with Croatia (increase in the share of renewable energy sources from 31% to 70%) and Georgia (from 19.5% to 80.3%) showed the potential for adapting institutional models, provided that national capacity is built. Barriers were identified: lack of environmental statistics, competition between donors, and the absence of a single coordinating body.

Based on the analysis, several recommendations for strengthening the green transformation policy are formulated. It is proposed to adapt the regulatory framework to the principles of EGD and develop a system for monitoring the green footprint of projects. Attention is drawn to the need to ensure political conditions for transparency, public participation, and alignment of environmental goals with strategic planning. Promising areas for further research include quantifying the impact of environmental investments on the structure of post-war recovery, studying sectoral efficiency in the context of the Green Deal, and analysing donor interaction in climate finance.

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Інституційні та фінансові механізми Європейського зеленого курсу в процесах раннього відновлення та повоєнної трансформації України

Катерина Лещенко

Кандидат економічних наук, доцент
Київський національний економічний університет імені Вадима Гетьмана
03057, просп. Берестейський, 54/1, м. Київ, Україна
https://orcid.org/0000-0001-8467-5141

Анотація. Актуальність дослідження полягала у необхідності екологічної інтеграції в національні політики відбудови України в умовах повномасштабної війни та євроінтеграції в межах Європейського зеленого курсу. Метою дослідження було проаналізувати інституційні та фінансові механізми реалізації принципів Європейського зеленого курсу у процесах раннього відновлення та післявоєнної трансформації України. Методологія дослідження ґрунтувалася на міждисциплінарному підході, що поєднував кількісний аналіз екологічного фінансування, кейс-стаді посткризових країн, порівняльну оцінку інституційної сумісності. У результаті було систематизовано інституційну архітектуру Європейського зеленого курсу з акцентом на ключових виконавчих і фінансових суб'єктах та визначено механізми їх взаємодії з українськими органами влади. Проаналізовано хронологію політичних рішень у 2020-2023 роках щодо декарбонізації, енергоефективності та розвитку відновлюваних джерел енергії. Зокрема, до 2023 року Україна збільшила частку відновлюваної енергії до 22 % у структурі генерації, зменшила викиди CO2 на душу населення з 4,6 т (2020) до 3,6 т (2023), але зберігала нерівномірну інтеграцію екологічних критеріїв у плани відновлення. Порівняльний аналіз досвіду Хорватії (відновлювані джерела енергії – 70 %, частка «зелених» проєктів у національних програмах – понад 35 %) та Грузії (відновлювані джерела енергії – 80,3 %) дозволив виокремити ефективні моделі інституційної координації, зокрема створення єдиного органу для екологічного управління. Ідентифіковано ключові бар'єри: розпорошеність повноважень, слабка координація між міністерствами, нестабільна регуляторна база та обмежений доступ до кліматичного фінансування. У дослідженні було підкреслено, що ефективна зелена відбудова України потребує удосконалення механізмів фінансового залучення та адаптації регуляторної бази до стандартів ЄС. Практичне значення дослідження полягало у формулюванні чітких рекомендацій щодо модернізації інституцій. Отримані результати можуть бути використані при розробці національної стратегії зеленої відбудови та в процесі погодження з міжнародними донорами, з урахуванням критеріїв довгострокової екологічної стійкості

Ключові слова: інтеграція; моніторинг; стратегія; енергоефективність; декарбонізація; клімат