

THE EU AND UKRAINE ECONOMIES RESILIENCE TO CLIMATE CHALLENGES

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Abstract: *Climate challenges such as rising temperatures, droughts, floods, and extreme weather events pose systemic threats to agriculture, infrastructure, energy security, and public health. An examination of the vulnerability and readiness level of Ukraine and EU member states to climate change, with both common challenges and regional differences has been presented in the article. The study aims to identify key climate risks, evaluate national adaptive capacities, and propose mechanisms for strengthening economic resilience of EU member states and Ukraine. Findings show that Northern and Western Europe demonstrate the highest resilience, supported by strong institutions, green policies, and investments in infrastructure. In contrast, Southern and Eastern Europe display medium resilience, with Ukraine also falling into this group. However, Ukraine's readiness remains critically low, limiting its ability to respond effectively to climate risks, particularly in the context of ongoing military aggression that amplifies climate-related challenges. To address these threats, the study proposes the "Economic Resilience Shield," which focuses on reducing carbon intensity, expanding renewable energy, improving efficiency, and strengthening adaptation policies.*

Keywords: *climate change, economic resilience, vulnerability, Ukraine, European Union*

1. Introduction

The growing impact of climate change on economic systems is significantly affecting the agricultural, forestry and water management sectors. Rainstorms, floods, hurricane winds, downpours, hail, prolonged droughts, heat waves and "tropical nights" already today in many countries of the world lead to significant economic losses, reduce the productivity of the agricultural sector, worsen business conditions and create additional risks for sustainable development. For the countries of the European Union, the issue of resilience to climate challenges is an integral part of the implementation of the European Green Deal and achieving the goals of climate neutrality, while for Ukraine it is also of strategic importance in the context of post-war recovery, integration into the European economic space and ensuring national security. Accordingly, the study of the resilience of the economies of the EU countries and Ukraine to climate challenges is of strategic importance, since it determines their ability to adapt to environmental transformations, minimize economic losses and ensure sustainable development in the long run.

The topic of climate aspects of resilience has sparked an interest in scientific circles. It has been developed as by Ukrainian researchers as the ones abroad. The analysis provided by Krysovatiy, Maksymova & Kuryliak (2024) covers the analysis of current challenges for the global economy due to climate change, and also emphasizes the strategic role of digitization as a driving force for climate neutrality. Shevchenko (2023) has made an investigation into the EU's multi-level strategies for climate change adaptation and resilience concerning the policy framework, funding instruments, and mechanisms for cooperation among Member States.

Shcherbakova (2025) having analysed the evolution of climate financing, the main sources, directions, and instruments of funding for climate initiatives in Ukraine, states that it is insufficient, unstable, uncoordinated, and not fully adapted to modern challenges caused by climate change.

Fedorchuk (2025) analyses the effects of climate changes on policies and authority relations stating that strategically important tasks and directions of environmental policy of modern states are the activation of both domestic and foreign political cooperation, international cooperation, promotion of environmental awareness and culture of citizens, and environmental diplomacy.

The OECD's *Fast-tracking Net Zero by Building Climate and Economic Resilience: A Summary for Policymakers* (2025) recommends a coherent set of policy levers that include aligning finance with climate goals, scaling demand-side measures, reforming governance, engaging citizens, and investing in climate adaptation to enable resilient emissions reductions and mitigate climate risks while stimulating economic growth.

Munguambe & Aung (2025) research highlights the importance of integrating climate finance into broader structural and institutional reforms to support economic transformation and resilience in vulnerable economies. They find that institutional quality, trade openness, industrial development, and overall economic performance significantly enhance resilience, while the direct impact of climate finance and sustainable investments is statistically minimal.

Hasan, et.al (2025) state that both economic and climate resilience significantly contribute to sustainable development of a nation, underling that proactive resilience policy measures can yield long-term development advantages. Findings of the research also demonstrate that trade openness and financial development significantly boost sustainable economic development, while GDP growth, gross fixed capital formation, and natural resources may obstruct it if not handled prudently.

Costella, et.al. (2023) finds that integrating climate considerations into social protection and labor programs can significantly reduce vulnerability for marginalized populations and enhance economic resilience of a nation, thus underlining the need for a coordinated policy in the social sphere.

Szyja (2025) examines economic resilience to natural hazards at the macroeconomic level, highlighting that shaping economic resilience depends on the risk and vulnerability of hazards and the availability of infrastructure and financial resources for recovery.

The authors of the article propose the hypothesis that the economic resilience of countries to climate challenges is determined by the level of decarbonization, the spread of renewable energy sources, increased energy efficiency, as well as the effectiveness of climate policy and the ability of the economy to adapt to climate change.

The aim of the study is to assess the level of vulnerability and readiness of the economies of Ukraine and EU countries to climate challenges.

The structure of the article is as follows: first, key climate challenges for an economy are analyzed; then, the level of vulnerability and preparedness of Ukraine and EU countries to climate challenges is assessed; finally, the ways to ensure the resilience of national economies to climate change are highlighted.

To achieve the research aim, a combination of general scientific and specific methods was applied. Content analysis was used to examine the key climate challenges affecting the economy at global, European, and Ukrainian levels. Comparative analysis was applied to assess the vulnerability and readiness of Ukraine and EU countries to climate challenges, highlighting commonalities and differences. Statistical analysis was employed to interpret quantitative indicators of climate-related risks, adaptive capacity, and economic resilience. In addition, the systematization and generalization of scientific and policy approaches allowed for the identification of strategic directions to strengthen economic resilience to climate change.

2. Results

2.1 Climate challenges for an economy

Global climate change represents one of the most significant contemporary challenges, drawing attention from the international community. Climate change is the result of the interaction of a number of natural factors and human activity, and is manifested in an increase in the average global

temperature of the Earth's surface and ocean. The consequences of such an increase in temperature are an uneven distribution of precipitation, an increase in the number and intensity of extreme weather events: droughts, floods, hurricanes, flash floods, etc. Over the past decades, the intensity of natural phenomena has increased worldwide, as global temperatures have risen to record levels. Thus, UN experts have concluded that, as the climate changes, droughts, which previously could occur only once every 10 years, now occur 70% more often, while downpours, which previously occurred once every 10 years, now occur 30% more often (UNCCD, 2025). Modern climate challenges and their impact on an economy are presented in Table 1.

Table 1. *Climate challenges and their of impact on an economy*

№	Climate Challenge	Potential Economic Impact	Sectors at Highest Risk
1	Rising air temperatures	Labor productivity reduction, higher energy consumption for cooling, negative impact on crop yields	Industry, agriculture, energy, construction
2	Heat waves	labor productivity reduction, increased healthcare costs	Industry, agriculture, services
3	Droughts	Lower crop yields, water shortages, higher irrigation costs	Agriculture, water management, energy
4	Floods and inundations	Infrastructure damage, business losses, higher recovery costs	Transport, manufacturing, housing and utilities
5	Hurricane winds and storm events	Damage to buildings, energy networks, and logistics	Energy, construction, insurance
6	Hail and other extreme precipitation	Crop and property damage, financial damage to farmers	Agriculture, transport, insurance
7	Sea level rise	Coastal flooding, property losses, higher protection costs	Construction, tourism, port infrastructure
8	Earthquakes	Destruction of buildings and infrastructure, production and business losses, recovery costs	Construction, transport, energy, insurance

Source: developed by the authors

Climate challenges pose a serious threat to the economies of both Ukraine and the EU countries, as their consequences are manifested in various sectors of economic activity and create additional risks for socio-economic stability. For example, an increase in air temperature in the medium and long run leads to a decrease in crop yields, an increase in the problem of water shortage, an increase in infrastructure cooling costs and an increase in the level of morbidity among the population, which negatively affects labor productivity and the health care system. Heat waves and so-called tropical nights are increasing in frequency and duration, they already have a significant impact on the urban economy, require additional cooling expenses and increase the burden on health care systems due to heat stress. Droughts are especially dangerous for the agricultural sector of Ukraine, which has a significant export orientation, and for the EU southern countries with traditionally high dependence on agriculture.

Floods place a huge burden on transport and energy infrastructure, lead to the destruction of housing stock and significant losses for economy, which is especially relevant for Central Europe, where river basins are densely populated and economically active (Fernández, G. & Parker, M. (2025). Strong winds, downpours and hail cause damage to infrastructure, transport networks and energy systems, including renewable energy sources, which reduces energy security. At the same time, earthquakes, although less common in Ukraine, still pose a potential hazard to its western regions, while in southern EU countries (Italy, Greece, Spain) they are an additional risk factor, which, combined with climate change, increases economic vulnerability (Pereira, Mónico, & Rego, 2024). Economic losses and fatalities caused by extreme weather and climate-related events in EU are shown in Table 2.

Table 2. *Economic losses and deaths in the EU caused by climate challenges (1980-2023)*

Country	Total losses (Million EURO)	Loss per sq.km (EURO)	Losses per capita (EURO)	Insured losses (Million EURO)	Insured losses (%)	Fatalities
Austria	14726	175564	1806	2786	19	771
Belgium	16988	553942	1612	6679	39	4693
Bulgaria	5168	46564	650	93	2	265
Croatia	4154	73402	943	101	2	910
Cyprus	441	47626	618	8	2	68
Czechia	18533	234974	1783	2168	12	716
Denmark	8751	203867	1618	5443	62	533
Estonia	332	7333	236	5	15	5
Finland	2380	7034	457	73	3	7
France	129897	203449	2092	46052	35	50461
Germany	180372	504438	2225	54759	30	104544
Greece	16350	124155	1548	849	5	4690
Hungary	10444	112291	1026	587	6	874
Ireland	3955	56542	965	541	14	68
Italy	133934	443373	2311	5916	4	21822
Latvia	1250	19348	544	71	6	88
Lithuania	2283	39976	690	58	3	103
Luxembourg	1262	486143	2694	627	50	170
Malta	51	162361	128	2	4	5
Netherlands	10970	293491	688	4297	39	3918
Poland	20630	66138	545	1379	7	2553
Portugal	16671	180775	1628	578	3	10339
Romania	19628	82335	916	199	1	1445
Slovakia	1956	38983	367	84	4	121
Slovenia	17484	862448	8639	271	2	323
Spain	95966	189662	2258	5243	5	32053
Sweden	3703	8276	406	967	26	44
EU-27	738280			139872		241587

Source: European Environment Agency

Between 1980 and 2023, extreme climate-related events generated estimated economic damages of approximately EUR 738 billion (in 2023 prices) across the European Union. Hydrological disasters, primarily floods, accounted for 44% of these losses, while meteorological events such as storms, lightning, and hail made up nearly 29%. Climatological hazards contributed a smaller share: heatwaves were responsible for around 19% of total damages but caused the vast majority of fatalities (95%), while droughts, wildfires, and cold together represented about 8% (European Environment Agency).

A relatively small proportion of incidents generated the majority of economic losses: the most severe 5% of events were responsible for 61% of the damages, and just 1% of events accounted for 28%. Average annual losses (in constant 2023 euros) rose markedly over time: EUR 8.5 billion in the 1980s, 14.0 billion in the 1990s, 15.8 billion in the 2000s, 17.8 billion in the 2010s, and 44.5 billion between 2020 and 2023. A 30-year moving average confirms this upward trajectory, showing a 53% increase in losses between 2009 and 2023, equivalent to about 2.9% growth per year (European Environment Agency).

In general, the climate challenges create a multi-vector impact on the national economies, forcing governments and businesses to adapt through the implementation of modern risk management technologies, development of protective infrastructure, economic diversification and increased cooperation in the field of climate policy. In particular, the 2021 EU Strategy on Adaptation to Climate Change (European Commission, 2021) aims to increase resilience and ensure that EU is adequately prepared to manage these challenges. It also adapts to the consequences of climate change. Ultimately, the EU seeks to reduce overall monetary losses from weather and climate events.

2. 2. The Analysis of vulnerability and readiness level of national economies to climate challenges

The Notre Dame Global Adaptation Initiative Index (ND-GAIN Index) is a global indicator developed by the University of Notre Dame (USA) that measures the vulnerability of countries to climate change and their readiness to adapt to its consequences. Vulnerability Index assesses the exposure rate of a country to climate change and their dependance on climate-sensitive sectors (food security, water resources, health, infrastructure, ecosystems, housing). Readiness Index reflects a country's ability to use investments and resources for adaptation, taking into account economic, social and political factors. The index ranges from 0 to 100 and shows which countries are most vulnerable and least prepared, and which have the best opportunities to be resilient to climate challenges. The ND-GAIN Index ranking for Ukraine and the EU in 2023 is given in Table 3.

Table 3. *ND-GAIN Index for Ukraine and EU in 2023*

No	Countries	ND-GAIN Index	Vulnerability Index	Readiness Index
1.	Finland	74.8	0.280	0.776
2.	Denmark	72.7	0.347	0.802
3.	Sweden	71.1	0.317	0.739
4.	Germany	69.6	0.301	0.694
5.	Austria	67.9	0.295	0.654
6.	Luxembourg	67.7	0.311	0.665
7.	France	67.2	0.304	0.648
8.	Netherlands	66.7	0.354	0.687
9.	Estonia	64.2	0.334	0.619
10.	Ireland	64.1	0.316	0.597
11.	Czech Republic	62.9	0.264	0.522
12.	Belgium	62.8	0.335	0.592
13.	Slovenia	62.8	0.314	0.571
14.	Portugal	61.5	0.318	0.548
15.	Poland	60.5	0.306	0.515
16.	Lithuania	60.2	0.360	0.564
17.	Spain	60.1	0.305	0.506
18.	Latvia	59.5	0.360	0.549
19.	Italy	58.8	0.342	0.518
20.	Greece	58.0	0.337	0.498
21.	Cyprus	56.0	0.359	0.478
22.	Malta	55.9	0.320	0.437
23.	Slovakia	55.2	0.360	0.464
24.	Hungary	54.6	0.353	0.445
25.	Croatia	53.6	0.380	0.452
26.	Bulgaria	53.2	0.354	0.419
27.	Romania	51.4	0.412	0.441
28.	Ukraine	51.2	0.365	0.388

Source: Notre Dame Global Adaptation Initiative.

A high level of the ND-GAIN Index, corresponding to the range from 60 to 100 points, is demonstrated by most countries of Western and Northern Europe, among which the leaders are Finland (74.8 points), Denmark (72.7 points) and Sweden (71.1 points). These can be explained by developed institutions, a high level of economic development, systematic climate policy and investments in infrastructure. This group also includes Germany, Austria, Luxembourg, France, the Netherlands, Estonia, Ireland, the Czech Republic, Belgium, Slovenia, Portugal, Poland, Lithuania and Spain, which indicates the dominance of high standards of adaptive capacity in the EU.

In contrast, the medium level, with range of indicators from 40 to 59 points, is typical for the countries of Southern and Eastern Europe, including Latvia, Italy, Greece, Cyprus, Malta, Slovakia, Hungary, Croatia, Bulgaria and Romania. Ukraine also belongs to this group with an indicator of

51.2 points.

Thus, the EU as a whole demonstrates a sufficient resilience to climate change, but there is a regional asymmetry between the North and the West, that are leading, and the South and the East, which have medium results.

Analysis of individual components of the Vulnerability and Readiness indicators allows for a more detailed assessment of the position of Ukraine and the European Union member states in climate resilience (table 4). According to the ND-GAIN Index methodology, low vulnerability values indicate lower sensitivity to climate risks, while high readiness values demonstrate better capacity of society and the economy to climate adaptation.

Table 4. Classification matrix of EU member states and Ukraine by the levels of vulnerability and readiness to climate challenges

Readiness	Countries		
High level (> 0,6)	-	-	Finland, Denmark, Sweden, Germany, Austria, Luxembourg, France, Netherlands, Estonia,
Medium level (0,6-0,4)	-	Romania	Ireland, Czech Republic, Belgium, Slovenia, Portugal, Poland, Lithuania, Spain, Latvia, Italy, Greece, Cyprus, Malta, Slovakia, Hungary, Croatia, Bulgaria.
Low level (< 0,4)	-	-	Ukraine
Vulnerability	High level (>0,6)	Medium level (0,6-0,4)	Low level (< 0,4)

Source: systemized by the authors according to Notre Dame Global Adaptation Initiative.

The majority of countries in Western and Northern Europe, including Finland, Denmark, Sweden, Germany, Austria, Luxembourg, France, the Netherlands and Estonia have a high readiness level (over 0.6). At the same time, these countries demonstrate a low vulnerability level – ranging from 0.28 to 0.36, that forms their leading position in the world ranking. Medium level of preparedness (0.6–0.4) is observed in Ireland, the Czech Republic, Belgium, Slovenia, Portugal, Poland, Lithuania, Spain, Latvia, Italy, Greece, Cyprus, Malta, Slovakia, Hungary, Croatia and Bulgaria. At the same time, the vulnerability level in these countries is within the low level (0.3–0.4), which means that additional measures are needed to enhance resilience, in particular investments in infrastructure modernization and improvements of risk management system. Romania is the only EU country with the medium level of both vulnerability and readiness to climate challenges.

Ukraine demonstrates a low level of vulnerability (0.365) and a low readiness level (0.388), which indicates that the country as a whole is less susceptible to certain negative climate impacts, but its capacity to respond effectively and adapt to climate change is limited. This combination of indicators highlights the need to strengthen preparedness mechanisms, increase resource and institutional capacity to reduce the potential consequences of climate impacts.

2.3 Directions for ensuring an economy resilience to climate change

The global climate crisis is a systemic problem, so its solution requires organizational steps at the international and national levels. In 2015, Ukraine and the EU member states, together with other countries of the world, signed the Paris Climate Agreement - a document by which all signatories agreed to reduce their impact on climate change and prevent the average global temperature from rising higher than 1.5-2°C above pre-industrial levels (mid-19th century) (Council of the European Union, n.d.). To assess the countries actual progress in fulfilling their commitments and the effectiveness of their climate policy, the international Climate Change Performance Index tool is used annually, which allows comparing the achievements of countries in reducing emissions, developing renewable energy, increasing energy efficiency, and forming effective climate policy (Germanwatch, n.d.).

The Climate Change Performance Index (CCPI) is an international analytical tool published annually by Germanwatch, NewClimate Institute and Climate Action Network (CAN International) since 2005. The CCPI assesses and compares the climate protection performance of 63 countries and the European Union (EU), which together account for over 90% of global greenhouse gas (GHG) emissions. The CCPI uses 14 indicators grouped into four categories:

- GHG Emissions (40%) – emission dynamics, per capita emissions, compliance with climate goals.
- Renewable Energy (20%) – development of "green" energy, share of renewables in the energy consumption structure.
- Energy Use (20%) – efficiency, per capita energy consumption, trends.
- Climate Policy (20%) – national and international government policy, expert assessments of its ambition and effectiveness.

Countries are ranked from 1 to 100. The values of the Climate Change Performance Index for Ukraine and the EU member states in 2025 are given in Table 5.

Table 5. *The Climate Change Performance Index for Ukraine and EU countries in 2025*

№	Countries	Points	Levels
1.	Denmark	78.37	High
2.	Netherlands	69.60	High
3.	Sweden	67.62	High
4.	Luxembourg	67.29	High
5.	Estonia	66.79	High
6.	Portugal	66.59	High
7.	Germany	64.91	Medium
8.	Lithuania	63.05	Medium
9.	Spain	61.57	Medium
10.	Greece	59.41	Medium
11.	Austria	59.40	Medium
12.	France	59.18	Medium
13.	Ireland	57.17	Medium
14.	Slovenia	57.16	Medium
15.	Romania	56.45	Medium
16.	Malta	55.78	Medium
17.	Belgium	54.89	Low
18.	Latvia	54.35	Low
19.	Finland	54.24	Low
20.	Croatia	51.83	Low
21.	Italy	49.81	Low
22.	Cyprus	49.45	Low
23.	Hungary	48.81	Low
24.	Slovakia	48.44	Low
25.	Poland	47.86	Low
26.	Czech Republic	47.57	Low
27.	Bulgaria	47.13	Low
	European Union	63.76	Medium

Source: Climate Change Performance Index. (n.d.).

The Climate Change Performance Index shows significant differences in the effectiveness of overcoming climate change among EU member states in 2025. The leaders in this indicator are Denmark with 78.37 points, the Netherlands – 69.60, Sweden – 67.62, Luxembourg – 67.29, Estonia – 66.79 and Portugal – 66.59, which reflects the high level of preparedness of these states for climate challenges and the effective implementation of measures to reduce emissions and develop renewable energy. The medium level of effectiveness is in Germany, Lithuania, Spain, Greece, Austria, France, Ireland, Slovenia, Romania and Malta, demonstrating the presence of climate policies, but with significant potential for improvement. Countries with low performance, including Belgium, Latvia, Finland, Croatia, Italy, Cyprus, Hungary, Slovakia, Poland, the Czech Republic and Bulgaria, have

serious gaps in implementing measures to reduce emissions and adapt to climate change. The medium value of the index for the EU is 63.76, which reflects the overall medium effectiveness of the EU in overcoming climate change. For Ukraine, which is not currently represented separately in the ranking, integration into European climate practices requires a focus on reducing emissions, developing green energy and increasing preparedness for climate risks, which will allow it to improve its position and effectiveness in the context of European standards.

Given the need to adapt national economies to the consequences of climate change and reduce their vulnerability to extreme natural phenomena, Figure 1 shows the directions for ensuring the resilience of an economy to climate change. The directions include reducing and decarbonizing emissions, developing renewable energy sources, increasing energy efficiency, and implementing effective climate policies. Thus, these directions form the so-called “Economic Resilience Shield”, which protects the country from the negative consequences of climate change, reduces the vulnerability of critical sectors, and increases readiness for extreme natural phenomena.

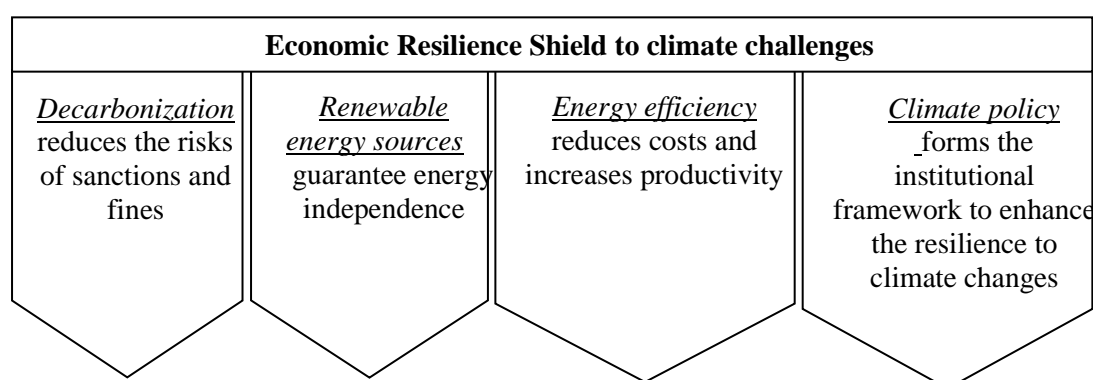


Figure 1. The directions to enhance an economy resilience to climate challenges
Source: developed by the authors.

The reduction and decarbonization of emissions involve a gradual decrease in greenhouse gas volumes through industrial modernization, the phasing out of coal-based power generation, the development of low-carbon technologies, and the introduction of carbon regulation mechanisms. Accordingly, this in turn reduces the vulnerability of the economy to international climate restrictions (for example, CBAM (Carbon Border Adjustment Mechanism) in the EU) and creates conditions for “green” integration into global markets. Ukraine has committed to achieving climate neutrality by 2060, but the pace of decarbonization remains uneven (Ecoaction, n.d.). The largest sources of emissions are energy sector, metallurgy and transport. The war caused a paradoxical effect, which shows a partial reduction in emissions due to a drop in industrial production, but at the same time an increase in emissions in the military sector and due to the destruction of infrastructure. An urgent challenge is adaptation to the EU's CBAM, as Ukrainian metallurgical and chemical enterprises must reduce their carbon footprint in order to maintain access to European markets (European Commission-Taxation and Customs Union. (n.d.).

The European Union is implementing the European Green Deal, which envisages reducing emissions by 55% by 2030 (compared to 1990) and achieving climate neutrality by 2050. (European Commission, n.d.). The introduction of CBAM stimulates external partners to accelerate decarbonization. The EU is actively investing in the development of carbon markets, implementing the EU Emissions Trading System (EU ETS) and preparing to extend it to transport and construction sectors. Development of renewable energy sources is aimed at increasing the share of solar, wind, bio- and hydropower in the energy consumption structure. Accordingly, this strengthens energy security, reduces dependence on imported fossil resources, stimulates investment and creates new jobs in the "green" sector of the economy. In Ukraine, the share of renewable energy sources in the

overall energy balance reached approximately 12% before the war, but the conflict has led to the destruction of a significant number of solar and wind power plants (Cahill, B., & Dawes, A., 2022). Despite this, the development of renewable energy sources is a key area of energy security and integration with the EU. Ukraine has a high potential for solar and wind generation, as well as bioenergy (including the agricultural sector). The EU has an ambitious goal of achieving 42.5% of renewable energy sources in energy consumption by 2030. The EU finances the development of trans-European energy networks and invests in “green” energy storage technologies. Ukraine can integrate into these processes through synchronization with ENTSO-E and the development of projects in the field of hydrogen energy.

Increasing energy efficiency and rational consumption is aimed at reducing the energy intensity of GDP through the modernization of industry, insulation of the housing stock, the development of electric transport and the introduction of digital technologies for energy consumption management. Accordingly, this allows the economy to withstand external price shocks and ensures competitiveness in the long run. The Ukrainian economy is one of the most energy-intensive in Europe (energy consumption per unit of GDP is 2–3 times higher than the EU average).

The greatest potential for improving energy efficiency lies in the residential and communal sector (building insulation, modernization of heat supply systems). Existing programs such as “Enerhodim,” the Energy Efficiency Fund, and “warm loan” schemes are initial steps, but they need to be scaled up. In wartime conditions, energy conservation amid infrastructure destruction is also crucial (modernization of boiler houses, mobile heating systems, and microgrid solutions).

The EU considers energy efficiency as the “first fuel resource” and prioritizes reducing energy consumption. The goal is to increase energy efficiency by at least 11.7% by 2030. Large-scale investments are aimed at building insulation, digital energy management systems, the development of “smart” grids and electric transport. It is important for Ukraine to implement EU directives on energy efficiency (especially in the building sector) in order to integrate into the EU energy market.

Institutional and regulatory climate policy covers the development and implementation of national strategies for decarbonization, adaptation to climate change, and integration of climate goals into all areas of economic policy. Important components include development of a system of “green” financing, participation in international climate agreements, and transparency in the implementation of climate initiatives. Ukraine has joined the Paris Agreement and committed to reducing its emissions by 65% by 2030. The Strategy for Environmental Security and Adaptation to Climate Change by 2030 has been adopted. However, there are a number of problems, such as the fragmentation of the institutional system, insufficient funding, weak integration of climate goals into industrial policy. The war made climate policy secondary, but the post-war reconstruction provides a chance to shift to a “green recovery” with the support of the EU and international partners.

The EU has a coherent and institutionally strong climate policy, based on the European Green Deal, the Fit for 55 package (Council of the European Union. (n.d.)b., as well as the European Climate Law, which legally states climate neutrality by 2050 (European Commission, n.d.).

Considerable attention is paid to “green finance”, in particular through the classification system “EU Taxonomy” and introduction of green bonds European Commission. (n.d.) c.

The EU is also actively funding partner countries, including Ukraine, to help adapt their economies to new climate requirements. Thus, in both cases these directions are interconnected, as Ukraine follows the EU’s lead, while European policy creates both challenges for Ukraine (CBAM, competition for “green” investments) and opportunities (access to funds, integration into the “green” market).

3. Conclusion

Climate change has become an inevitable challenge for all countries of the world due to its global nature and large-scale consequences for natural, economic and social systems. Rising average temperatures, melting glaciers, sea-level rise, and the increasing frequency of extreme weather

events are not confined by national borders and affect the entire world. The processes that are already taking place are practically inevitable, and their consequences can affect the environment for decades, which reinforces the need for adaptation and increasing resilience.

The study has proved that climate change forms a set of challenges for the economy, among which the key ones are rising energy costs, risks to food security, threats to the functioning of infrastructure and a decrease in the competitiveness of individual industries. In terms of their scale and consequences, climate challenges are comparable to wars and pandemics, as they can cause significant economic losses, destruction of infrastructure, mass migrations and exacerbation of socio-political tensions.

The analysis of the level of vulnerability and readiness showed that the leaders in the field of climate resilience remain the countries of Northern and Western Europe, while Southern and Eastern Europe demonstrate medium results. Unlike most EU countries, where even under conditions of medium vulnerability, sufficient readiness to counter challenges is ensured, Ukraine is characterized by a low readiness level, which limits its ability to respond effectively to climate risks. Accordingly, there is a need to implement significant environmental reforms, intensify green transformation and attract international support, because the current relatively low level of vulnerability does not guarantee the absence of new climate challenges in the future.

It is worth noting that Russian military aggression in Ukraine affects climate change with both direct and indirect consequences. For example, the destruction of energy, industrial and transport infrastructure leads to uncontrolled emissions of greenhouse gases, and the active use of military equipment and transport significantly increases CO₂ and methane emissions. Damage to forests, water bodies and agricultural lands reduces the ability of natural ecosystems to absorb carbon, causing soil degradation and loss of biodiversity. The destruction of cities and industrial facilities also leads to the accumulation of toxic waste and debris, which pollutes soil and water bodies. In addition, rising energy prices in the world are stimulating a transition to cheaper but more carbon-intensive energy sources, which may slow down global efforts to combat climate change. Thus, the war in Ukraine has a significant both local and global impact on climate processes, increasing risks for economies and natural ecosystems. To ensure the resilience of the economy to climate change, the study proposes an “Economic Resilience Shield”, which is relevant for every country in the world. Accordingly, the “Economic Resilience Shield”, formed on the basis of the calculation methodology of The Climate Change Performance Index, covers reducing the carbon intensity of the economy, expanding the share of renewable energy, increasing energy efficiency, and improving environmental policy and adaptation mechanisms.

Further research on this issue will be aimed at modeling scenarios for the adaptation of the economy to climate change and assessing the socio-economic consequences of such measures.

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