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Climate Neutrality in Economics

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DIGITALIZATION-BASED INTEGRATION OF CLIMATE POLICIES OF UKRAINE AND THE EU

Abstract

The article investigates the problem of climate policy integration between the European Union and Ukraine, taking into consideration the current targets of climate-resilient development and the possibilities for digitalization of the components of this process. The author performs a systematization of the modern programme documents and mechanisms that are fundamental to the implementation of climate policies in the EU and Ukraine. The author also highlights the innovations of the «Fit for 55» programme and identifies the EU's climate policy targets for the coming decade. In particular, the author performs an analysis of the potential impact of the Carbon Border Adjustment Mechanism (CBAM) on Ukrainian producers. The findings of the study show that the existing pace of emissions reductions in line with Nationally Determined Contributions of Ukraine and the EU is insufficient to achieve the net-zero level of emissions and to build the climate-neutral economy before the internationally adopted milestone years of 2030 and 2050. The author substantiates the need for climate policy intensification through imposition of stricter restrictions on GHG emissions, as well as determines the expediency of increasing Ukraine's NDC2 from 65% to at least 72%, which would ensure the sufficient pace of climate strategy implementation that would align

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with the Paris Agreement. Digitalization in this article is viewed as a tool, a process and an enabling environment for acceleration of climate-friendly changes, as well as a factor of overcoming the barriers to integration between the climate policies of the EU and Ukraine.

Key Words:

climate policy; climate-neutral economy; digitalization; Ukraine; the EU; CBAM; NDC2.

JEL: F29, O14, O57.

2 figures, 23 references.

Introduction

Addressing global climate challenges calls for joint and coordinated action by the global community, given the all-encompassing scope of the problem and the intensifying negative impact of most industries on the planetary ecosystem. Over the recent decades, the European Union has been acting as the headliner of international initiatives to combat climate change and facilitate «green transition» of the world economy. However, despite broad spread of the European Green Deal paradigm, the speed of change remains insufficient to achieve the net-zero emissions level, prevent irreversible climate changes and build a climate-neutral economy in accordance with the Paris Agreement (United Nations Environment Programme, 2022). An important factor behind this lagged progress is the lack of coordination between climate policies of different countries, in particular insufficient agreement between individual regional and industry development programmes in the context of applying unified climate governance standards and instruments (Wendler, 2022; Nascimento et al., 2022).

This problematic is especially relevant for Ukraine in view of its proactive aspirations for European integration and partnership with the EU in many sectors of modern industry. In accordance with the EU-Ukraine Association Agreement of

2014 (with amendments made in 2018 and 2021), as well as the 2022 EU-Ukraine Agreement about Ukraine's participation in the EU's LIFE Programme, the Ukrainian government has committed itself to a number of important obligations in the field of environmental protection and creation of the «green» economy based on principles of sustainable development. This has become a cross-cutting vector shaping Ukraine's policy of European integration, the effective implementation of which requires enhanced intergovernmental cooperation between Ukraine and the EU in the sphere of combatting climate change through transformation of national industry. The issue of finding mechanisms to accelerate this process remains unresolved. However, it should be noted that the process of «green» transition of the modern economy takes place against the backdrop of all-inclusive mainstream idea of digital transformation of the society, which creates grounds for looking into the potential of digitalization as not only the factor of industrial and technological development, but also as an efficiency-enhancing climate policy instrument.

Literature Review and Problem Statement

Modern scientific discourse distinguishes several streams of research on the imperatives of forming effective climate policies in the EU and their implementation in Ukraine.

The EU has traditionally been viewed as one holding the position of authority and powerful regulatory force in disseminating the paradigm of «green» transition among countries that take part in climate agreements (Delreux & Ohler, 2019).

In Ukraine, such a narrative of the EU climate policy is framed through mechanisms of contagious, procedural, information, normative, and cultural influence (Hutsaliuk, 2022). The priority direction for such integration of the EU climate policy is sectoral implementation of ecological standards into separate industries of Ukraine (Halushkina et al., 2018).

The European Green Deal is viewed as a pathway to change in global consumption models, while integration of climate policy in Ukraine – as an opportunity for the national economy to enter the new markets for «green» products and energy (Ivasechko & Melnyk, 2021).

When considering the global significance of the European Green Deal, a group of scientists (Mercure et al., 2021) has shown that the spread of the EU climate policy has a considerable impact on the key macroeconomic indicators of the regions of the world. In particular, the authors note that if the world economy achieves net-zero emissions by 2050, the shrinkage of emissions-intensive industries will cause considerable losses among large business actors, resulting in

substantial industrial transformation. On the other hand, some authors suggest that although full decarbonisation of the EU economy by 2050 is unattainable, the postponement of this deadline for the world economy can lead to irreversible climate changes and start of the worldwide struggle for natural resources (Jordan & Moore, 2022; Sovacool, 2022).

Even though the European Green Deal-related issues are broadly covered and major international attention is focused on the insufficiency of the existing pace of decarbonisation, the question of finding ways to accelerate this process remains insufficiently studied. Boasson and Tatham (2023) propose three possible models of green transition for the world economy – the market model, the public model and the technological model. It is the technological aspect which attracts increased attention of the scientists. Digitalisation is viewed as the driver of industrial development of our mankind, a tool for production process optimisation and a source of innovations, including those meant to mitigate the consequences of climate change (Boasson & Tatham, 2023).

The idea of the effectiveness of twin green and digital transition has been suggested in a number of studies (Bauer et al., 2021; Nativi et al., 2021) and reports of the European Commission (2022). The implementation of national climate policies and digitalization programmes in a concurrent and coordinated manner can have mutually-enhancing results when countering climate change. However, the global discourse lacks an integrated framework for such integration to take place at the level of national economy. The importance of reassessing the international system of «eco-digital» linkages for achieving the decarbonisation targets is considered in the works by Geels et al. (2017), Victor et al. (2019), Boasson et al. (2023), Hushko et al. (2021). The authors emphasize the need to fundamentally reconstruct global socio-technological clusters in the sectors of electrical power generation, manufacturing, agriculture, transport, and heating, as well as to develop international sectoral policies and introduce national incentives in order to boost technological progress in these industries. This needs clear awareness of the role of digitalisation in the implementation of climate policies and formation of the digital paradigm of green transition of the economy.

On the other hand, the study of practical opportunities offered by digitalization in implementing international climate projects remains to be a relevant issue. Although the European Union is a flagship of the world movement towards climate neutrality and the originator of the idea of digital and green transition, the mechanism of applying digital instruments in the context of integration of climate policies of the EU and its partner countries has not been sufficiently revealed.

The goal of this article consists in developing substantiation for the imperatives and the mechanism of implementing the policy of climate neutrality of the economy, taking into account the time frames set by international agreements and on the conditions of using digitalization and enhancing the integration of climate policies of the EU and Ukraine.

Methodology

The methodology of this study uses a combination of the methods of empirical and applied analytics. The starting point for this work was to carry out systemic generalization, arrangement and systematization of the legal and regulatory documents forming the basis of climate policies in the EU and Ukraine for purposes of deductive analysis, identification of key factors and logical interrelationships. The authors also uses analytical methods for assessment and modelling of the dynamics of greenhouse gas emissions reduction by the economies of the EU and Ukraine, in particular trend analysis and correlation- regression analysis. The methodological approach stipulated for the collection and generalization of statistical information based on the data of Eurostat, as well as of the international climate organization Climate Action Tracker (CAT).

The checkpoints for purposes of scenario calculations were set to years 2030 and 2050 as the key milestone years for performance monitoring and reporting established under the EU Roadmap on Climate Neutrality and the Paris Agreement. The required volumes of emissions reductions were calculated in accordance with the following international methodologies:

- the norms on emissions reductions determined by the Paris Agreement for the EU countries and Ukraine as signatories to this agreement;
- Nationally Determined Contributions (NDC) of the EU and Ukraine;
- the CAT methodology developed by the respective international organization, which provides for calculations of emissions norms based on the dynamics of emissions and potential possibilities of the countries and global climate policies. This methodology provides for calculation of the optimistic (sufficient) scenario and a pessimistic (critically insufficient) scenario (CAT, 2023). Thus, for Ukraine, the green band for emission cuts was determined within the range of 55.7% and 75.1% in 2030 and between 49.6% and 87% in 2050;
- the forecast for Ukraine prepared by the International Energy Agency together with the Intergovernmental Panel on Climate Change with support granted by the EBRD (2020).

The results of calculations were used to study the dynamics of percentage change in the annual volumes of emissions in order to perform their comparison in time and to draw conclusions with respect to the possibility of achieving the net-zero level of emissions by the milestone years of 2030 and 2050.

Research Results

At the present stage of industrial development, the world climate policy involves multi-level interactions among different actors of international relations through creation and spreading of a system of comprehensive measures, instruments and strategic programmes on reduction of the negative impact of human activity on climate, in particular regulations on GHG emissions, transition to energy-efficient technologies and renewable sources of energy.

After signing the Kyoto Protocol, the European Union has become the undisputed leader of the global movement for «green» development by actively disseminating climate-related values and proposing integrative mechanisms for international cooperation within programmes on combatting climate change. The modern climate policy of the EU rests upon a whole set of regulatory documents, programmes and communications on climate-resilient development, among which it is worth paying attention to the following: first of all, the Paris Climate Agreement of 2015, the comprehensive European Green Deal programme of 2019, the New EU Industrial Strategy of 2020, and the EU Roadmap to Climate Neutrality of 2021. An important contribution to strengthening of the EU climate policy was made by the single «European Climate Law» adopted by the European Parliament and the Council of the European Union in April 2021. This document sets out to achieve climate neutrality of the economy of the EU by 2050 as the key goal of the European policy, as well as establishes the regulatory and legal mechanisms to ensure gradual reduction of greenhouse gas emissions by all industries.

The analysis of the mentioned programmes and documents shows a gradual, yet clear shift in the focus of European climate policy from declarative statements and eco-populism towards implementation of practical regulatory mechanisms, criteria and performance indicators that convey the general «polluter pays principle» to both the EU member countries and their economic partners. This tendency is corroborated by previously implemented «20-20-20», «Winter package» and «Clean energy for all Europeans» climate programmes, which put forth clear standards on emissions reductions and renewable energy use for all players of the European economic space.

In this context, it is necessary to give special consideration to the recently approved programme package «Fit for 55», which features a profound extension of climate standards to all industrial sectors of the EU, offers a new concept of socioeconomic development and contains a programme of measures with respect to reduction of greenhouse gas emissions by 55% by 2030 and reaching the net-zero level by 2050 (European Commission, 2021). Upon closer examination of this document, we were able to identify the following imperatives that will

form the basis for the climate policy of the European Union in the coming decade:

First, setting stricter requirements on energy efficiency and developing the basis for a hydrogen economy: The established performance criteria aim to achieve a 1.5% reduction in energy consumption in the EU countries, as well as to perform rapid energy modernization of at least 3% of the total stock of residential housing and construction objects annually.

Second, transforming the automotive industry by transitioning it to electrical engines or alternative hydrogen technologies: The «Fit for 55» package stipulates for a complete phase-out of the sales of petrol and hybrid cars by 2035, as well as introduces regulations on the rapid expansion of the infrastructure for electric transport and considerable transformation of fuel distribution networks.

Third, expanding the emissions trading system (ETS) to cover all types of transport, including shipping and aviation, which have so far managed to avoid rigorous restrictions: This step will certainly have an effect on the transformation of the EU logistics system and trade due to increased costs of freight transport.

Fourth, increasing the tax burden on emissions through implementation of the Carbon Border Adjustment Mechansim that stipulates for imposition of a considerable tax on carbon footprint of the products placed on the EU markets: In fact, CBAM imposes additional tax charges on imports of ecologically dirty products that do not comply with the system of carbon norms, which will be transported through the territory of the European Union. At the present, the stringent mechanism of CBAM is applied to the most ecologically unsustainable industries, including metallurgy (steel and iron), cement, fertilizers, and energy industries. The programme stipulates for the monitoring of climate polluting producers to be started by the end of 2023 and the CBAM payments to be introduced by the early 2026.

Fifth, encouraging the financial support policies and expanding their sources: Taking into account the considerable volume of financial resources needed for the realisation of the above-mentioned initiatives, the novelty of the EU programme, on the one hand, consists in creation of the new Social Climate Fund, which will accumulate the material support of the European market participants through the prism of social responsibility and based on the principles of new emissions authority. On the other hand, the EU regulates the mechanism of scaling up the active Innovations and Modernisation Funds through concentration of collected CBAM taxes and cash funds accumulated from issued emissions allowances.

The outlined priorities of the modern climate policy of the EU create significant challenges for national economies of the EU member states and partner countries, particularly because of the need to undertake high-technology transformation of major industries, primarily in the resource-dependent and energy-

intensive sectors of the economy. In view of this, the EU climate policy is considered within the fairway of digital development programmes such as «Digital Europe» and «EU Green Data».

The key imperative for such interaction is the creation of cross-border information flows, digital platforms, products and services in order to increase the effectiveness of implementation of the climate initiatives. On the other hand, thanks to implementation of the digital communication dimension, the current climate policy of the EU, apart from increased economic impact, will be able to use such a powerful lever of public pressure as «naming-shaming» of the companies that do not comply with the principles of environmental responsibility. This will create additional reputational and business risks for companies in the partner countries, for which the EU standards of climate neutrality are an overly complex task.

For Ukraine, all the mentioned trends in the climate policy of the EU serve as reference points for the development of the national climate governance pathway and for the strategic development of the economy in the fairway of the Eurointegration processes.

Following the ratification of the Paris Agreement by Ukraine in 2016, the national climate policy has been actively adopting the experience of international agreements in the sphere of climate change, as corroborated by the whole set of national programmes, in particular «The national action plan on energy efficiency by 2030», «The conception of energy strategy of Ukraine by 2035», «National strategy of environmental security and adaptation to climate change by 2030». The mentioned documents mirror the doctrine of the European Green Deal and form the overall concept of Ukraine's development taking into consideration the environmental imperatives.

A significant step forward in the sphere of emissions regulations was made with the development of the Law of Ukraine «On the principles of monitoring, reporting and verification of greenhouse gas emissions», as well as «The strategy of low-carbon development of Ukraine by 2050». These are the documents that lay the foundations for the creation of the system of trade in quotas on GHG emissions in Ukraine. This step is extremely important for the development of climate-neutral economy and integration into the European space in view of the introduction of the CBAM mechanism in 2026.

The adoption of the Carbon Border Adjustment Mechanism on imports will directly affect Ukrainian exporters of steel, iron, chemical fertilizers, and electricity. These industries are among the most powerful engines of the Ukrainian economy. However, due to climate aggressiveness of production, they are subject to strict regulations and additional tax on carbon footprint. According to preliminary analytical forecasts, additional financial load on producers of steel and cast iron in Ukraine due to CBAM is estimated to be €300 to €900 million per year given the volume of supplies of 5.5 million tons, with the price of emissions

varying in the range from 25 to 75 euros per ton (Khabatiuk & Andrusevych, 2021).

It should be noted that, taking into account the pre-war potential of national production, the products of mining and metallurgy industry account for 85% of Ukraine's total exports of CBAM-covered products and for 11% of Ukraine's total exports to the EU. In view of the military and political context, at the initial stage of policy implementation, CBAM will not be able to significantly weaken the positions of Ukrainian steel producers compared to their competitors from the Russian Federation and China, but in strategic perspective, the low level of decarbonisation of production can become not only a considerable financial burden, but also a reputational barrier to trade with the EU from the climate responsibility perspective.

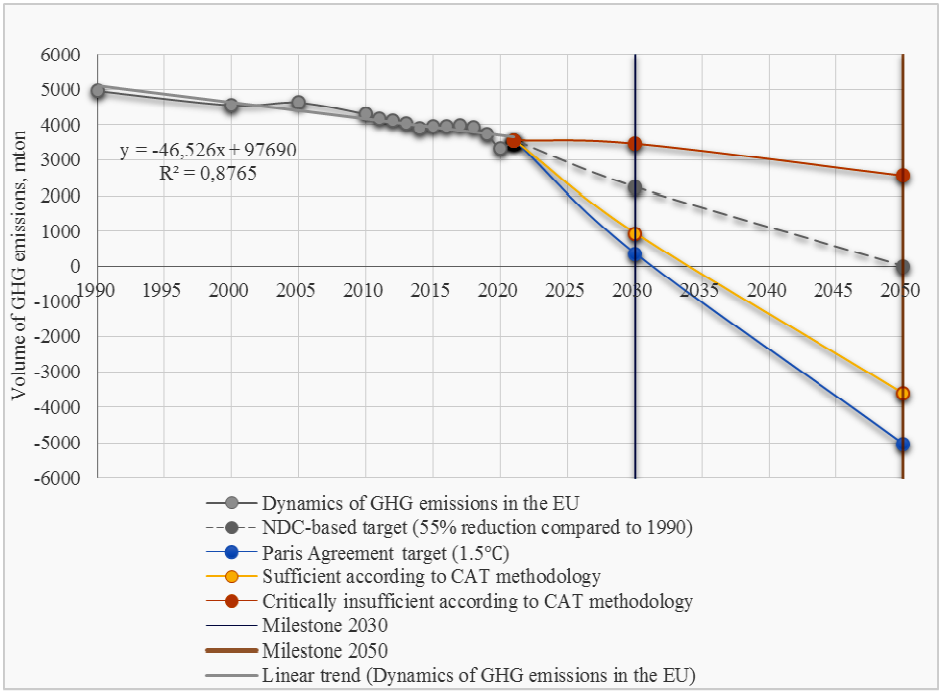
When considering the climate policies of the EU and Ukraine in the context of their integration and fulfilment of obligations under international climate agreements, the key criterion of their effectiveness is the volume of greenhouse gas emissions produced by the national industry itself. Modelling the dynamics of GHG emissions in the EU and Ukraine revealed their significant variations under different decarbonisation scenarios and the impossibility for the EU to fulfil the Paris Agreement by the milestone years of 2030 and 2050 (Figures 1 and 2).

As we can see, the EU economy is confidently moving towards its climate neutrality targets, but considerable differences can be observed with respect to criteria on emissions reduction. This puts into question whether the economy will attain its decarbonisation targets by 2030 and 2050 as stipulated by the Paris Agreement. It should be noted that this scenario needs a much more stringent climate policy in what concerns restrictions on emissions and energy efficiency, as it aims to maintain the growth of global warming below 1.5℃. The current pathway taken by the EU seems to be more realistic – it stipulates that the countries will be able to achieve a reduction in emissions already in 2030, given the nationally-determined contribution of 55% compared to 1990 (or 37.2% compared to 2021), and reach the net-zero level in 2050.

However, such a scenario is not sufficient in view of the irreversible environmental impacts of industrial activity and will not allow keeping the pace of global warming within the required range. As envisioned by the international climate organization CAT, the EU should not only achieve the net-zero level of emissions, but also demonstrate their negative dynamics by 2050, which will prove not only that the «green» production process will be put in place, but also that the process of absorption of greenhouse gas from the surrounding environment will be taking place. The need for urgent implementation of such a policy is preconditioned by the fact that the EU together with the United States and China are the top three leaders of world production and major emitters of carbon dioxide.

Figure 1

The dynamics of reaching climate neutrality by the EU economy



Source: designed by the author based on data of the EBRD (2020), Eurostat (2022), CAT (2023).

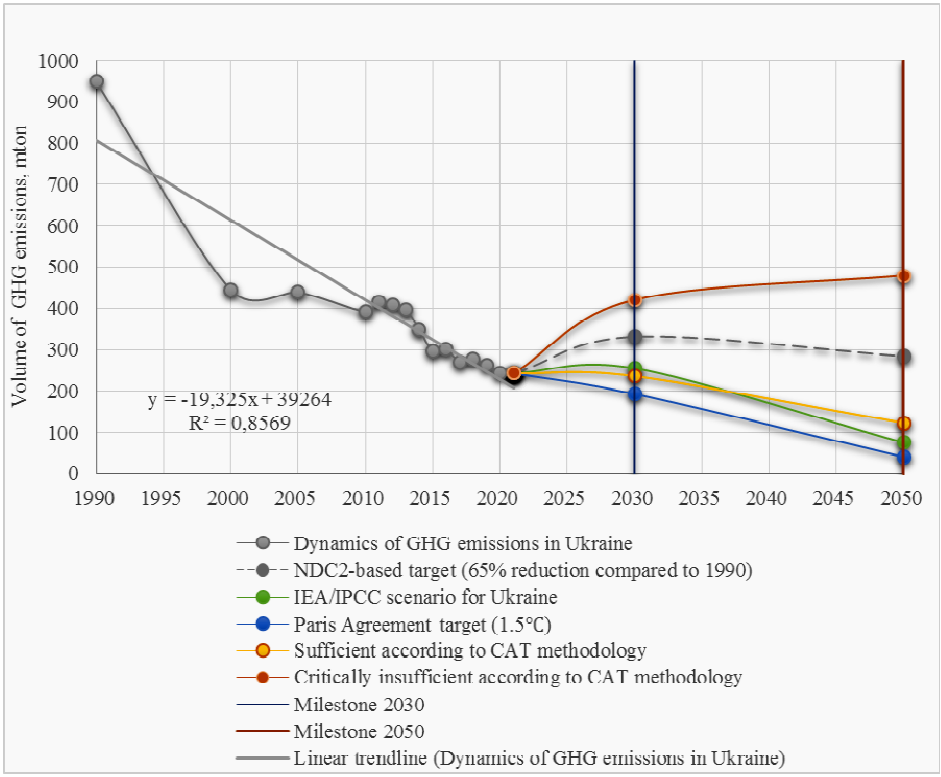
However, in order to achieve such pace of decarbonisation, the measures of climate policy in the EU have to ensure a 73% reduction in emissions already in 2030 (compared to 2021), whereas by 2050 the level of carbon offsets in the ecosystem should reach nearly 3,600 Mtpa, which is equivalent to the amount produced by the EU industries today. In other words, in order to ensure that the programmed climate pathway is maintained, the EU economy has to decrease its carbon footprint by nearly a factor of 4 within the coming 8 years (by 327 Mt per year). This will require that the EU economy makes a considerable «climate leap» towards neutrality in view of the fact that according to dynamics observed over the last decade, the rate of emissions reductions in the EU amounted to 46.5 Mtpa on average, which is seven times less than it should have been. The said observations corroborate the feasibility of introducing the instruments for acceleration of climate change. Digital transformation of the industry can be con-

sidered as a driver that can speed up global decarbonisation and create new opportunities for increasing the efficiency of resource use and overall energy efficiency of production, reduction of GHG emissions and adoption of new technologies of their absorption, as well as contribute to forming a single information space to combat climate change (Maksymova & Kurylyak, 2021). Another important factor is high growth potential of the digital industry. Analytical estimates show that Industry 4.0 will account for 16.5% of annual growth by 2030 in the EU (European Commission, 2022).

In Ukraine, however, we can observe a somewhat different dynamics of emissions and assessments of the effectiveness of climate policies (Figure 2).

Figure 2

The dynamics of achieving climate neutrality by the economy of Ukraine



Source: designed by the author based on data of EBRD (2020), Eurostat (2022) and CAT (2023).

In Ukraine, we can observe a noticeable progress in emissions reduction, which is to a larger extent explained by the historical and geopolitical reasons rather than introduction of the modern climate policy toolkit. A drop in production output after the collapse of the Soviet Union and fluctuations in GDP due to crisis events that followed in 2008 and 2014, as well as full-blown military warfare taking place since February 24, 2022, have led to a reduction in the carbon footprint of the national industry due to decreased scale of economic activity.

Our analysis reveals contradictions between the climate policy implementation criteria as set by Ukraine and the volume of emissions reduction required for decarbonisation of its national economy as envisaged by world organizations and signed agreements. In 2021, Ukraine announced its second nationally-determined contribution (NDC2) to be set at the level of 65% below 1990 in GHG emissions, which is equivalent to 330 Mtpa of emissions in 2030.

However, the national economy had already reached this level of reductions (300.3 Mtpa) by the time the Paris Agreement was signed in 2016, with indicators of GHG emissions continuously and gradually falling to 243 Mtpa in 2021. Thus, the national climate-neutrality programme creates an opportunity to increase emissions of carbon dioxide by 36% over the next 8 years, which contradicts the key principles of the global GHG emissions reduction policy.

This paradoxical inconsistency can be due to the rhetoric about Ukraine's potential GDP growth in the post-war years and its rapid economic leap thanks to support programmes from the EU, which will be accompanied by scaling up of the metallurgy, transport, construction, and other energy-intensive industries. However, such industrial growth must be «green» and climate-neutral, which will allow Ukraine to retain the achieved rate of decarbonisation (19.3 Mtpa) and ensure its alignment with the world's climate standards. Such an approach is supported with estimates of the target emissions indicator based on the scenario for Ukraine that has been developed by the International Energy Agency together with the Intergovernmental Panel on Climate Change (EBRD, 2020). According to this approach, the economy of Ukraine must keep its emissions at their 2021 level (256.2 Mtpa) up to 2030, afterwards decreasing them gradually by 90% by 2050.

In view of the above, it becomes necessary to intensify national climate policy measures and orient domestic climate pathway towards stricter emissions criteria. This conclusion is based on the estimates of the required volume of emissions in the national economy under the two scenarios: in accordance with the target set by the Paris Agreement (194.5 Mtpa by 2030, a reduction of 79.5% compared to 1990) and the CAT methodology (236.5 Mtpa by 2030, a reduction of 75% compared to 1990). Thus, the currently set value of the NDC2 at the level of 65% should be increased to at least 75% so that to comply with the climate policy of the EU and the climate neutrality pathway.

When analyzing the effectiveness of climate policies of Ukraine and the EU in the context of their integration, the main obstacles to integrating the climate policies of Ukraine and the EU currently include the following: different levels of technology and infrastructure development; the possibilities of providing resources for the implementation of joint policies; different standards and concepts of environmental security; different levels of development of climate governance and monitoring at the state level and at the level of individual industries; different levels of environmental awareness demonstrated by economic actors and citizens; discrepancies in the amounts of financial instruments available for the implementation of green transition; differences in standardization and regulatory support of climate policies; unfavourable investment climate in Ukraine, as well as geopolitical instability and conditions of the martial law.

Digitalization will help to overcome the mentioned barriers to integration between Ukraine and the EU in the sphere of climate policy thanks to comprehensive application of the modern digital toolkit:

1. Introducing the system of monitoring and analysis of climate change data: Using detectors, drones and satellite technologies for deep analytics of climate changes and emissions in individual industries and regions of Ukraine and the EU.

2. Using the «big data» concept as a tool for performing assessments of the current state of climate change and forecasting its consequences.

3. Creating EU-Ukraine information platforms and international research clusters so that to directly develop and introduce innovative technologies in the fields of energy efficiency, renewable energy and other areas related to reduction of GHG emissions. The use of artificial intelligence will facilitate improvements in energy efficiency of buildings and optimization of energy consumption.

4. Integrating digital instruments into the network of climate diplomacy and EU-Ukraine communications – through development of web portals, mobile applications, social networks and study materials, in particular – in order to engage general public in the process of decision-making and increasing the awareness of Ukrainian economic actors about the opportunities, directions and sources of green transformation projects.

5. Developing digital education, joint education and science programmes in the sphere of climate governance with the aim of further bridging the gap in project resource provision and developing the environmental mindset.

6. Integrating the digital tools of the FinTech and GovTech sectors in order to ensure the transparency of interaction in the context of implementing joint investment programmes in the sphere of combatting climate change.

7. Mutual recognition of the systems of monitoring and reporting on climate change and its impacts, gradual introduction in Ukraine of the information support

for environmental information monitoring in accordance with the EU standards. Creating a single digital platform for legal and regulatory support.

8. Creating a joint electronic emissions trading system primarily for the products that are subject to CBAM mechanism. At the present stage, Ukraine is more interested in the development of the mentioned instruments in view of its Eurointegration aspirations and prospects for strengthening its economic partnership with the EU, which is increasing its levers of climate pressure on producers. However, taking into account the EU's and Ukraine's shared ambitions to build climate-neutral economy, digital transformation can be considered across three dimensions with respect to its role in the development of a single climate policy:

1. Digitalization as a set of applied digital tools and technologies for ensuring the achieving of climate neutrality at the level of separate industries and institutions.

2. Digitalization as a process of optimization of the processes of green transition, integration of technologies into the production cycle with the aim of increasing its environmental sustainability, productivity and energy efficiency.

3. Digitalization as a dimension of global information environment comprising a broad range of stakeholders – general public, power authorities, business, specialized experts, scientists, education workers – with the aim of joint design and development of the instruments of climate policy, which will ensure a broader understanding and support for climate-oriented programmes by all actors of the international economic space.

In view of this, the concurrent implementation of climate policies and digital development programmes will ensure their mutual enhancement, increasing the effectiveness of climate neutrality strategy in Ukraine and in the European Union.

Conclusions

The performed study lets us draw the several conclusions. First, the modern vector of integration between climate policies of the EU and Ukraine requires enhanced international cooperation in the following directions: establishing common rigorous energy-efficiency standards; engaging all industries in gradual refusal from distribution and consumption of fuels; expanding the financial support packages for green transition; increasing the tax burden through introduction of the CBAM carbon pricing mechanism. In what concerns the implementation of EU climate policies, these directions represent a major challenge for the economy of Ukraine, especially for industries that are subject to CBAM (metallurgy, fertilizers and energy), which currently account for a significant share of Ukraine's export relations with the EU.

Second, despite significant programme initiatives of the EU, the current rate of decarbonisation is insufficient for achieving the climate neutrality objectives in the EU and its partner countries by 2050. Based on the results of performed analysis, we suggest revising the climate policies of Ukraine and the EU and increase their nationally defined contributions. In particular, it would be feasible for Ukraine to revise and intensify its emissions reduction policy by increasing its NDC from 65% to at least 72% in 2030. This will give a timely stimulus for decarbonisation of national industries in line with the European climate standards, which is especially relevant for producers that are subject to CBAM. Our study finds that there is a need to develop a mechanism for «green» GDP growth, which will be possible in Ukraine after the war and which will help to maintain the achieved pace of climate neutrality indicators and increase national competitiveness in the context of the European integration process.

Third, it would be feasible to consider digitalization broadly as a driver for acceleration of «green» transition and integration of climate policies of the EU and Ukraine in their shared pursuit to achieve the decarbonisation targets by 2050. In order to enhance the effectiveness of climate policy, the modern mechanism of digitalization should include systems for ensuring comprehensive monitoring, processing and forecasting of climate data, introduction of information platforms, ensuring the transparency of interaction between the financial and public sectors, as well as assisting in bridging the technological, innovation, educational gaps among the countries that take part in EU climate agreements. This will allow forming a powerful technological basis for the design and implementation of climate-related projects in Ukraine and the EU.

Fourth, the current stage of climate policy implementation in the EU creates a need to design a global system for the digitalisation of «green» transition of national economies – the one that would allow developing a comprehensive understanding of the digital paradigm of climate neutrality. In particular, at the global level, digital transformation can be considered across three dimensions: as a tool for «green» transition at the level of individual production units and industries; as a process of optimising and coordinating sectoral industrial policies; and as a shared information and communication environment for climate interaction and implementation of joint intergovernmental programmes.

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