



Tomasz KOLASIŃSKI • Marek WIGIER

## THE EUROPEAN GREEN DEAL AND THE EU COMMON AGRICULTURAL POLICY IN THE CONTEXT OF UKRAINE – SELECTED ISSUES

Tomasz KOLASIŃSKI (ORCID: 0009-0003-7663-7956) – Institute of Agricultural and Food Economics  
– National Research Institute

Marek WIGIER (ORCID: 0000-0001-5134-2295) – Institute of Agricultural and Food Economics  
– National Research Institute

**Correspondence address:**

Swietokrzyska Street 20, 00-002 Warsaw, Poland  
e-mail: tomasz.kolasinski@ierigz.waw.pl

**ABSTRACT:** The paper aims to evaluate the feasibility and conditions of Ukraine's potential accession to the European Union's Common Agricultural Policy and the Green Deal. Classic analyse of Ukrainian and the EU's official acts of law in comparative method of legal study with desk study applied to literature and official institutions' documents, completed with economic quantitative analyse approach method of secondary statistical data enabled the authors to reveal discrepancies in the areas of consideration between EU *acquis*, Ukrainian "*de lege lata*", and obtained targets in pre-wartime and actually. Using "non-green" nitrogen-based fertilisers and keeping farm structure unchanged is justified by soil degradation during wartime. Reduction of carbon dioxide and waste policy targets fail due to ongoing military activity. Solar and wind abundance cannot support a "green" transformation when the base infrastructure is damaged. The feasibility of Ukraine's potential accession to the Common Agricultural Policy and the Green Deal seems indistinct.

**KEYWORDS:** European Green Deal, Common Agricultural Policy, circular economy, Ukraine

## Introduction

The European Green Deal (EGD) and the Common Agricultural Policy (CAP) are two of the EU's most influential frameworks for sustainability and economic governance. They both, due to their far-reaching requirements of member states' involvement in rough changes and adjustments of home standards to common *acquis* and profound changes in resource use, represent an opportunity, but also high tension between environmental ambitions and economic and agricultural realities. The main point of EGD is to transform Europe into the first climate-neutral continent by 2050. To reach this target it points the following "green" steps: 1/ reducing net greenhouse gas emissions (GHG) by at least 55% by 2030, compared to 1990 base year level; 2/ introduce sustainable resource use, biodiversity protection, and pollution reduction; 3/ introduce a sustainable food system (Farm to Fork Strategy); 4/ introduce ecosystem restoration and land use reform (Biodiversity Strategy for 2030); 5/ introduce circular economy.

CAP has been the EU's primary tool for supporting farmers (food security, living standards) and the development of rural areas (land management, climate-friendly environment). EGD and CAP both link agriculture to the EU's climate "green" goals. The most important is GHG emission reduction, protection of biodiversity, reduction of pesticide use by 50%, fertiliser use by 20%, and antibiotics in livestock by 50% by 2030.

The purpose of this paper is to analyse and make a reasoned judgement on the feasibility of Ukraine's potential accession to the EU, based on a classic analysis of the EU's "green" *acquis* and Ukrainian official acts of law, "de lege lata", in a comparative method of legal study and a semantic approach. A desk study is applied to literature and official institutions' documents (like UNIDO Reports or Ukrainian national strategies) relevant to the presented issues. Limitations of official Ukrainian data occur from the latest available "Ukraine. 2024 National Inventory Document (NID)" that ends the time series on the statistical year 2022. Comparative descriptive legal study. The authors completed an economic analysis, a quantitative analysis approach, and a method of secondary statistical data. Comparative legal studies of official law in Ukraine, together with documents of international organisations and think-tanks, and economic analysis of Ukraine's statistical secondary data, present capabilities, strengths and weaknesses defining its access stance to the EU's EGD and CAP. As a candidate country for the EU membership, Ukraine is bound to implement "green" solutions, an element of the *acquis*. Weaknesses are critical due to high-level pollution and excessive GHG emissions. Threats and hazards have already achieved progress during pre-wartime periods, as well as in the future, due to ongoing military activities. Strengths and opportunities are promising due to the overwhelming abundance of "green" resources, wind and sun, that will serve not only Ukraine with green energy, renewable energy resources, but the EU member states as well. Out of numerous issues embracing CAP and EGD, the Authors concentrate their attention on GHG emissions, farm structure, fertiliser use, renewable energy resources, circular economy and decarbonization.

Scientific research conducted by the Institute the Authors are affiliated with covers the most important range of issues concerning the economic, production, and social situation of agriculture and the broadly understood agri-food economy. For the efficiency of agricultural production and economic processes, achieving sustainable development is of paramount importance. "Sustainability" itself runs through the aspects that the Authors selected in their analysis. Sustainability of the agriculture sector, its performance is determined by the farm structure: the size, ownership pattern, organisation, use of land and others. It should ensure optimal utilisation of land, labour, and capital, directly influencing productivity. Rural livelihoods enhance productivity, foster rural development and provide food security. Small and fragmented farms often face challenges such as low economies of scale, limited access to credit, and difficult adoption of modern technology. Larger and better-organised farms can benefit from mechanisation, efficient input use, stronger market linkages and foreign capital investment. A balanced farm structure where both smallholders and commercial farms coexist promotes inclusivity and resilience. Environmental sustainability and productivity in agriculture depend on the type of fertiliser in use. The choice between organic and inorganic fertilisers has significant implications. Organic fertilisers, derived from natural sources, improve soil structure, enhance microbial activity, and maintain long-term fertility. They release nutrients slowly, reducing the risk of leaching and pollution. Chemical or synthetic fertilisers provide rapid nutrient availability,

enabling quick growth and higher short-term yields, which is beneficial for meeting food demand, but degrade soil quality and cause nutrient imbalance. Sustainability promotion in agriculture is led by renewable sources of energy. Agriculture is a highly energy-intensive sector, relying on electricity and fuel for irrigation, processing, and transportation. Conventional fossil fuels not only contribute to greenhouse gas emissions but also expose farmers to price volatility and supply uncertainties. Solar, wind, and biomass offer a cleaner, decentralised, cost-effective alternative and mitigate emissions while adapting to changing climatic conditions. Sustainability is promoted by the circular economy. Traditional linear models: “take-make-dispose” deplete soil nutrients, overuse water, and generate large amounts of agricultural waste. A circular approach focuses on recycling resources, regenerating ecosystems, and closing nutrient and energy loops and enhances long-term productivity. Circular models also encourage precision agriculture, composting, and the use of renewable energy on farms. Sustainability and resilience are enhanced by decarbonization. Decarbonization in the agriculture sector is critical due to its substantial contribution to greenhouse gas (GHG) emissions and the sector’s vulnerability to climate change. Precision farming, agroforestry, reduced tillage, and renewable energy can lower emissions while improving soil health, water efficiency, and crop yields. Decarbonization strengthens food security by mitigating the effects of climate change on crop productivity, livestock health, global nutrition and livelihoods.

Since the Paris Agreement of December 2015, the European Union has been working on a long-term vision strategy that aimed, similarly to the predecessors, to reduce greenhouse gas emissions, pollution and fossil fuels, and to reverse negative warming effects and disastrous climate change scenes observable worldwide. „Nothing can be added to the dramatic findings /.../ about how the limits of the Earth’s carrying capacity have already been exceeded, how global resource consumption and global waste volumes will nevertheless continue to increase if nothing is done, and to what extent the resource extraction and processing practices currently in use contribute to climate problems, biodiversity loss and water stress” (European Commission, 2020). Rio+20 Conference presents “the green economy” as the intersection between environment and economy (Leggett & Carter 2012; Mentés, 2023). At this intersection, development, industrialisation, growth and natural environment protection go together in “win-win” solutions, not as adversaries but as supporters (Mentes, 2023; Loiseau et al., 2020). “The systematic decoupling of rates of change in economic output and the environmental assets used up in that process” is on (Pearce, 1992; Bąk & Cheba, 2020; UNEP, 2011; UNEP, 2011a). A sustainable development takes place, led by green solutions. These are all closely connected with the broad goals of the European Green Deal (Barbier & Markandya, 2013; United Nations, 1987; Leggett & Carter, 2012; Kirchherr et al., 2017). Its provisions are the element of the EU’s *acquis communautaire*, an obligatory body of EU law to be met by the EU member states as well as new members. Ukraine, as a candidate country for EU membership, is strictly bound to implement it.

## Literature Review

### The literature review covers only EU sources in this section

Published on 11<sup>th</sup> December 2019 the European Green Deal opened the last phase of the green transformation in a broad sense as a growth strategy aiming to tackle negative climate changes, maintain biodiversity, combat negatives and achieve a broad set of ambitious goals of building a modern, resource-efficient and competitive economy, environment-friendly with net-zero greenhouse gas emissions by 2050 (*climate neutrality*), and with economic growth decoupled from the use of natural resources (*circular economy* assumption) and create a competitive economy with no net emissions of greenhouse gases in 2050 and growth source decoupled from resource use (European Commission, 2019). This, the most transformative so far EU’s strategy after decades, would be operational through: 1/ the European Climate Law Regulations with the goals to achieve climate neutrality by 2050 with the intermediate target of reducing net greenhouse gas emissions by at least 55% by 2030, compared to 1990 levels, 2/ industrial policy aimed at environment goals, 3/ circular economy (European Commission, 2019; European Commission, 2020; Dahl, 2021; INRAE, 2021; Norton Rose Fulbright, 2021; Fetting, 2020; Strategic Perspectives, 2022). By 2030, greenhouse gas emissions should be reduced by 40% in the EU to reach its reduction of between 80-95% by 2050. It would be in line with the

target to limit atmospheric warming to below 2°C (European Commission, 2013). This is challenging, especially for agriculture, the sector of the economy responsible for climate change, as the source of greenhouse gas emissions, which in the EU reached double-digit shares of approximately 11% of the EU's total GHG emissions. In 2021, greenhouse gas emissions generated by the economic activities of EU-27 resident units stood at 3.6 Bt of CO<sub>2</sub>-eq. Compared with 2008, there was a 22% decrease. In the fourth quarter of 2023, EU economy greenhouse gas emissions were estimated at 897 Mt of CO<sub>2</sub>-eq., a 4.0% decrease compared with the same quarter of 2022, when they were 935 Mt of CO<sub>2</sub>-eq. In the fourth quarter of 2023, greenhouse gas emissions were estimated to have decreased in 22 EU countries, when compared with the same quarter of 2022 (Eurostat, 2022; Eurostat, 2024; Eurostat, 2024a; Strategic Dialogue, 2024).

One of the elements of the Green Deal is the Farm to Fork strategy (Schebesta & Candell, 2020; Rossi & Sajn, 2024). It is supposed to create a fair, healthy and environmentally friendly food system. The main objectives it sets for agriculture to be achieved by 2030 are: 1/ to reduce the use of chemical pesticides by 50%; 2/ to reduce nutrient losses by at least 50% without allowing soil fertility to deteriorate and a 20% use of fertilizers; 3/ to reduce by 50% the sales of antimicrobials intended for farmed animals and used in aquaculture; 4/ to popularize of organic farming (Prandecki et al., 2021; Wrzaszcz, 2022). Currently, the share of organic farming is estimated at about 9% of agricultural area in Europe. It is projected to be of 13% by 2030 if the current pace is maintained. The prescribed target is, however, 25%. Organic farming as an agricultural system is free from chemical pesticides and fertilisers, but based on natural, biological fertilisers and ecological components of growing plants. Pesticides are banned in the EU for their hazardous impact on humans and the environment. Domestic measures have been adopted to ban or prohibit their use within the EU. Nevertheless, the use of pesticides on average in the EU has not decreased in recent years. Between 2011 and 2020, pesticide sales in the EU were almost stable, around 350,000 tonnes per year. In 2022, a slight decrease occurred, although this was not a trend (Pesticide Use in Europe; EU pesticides export). Considering these legal efforts on the way to make the EU green and Europe the first climate-neutral area by 2050, we express our doubts about the EU's real capability to save our Planet. The European Green Deal binds legally only European Union member states, with their share in global environmental pollution of only about 8%. Excluded from the participation are the greatest global pollution emitters like the United States, China, India, and Russia, which do not foretell much success in the global dimension (United Nations, 1997; Kirk, 2023; Nahm, 2023).

An element of the European Green Deal is the Carbon Border Adjustment Mechanism (CBAM) that supports the achievement of a carbon-neutral Europe by 2050, introduces effective, fair carbon pricing, and prevents shifting industry production that emits carbon from the EU to destinations with less stringent legal provisions on ecology and environment. The CBAM assures that the carbon price of imported goods is equivalent to the carbon price of domestic production, and that the EU's climate objectives are not weakened. The CBAM mechanisms enter fully into force from 2026 after a transitional phase from 2023 to 2025. To ensure that business and operations mitigate negative impacts on the natural environment and climate a reduction in business carbon footprint is projected of 15% by 2023, 80% by 2030 to reach finally carbon neutrality by 2050, from a baseline of 2013/14 (Kobyłka & Sobkiewicz, 2022; Rimini et al., 2023; Rzeczpospolita, 2023; Regulation, 2023; Annex 7). The basic law in this area is the EU Regulation 2023/956 of the European Parliament and of the Council of 10<sup>th</sup> May 2023, establishing a Carbon Border Adjustment Mechanism. CBAM imposes reporting obligations on importers of goods operating in the EU customs territory whose production puts at risk carbon leakage. It will cover at first the categories of industrial activity with the highest risk to the natural environment in case of pollution and emissions of gases: iron, steel, cement, aluminium, fertilisers, electricity, and hydrogen. It encourages, in point 14 of the Regulation, third countries' producers to use technologies that reduce greenhouse gas emissions, and point 16 emphasises that the Regulation should apply to goods imported into the customs territory of the Union from third countries. If the word "should" does not clearly enough represent "obligation", the further provision of point 26 does not leave any doubts that CBAM creates "obligations" and not only "optional possibilities". Point 26 of the Regulation states that Member States have the power to impose penalties for infringements of this Regulation and ensure that such penalties are enforced (Regulation, 2023).

The industrial aspect of the European Green Deal is the circular economy (Loiseau et al., 2020; UNEP, 2011a; Kirchherr et al., 2017). Reusing, recycling and recovering mean that an economy is

restorative or regenerative by intention. The model is cyclical, regenerative, and innovative (Przybojewska, 2021; Corvellec et al., 2022). With the circular economy concept, one thing is not reasonably clear to us. For today, renewable resources are not able to replace non-renewable ones. Non-renewables – oil, coal, and natural gas extraction become more and more costly as easily accessible sources have already been used (Przybojewska, 2021). Solar and wind cannot, on their own, replace coal and gas plants, which produce and supply continuous power. To attain continuity with renewables, man must learn how to capture and store solar and wind power, which to some extent seems tricky (Zhao et al., 2015; The Economist, 2019; E-magazyny, 2024; Baltic Wind, 2024; Regulation, 2023). The circular economy “is not a theory but an emerging approach to industrial production and consumption” (Korhonen et al., 2018b), a multiplicity, an umbrella concept that creates excitement and enthusiasm as it seemingly provides a new framing able to resolve many problems, for example reconceptualization of “waste” (not treating waste as waste but as a resource to reuse) (United Nations, 2015). The European Union adopted the European Circular Economy Action Plan (CEAP) in December 2015. “Green” solutions outlined above impact the EU Common Agricultural Policy. The intersection of the European Green Deal and the Common Agricultural Policy represents a strategic convergence of climate, environmental, and agricultural policy. The European Green Deal through the Farm to Fork Strategy, the 2030 Biodiversity Strategy and the European Climate Law has reshaped and influenced CAP’s objectives, instruments and performance. The 2023–27 CAP adopted new “green” solutions like conditionality, eco-schemes, agri-environment-climate measures and strategic plans. The EGD, with its Farm to Fork Strategy and Biodiversity Strategy, introduced quantified environmental ambitions, for example, in the area of pesticide and fertiliser reductions, which must be introduced in CAP planning. Environmental outcomes were introduced in the 2021 CAP reform by: 1/ enhanced conditionality (cross-compliance + GAECs) that links basic payments to environment/climate rules; 2/ eco-schemes (pillar I) as a dedicated, flexible payment stream to reward climate and biodiversity-friendly practices; 3/ agri-environment-climate measures (AECM) (pillar II) to fund more targeted interventions. The Farm to Fork strategy broadened CAP’s role from farm income support to include food-system sustainability, for example, supply chains, among others. It has implications for rural development measures and for how CAP funds may be used to support transitions toward agroecology and reduced inputs. CAP 2023-2027 of “green” solutions introduced and pushed EU agriculture on the path to environmental sustainability. EU farmers receiving CAP conditional direct payments must comply with certain baseline environmental, climate, and health standards. These include rules such as crop rotation, soil cover, protection of wetlands and peatlands, etc. A new voluntary component under CAP 2023-2027 has been introduced, designed to reward farmers who go beyond these mandatory requirements, for practices benefiting climate, environment, and animal welfare. It is Eco-schemes. Each Member State is obliged to submit its CAP Strategic Plan on how they are going to achieve the common objectives (including environmental, climate, and biodiversity), adapted to its national environment. The Commission then approves the Plan (Lampkin et al., 2020).

CAP must be consistent with the EGD “Farm to Fork” Strategy and the Biodiversity Strategy. The Farm to Fork Strategy recommends sustainable food systems by less use of pesticides and fertilisers; more organic farming; less antimicrobial resistance; shorter supply chains; and reducing food waste. The Biodiversity Strategy recommends and supports restoring ecosystems and habitat protection. CAP conditionality, with its protection of wetlands and minimum soil cover, clearly stands for and supports EGD provisions. This shows the Green Deal as a major and multi-dimensional influence on the Common Agricultural Policy. The CAP reforms for 2023-2027 reflect many of the Green Deal’s core ambitions: climate action, biodiversity protection, sustainable food systems, reducing chemical inputs, etc. The instruments, such as conditionality, eco-schemes, and strategic national plans, show that CAP has been reshaped to some significant extent. Delivery of the CAP ambitious “green” solutions and environmental outcomes required by the Green Deal will depend heavily on design, enforcement, financial support and political courage, and take time.

## Methods

In this paper, we use both descriptive and analytical methods. The descriptive method is a research approach that involves a thorough description of a phenomenon without interfering with it. It is one of the fundamental methods used in the social sciences and humanities, enabling researchers to explore and understand the phenomenon under study. The descriptive method consists of collecting and analysing data obtained from observations, interviews, documents, or other sources. We, following this method, aimed to gather as much information as possible about the studied phenomenon, allowing for its detailed description and a deeper understanding of its nature (Apanowicz, 2002; Kawa, 2013). Analytical method in social sciences, in economics, involves applying systematic techniques, often mathematical and statistical, to test hypotheses and understand economic phenomena. Key approaches include quantitative methods like econometrics, regression analysis, and data analysis, for example, in the form of time-series. It allowed us to analyse economic relationships and predict outcomes (Takayama, 1993; Weber, 2011; Syll, 2017). This paper focuses on Ukrainian prospects to access the EU in the field of *acquis*, referring to selected issues of the Common Agricultural Policy and the European Green Deal. Upon descriptive method, legal provisions representing the EU “green” *acquis* together with Ukrainian acts of law, “*de lege lata*”, are collected and studied using a comparative method of legal study. It enables the authors to determine the EU *acquis* and Ukrainian “*de lege lata*”, law of legal force on respective issues and make a comparison to realities. We compared reference values in the form of numbers when official documents under study contained statistics, with current, latest or earlier due to the scarcity of obtainable data relevant to the issue. Given that the reference values sometimes took a descriptive, non-numerical form, we made a comparison using a description of the phenomena based on the latest obtainable official sources. We conducted our comparative study of reference values strictly limited to Ukraine’s issues. We tried to avoid a comparison of data, reference values referring to one country – Ukraine, with data referring to the assembly of countries – the EU-27, which we considered not to be scientific integrity and reliability. Only once did we decide on such a comparison when the sun and wind potential in Ukraine was set together with selected EU countries. We found out as the outcome of this paper that even if Ukrainian law reflects EU “green” *acquis*, the gap defined by numbers or by description of a phenomenon between “paper” and “practice” seems enormous. Ukrainian legal provisions that are already in force, however, do not work in practice mainly due to the military conflict.

We applied a desk study to literature and official institutions’ documents (like UNIDO Reports, the International Climate Initiative publications) or official technical documents like the Ukrainian National Inventory, relevant to the presented issues. Descriptive method analyses in this paper are completed with the analytical method. It is an economic, quantitative analysis approach to study secondary statistical data and time series. It allows the authors to compare the statistical picture in numbers and point out either its correspondence or dispersion between the targets set and reality.

## Results and Discussion

### Ukrainian Energy Strategy 2017

Ukraine’s economy relies on agriculture and the mining industry. The share of the mining (extractive) industry was estimated at around 10% of GDP before 2022, around 7.3% in 2023 and around 7.2% in 2024. This sector is regaining its global player position following the resumption of exports from the Black Sea ports. The share of agriculture in GDP, estimated at around 11% in 2021, declined to around 8% in 2023-2024 (Iakovenko & Zachmann., 2024; Tarasenko, 2025; KPMG, 2025; Statista, 2026). These two sectors mainly require attention to adjust their standards to the EU’s binding legal regulations. Ukrainian Energy Strategy to 2035 under the law of 18<sup>th</sup> August 2017, “Безпека, енерго-ефективність, конкурентоспроможність” (English: “Security, energy efficiency, competitiveness”) Указ Кабінету Міністрів України № 605-р від 18 серпня 2017, outlines strategic guidelines for the development of Ukraine’s fuel and energy complex up to the year 2035. It is a foundational document for Ukraine’s energy policy, a guide of state policy, regulation, investment, infrastructure, and reform in the energy sector. It sets ambitious, broadly aligned goals with European norms as a roadmap to

align with EU “green” provisions, integrates Ukraine more with European Union energy markets and adopts best practices for the home legal system. It draws attention to both supply-side (security, renewables) and demand-side (efficiency, metering, buildings) reforms. Its success, however, like in the case of any law, depends heavily on implementation – regulatory, financial, and institutional issues and navigating the political, economic and external environment. The Strategy objectives concentrate on: 1/ raising awareness to the need of energy saving, reduction of energy consumption of households, commercial and communal sectors – cut by 2030 energy intensity in half (50%) compared to a baseline year 1990; 2/ completeness and transparency of accounting for all forms of energy and energy resources; 3/ reduction of energy consumption in the systems of transportation and distribution of electric and thermal energy by technical, technological modernization and conceptual revision of power supply schemes. Expanding renewables and alternative energy sources by raising the share of renewables in final energy consumption; promoting biofuels and energy technologies that are cleaner, in particular through the use of renewable energy sources (RES) and energy management; 4/ environmental sustainability and emissions reducing the environmental footprint like GHG emissions through efficiency, renewables, etc. (Кабінет Міністрів України, 2017).

The Energy Strategy for 2035 set ambitious goals for Ukraine’s energy sector, focusing on security, energy efficiency, and competitiveness. While there were notable achievements, particularly in renewable energy development and energy efficiency improvements, several challenges impeded the full realisation of the strategy’s objectives. Addressing issues such as regulatory inconsistencies, financial constraints, and political instability will be crucial for the successful implementation of future energy strategies. The Strategy sets a target to reduce energy intensity by 50% by 2030. The strategy aimed to increase the share of renewable energy sources in the energy mix. Ukraine made significant strides in this direction, particularly in the solar and wind energy sectors, attracting both domestic and international investments. In case of energy security enhancements, ongoing geopolitical tensions and infrastructure vulnerabilities continued to pose challenges to achieving full energy security. Many initiatives experienced delays due to various factors, including political instability, financial constraints, and administrative challenges. The energy sector faced regulatory inconsistencies and institutional inefficiencies. These challenges hindered the effective implementation of reforms and the achievement of strategic objectives. Ukraine’s goal is to achieve net-zero greenhouse gas emissions in its energy sector by 2050, according to its Energy Strategy up to 2050. The country’s overall economy-wide climate neutrality target is set for 2060 (Iakovenko et al., 2024). The Strategy shares several objectives with the European Green Deal. Both official legal documents aim to transform economies toward sustainability, resilience, and reduced dependence on fossil fuels, and the issue of energy security through diversification of energy sources. Reading “between the lines” shows the will of both documents to turn down dependency on Russian gas. Both documents share the point to improve efficiency in industry, transportation and housing for cutting emissions, lowering costs and stimulating innovation. Common ideas are also shared by both documents on the issue of modernisation of economic sectors: 1/ efficient and competitive industry sector through deployment of “green”, clean technologies; 2/ promotion and support for “green” innovation and transition to competitiveness of the EU industry and broader – low-carbon, resilient, and competitive economy. The Strategy is also conceived to reflect ideas and principles of the EU’s Common Agricultural Policy (CAP). Both documents prioritise sustainability, resource efficiency, and economic resilience of the agricultural sector. Emphasise energy independence, clean energy-efficient technologies that go together with competitiveness in agriculture. Food security, reduce dependence on external energy and foster innovation for efficiency in farming practices. Climate and environmental protection with encouraging renewable energy, reduced emissions and sustainable nature-friendly land use. Sustainability and efficiency in the competitive market.

### Greenhouse gases (GHG) emissions

According to the Kyoto Protocol and the Paris Agreement, Ukraine – one of the largest producers of hydrocarbons – commit itself to reducing greenhouse gas emissions by 65% between 1990 and 2030. 1990 serves as a base year and 2030 as a deadline year (Ministry of Environmental Protection and Natural Resources of Ukraine, 2021; Iakovenko et al. 2024). Table 1 presents GHG emissions in Ukraine in a period 1990-2022.

**Table 1.** GHG emissions in Ukraine in 1990-2022 (Mt CO<sub>2</sub>-eq.)

Gas /Year	1990	1995	2000	2005	2010	2015	2016	2017	2018	2019	2020	2021	2022
Total*	915.5	532.9	408.3	435.8	396.0	328.4	348.8	325.8	351.7	344.9	309.3	327.9/ 341.5**	223.2/ 366.5**

\* including LULUCF and indirect CO<sub>2</sub>

Land Use, Land Use Change and Forestry (LULUCF) is defined as a GHG inventory sector that covers emissions and removals of GHG resulting from direct human-induced land use, land-use change and forestry activities. LULUCF has impacts on the global carbon cycle: add or remove it from the atmosphere, influencing climate.

Source: Country economy, 2023; Ministry of Environmental Protection and Natural Resources of Ukraine, 2023, 2024\*\*.

The obligation to reduce GHG emissions clearly did not take into account future hindrances that might spoil the expected success. We mean the military conflict that broke out in late 2022. In 2024 alone, GHG emissions in Ukraine caused by armed conflict and warfare were estimated to increase by 30% in comparison to 2023 levels. 30% in numbers was 55 Mt CO<sub>2</sub>-eq. Total emission for 2024 in Ukraine was estimated at 230 Mt CO<sub>2</sub>-eq. It was the equivalent of the annual collective emissions of Austria, Hungary, the Czech Republic and Slovakia (Ministry of Environmental Protection and Natural Resources of Ukraine, 2023, 2024; de Klerk et al., 2023). A period 1990-2022 marked with a picture of decreasing in general GHG emissions level since 1990, but at standstill since 2015. The base year 1990 GHG emission level in Ukraine was 915.5 Mt CO<sub>2</sub>-eq, including LULUCF and indirect CO<sub>2</sub>. If 65% of this value is around 595, the level of GHG emissions for 2030 should be around 320.5 Mt CO<sub>2</sub>-eq. The wartime hampered the pace towards reduction of GHG emissions, but 230 Mt CO<sub>2</sub>-eq. in 2024 and 320.5 Mt CO<sub>2</sub>-eq. in 2030 still create a margin for a happy end in this issue. It is also worth considering a reduction in the pace of individual gases that are responsible for warming effects (Table 2).

**Table 2.** Dynamics of individual gases emissions in Ukraine in a period 1990-2022 (Mt CO<sub>2</sub>-eq.)

Gas / Year	1990	1995	2000	2005	2010	2015	2016	2017	2018	2019	2020	2021	2022
CO <sub>2</sub> emissions with net CO <sub>2</sub> from LULUCF	659.3	344.6	252.6	295.5	273.5	228.0	240.2	220.8	239.1	227.3	191.2	205.4	127.7
CH <sub>4</sub> emissions with CH <sub>4</sub> from LULUCF	208.0	158.7	135.3	117.8	97.3	71.1	76.4	74.0	78.2	81.1	83.1	82.6	66.3
N <sub>2</sub> O emissions with N <sub>2</sub> O from LULUCF	48.1	29.4	20.3	22.1	24.4	28.4	31.1	29.9	32.8	34.6	32.9	37.6	26.8

Source: Ministry of Environmental Protection and Natural Resources of Ukraine, 2023.

Individual gases of GHG volume emission in a period 1990-2022 shows consistent pace of reduction levels. Carbon dioxide emissions were reduced by almost 80%, methane by 69% and nitrous oxide by 45%. Breaking moment on this timeline was 2021/2022 when the respective emissions decreased by an impressive 38%, 20% and 29%.

Agriculture sector GHG emissions in Ukraine in 2019 were at the level 42.5 Mt CO<sub>2</sub>-eq. In 2021, around 47 Mt CO<sub>2</sub>-eq., while broader accounting pointed to ~76 Mt CO<sub>2</sub>-eq. In 2022, after the conflict broke out, measured the level of was 57 Mt CO<sub>2</sub>-eq. Nevertheless, Ukraine's agricultural sector projections for GHG emission reduction capability was considered of a great potential estimated at 39 Mt CO<sub>2</sub>-eq. per year by 2030 (Zorya et al., 2022; Ministry of Environmental Protection and Natural Resources of Ukraine, 2023; Dixigroup & UK International Development, 2025). Ukrainian agriculture was responsible for about 14% of GHG emission, among which are carbon dioxide CO<sub>2</sub>, nitrous oxide N<sub>2</sub>O and methane CH<sub>4</sub> connected with farming, cattle production and fertilizers (Trypolska et al., 2022). Agriculture emissions are made up of N<sub>2</sub>O emitted from agricultural soils and fertilisers and CH<sub>4</sub> emitted from enteric fermentation and manure management. The reduction pace of these gases in the period 1990-2022 shows a bright perspective in this field (Table 2).

The energy sector in Ukraine in 2021 emitted around 209 Mt CO<sub>2</sub>-eq. This amount included energy industries, manufacturing, construction, fugitive emissions and other fuel combustion categories. The year 2022 was unique in GHG emission statistics. Military conflict activities impacted on energy production, industry efficiency and transportation. Damages were reflected in the reduction of GHG emissions level estimated at around 101 Mt CO<sub>2</sub>- eq. It was a spectacular 66% decrease since the year 2000 (Ministry of Environmental Protection and Natural Resources of Ukraine, 2023; Iakovenko et al., 2024; IEA Ukraine). The prospects for reducing the share of carbon dioxide in GHG are, however, quite vague. Its levels are expected to rise continually as a result of burning fuels from diesel generators in use as the military conflict since February 2022 has deteriorated the electricity infrastructure. Over 80% of Ukraine's conventional power plant capacity has been occupied, destroyed, or attacked (Ministry of Environmental Protection and Natural Resources of Ukraine, 2023; Nies & Savvitskyi, 2024; Meissner et al., 2024). Reducing carbon dioxide emissions seems hardly possible considering the broader perspective of ongoing military activities, so the overall GHG statistics would rise and spoil the 2021/2022 success. In 2019, carbon dioxide emissions from steel production in tonnes of carbon dioxide per tonne of crude steel were estimated at 2.3, which was the highest level in the European Union, a higher level than this in India, China and the United States (Keim & Sydorovych, 2024; Center for American Progress, 2023). The conflict only worsened these statistics. GHG emissions from wartime Ukraine's territory during the seven months of a conflict was at least 100 Mt CO<sub>2</sub> - eq. - the same emission as in the Netherlands over the same period. A 1.5-year period emissions exceeded the annual emissions of some EU countries, such as Austria, Portugal, and Hungary. The conflict in Ukraine has emitted roughly 175 Mt CO<sub>2</sub>- eq. in 24 months, according to the most comprehensive such study of any military conflict to date. This is the equivalent of the annual use of 90 million cars. In March 2023, Ukraine was one of the countries most affected by air pollution in Europe (Hunder, 2024; UNDP, 2022; Bun et al., 2024; de Klerk et al., 2023; Liu et al., 2024; Frost, 2024). The area of forests burned in wildfires and military conflict was 25 times larger in 2022 than in 2021 (Dibrova et al., 2022). Compared to 2021, the total area of forest fires in Ukraine increased 100 times, with most fires happening in the South and East of Ukraine, making it hardly possible to turn green using natural green resources to offset carbon emissions. The rate at which the forest and green area shrink exceeds carbon dioxide emission additionally released to the atmosphere by the military equipment. In the period from 24<sup>th</sup> February to 31<sup>st</sup> December 2022, at least 33 Mt CO<sub>2</sub>-eq. emissions were recorded - from hostilities - about 8.9 Mt CO<sub>2</sub>-eq. from the movement of internally displaced persons - about 1 Mt CO<sub>2</sub>-eq. and from fires - more than 23.4 Mt CO<sub>2</sub>-eq. (UNDP 2023; Brown et al., 2023). In addition to the 'popular' warming effect gas, carbon dioxide emission, the military activity is responsible for releasing more environmentally dangerous gas -sulphur hexafluoride(SF<sub>6</sub>) when energetic and high voltage stations are attacked. Only to mention here, statistics for May 2023 show that Russia destroyed about 61% of Ukraine's electricity-generating capacity, reducing installed capacity from 37.6 to 18.3 GW. Sulphur hexafluoride has a much harder warming effect than carbon dioxide, and is said to accumulate warming effect capacity almost 24-thousand times harder than the base capacity of carbon dioxide. Released to the atmosphere, 40 tonnes of sulphur hexafluoride corresponds to a million tonnes of carbon dioxide. After a military conflict draft estimations suggest another additional ecological bomb in Ukraine - 48.7 Mt CO<sub>2</sub>-eq., amount of emissions of GHG "required" to conduct the process of reconstruction the country (Dervos & Vassiliou, 2000; Environmental Coalition on Standards, 2022; Ministry of Energy of Ukraine, 2023).

### Agricultural sector farm structure

The structure of farms in Ukraine reflects a course against the EU respective law on Common Agriculture Policy and the Green Deal. First and very diversified by hectare size group is registered commercial agricultural enterprises with a share of about 68% in agricultural production (Table 3).

Second group, family self-sufficient households (not registered) in 2021 accounted for the population of about 4-5 million. They possessed 1/5 of arable land. 78,2% had less area than 1 ha. 20,4% had the area between 1-10 ha., and 1,4% were larger than 10 ha(Zorya et al., 2022; UNDP, 2023; Dibrova et al., 2022). Large agricultural enterprises and agri holdings favoured by the authorities are the most important part of the agricultural sector for production and export performance. Their economic activity however is responsible for excessive arable soil exploitation and land degradation as they cultivate monoculturally on extensive areas for export mainly.

**Table 3.** Ukrainian agricultural enterprises size in 2021

Farms		Agricultural enterprises
Size (ha)	Number of items	Number of items
<10	3556	37
10-50	11632	711
50-100	4641	679
100-500	6771	2600
500-1000	1262	1966
1000-5000	926	3919
>5000	-	601

Source: Державна служба статистики України, 2022; Régnier et al., 2024; European Parliament, 2024; FAO Ukraine, 2024.

This practice excludes planting of different crops sequentially on the same plot of land to improve soil health, maintain its nutrients and combat pest and weed. The EU's Common Agriculture Policy does not accept such production schemes as not beneficial for the environment and maintaining soil fertility, quality and biodiversity. Considering economic interests, it would, as we presume, be difficult to crack" the subject of farm structure adjustment at the negotiation table. Given that agri-holdings are driven by European-owned foreign capital input, it would be hardly possible to witness the Ukrainian farm structure adjustment to the farm population structure standard in the EU. In 2020, the vast majority of the EU farm structures were farms between 0-4.9 ha, around 60% of the overall population, while a bit larger ones between 5-9.9 ha shared around 10%. The largest farms of 50-99.9 ha and those over 100 ha share did not exceed 5% (Eurostat, 2022). The exact opposite of the farm structure in Ukraine (Radomska, 2017; Strojny, 2020; Dibrova et al., 2022; Petrychenko et al., 2022; Eurostat, 2022; European Commission, 2023; European Parliament, 2024; Régnier & Catalo, 2024).

### Fertilizers use

The law of Ukraine Правове регулювання використання пестицидів та агрохімікатів, 16 Лютого, 2022 (English: Legal Regulation of the Use of Pesticides and Agrochemicals) is the basic legal act to regulate fertilizer matters. According to the law, fertilisers create a large set of substances like organic, mineral, and bacterial fertilisers, plant growth regulators, and ameliorants. Pesticides are defined as: toxic substances, their compounds and mixtures of substances of chemical or biological origin, intended to destroy, regulate and stop the development of pests. Agrochemicals are: organic, mineral, and bacterial fertilisers, chemical ameliorants, plant growth regulators and other substances intended to increase soil fertility, crop yields, and improve the quality of crop products (Верховна Рада України, 2022). Ukrainian legislation in this area goes towards the EU standards, making digestate, an organic by-product from biogas plants, legally defined, which is in line with EU Regulation (EU) 2019/1009. Ukraine is progressively aligning fertiliser law with EU law, especially via commitments in its Association Agreement, and through draft laws such as the proposed "On Plant Protection Products and Fertilisers" aimed to tighten control over allowed substances, require prior assessment and approval of active ingredients, and bring into law comparable safety, environmental, and market regulations as in the EU. Nevertheless, in terms of fertilisers in Ukrainian agriculture, the first remark is the gap in legal provisions on limited use of them, which results in permanent use of those withdrawn from the EU market long ago. Crop protection remains doubtful as the Ukrainian agricultural landscape is dominated by the growth of mineral fertiliser consumption, accompanied by the decline of organic ones. This is in contrast with the European Green Deal Farm to Fork Strategy target of 10% reduction in fertiliser use. To attain such a level would require a decrease from 78.5 kilograms per hectare of arable land in 2021 to 62.8 kilograms per hectare (UNIDO, 2024). In the period of 2000 – 2017, the amount of organic fertilisers per ha decreased from 693 to 223 kg, which was an obvious reverse from "green" solution prescriptions (Dibrova et al., 2022). Currently, Ukraine consumes about 100,000 tons of pesticides every year, worth approximately 2 billion USD

(Programme, 2018; Dibrova et al., 2022; European Commission, 2022; Ohio State University, 2018; Foote, 2023). To go back to “green” solutions the course needs adjustment to Green Deal principles of organic farming that concentrate on: 1/ prohibition of the use of GMOs; 2/ forbidding the use of ionising radiation; 3/ limiting the use of artificial fertilisers, herbicides and pesticides or use of hormones; 4/ crop rotation; 5/ cultivation of nitrogen fixing plants and other green manure crops to restore the fertility of the soil; 6/ prohibition of use of mineral nitrogen fertilisers. Ukraine applied an average of 55.6 kg of fertiliser per hectare of arable land in 2022. This marked a decrease from 78.5 kg per hectare in 2021, and was below the global average of 133.2 kg per hectare. 2022 showed a significant drop in fertiliser use statistics due to wartime and its impact on fertiliser production (The Global Economy, 2023) (Table 4).

**Table 4.** Fertiliser consumption (kg/ha of arable land) in Ukraine in 2014-2022

kg/ha of arable land	Year:								
	2014	2015	2016	2017	2018	2019	2020	2021	2022
	44.9	43.2	52.7	61.9	65.4	65.1	75.6	78.5	55.6

Source: The Global Economy, 2023; World Bank, 2023.

In Ukraine, fertiliser application remains relatively high, especially nitrogen-based inputs, to sustain yields of staple crops like wheat, corn, and sunflower, in which Ukraine has been a leader. Reliance on synthetic fertilisers to maximise crop yields and agricultural productivity is in contrast with Farm to Fork Strategy principles. In 2021, Ukraine produced over 5.2 million metric tons of nitrogenous fertilisers. This amount dropped by 78.3% to 1.1 million metric tons. It may open a new chapter in going “green”. Nitrogen fertilisers are hazardous to nature and in sharp contradiction to the EU’s “green” *acquis* as they do harm to the environment, like water pollution, nitrous oxide emissions or air pollution from compounds like ammonia. Nitrogenous fertilisers cause pollution in soil, water, and air, water contamination, “dead zones” in oceans, and increased GHG emissions. In 2022, imported fertilisers increased to 4.3 million metric tons. We can not confirm the share of organic and hazardous ones in this amount (CSIS, 2023). Ukrainian farmers, however, increasingly adopt precision application techniques, integrated soil fertility management, and crop rotations, partly driven by export demands from environmentally-conscious European markets. Year 2022 showed that reduced use of fertilisers had adverse effects on crop yields and agricultural productivity, with a decline in wheat production, which affects food security. The wartime makes the arable area shrink. In 2024, 32.92 million hectares of land were arable, which was 26% less than 2021’s figure. At the beginning of 2024, the area suitable for agricultural activity increased to 48.11 million hectares due to the liberation of portions of the Kharkiv and Kherson regions (Ukraine Business News, 2024). As a result of the military conflict, Ukraine lost an estimated at 20.5% of all agricultural land, which affected the volume of crops cultivated. During the 2021 harvest, Ukraine produced 106 million tons of grains and industrial crops, whereas in 2024, only 77 million tons (Ukrinform, 2025).

Ukraine’s fertiliser practices partially align with the EU’s principles through emerging efficiency and sustainability measures, but widespread high chemical input use indicates significant gaps (Tyszka, 2024; Petrychenko et al., 2022; European Commission, 2023; Regulation, 2009).

## Renewable energy resources

Ukraine’s immense abundance of natural renewable energy sources has enormous potential, which is unquestionably its major strength in the EU’s “green” *acquis* alignment. The potential for wind energy is around 180GW, while for solar energy it’s around 39GW. Therefore a total capacity of 219GW would vastly exceed the generation capacity of 59GW Ukraine had at the start of the military conflict. Considering 272GW of wind capacity in EU-27, the Ukrainian wind capacity looks stunning. Solar energy potential outperformed the EU-27 solar market output in 2023, giving prospects for future supplying the surplus of renewable energy to EU member states (Table 5) (SolarPower Europe, 2023; Windeurope, 2024).

**Table 5.** Solar market output in the selected EU countries in 2023

2023 Solar market output (GW)	EU Country:									
	Germany	Spain	Italy	Poland	Netherlands	France	Austria	Belgium	Greece	Hungary
	14.3	8.2	5.2	4.8	4.5	3.2	2.2	1.7	1.6	1.6

Source: SolarPower Europe, 2023.

Regardless of this natural potential, in 2018, in Ukraine, renewables accounted for only 5% of the energy mix and for 9% of electricity generation (13.4 kilowatt hours in 2019). In 2020, the total share of renewable energy sources in energy consumption was estimated at 9,2%. The indicator of renewable energy share in Ukraine shows a very low renewable energy share, under 5%, up to the 45% EU target. As a result of the military conflict, about 90% of wind power capacity and 50% of solar energy capacity have been taken offline. More than 500 water infrastructure facilities, including hydroelectric dams, have been destroyed (Brown et al., 2023). Considering the above, the planned end to coal-fired power generation by the year 2035 may not succeed by that date. The paradox of military conflict serves here as a bitter irony. The scale of energy infrastructure damage during military operations made not only a massive turn to solar energy, but also made lower costs to rebuild a frail, partly damaged energy sector on new bases in transition to renewable solar energy and completely new country's energy management schemes. Solar and wind energy from decentralised sources deliver and distribute power quickly and prevent a monopolised decision process by corrupted centralised business administration officers (Science Business, 2024).

### Circular economy

Ukraine's legal efforts in the area of circular economy push it toward the EU "green" solutions. Nevertheless, in light of circular economy recommendations, the country lags behind this quality. It does not have a modern waste management system in place. Solid waste is one of the main objects of a circular economy, and the EU Directive 2008/98 EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives is an important component of the EU "green" *acquis*. Solid waste includes different types of packaging, paper and cardboard, wood, glass, metal, plastic, textiles, broken or obsolete household appliances, and agricultural and municipal solid food waste (Directive, 2008). The situation with Ukraine's waste seems critical. Lots of waste is dumped into landfills, with some sites filled with household waste to 80-95% capacity. In 2021, over 90% of Ukrainian household waste was disposed of at landfill sites, only 7% was recycled, and 1.7% burned. Out of the 6000 operational landfills, 824 did not meet environmental standards, 371 required renovation, and 230 were overcrowded (Panasytska, 2022). Ukraine was the only European country without extended producer responsibility (EPR) (Lindskog, 2023). The law "Проект Закону про управління відходами 2207-1-д" (English: "Law on Waste Management") constitutes a landmark law passed by the Verkhovna Rada in June 2022 to reform waste management in Ukraine, so to come closer from linear to circular economy. It introduces a more EU-style waste management hierarchy, stricter rules on handling, treating and disposing of waste, and lays the foundation for circularity in terms of reuse, recycling, etc. (Parliament of Ukraine, 2022). It strengthens the principles of extended producer responsibility (EPR) and "polluter pays", which means producers are more responsible for the end-of-life of their products. The Law is, however, only on paper. The implementation process is significantly delayed. The obstacles are the lack of infrastructure and insufficient activity at the local level. It is planned to reduce the use of primary raw materials to 80% by 2023, and to 20% by 2030. Up to 100 waste collection centres should be established for further repair and reuse by 2030. In 2030, their number should increase to 250. According to the law, 8% of household waste should be sent for reuse by 2023 and 10% from 2024 to 2030. As for 2020, only about 5% of waste was recycled in Ukraine (Shpak et al., 2020; Parliament of Ukraine, 2023). The law "Затверджено Національну стратегію управління відходами в Україні" 15 Січня, 2021 (English: the National Waste Management Plan until 2030) is another legal milestone consistent with core EU principles on waste hierarchy, circular economy and extended producer responsibility. It was supposed to switch the country to a new model of waste management by 2030 (Кабінет Міністрів України, 2021).

It will be in effect on July 9<sup>th</sup> 2023, which does not change much to influence reality during wartime (UNIDO, 2024). It projects the household/municipal waste recycling target at the level of 50% recycling (material recycling + composting) by 2030. Latest scarcity estimates reported a range of recycling waste at 3.7% to 8.8% of municipal solid waste. The absolute gap to 50% is then huge. The large majority of waste is still landfilled (IFC & World Bank Group, 2015; Кабінет Міністрів України, 2021; Konsort, 2024). Statistics from various sectors, particularly Textiles and Electronics, reveal alarmingly low rates of reuse in Ukraine. For instance, there is an abundance of imported second-hand textiles, with less than 2% currently being recycled or repurposed. The handling of waste electrical and electronic equipment (WEEE) is also inadequate, as it is poorly segregated and treated, often mixed with household waste. There is also little data on available refurbishment activities for this sector in Ukraine. The repair and installation of machinery equipment, with a declining labour force (-16.69% between 2019 and 2021), should be further supported to implement circular strategies. The Circular Material Use Rate (CMUR) is not currently measured in Ukraine. In terms of legal efforts, the foundations in this area have been laid, but there remain significant gaps and implementation challenges. Legal and policy approximation, although underway, seems incomplete. Targets together with timelines are weak elements. The capacity to implement the law is limited by financial constraints and infrastructure drawbacks. Considering the above, UNIDO delivered a conclusion upon analysis that the circular economy in Ukraine was only at an early stage of development (UNIDO, 2024).

## Decarbonization

Decarbonization is the process of reducing carbon dioxide (CO<sub>2</sub>) emissions that result from human and economic activities such as the burning of fossil fuels: coal, oil, and natural gas. It is a core activity on the way to mitigate climate change and achieve “green” targets, among others, to limit global temperature rise to well below 2°C above pre-industrial levels. Decarbonization involves a structural transformation of the global economy from one that is heavily dependent on carbon-intensive energy sources to one that is powered by low-carbon and renewable energy sources like solar, wind, hydro or nuclear power. In the case of Ukraine, the transition from fossil fuels would probably challenge and disrupt industries and employment patterns, particularly in regions such as the eastern part of Ukraine, a coalfield and metallurgy area of the Donets Coal Basin. The EU’s Carbon Border Adjustment Mechanism, CBAM, would hamper heavy industry and metallurgy production for export to the EU, the main trading partner for Ukraine. The share of Ukrainian imports to the EU in the case of products covered by CBAM is estimated at 17%. Economic interests of the EU industry and producers may lobby to force the EU authorities to limit some Regulation provisions and obligations for the sake of both trading parties. The bitter irony in the Ukrainian decarbonization context is that 68% of Ukraine’s coal-generating capacity has been damaged during the ongoing military conflict. This loss would support phasing out coal from its power sector by 2035 more easily than if a military conflict did not break out and the industry and energy sectors worked in full capacity (Ministry of Energy of Ukraine, 2023). The Ukrainian Національна Економічна Стратегія на період до 2030 року – постановою Кабінету Міністрів України від 3 березня 2021 р. № 179 (English: National Economic Strategy of 3<sup>rd</sup> March 2021) assumes total decarbonization (декарбонізація), a net zero goal within green transformation and green deal course (зелений курс) till 2060 (Верховна Рада України, 2021). The Strategy plans targets for a large share of renewables green energy by 2030. It indicates a share of around 25% in electricity by 2030, while the government of Ukraine suggested a share at the level 27–29%. Recent estimates of 2023 put renewables energy in electricity in around 22% including hydro sources, but only around 10% if hydro sources are excluded. Given the enormous potential of renewables in Ukraine this estimate may rise to projected 25% by 2030 (European Policy Centre, 2025). Required investments to meet this target (prescribed share) would be however possible to go on only after the military conflict ends. The goals of the Strategy to be met until 2030 are not only the “green” ones. Financial aspects of the Ukrainian economy are as important as money in the economy to push its growth. Achieving a pathway to the 2060 net-zero goal requires deep structural policies like grid investment, storage, electrification, and industry decarbonisation, which is costly to implement. The Strategy projects a high dynamics of GDP growth to be doubled, which in reality seems hardly possible after it fell by almost 29% in 2022. It, of course, might rebound and go back to its previous trajectories only when consumption, investment and public spending go up. Spending on

raising the country from the ruins together with foreign investment capital inflow could spark the dynamics of GDP growth, but it is today not possible to verify if it really doubled in 2030 (Szeligowski, 2021). In June 2023, Ukraine presented the Energy Strategy through 2050. The strategy vision is to decarbonise Ukraine's energy sector by 2050 (Ministry of Energy of Ukraine, 2023). Estimates concerning decarbonization investments in Ukraine towards Green Deal point at 102 billion euro to 2030 (Просхвалення Оновленого національно визначеного внеску України до Паризької угоди: Розпорядження Кабінету Міністрів України від 30.07.2021 № 868) (English: On the Approval of Ukraine's Updated Nationally Determined Contribution to the Paris Agreement). This sum undoubtedly will have to be multiplied as the military conflict is on. For the same reason, the decarbonization process is today vague.

## Conclusions

The findings from the study on the feasibility and conditions of Ukraine's potential accession to the European Union's Common Agricultural Policy and the Green Deal, which we present in this paper, based on the given legal and economic sources, are to some extent pessimistic. Ukraine today, and probably in the nearest coming years is on the far track towards the European Green Deal and the EU Common Agricultural Policy "green" *acquis*. The overarching conclusion is the role of shock from a large wartime contraction. We point an accumulating multitude of problems on the way to go "green" that can be solved only when the military conflict has been permanently brought to an end. Strategies and their targets, timelines and schedules to complete particular items projected before February 2022 must be worked out from the beginning while the baseline they were backed has mostly been damaged. The National Economic Strategy of 2021 projected a doubled GDP growth rate by 2030. In the unfriendly environment it seems doubtful. In 2022 GDP growth fell by almost 29%. Trajectory of restoring growth will start with the inflow of foreign capital in a form of export revenues or investment when investors' confidence in doing business regained. To achieve it and boost domestic demand with consumption the end of military conflict is indispensable. In the area of GHG emissions and air pollution it must be highlighted that Ukraine has never been a "green-going" economy. Nevertheless in a period 1990-2022 as we showed greenhouse gas emissions level got a downward trend. Carbon dioxide emission was reduced by almost 80%, methane by 69% and nitrous oxide by 45%. Breaking moment on this timeline was 2021/2022 when the emission of gases decreased respectively by impressive 38%, 20% and 29%. The 2022-2024 wartime period marked with loss of this achievement. Additional levels of GHG emissions emerged from military activity, fires and infrastructure destruction. In 2024 alone GHG emissions in Ukraine caused by military conflict were estimated to increase by 30% (55 Mt CO<sub>2</sub> -eq.) in comparison to 2023 levels. The pace of reducing carbon dioxide (CO<sub>2</sub>) emissions has been then hindered. Nevertheless, 68% of Ukraine's coal-generating capacity has been damaged during ongoing military conflict. Coal-generating capacity and carbon dioxide (CO<sub>2</sub>) emissions are closely linked because coal combustion is one of the most carbon-intensive forms of energy production. Therefore, this loss may support phasing out coal from the power sector by 2035 easier than if a military conflict did not break out and industry and energy sectors worked in full capacity. Year 2026 is the moment the Carbon Border Adjustment Mechanism enters fully into force. It would open a "new" chapter of numerous bilateral negotiations between the European Union and Ukraine, considering however that its transitional phase 2023-2025 in the country has been lost for progress in reduction of carbon footprint. CBAM itself for sure would not boost phasing out coal in Ukraine by 2035 due to wartime damage of infrastructure and vague peace for 2026. Furthermore to carbon footprint to mention is a huge gap in renewable energy sources. Its projected 27-29% share in electricity by 2030 when 2023 marked with a single digit share leaves 20% gap to fill. An explosion of more than doubled pace would be needed to catch up the missing share of renewables. It might be too short to 2030 to reach the target. Even considering the enormous potential of renewables in Ukraine, the 2024 last couple of months and a military conflict still ongoing are not favourable forecast factors for 2030. In terms of circular economy waste management objectives, Ukraine is quite far from the 2030 recycling target. Currently only 7-18% of the 50% recycling target has been achieved. This requires immediate, large-scale investments in collection, sorting, processing, financing, make extended producer responsibility in force, and enforcement to move millions of

tonnes off landfills into recycling streams. Agriculture sector shares similar challenges arising from wartime. Necessity to maintain food security in unfriendly environment, shrinking arable area of around 26% in 2024 and keep foreign trade in agricultural products on, justify to postpone the issue of agricultural farm structure adjustment to the EU's Common Agricultural Policy standard. For the same reason, fertilizers use politics towards organic ones must be postponed.

In case of a candidate country to the EU, Ukraine, it is not possible to separate the EU membership from the CAP and the Green Deal *acquis* implementation. Straightforward implementation considering wartime environment is for sure not possible. *Acquis* in our opinion will be adopted with reasonable limitations, timeline postpones after numerous multi-staged negotiation rounds and only after the military conflict ends. It is the inevitable cost of the gap between the developed EU and reviving Ukraine, not possible to catch up in a few years.

Out of numerous issues embracing CAP and EGD, in this paper, we analysed the level of GHG emissions, farm structure, fertiliser use, renewable energy resources, circular economy and decarbonization in the context of Ukraine. Opportunities to reduce GHG emissions together with the reduction of individual gas emissions in pre-war periods have been unexpectedly intercepted by weaknesses of wartime and lost with threats of excessive levels of GHG emissions from military activity that additionally contribute to decarbonization failure. The necessity to use intensive fertilisers, not always organic, in agriculture to compensate for the shrinking area of arable land due to wartime, broadens the gap of lost opportunities. In the area of "green" energy, renewable energy resources, strengths and opportunities are promising due to their overwhelming abundance Ukraine is proud of. Overall picture of Ukraine attempts to meet the "green" targets in mentioned areas is marked with threats, that have already spoiled achieved progress during pre-wartime periods. Circular economy has been suppressed at the early stage of development.

Fast-track Ukraine's meeting of the EU "green" *acquis* is hardly possible, however in the EU's economic interest. It still supports EU's agriculture delivering crop and other products. Of the same economic reason as we presume, the Ukrainian farm and farmland structure beyond the EU CAP standards will be passed over in silence not to disturb foreign capital investment business from and outside the EU. Renewables – Ukraine's undisputable potential would support the EU-27 pace towards net-zero GHG emissions – climate neutrality. The time of completion our paper marks with Ukraine's position beyond the reach of the European Green Deal "green" *acquis* and the Common Agricultural Policy 2023-2027 requirements. Our study showed that legal base "de lege lata" in Ukraine must be inevitably revised in articles regarding to timelines and deadlines to reflect actual realities. Foreign investment capital inflow to Ukraine's economy and "green" infrastructure push them onto new tracks of vital development. Until the wartime ends and friendly, peaceful environment comes back it is temporarily postponed and bides its time. The chapter to aim the legal defined "green" targets in Ukraine stays open, in a stand-by mode.

## The contribution of the authors

Conceptualization, T.K and M.W.; literature review, T.K.; methods T.K. and M.W.; analysis T.K. and M.W.; writing, T.K.; discussion and conclusion, T.K. and M.W.; supervision, M.W.

The authors have read and agreed to the published version of the manuscript.

## References

- Andrusewycz, N. (2022). *Zielony Ład i Ukraina. Fundacja im. Stefana Batorego*. [https://www.batory.org.pl/wp-content/uploads/2022/08/N.Andrusewycz\\_Zielony.Lad\\_i.Ukraina.pdf](https://www.batory.org.pl/wp-content/uploads/2022/08/N.Andrusewycz_Zielony.Lad_i.Ukraina.pdf) (in Polish).
- Annex 7: Environmental Action Plan. (2019). *SP Energy Networks, RII0-T2 Business Plan*. [https://www.spenergy-networks.co.uk/userfiles/file/RIIO-T2\\_Annex\\_7\\_Environmental\\_Action\\_Plan.pdf](https://www.spenergy-networks.co.uk/userfiles/file/RIIO-T2_Annex_7_Environmental_Action_Plan.pdf)
- Apanowicz, J. (2002). *Metodologia ogólna*. Wydawnictwo Diecezji Pelplińskiej "Bernardinum." (in Polish).
- Austrian Federal Chamber of Labour. (2020). *A new Circular Economy Action Plan: For a cleaner and more competitive Europe*. [https://www.akeuropa.eu/sites/default/files/2020-07/EN\\_Kreislaufwirtschaftspaket\\_2.pdf](https://www.akeuropa.eu/sites/default/files/2020-07/EN_Kreislaufwirtschaftspaket_2.pdf)
- Bąk, I., & Cheba, K. (2020). *Zielona gospodarka jako narzędzie zrównoważonego rozwoju*. Warszawa: CeDeWu. (in Polish).

- Baltic Wind. (2024, January 15). *Breaking wind records: Europe's remarkable 2023 achievement of 17 GW, elevating wind to 19% of electricity production*. <https://balticwind.eu/breaking-wind-records-europes-remarkable-2023-achievement-of-17-gw-elevating-wind-to-19-of-electricity-production/>
- Barbier, E. B., & Markandya, A. (2013). *A new blueprint for a green economy*. Routledge.
- Brown, O., Froggatt, A., Gozak, N., Katser-Buchkovska, N., & Lutsevych, O. (2023). *The consequences of Russia's war on Ukraine for climate action, food supply and energy security*. Chatham House.
- Bun, R., Marland, G., Oda, T., See, L., Puliafito, E., Nahorski, Z., Jonas, M., Kovalyshyn, V., Ialongo, I., Yashchun, O., & Romanchuk, Z. (2024). Tracking unaccounted greenhouse gas emissions due to the war in Ukraine since 2022. *Science of the Total Environment*, 914, 169879. <https://doi.org/10.1016/j.scitotenv.2024.169879>
- Center for American Progress. (2023). *Trade beyond neoliberalism: Concluding a global arrangement on sustainable steel and aluminium*. <https://www.americanprogress.org/article/trade-beyond-neoliberalism-concluding-a-global-arrangement-on-sustainable-steel-and-aluminum/>
- Center for Strategic & International Studies. (2023). *From the ground up: Demining farmland and improving access to fertilizer to restore Ukraine's agricultural production*. <https://www.csis.org/analysis/ground-demining-farmland-and-improving-access-fertilizer-restore-ukraines-agricultural>
- Corvellec, H., Stowell, A. F., & Johansson, N. (2022). Critiques of the circular economy. *Journal of Industrial Ecology*, 26(2), 421–432. <https://doi.org/10.1111/jiec.13187>
- Country economy. (2023). *CO2 emissions Ukraine*. <https://countryeconomy.com/energy-and-environment/co2-emissions/ukraine>
- Dahl, M. (2021). The European Green Deal and the Social Market Economy. *Sprawy Międzynarodowe*, 74(3), 131–146. <https://doi.org/10.35757/SM.2021.74.3.10>
- de Klerk, L & Initiative on GHG Accounting of War. (2023). *Climate damage caused by Russia's war in Ukraine: 24 February 2022 – 23 February 2023*. <https://en.ecoaction.org.ua/wp-content/uploads/2024/06/Climate-Damage-Caused-by-War-24-months-EN.pdf>
- Dervos, C. T., & Vassiliou, P. (2000). Sulfur hexafluoride (SF<sub>6</sub>): Global environmental effects and toxic byproduct formation. *Journal of the Air & Waste Management Association*, 50(1), 137–141. <https://doi.org/10.1080/10473289.2000.10463996>
- Dibrova, S. A., Nivievskiy, O., & Martyshev, P. (2022). *Agricultural policy. National University of Life and Environmental Sciences of Ukraine*. [https://kse.ua/wp-content/uploads/2022/09/Chapter\\_2\\_Agrocenter.pdf](https://kse.ua/wp-content/uploads/2022/09/Chapter_2_Agrocenter.pdf)
- Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives, Pub. L. No. 32008L0098, 312 OJ L (2008). <https://eur-lex.europa.eu/legal-content/pl/TXT/?uri=CELEX%3A32008L0098>
- Dixigroup, & UK International Development. (2025). Сільське господарство: сталі практики для продовольчої безпеки і досягнення кліматичних цілей. Офіс зеленого переходу. <https://gto.dixigroup.org/assets/images/files/gto-agriculture-sectoral-study-2025.pdf> (in Ukrainian).
- Ellen MacArthur Foundation. (2020). *The EU's Circular Economy Action Plan: Setting the world's largest single market on a transition towards a circular economy*. <https://www.ellenmacarthurfoundation.org/circular-examples/the-eus-circular-economy-action-plan>
- E-Magazyny. (2024). *Energetyka wiatrowa w 2023 roku: Podsumowanie i trendy na 2024 rok*. <https://e-magazyny.pl/eksperckim-okiem/energetyka-wiatrowa-w-2023-roku-podsumowanie-i-trendy-na-2024-rok/> (in Polish)
- Energy News. *Ukraine: Solar installations explode in the face of bombardment*. <https://energynews.pro/en/ukraine-solar-installations-explode-in-the-face-of-bombardment/>
- Environmental Coalition on Standards. (2022). Briefing: Worst in class. Phasing-out sulphur hexafluoride (SF<sub>6</sub>). [https://ecostandard.org/wp-content/uploads/2022/05/Briefing\\_Sulphur-Hexafluoride\\_final.pdf](https://ecostandard.org/wp-content/uploads/2022/05/Briefing_Sulphur-Hexafluoride_final.pdf)
- European Commission. (2010). Communication from The Commission Europe 2020, A strategy for smart, sustainable and inclusive growth Europe 2020: A European strategy for smart, sustainable and inclusive growth. <https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2010:2020:FIN:EN:PDF>
- European Commission. (2013). *Green Paper: A 2030 framework for climate and energy policies*. <https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2013:0169:FIN:EN:PDF>
- European Commission. (2019). Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions, The European Green Deal. [https://eur-lex.europa.eu/resource.html?uri=cellar:b828d165-1c22-11ea-8c1f-01aa75ed71a1.0002.02/DOC\\_1&format=PDF](https://eur-lex.europa.eu/resource.html?uri=cellar:b828d165-1c22-11ea-8c1f-01aa75ed71a1.0002.02/DOC_1&format=PDF)
- European Commission. (2020). Annex to the Communication from the Commission, A new Circular Economy Action Plan for a cleaner and more competitive Europe. <https://secure.ipex.eu/IPEXL-WEB/document/COM-2020-098>
- European Commission. (2022). *Green Deal: Halving pesticide use by 2030*. <https://ec.europa.eu/eip/agriculture/en/news/green-deal-halving-pesticide-use-2030.html>
- European Commission. (2023). *EU agricultural outlook for markets 2023–2035. DG Agriculture and Rural Development*. [https://agriculture.ec.europa.eu/system/files/2024-01/agricultural-outlook-2023-report\\_en\\_0.pdf](https://agriculture.ec.europa.eu/system/files/2024-01/agricultural-outlook-2023-report_en_0.pdf)
- European Commission. (2023). *Organic production and products*. [https://agriculture.ec.europa.eu/farming/organic-farming/organic-production-and-products\\_en](https://agriculture.ec.europa.eu/farming/organic-farming/organic-production-and-products_en)

- European Commission. (2024). *Use of fertilisers in EU agriculture down 10% in 2022*. <https://ec.europa.eu/eurostat/web/products-eurostat-news/w/ddn-20240628-1>
- European Commission. (2026). Carbon Border Adjustment Mechanism. [https://taxation-customs.ec.europa.eu/carbon-border-adjustment-mechanism\\_en](https://taxation-customs.ec.europa.eu/carbon-border-adjustment-mechanism_en)
- European Council. European Green Deal. <https://www.consilium.europa.eu/en/policies/green-deal/>
- European Parliament resolution of 24 March 2022 on the need for an urgent EU action plan to ensure food security inside and outside the EU in light of the Russian invasion of Ukraine. [https://www.europarl.europa.eu/doceo/document/TA-9-2022-0099\\_EN.html](https://www.europarl.europa.eu/doceo/document/TA-9-2022-0099_EN.html)
- European Parliamentary Research Service. (2024). *Ukrainian agriculture: From Russian invasion to EU integration (PE 760.432)*. [https://www.europarl.europa.eu/RegData/etudes/BRIE/2024/760432/EPRS\\_BRI\(2024\)760432\\_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/BRIE/2024/760432/EPRS_BRI(2024)760432_EN.pdf)
- European Policy Centre. (2025). *Greener, better, stronger together: Why cooperation in renewable energy should be a priority for EU-Ukraine relations*. <https://www.epc.eu/publication/greener-better-stronger-together-why-cooperation-in-renewable-energy-should-be-a-priority-for-eu-ukraine-relations/>
- Eurostat. (2022). *EU economy emissions in 2021: -22% since 2008*. <https://ec.europa.eu/eurostat/web/products-eurostat-news/w/DDN-20221221-1>
- Eurostat. (2022a). *Farms and farmland in the European Union – Statistics explained*. <https://ec.europa.eu/eurostat/statistics-explained/>
- Eurostat. (2024). *EU economy greenhouse gas emissions: -4.0% in Q4 2023*. <https://ec.europa.eu/eurostat/web/products-eurostat-news/w/ddn-20240515-1>
- Eurostat. (2024a). *EU economy greenhouse gas emissions: -7.1% in Q3 2023*. <https://ec.europa.eu/eurostat/web/products-eurostat-news/w/ddn-20240214-1>
- FAO Ukraine. (2024). *Beyond size: Rethinking farm typologies in the Ukrainian context*. <https://fscluster.org/sites/default/files/documents/FAO%20-%20Beyond%20Size%20Rethinking%20Farm%20Typologies%20in%20the%20Ukrainian%20Context.pdf>
- Fetting, C. (2020). *The EU Green Deal*. Vienna: ESDN Office.
- Foote, N. (2023). *Banned pesticides found in Ukraine agri imports prove sticky point*. <https://www.euractiv.com/section/agriculture-food/news/banned-pesticides-found-in-ukraine-agri-imports-prove-sticky-point/>
- Frost, R. (2024). *The cost of 'conflict carbon': Russia could face €30bn climate reparations bill for war in Ukraine*. <https://www.euronews.com/green/2024/06/13/the-cost-of-conflict-carbon-russia-could-face-30bn-climate-reparations-bill-for-war-in-ukr>
- GO250. (2023). *Klimat, społeczeństwo, gospodarka*. <https://www.kobize.pl/pl/article/publikacja-go250-klimat-spoleczenstwo-gospodarka/id/2557/go250-klimat-spoleczenstwo-gospodarka-numer-4-2023> (in Polish).
- Hunder, M. (2024). *Study details huge emissions resulting from Russia's invasion of Ukraine*. <https://www.reuters.com/world/europe/study-details-huge-emissions-resulting-russias-invasion-ukraine-2024-06-12/>
- Iakovenko, M., & Zachmann, G. (2024). *Structural shifts will shape Ukraine's energy and climate future: Lessons from the EU accession of Poland and Romania*. Berlin: Helmholtz Zentrum.
- Iakovenko, M., Zachmann, G., & Yevstihnieieva, O. (2024). *GHG emissions assessment in Ukraine on the way to climate neutrality and ETS introduction*. Berlin: Helmholtz Zentrum.
- IEA Ukraine. <https://www.iea.org/countries/ukraine>
- INRAE. (2021). *How can the CAP help achieve the European Green Deal's agriculture objectives?* <https://www.inrae.fr/en/news/how-can-cap-help-achieve-european-green-deals-agriculture-objectives>
- International Finance Corporation & World Bank Group. (2015). *Municipal solid waste in Ukraine: Development potential scenarios for developing the municipal solid waste management sector*. <https://documents1.worldbank.org/curated/en/839801556599035128/pdf/Municipal-Solid-Waste-in-Ukraine-Development-Potential.pdf>
- Kawa, J. (2013). Metodologia, metodyka, metoda jako podstawa wywodu naukowego. *Studia Prawnoustrojowe*, 21, 169-188. <https://bazhum.muzhp.pl/media/texts/studia-prawnoustrojowe/2013-numer-21/studia-prawnoustrojowe-r2013-t-n21-s169-188.pdf> (in Polish).
- Keim, G., & Sydorovych, M. (2024). Policies to address climate change: Ukraine. IMF Selected Issues Paper, 2024/001. <https://doi.org/10.5089/9798400266416.018>
- Kirchherr, J., Reike, D., & Hekkert, M. (2017). Conceptualizing the circular economy: An analysis of 114 definitions. *Resources, Conservation & Recycling*, 127, 221-232. <https://doi.org/10.1016/j.resconrec.2017.09.005>
- Kirk, A. (2023). *Visualised: How all of G20 is missing climate goals – but some nations are closer than others*. <https://www.theguardian.com/environment/2023/dec/07/visualised-how-all-of-g20-is-missing-climate-goals-but-some-nations-are-closer-than-others>
- Kobyłka, K., & Sobkiewicz, M. (2022). *Europejski mechanizm dostosowania cen CO2 na granicy (CBAM): Gdzie jesteśmy? Dokąd zmierzamy?* Fundacja Warszawski Instytut Studiów Ekonomicznych i Europejskich. (in Polish).
- Konsort. (2024). *Waste recycling in Ukraine*. <https://konsort.com.ua/en/pererobka-smitty-a-v-ukrayini/>

- Korhonen, J., Nuur, C., Feldmann, A., & Birkie, S. E. (2018). Circular economy as an essentially contested concept. *Journal of Cleaner Production*, 175, 544–552. <https://doi.org/10.1016/j.jclepro.2017.12.111>
- KPMG Ukraine Ltd. (2025). *Your business in Ukraine*.
- Lampkin, N., Stolze, M., Meredith, S., de Porras, M., Haller, L., & Mészáros, D. (2020). *Using eco-schemes in the new CAP: A guide for managing authorities*. IFOAM EU.
- Leggett, J. A., & Carter, N. T. (2012). *Rio+20: The United Nations Conference on Sustainable Development, June 2012*. Congressional Research Service.
- Lindskog, T. (2023). *The present state of the circular economy in Ukraine*. <https://www.circularinnovationlab.com/post/the-present-state-of-the-circular-economy-in-ukraine>
- Liu, Z., Li, J., Chen, H., Wang, L., Yang, J., & Plaza, A. (2024). Prediction of changes in war-induced population and CO<sub>2</sub> emissions in Ukraine using social media. *Humanities and Social Sciences Communications*, 11, 884. <https://doi.org/10.1057/s41599-024-03318-5>
- Loiseau, E., Saikku, L., Antikainen, R., Droste, N., Hansjürgens, B., Pitkänen, K., Leskinen, P., Kuikman, P., & Thomssen, M. (2020). Green economy and related concepts: An overview. *Journal of Cleaner Production*, 139, 361–371. <https://doi.org/10.1016/j.jclepro.2016.08.024>
- Matuszak, S. (2021). *Spichlerz świata? Rozwój rolnictwa na Ukrainie*. Ośrodek Studiów Wschodnich im. Marka Karpia. (in Polish).
- Matyka, M. (2023). Changes in the consumption in mineral fertilizers and pesticides in Poland and in Ukraine – Comparative analysis. *Annals of the Polish Association of Agricultural and Agribusiness Economists*, XXV(3), 220–231. <https://doi.org/10.5604/01.3001.0053.8658>
- Meissner, F., Carr, R., Mikhnich, V., & Zachmann, G. (2024). *Modelling the electricity deficit in Ukraine and potential policy responses for the period June 2024 – May 2025*. Berlin: Helmholtz Zentrum.
- Mentes, M. (2023). Sustainable development economy and the development of green economy in the European Union. *Energy, Sustainability and Society* 13, 32. <https://doi.org/10.1186/s13705-023-00410-7>
- Ministry of Energy of Ukraine. (2023). *Report for COP28. Clean Energy Roadmap: From reconstruction to decarbonization in Ukraine*. <https://www.energy.gov/sites/default/files/2024-10/NZW06%20Clean%20Energy%20Roadmap%20From%20Reconstruction%20to%20Decarbonization%20In%20Ukraine.pdf>
- Ministry of Environmental Protection and Natural Resources of Ukraine. (2021). *Environmental Security and Climate Adaptation Strategy until 2030 adopted*. <https://www.kmu.gov.ua/en/news/uhvaleno-strategiyu-ekologichnoyi-bezpeki-ta-adaptaciyi-do-zmini-klimatu-do-2030-roku>
- Ministry of Environmental Protection and Natural Resources of Ukraine. (2023). *Ukraine's greenhouse gas inventory 1990–2021: Annual national inventory report*. [https://mepr.gov.ua/wp-content/uploads/2023/03/Kadastr\\_2023.pdf](https://mepr.gov.ua/wp-content/uploads/2023/03/Kadastr_2023.pdf)
- Ministry of Environmental Protection and Natural Resources of Ukraine. (2024). *Ukraine's greenhouse gas inventory 1990–2022: Annual national inventory report*. [https://mepr.gov.ua/wp-content/uploads/2023/03/Kadastr\\_2023.pdf](https://mepr.gov.ua/wp-content/uploads/2023/03/Kadastr_2023.pdf) Ukraine%E2%80%99s%20greenhouse%20gas%20inventory%201990%E2%80%932022:Annual%20national%20inventory%20report
- Nahm, J. (2023). *Failures and successes of the Paris Agreement*. *American Council on Europe*. <https://ace-usa.org/blog/research/research-foreignpolicy/failures-and-successes-of-the-paris-agreement/>
- National Agency of Ukraine. (2021). Затверджено Національну стратегію управління відходами в Україні [National Waste Management Strategy in Ukraine until 2030]. <https://dlf.ua/en/ukrainian-national-waste-management-strategy-until-2030-approved/>
- Nies, S., & Savytskyi, O. (2024). *Six options to boost power grid transfers from Continental Europe to Ukraine for the next two winters: Ukraine's power network integration with the EU*. <https://greendealukraine.org/products/analytical-reports/six-options-to-boost-power-grid-transfers-from-continental-europe-to-ukraine-for-the-next-two-winters>
- Norton Rose Fulbright. (2021). *The EU Green Deal explained*. <https://www.nortonrosefulbright.com/en-pl/knowledge/publications/c50c4cd9/the-eu-green-deal-explained>
- Office of Deputy Prime Minister for European and Euro-Atlantic Integration of Ukraine. (n.d.) *Ukraine's participation in the European Green Deal*. <https://mon.gov.ua/storage/app/media/nauka/2020/European%20Green%20Deal/Informatsiyi%20materialy/ukraines-participation-in-the-european-green-dealcompressed.pdf>
- Ohio State University College of Food, Agricultural and Environmental Sciences. (2018). *Understanding pesticides in organic and conventional crop production systems*. <https://ohioline.osu.edu/factsheet/anr-69>
- PAN Europe. (n.d.). Pesticide use in Europe. <https://www.pan-europe.info/issues/pesticide-use-europe>
- Panasytska, O. (2022). *Less waste and more resources: How extended producer responsibility works within the context of a circular economy*. <https://voxukraine.org/en/less-waste-and-more-resources-how-extended-producer-responsibility-works-within-the-context-of-a-circular-economy>
- Parliament of Ukraine. (2021). Document 179-2021-n. <https://zakon.rada.gov.ua/laws/show/179-2021-%D0%BF#Text>

- Parliament of Ukraine. (2021). Про схвалення Оновленого національно визначеного внеску України до Паризької угоди... <https://www.kmu.gov.ua/npras/pro-shvalennya-onovlenogo-nacionalno-viznachenogo-vnesku-ukrayini-do-parizkoyi-t300721>
- Parliament of Ukraine. (2022). Проект Закону про управління відходами 2207-1-д. [http://w1.c1.rada.gov.ua/pls/zweb2/webproc4\\_1?pf3511=69033](http://w1.c1.rada.gov.ua/pls/zweb2/webproc4_1?pf3511=69033)
- Pearce, D. (1992). Green economics. *Environmental Values*, 1(1), 3–13. <http://environmentandsociety.org/node/5454>
- Petrychenko, V., Petrychenko, O., Fedoryshyna, L., Kravchuk, O., Korniihuk, O., & Nitsenko, V. (2022). Agricultural production in Ukraine: Ecological challenges and impact on the quality of life, 4(45), 374-384. <https://doi.org/10.55643/fcaptp.4.45.2022.3782>
- Prandecki, K., Wrzaszcz, W., & Zieliński, M. (2021). Environmental and climate challenges to agriculture in Poland in the context of objectives adopted in the European Green Deal strategy. *Sustainability*, 13(18), 10318. <https://doi.org/10.3390/su131810318>
- Przybojewska, I. (2021). The concept of the circular economy in the EU Green Deal. In E. Radecka & F. Nawrot (Eds.), *Green deal or green disorder?* (pp. 267-269). Toruń. (in Polish).
- Radomska, E. (2017). *DCFTA – umowa o strefie wolnego handlu Ukrainy z Unią Europejską – szanse, zagrożenia, wyzwania*. KNUV. (in Polish).
- Régnier, E., & Catalo, A. (2024). *The Ukrainian agricultural sector: An overview and challenges in light of possible European Union enlargement (Study No. 03/24)*. <https://www.iddri.org/en/publications-and-events/study/ukrainian-agricultural-sector-overview-and-challenges-light-possible>
- Regulation (EC) No 1107/2009 concerning the placing of plant protection products on the market, Pub. L. No. 32009R1107, 309 OJ L (2009). <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32009R1107>
- Regulation (EU) 2023/956 of the European Parliament and of the Council of 10 May 2023 establishing a carbon border adjustment mechanism, Pub. L. No. 32023R0956, 130 OJ L (2023). <https://eur-lex.europa.eu/eli/reg/2023/956/oj/eng>
- Rimini, M., Peters, J., Vangenechten, D., & Lehne, J. (2023). *The EU-US global arrangement on sustainable steel and aluminium: Resetting negotiations for a carbon-based sectoral agreement*. <https://www.e3g.org/publications/the-eu-us-global-arrangement-on-sustainable-steel-and-aluminium/>
- Rossi, R., & Šajn, N. (2024). *EU 'farm to fork' strategy: State of play (Members' Research Service PE 690.622)*. European Parliamentary Research Service.
- Rzeczpospolita. (2023). *Europejska stal i aluminium nadal bez cła w USA*. <https://www.rp.pl/biznes/art39639491-europejska-stal-i-aluminium-nadal-bez-cla-w-usa> (in Polish).
- Schebesta, H., & Candel, J. J. L. (2020). Game-changing potential of the EU's Farm to Fork strategy. *Nature Food*, 1, 650–655. <https://doi.org/10.1038/s43016-020-00166-9>
- Science Business. (2024). *Ukraine should invest in solar and wind to rebuild war-torn energy system*. <https://sciencebusiness.net/network-updates/ukraine-should-invest-solar-and-wind-rebuild-war-torn-energy-system>
- Shpak, N., Kuzmin, O., Melnyk, O., Ruda, M., & Sroka, W. (2020). Implementation of a circular economy in Ukraine: The context of European integration. *Resources*, 9(8), 96. <https://doi.org/10.3390/resources9080096>
- SolarPower Europe. (2023). *EU market outlook for solar power 2023–2027*. <https://www.solarpowereurope.org/insights/outlooks/eu-market-outlook-for-solar-power-2023-2027>
- Statista. (2026). *Share of value added by the agricultural sector to the gross domestic product (GDP) in Ukraine from 2010 to 2023*. <https://www.statista.com/statistics/1326724/ukraine-agriculture-share-gdp/>
- Strategic Dialogue on the Future of EU Agriculture. (2024). *A shared prospect for farming and food in Europe*. [https://agriculture.ec.europa.eu/system/files/2024-09/strategic-dialogue-report-2024\\_en.pdf](https://agriculture.ec.europa.eu/system/files/2024-09/strategic-dialogue-report-2024_en.pdf)
- Strategic Perspectives. (2022). *Turning the European Green Deal into reality*. [https://strategicperspectives.eu/wp-content/uploads/2023/06/European-Green-Deal-turns-into-Reality\\_StrategicPerspectives\\_Pages-1.pdf](https://strategicperspectives.eu/wp-content/uploads/2023/06/European-Green-Deal-turns-into-Reality_StrategicPerspectives_Pages-1.pdf)
- Strojny, J. (2020). Small farms in the area structure of agricultural holdings of the European Union countries. *Acta Scientiarum Polonorum. Oeconomia*, 19(1), 61-70. <https://doi.org/10.22630/ASPE.2020.19.1.7>
- Syll, L. (2017). *Why the 'analytical' method does not work in economics*. <https://larspsyll.wordpress.com/2017/10/22/why-the-analytical-method-does-not-work-in-economics/>
- Szeligowski, D. (2021). *Ukraine's economic strategy to 2030*. [https://www.pism.pl/publications/Ukraines\\_Economic\\_Strategy\\_to\\_2030](https://www.pism.pl/publications/Ukraines_Economic_Strategy_to_2030)
- Takayama, A. (1993). *Analytical methods in economics*. University of Michigan Press.
- Tarassenko, A. (2025). *The launch of the sea corridor contributed to the growth of production in the industry*. *GMK Center*. <https://gmk.center/en/news/iron-steel-industry-contribution-to-ukraines-gdp-increased-to-7-2-in-2024/>
- The Economist. (2019). *Power storage is the missing link in green-energy plans*. <https://www.economist.com/leaders/2019/11/30/power-storage-is-the-missing-link-in-green-energy-plans>

- The Global Economy. (2023). Ukraine: Fertilizer use. [https://www.theglobaleconomy.com/Ukraine/fertilizer\\_use/](https://www.theglobaleconomy.com/Ukraine/fertilizer_use/)
- The World Bank Group. (2021). *Climate Change Knowledge Portal: Ukraine*. <https://climateknowledgeportal.worldbank.org/country/ukraine/vulnerability>
- Trading Economics. (n.d.) *Fertilizer consumption (kg/ha of arable land) in the EU*. <https://tradingeconomics.com/european-union/fertilizer-consumption-kilograms-per-hectare-of-arable-land-wb-data.html>
- Trypolska, G., Krupin, V., & Podolets, R. (2022). Energia odnawialna na obszarach wiejskich Ukrainy w perspektywie zmian klimatycznych. *Więś i Rolnictwo*, 2(195). <https://doi.org/10.53098/wir022022/02> (in Polish).
- Tyburski, J., Marks, M., & Franke, K. (2023). Nawożenie azotem ekologicznie uprawianej pszenicy zwyczajnej jako czynnik ograniczający jej zachwaszczenie i zwiększający wydajność ziarna. *Fragmenta Agronomica*, 40(2), 39-46. <https://www.researchgate.net/publication/377635358> (in Polish).
- Tyszka, M. (2024). *Ile substancji czynnej na hektar stosuje się w Ukrainie i w Rosji?* <https://www.farmer.pl/produkcja-roslinna/ochrona-roslin/ile-substancji-czynnej-na-hektar-stosuje-sie-w-ukrainie-i-w-rosji,142388.html> (in Polish).
- Ukraine Business News. (2024). *Due to the war, the amount of land suitable for agriculture has decreased by 26%*. <https://ubn.news/ue-to-the-war-the-amount-of-land-suitable-for-agriculture-has-decreased-by-26/>
- Ukrinform. (2025). *Ukraina w wyniku wojny straciła ponad 20% swoich gruntów rolnych*. <https://www.ukrinform.pl/rubric-economy/3975320-ukraina-w-wyniku-wojny-stracia-ponad-20-swoich-gruntow-rolnych.html> (in Polish).
- UN Environment Programme. (2018). *Fake pesticides, real problems: Addressing Ukraine's illegal and counterfeit pesticides problem*. <https://www.unep.org/news-and-stories/story/fake-pesticides-real-problems-addressing-ukraines-illegal-and-counterfeit>
- UNDP. (2022). *Health impacts and social costs associated with air pollution in larger urban areas of Ukraine: Final report*. <https://www.undp.org/ukraine/publications/health-impacts-and-social-costs-associated-air-pollution-larger-urban-areas-ukraine>
- UNDP. (2023). *EU4Climate, Ukraine*. [https://eu4climate.eu/wp-content/uploads/2023/05/UKRAINE\\_EU4Climate\\_2023.pdf](https://eu4climate.eu/wp-content/uploads/2023/05/UKRAINE_EU4Climate_2023.pdf)
- UNEP, International Resource Panel. (2011). *Decoupling natural resource use and environmental impacts from economic growth: A report of the Working Group on Decoupling*. <https://www.unep.org/resources/report/decoupling-natural-resource-use-and-environmental-impacts-economic-growth>.
- UNEP. (2011a). *Towards a green economy: Pathways to sustainable development and poverty eradication – A synthesis for policy makers*. [https://sustainabledevelopment.un.org/content/documents/126GER\\_synthesis\\_en.pdf](https://sustainabledevelopment.un.org/content/documents/126GER_synthesis_en.pdf)
- UNIDO. (2024). *Baseline analysis of circular economy in Ukraine: Final report*. Vienna. <http://www.recpc.org/circular-economy>
- United Nations Framework Convention on Climate Change. (2023). *2023 Annex I Party GHG Inventory Submissions*. <https://unfccc.int/ghg-inventories-annex-i-parties/2023>
- United Nations Industrial Development Organization. (2023, November). *Boosting circular economy in Ukraine through resource efficient and cleaner production: Impacts and lessons from company experiences under the European Union's EaP GREEN and EU4Environment programmes*. <https://www.unido.org/sites/default/files/unido-publications/2023-11/Boosting%20Circular%20Economy%20in%20Ukraine%20through%20Resouce-Efficient%20and%20Cleaner%20Production.pdf>
- United Nations. (1997). *Kyoto Protocol to the United Nations Framework Convention on Climate Change*. <https://unfccc.int/sites/default/files/resource/docs/cop3/107a01.pdf>
- United Nations. (2012). *The future we want: Outcome document of the United Nations Conference on Sustainable Development, Rio de Janeiro, Brazil, 20–22 June 2012*. <https://www.un.org/en/conferences/environment/rio2012>
- United Nations. (2015). *Paris Agreement*. [https://unfccc.int/sites/default/files/english\\_paris\\_agreement.pdf](https://unfccc.int/sites/default/files/english_paris_agreement.pdf)
- United Nations. (2015). *Transforming our world: The 2030 agenda for sustainable development (A/RES/70/1)*. <https://sdgs.un.org/sites/default/files/publications/21252030%20Agenda%20for%20Sustainable%20Development%20web.pdf>
- Veblen Institute. (2024, April). *EU pesticides export ban: What could be the consequences?* <https://www.veblen-institute.org/EU-pesticides-export-ban-what-could-be-the-consequences.html>
- Weber, M. (2011). *Methodology of social sciences*. Free Press.
- WindEurope. (2024). *Wind energy in Europe: 2023 statistics and the outlook for 2024–2030*. <https://wind-europe.org/data/products/wind-energy-in-europe-2023-statistics-and-the-outlook-for-2024-2030/>
- World Bank. (2023). *Fertilizer consumption (kg per hectare of arable land) – Ukraine*. <https://data.worldbank.org/indicator/AG.CON.FERT.PT.ZS?locations=UA>
- United Nations. (1987). *Our common future*. World Commission on Environment and Development.
- World Economic Forum. (2024). *Global risks report 2024*. <https://www.weforum.org/publications/global-risks-report-2024/>

- Wrzaszcz, W. (2022). *Zielona transformacja polityki rolnej w Unii europejskiej*. PAN. <https://bibliotekanauki.pl/chapters/15588433> (in Polish).
- Zhao, H., Wu, Q., Hu, S., Xu, H., & Rasmussen, C. N. (2015). Review of energy storage system for wind power integration support. *Applied Energy*, 137, 545-543. <https://doi.org/10.1016/j.apenergy.2014.04.103>
- Zorya, S., Soroka, L., Nivievskiy, O., Bogonos, M., Neyter, R., & Lytvynov, V. (2022). Ukraine country climate and development report: Agriculture. [https://kse.ua/wp-content/uploads/2024/03/CSA\\_en.pdf](https://kse.ua/wp-content/uploads/2024/03/CSA_en.pdf)
- Державна служба статистики України. (2022). [State Statistics Service of Ukraine]. <https://www.ukrstat.gov.ua/> (or updated portal: <https://stat.gov.ua/>)
- Затверджено постановою Кабінету Міністрів України від 3 березня 2021 р. № 179. Національна економічна стратегія на період до 2030 року. <https://climate-laws.org/documents/national-economic-strategy-for-the-period-up-to-2030-7ab2> (or official [rada.gov.ua](https://rada.gov.ua) link)
- Кабінет Міністрів України. (2017, August 18). Розпорядження № 605-р: Про схвалення Енергетичної стратегії України на період до 2035 року. <https://zakon.rada.gov.ua/laws/show/605-2017-%D1%80>
- Кабінет Міністрів України. (2021). Затверджено Національну стратегію управління відходами в Україні. 15 січня 2021.
- Правове регулювання використання пестицидів та агрохімікатів. (2022, February 16). Верховна Рада України. <https://dlf.ua/en/legal-regulation-of-pesticide-and-agrochemical-use-in-ukraine/>

---

Tomasz KOLASIŃSKI • Marek WIGIER

## EUROPEJSKI ZIELONY ŁAD I WSPÓLNA POLITYKA ROLNA W KONTEKŚCIE UKRAINY. WYBÓR ZAGADNIEŃ

**STRESZCZENIE:** Celem artykułu jest ocena możliwości przystąpienia Ukrainy do mechanizmu Wspólnej Polityki Rolnej UE i Zielonego Ładu. Analizie poddano akty prawa wspólnotowego, akty prawa Ukrainy, dokumenty rządowe oraz oficjalne dokumenty jak raporty czy strategie nie stanowiące źródeł prawa a także literaturę. Opisowa, jakościowa, porównawcza metoda analizy prawnej została uzupełniona analizą ekonomiczną, ilościową wtórnych danych statystycznych. Działania zbrojne na Ukrainie wymuszają stosowanie nie ekologicznych nawozów azotowych wobec zniszczonego arealu ziemi uprawnej. Przeprowadzenie reformy strukturalnej gospodarstw rolnych jest odłożone w czasie. Redukcja emisji dwutlenku węgla i realizacja norm utylizacji odpadów nie są możliwe. Zniszczona infrastruktura ogranicza wykorzystanie zasobów energii wiatru i słońca. Rozdzwięk zapisów prawa, chęci i ambicji władz Ukrainy z aktualnymi możliwościami realizacji „zielonych” celów Wspólnej Polityki Rolnej i Zielonego Ładu upoważniają Autorów do stwierdzenia, że Ukraina aktualnie nie jest gotowa na wprowadzenie w życie tych postanowień.

**SŁOWA KLUCZOWE:** Europejski Zielony Ład, Wspólna Polityka Rolna, gospodarka obiegu zamkniętego, Ukraina