CHALLENGES OF UKRAINE ON THE WAY TO CLIMATE NEUTRALITY

TETIANA SOBOLIEVA[1, 2]

[1] Kyiv National Economic University named after Vadym Hetman, Kyiv, Ukraine
sobolieva_tetiana@kneu.edu.ua
[2] Corvinus University of Budapest, Corvinus Institute for Advanced Studies (CIAS), Budapest, Hungary
tetiana.sobolieva@uni-corvinus.hu

Abstract The current ecological situation in Ukraine determines the need to overcome obstacles to decreasing greenhouse gas emissions. The aims of this research are to identify the main current challenges for mitigating the impact on climate conditions, measures to reduce greenhouse gas emissions, and possible actions by the government and businesses to attain climate neutrality. Ukraine has many challenges related to CO2 emissions due to both the sectoral structure of the economy and the high energy intensity of outdated technologies. Air pollution is significantly increasing as a result of military aggression on Ukrainian territory. The decrease in CO2 emissions is partly explained by the reduction of economic activities during the pandemic restrictions. Despite the government's implementation of measures to create favorable conditions to reducing environmental pollution, it is necessary to develop measures to increase energy efficiency and stimulate the transition of business to a circular economy.

Keywords:
climate neutrality, carbon emissions, Ukraine, circular economy, transition

JEL:
O13, P48, Q57

University of Maribor Press

DOI https://doi.org/10.18690/um.epf.3.2023.23
ISBN 978-961-286-736-2

1 Introduction

Global warming has become a critical issue worldwide, leading to changes in human living conditions that will make impossible or significantly limit the livability and workability of many geographical areas. As a result of drought or floods, agricultural crops can be significantly damaged, as well as buildings and infrastructure (McKinsey, 2020). Reducing greenhouse gas emissions is the main prerequisite for slowing down global warming. To this end, national economies must move towards climate neutrality. Climate neutrality is supposed to reduce greenhouse gas emissions to the level forests and oceans will be able to absorb. This entailed achieving a net balance between the generation and removal of greenhouse gases, in other words, zero emissions.

Despite the fact that most environmental pollution metrics in Ukraine are falling, the process requires additional monitoring and correction. This determines the relevance of our research and offers ways to mitigate the impact of climate change.

2 Theoretical Background

More and more countries are uniting with the aim to decarbonize and mitigate the impact of human activities on climate change. Under the terms of the Paris Agreement, countries have developed and implemented a wide range of emission reduction policies. As of January 2023, net zero carbon goals are agreed upon by 133 countries, which are responsible for almost 91% of global GDP and about 83% of global emissions. An important step for coordinated action to reduce emissions is the launch of the Inclusive Forum on Carbon Mitigation Approaches (IFCMA). The first meeting in early February 2023 gathered more than 600 representatives from 104 participating countries (OECD, 2023).

A powerful tool for the improvement of the environmental situation is the transition to a circular economy. The transition to a circular economy requires the development of infrastructure for the collection and processing of waste, which allows the use of secondary raw materials. Government support is needed through the implementation of environmental industry standards and green procurement, promotion of the circular economy concept and inclusive development model (Kraveishvili & Gogorishvili, 2022) at the state level and through the education system (Gagnidze, 2018; Lekashvili, 2019).

New technologies are an important source for the development of circular economy. The activities of startups and accelerator companies in the field of circular economy make it possible to identify the innovation trends in 2023 of the industries' development (StartUsInsights, 2023). The most influential circular economy trends & innovations are shown in Figure 1. Evidence of innovative breakthroughs in technologies for the circular economy outlines the challenge of the availability of such technologies for the economy of Ukraine, both from the point of view of investment and personnel support for implementation.

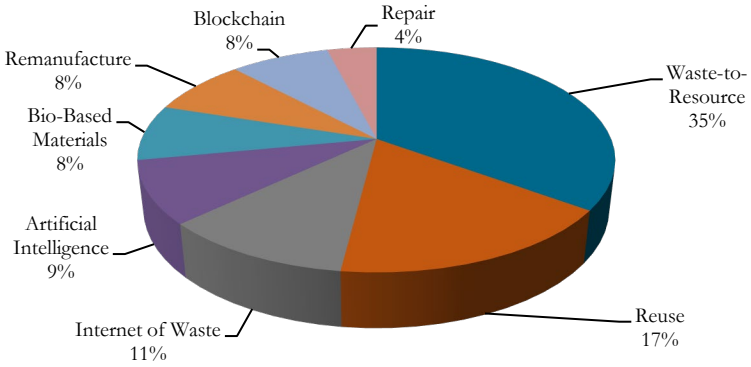

Figure 1: The most influential circular economy trends & innovations in 2023
Source: StartUsInsights (2023, January).

The UN Climate Summit COP27, which took place in November 2022 in Egypt, demonstrated the emphasis on the diversification of energy sources in the policies of countries and companies. Special attention is now focusing on renewable energy. The additional result is a reduction of the influence of energy monopolies. There is also an intensification of the development of technologies aimed at decarbonizing the economy.

The transition of the energy sector is particularly relevant for Ukraine. For the energy transition, it is necessary to increase the use of renewables. Ukraine has significant potential for the use of renewable energy sources such as solar and wind energy. Hydrogen also has great potential for Ukraine. On the way to climate neutrality, Ukraine must accelerate the transformation of the energy generation and consumption system. In order to achieve this goal, efforts should be made to simplify the procedures for obtaining access to land for the use of alternative energy

sources and clean technologies, modernizing the grid and other infrastructure, decarbonizing transport and industry, strengthening emission controls, and applying instruments that stimulate green investments (Tai et al., 2022).

3 Methodology

The research was conducted using statistical data of Ukrainian (MEPR, State Statistics Service of Ukraine, data is available until 2021) and international organizations (Our World in Data, UNECE, data is available until 2019). The current state and dynamics of the next indicators in the energy and industrial sector of Ukraine, which affect changes in climate neutrality due to greenhouse gas emissions were determined: these are Ukraine's contribution of total global greenhouse gas emissions, emissions of carbon dioxide from stationary sources, carbon intensity of energy production, and carbon emissions per unit of GDP. Operational information of state bodies of Ukraine and international organizations was used to analyze factors influencing the environmental situation and formulate conclusions.

4 Results

Analysing the impact of Ukraine's economy on environmental pollution before the war, it can be observed that the dynamics of greenhouse gas emissions show a reassuring declining trend. With a population of around 42 million (as of 2019), Ukraine contributes 0.61% of total global greenhouse gas (GHG) emissions. Air emissions of carbon dioxide from stationary pollution sources are shown in Figure 2. More than half of greenhouse gas emissions come from the electricity and heat sectors. The carbon intensity of energy production, which indicates the amount of CO_2 emitted per unit of energy, was one of the highest in Europe in 2021 (Figure 3). Despite the high intensity of emissions from Ukraine's energy sector, the growing trend of GDP till 2021 and declining GHG emissions confirmed the dynamics to reduce carbon emissions per unit of GDP. That is, this indicator in 2019 was 0.32 kg of CO_2 per constant 2010 USD, which is 8.5% less than in 2018 (UNECE, 2020).

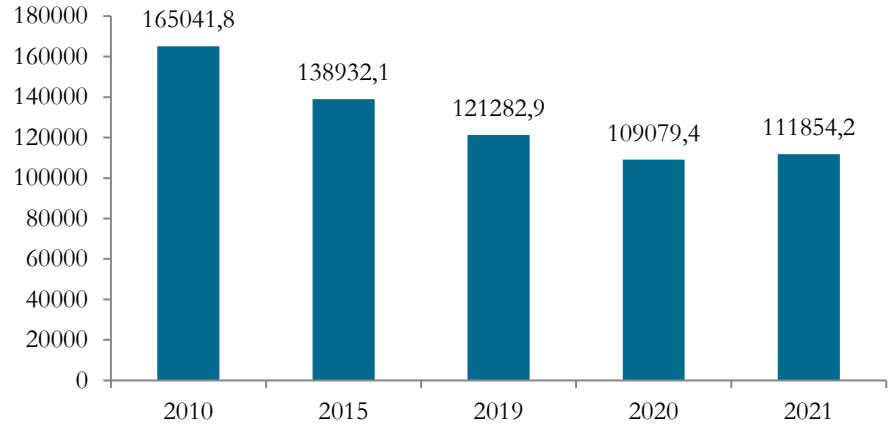

Figure 2: Carbon dioxide emissions from stationary sources, thsd.t.
Source: State Statistics Service of Ukraine (2022)

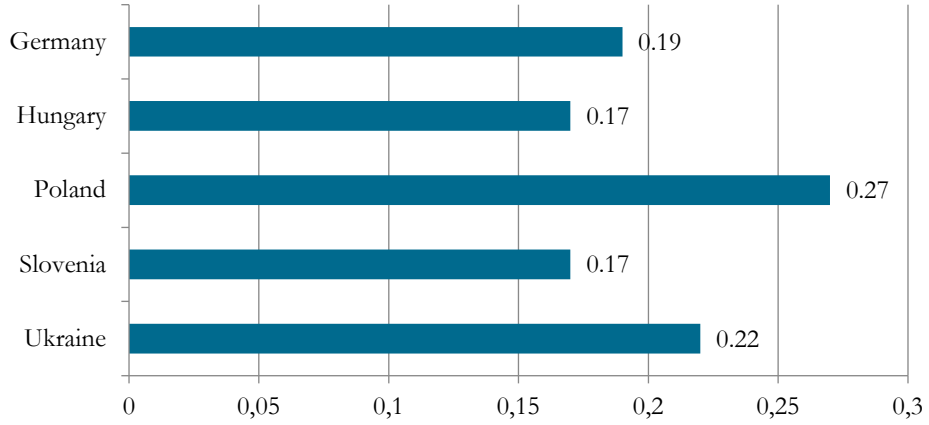

Figure 3: Carbon intensity of energy production in 2021, kilograms of CO_2 per kilowatt-hour
Source: Our World in Data (2021).

The Annual National Inventory Report for Submission under the United Nations Framework Convention on Climate Change and the Kyoto Protocol for 2021 both confirm that the energy sector is the most significant contributor to GHG emissions in Ukraine (MEPR, 2021). In 2020, the share of this sector accounted 65 % excluding LULUCF. The next most influential sector is the 'Industrial processes and product use,' which contributes about 18%, and the agriculture sector which contributes

about 13%. A big challenge for the environment is represented by outdated technologies and equipment in mature sectors of the Ukrainian economy. In 2020, the degree of depreciation of fixed assets was 55% in basic metals manufacturing, 70% in enterprises supplying electricity, gas, steam, and air conditioning (State Statistics Service of Ukraine, 2021).

4.1 Impact of the war in Ukraine

By the end of 2022, the Ministry of Environmental Protection and Natural Resources of Ukraine (MEPR) estimated the additional emissions of greenhouse gases caused by military actions on the territory of Ukraine, which amounted to about 33 million tons of CO_2eq. Emissions into the atmosphere due to forest fires, burning of oil products and the burning of industrial facilities due to attacks by Russian troops have already exceeded 67 million tons (Ukrinform, 2022). Potential indirect emissions of greenhouse gases due to the need for post-war reconstruction are estimated at about 48.7 million tons of CO_2eq (EcoBusinessGroup [EBG], 2022). The Minister of MEPR reported: "The amount of destruction waste in Ukraine due to military aggression can already be compared with the amount of solid household waste generated in the country per year on average. And this is about 10-12 million tons" (MEPR, 2023, February 10).

Despite the military operations on the territory of Ukraine, the country's government is making significant efforts to implement European legislation, comply with the requirements and recommendations of the European Green Deal and fulfill obligations under the Paris Agreement. Over the past year, changes to laws in the areas of waste management, forestry, water policy, strengthening of chemical safety, environmental monitoring, etc. were put into effect. Ukraine persistently adheres to the principles of the European Green Deal. The emphasis in their implementation is on private investments in renewable energy, mining, transport infrastructure, construction, and other sectors of the economy (Cabinet of Ministers of Ukraine (CMU), 2023).

The Cabinet of Ministers of Ukraine approved the Water Strategy of Ukraine until 2050 and the operational plan for its implementation until 2024. Such an initiative is an important step towards the fulfillment of Ukraine's international obligations in the field of "water" security, the Association Agreement between Ukraine and the

EU, and the Resolution of the UN General Assembly named Global Sustainable Development Goals by 2030.

In June 2021, the President of Ukraine signed the Law "On limiting the circulation of plastic bags in the territory of Ukraine". The Committee of the Verkhovna Rada on Environmental Policy and Nature Management considered the revised law 6077 "On measures to prevent and reduce the negative impact of plastic products on the environment", which prohibits the circulation and distribution of single-use plastic products (EBG, 2023, February 3).

The Verkhovna Rada of Ukraine made amendments to the Law of Ukraine "On Alternative Fuels." In January 2023, a biomethane register was launched, allowing producers and consumers of this renewable gas to obtain guarantees and certificates of biomethane origin (EBG, 2023, January 23). Quick submission of a waste declaration is possible through the Unified Environmental Platform "EcoSystem". There were changes in the procedure for environmental impact assessment during martial law.

An important step towards climate neutrality is the opening of the Ukrainian Climate Office in 2022, which will provide support to the government of Ukraine, cities, and regions, as well as businesses to overcome challenges on the way to the climate goals implementation. Financing will be provided by the European Union and the International Climate Initiative of the Federal Ministry of Economy and Climate Protection of Germany (Ukrinform, 2022).

5 Discussion and Conclusion

Ukraine, just like most countries of the world, faces the urgent task of reducing greenhouse gas emissions in order to slow down global warming. Ukraine's official position is to accept and adhere to the principles of the Paris Agreement. However, implementing such a policy requires overcoming a significant number of challenges. An important vector is the development of renewable energy (Sobolieva & Harashchenko, 2020), the share of which has increased significantly over the past 10 years but is insufficient for the needs of the transition to climate neutrality. In addition to the energy sector, modernization and renewal of the Ukrainian industries require significant investment.

Considerable potential on the way to climate neutrality can be realized by increasing the energy efficiency. The energy sector is the most carbon-intensive part of Ukraine's economy, therefore more attention should be paid to reducing emissions in the energy sector. An important prerequisite for this is the transition to a circular economy. This approach provides an opportunity to realize the inclusive model of economic growth.

Ukraine needs significant efforts to decarbonize the economy, as it has to overcome significant barriers on this path. It is necessary to jointly intensify the efforts of the government and businesses on the way to climate neutrality. The Ukrainian government constantly implements measures to improve legal and regulatory norms and mechanisms to support the circular economy and invest in infrastructure development.

Effective tools for encouraging enterprises to introduce new environmental technologies, increase energy efficiency, and assess the environmental footprint of products and services require further research. Another issue for discussion is about finding ways to increase the awareness of the Ukrainian population regarding the consequences of climate change, and the need to comply with the norms of ecological consumption and the use of resources.

References

Cabinet of Ministers of Ukraine. (2023). *Over the past year, Ukraine managed to adopt a number of reform decisions in the environmental sphere, which bring us closer to the EU*. Retrieved from https://www.kmu.gov.ua/news/za-ostannii-rik-ukraini-vdalosia-ukhvalyty-nyzku-reformatorskykh-rishen-u-dovkillievii-sferi-iaki-nablyzhaiut-nas-do-ies-ievhenii-fedorenko

EcoBusinessGroup. (2022, November 28). *The President signed the European integration law on strengthening chemical safety in Ukraine*. Retrieved from https://ecolog-ua.com/news/prezydent-pidpysav-yevrointegraciynyy-zakon-pro-posylennya-himichnoyi-bezpeky-v-ukrayini?fbclid=IwAR0XUZjUOOVJcQeebq-v3QT1ep6w2VkdCy2JMtX5SgLW4QO_s7teCwfLN4s

EcoBusinessGroup. (2023, January 23). *The State Energy Efficiency Agency has developed a register of guarantees of origin of biomethane*. Retrieved from . Retrievedhttps://ecolog-ua.com/news/derzhenergoefektyvnosti-rozrobylo-reyestr-garantiy-pohodzhennya-biometanu?fbclid=IwAR2k0VA-PLb6JZf1lKPrifIbjB5mxQCbL_zDncyy ZrHPWqrtvpWkC_suuPE

EcoBusinessGroup. (2023, February 3). *Prohibition of single-use plastic products in Ukraine: the revised draft law is recommended for the first reading*. Retrieved from https://t.ly/rlgq

European Commission. *Delivering the European Green Deal*. Retrieved from https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal/delivering-european-green-deal_en

Gagnidze, I. (2018). The Role of International Educational and Science Programs for Sustainable Development (Systemic Approach). *Kybernetes, 47*(2), 409-424, https://doi.org/10.1108/K-03-2017-0114

Kraveishvili, G., & Gogorishvili, I. (2022). Research and evaluation of perceptions of inclusive economic growth in Georgia. *Estonian Discussions on Economic Policy, 30*(1-2), 150-171. https://doi.org/10.15157/tpep.vi1-2.22092

Lekashvili, E. (2019). Management of innovations in Georgian Higher Educational Institutions: key problems with teaching economic science. *Marketing and Management of Innovations, 1*, 281-293. https://doi.org/10.21272/mmi.2019.1-23. https://armgpublishing.com/journals/mmi/volume-10-issue-1/article-23/

McKinsey. (2020, January 16). *Climate risk and response: Physical hazards and socioeconomic impacts* Report. Retrieved from https://www.mckinsey.com/capabilities/sustainability/our-insights/climate-risk-and-response-physical-hazards-and-socioeconomic-impacts

Ministry Environmental Protection and Natural Resources of Ukraine (MEPR). (2021). *The Ukraine's Greenhouse Gas (GHG) Inventory Report*. Retrieved from https://mepr.gov.ua/
files/docs/Zmina_klimaty/Kadastr_2021/Ukraine_NIR_2021_draft.pdf

Ministry Environmental Protection and Natural Resources of Ukraine (MEPR). (2023, February 10). *The waste of destruction in Ukraine can already be compared with the amount of solid household waste generated in the country per year on average*. Retrieved from https://www.kmu.gov.ua/news/mindovkillia-vidkhody-ruinatsii-v-ukraini-vzhe-mozhna-porivniaty-z-kilkistiu-tverdykh-pobutovykh-vidkhodiv-shcho-v-serednomu-utvoriuiutsia-v-kraini-za-rik

OECD. (2023). *Inclusive Forum on Carbon Mitigation Approaches*. Retrieved from https://www.oecd.org/climate-change/inclusive-forum-on-carbon-mitigation-approaches/#:~:text=The%20Inclusive%20Forum%20on%20Carbon,learning%20and%20inclusive%20multilateral%20dialogue

Our World in Data. (2021). *Ukraine: Energy intensity: how much energy does it use per unit of GDP?* Retrieved from https://ourworldindata.org/co2/country/ukraine?country=UKR~DEU~HUN~POL~SVN#citation

Sobolieva, T., & Harashchenko, N. (2020). Intellectual property indicators and renewable energy trends. *Polityka Energetyczna, 23*(4), 17-32. doi:10.33223/epj/127911

StartUsInsights. (2023, January). *Top 8 Circular Economy Trends & Innovations in 2023* Retrieved from https://www.startus-insights.com/innovators-guide/top-8-circular-economy-trends-innovations-in-2021/

State Statistics Service of Ukraine. (2022) *Environment of Ukraine 2021*. Retrieved from https://www.ukrstat.gov.ua/druk/publicat/kat_u/2022/zb/11/zb_dovkillia_2021.pdf

Tai, H., Samandari, H., Pacthod, D., Polymeneas, E., Bolano, A., Pratt, M., & Lodesani, F. (2022, December). *The energy transition: A region-by-region agenda for near-term action*. McKinsey & Company.

Ukrinform. (2022, November 15). *Decarbonization: a Climate Office will be created in Ukraine with the support of Germany and the EU*. Retrieved from https://www.ukrinform.ua/rubric-economy/3614762-dekarbonizacia-v-ukraini-stvorat-klimaticnij-ofis-za-pidtrimki-nimeccini-ta-es.html

Ukrinform. (2022, November 15). *Decarbonization: a Climate Office will be created in Ukraine with the support of Germany and the EU*. Retrieved from https://www.ukrinform.ua/rubric-economy/3614762-dekarbonizacia-v-ukraini-stvorat-klimaticnij-ofis-za-pidtrimki-nimeccini-ta-es.html

UNECE. (2020). *Carbon dioxide emissions per unit of GDP*. Retrieved from https://w3.unece.org/SDG/en/Indicator?id=28