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CLIMATE

Editors

Dr. Hanna Shelest
Dr. Mykola Kapitonenko

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Contacts:

website: <http://ukraine-analytica.org/>
e-mail: Ukraine_analytica@ukr.net
Facebook: <https://www.facebook.com/ukraineanalytica>
Twitter: https://twitter.com/UA_Analytica

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CLIMATE CHANGE AND UKRAINE'S POST-WAR RECONSTRUCTION

Andriy Andrusevych

Society and Environment Centre (Ukraine)

Building a climate neutral economy needs to be a central part of Ukraine's post-war reconstruction and recovery. Rising from the war ashes creates a unique opportunity for Ukraine to leapfrog from a carbon and resource intensive economy while building a strong basis for the country's energy security in the future. Putting climate efforts into the centre of the post-war recovery will also help integration into the EU and the building of a climate resilient economy.

Introduction

Since the full-scale aggression on February 24th, 2022, Russia's war against Ukraine has been a global problem affecting the established international peace and security framework in many ways¹. Yet, the climate change global agenda does not seem to have been downgraded: the major global economies have recently strengthened their commitment to climate change mitigation and adaptation².

The European Union, Ukraine's major trade³ and political partner, continues to implement its ambitious European Green Deal initiative, with a view to building a climate neutral economy by 2050⁴, despite the COVID-19 pandemic and the Russo-Ukrainian war. In fact, the Russian aggression against Ukraine may well be seen as a war against decarbonization in Europe, a core component of the European Green Deal⁵. Urgent measures are being taken to stop the dependency of the EU countries on Russian fossil fuels⁶.

1 Statement by Foreign Minister Annalena Baerbock in her capacity as Chair of the G7 Foreign Ministers' Meeting at the High-Level Week of the UN General Assembly, <https://www.auswaertiges-amt.de/en/newsroom/news/-/2553680>.

2 See, in particular, the G7 Leaders' Communique of June 28, 2022, where they explicitly reaffirm their commitment "to phase out [their] dependency on Russian energy, without compromising on our climate and environmental goals", <https://www.g7germany.de/resource/blob/974430/2057928/1315842ed9de069fa1be82dab18dabb2/2022-06-28-leaders-communique-executive-summm-data.pdf?download=1>.

3 The EU is Ukraine's largest trading partner, accounting for 39.5% of its trade in 2021. Source: https://policy.trade.ec.europa.eu/eu-trade-relationships-country-and-region/countries-and-regions/ukraine_en

4 The European Green Deal, COM (2019) 640 final, <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52019DC0640>.

5 85% of Europeans believe that the EU should reduce its dependency on Russian gas and oil as soon as possible to support Ukraine. Source: Flash Eurobarometer survey 506, May 2022, <https://europa.eu/eurobarometer/surveys/detail/2772>.

6 RE Power EU Plan is a major example of such efforts. See COM (2022) 230 final, <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2022%3A230%3AFIN&qid=1653033742483>.

Meanwhile, Ukraine is facing immense needs in several areas: supporting vital services, providing shelter and support to millions of internally displaced persons, and repairing or reconstructing damaged and ruined critical infrastructure, buildings, and whole towns and villages destroyed by Russian troops and missile attacks⁷. The scale of destruction is yet to be fully understood and assessed, as the war continues.



neither Ukraine nor the EU proposes a green recovery vision. The EU does not want to impose any vision, leaving it up to Ukraine to develop and take ownership of the plan. In Ukraine, in its turn, many key stakeholders remain locked in pre-war projections and strategies

To shape the reconstruction and recovery process the President of Ukraine launched a national platform to design a national recovery plan. First drafts were already made public⁸ and presented⁹ at the Lugano Conference in July, 2022. At the same time, Ukraine's international partners developed their own initial proposals and visions for the post-war reconstruction. In particular, the European Commission in May, 2022 adopted a communication "Ukraine Relief and Reconstruction", where it laid down its key approaches to future process¹⁰.

In short, the planning of the post-war reconstruction is an ongoing process. It

will take some time for Ukraine and its partners to agree on a common approach, or at least to come to coherent positions. The war needs to stop for the recovery plan to be finalised. What is already evident is that Ukraine and its partners share a common view of a three-stage process (relief during the war, reconstruction immediately after war and mid-term recovery period in the future 10+ years). In addition, the post-war reconstruction will necessarily include a "reforms" track, needed to attract investments, funding, and to support the EU accession process.

Green Post-War Reconstruction: A Need or A Dream?

The current vision of the Ukrainian government and its international partners has many green elements, in particular the draft national recovery plan and the European Commission's communication on Ukraine's relief and reconstruction.

However, neither Ukraine nor the EU proposes a green recovery vision. The EU does not want to impose any vision, leaving it up to Ukraine to develop and take ownership of the plan. In Ukraine, in its turn, many key stakeholders remain locked in pre-war projections and strategies. Their current approaches do not include sufficient and effective green elements, which means the post-war reconstruction may "close" some sectors off for decades from modernisation, greening and sustainability¹¹. In a wider context, this may create new obstacles for Ukraine to be part of the EU and the global green economy.

7 The World Bank's latest assessment is \$359 Billion, <https://www.worldbank.org/en/news/press-release/2022/09/09/ukraine-recovery-and-reconstruction-needs-estimated-349-billion>

8 Sectoral draft plans available at <https://www.kmu.gov.ua/en/national-council-recovery-ukraine-war/working-groups>

9 <https://www.urc2022.com/>

10 COM (2022) 233 final, <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52022DC0233>.

11 Green post-war reconstruction of Ukraine: vision and models, Policy brief summary, Society and Environment (2022), <https://www.rac.org.ua/uploads/content/658/files/green-post-war-reconstruction-of-ukrainefinal.pdf>.

From a pragmatic experience, a non-green recovery process will negatively affect the national energy security and well-being of Ukrainians.


Many experts and civil society organisations in Ukraine and in Europe called for a green approach to post-war reconstruction in Ukraine¹². On an expert level, at least two models of green reconstruction were proposed recently in Ukraine: they are ambitious and pragmatic¹³, and both received unequivocal support during a 200+ discussion session representing all the stakeholders in Ukraine, including government, business, and CSOs.

So, if the demand is there, why does the current national recovery plan not encompass a green vision? For many national and international policymakers, the green recovery of Ukraine remains a dream because of many practical considerations. Does “green” mean slower? Is “green” more expensive? Will “green” harm in any way national, including energy, security? Let’s try to look into the last, more fundamental, question.

Climate Change as the Centrepiece of the Green Reconstruction Vision

Climate change should be inevitably a central element of any green vision of a post-war recovery plan. Indeed, all current calls for a green recovery are largely climate change driven visions of the recovery.

In turn, decarbonisation of the economy is one of the central elements of the global and national climate change mitigation efforts. If this war is viewed as a war against decarbonisation in Europe, decarbonisation should be at the heart of building energy security and independence, including for Ukraine. Russia is weaponising its energy exports, and considers decarbonisation as a threat to its national security¹⁴.



Climate change should be inevitably a central element of any green vision of a post-war recovery plan

Ukraine is highly dependent on fossil fuel imports, though carbon and energy productivity in the economy have been growing in the last ten years. However, the average energy productivity in OECD countries is twice as high as in Ukraine, and in the EU – 2.5 times higher¹⁵. For Ukraine, therefore, a strong climate change mitigation policy, including energy efficiency measures and support to renewables, is a matter of energy security.

Post-war reconstruction will inevitably lead to large investments in the main fossil fuel consuming sectors, such as district heating, steel production, etc. Rebuilding damaged residential buildings and district heating systems (large thermal power plants) will

12 Will the EU support a green recovery for Ukraine from the ashes of war?, https://meta.eeb.org/2022/09/22/will-the-eu-support-a-green-recovery-for-ukraine-from-the-ashes-of-war/?mc_cid=e2ed96b96f&mc_eid=864a361bf5&fbclid=IwAR30x6_QM9UgMxbyrZYW_Duyogr5NlpkjKqjyofXp244VXTKM5CnvzpcSo

13 Green post-war reconstruction of Ukraine: vision and models, Policy brief summary, Society and Environment (2022), <https://www.rac.org.ua/uploads/content/658/files/green-post-war-reconstruction-of-ukraineengfinal.pdf>.

14 See, e.g. Strategy of National Security of Russian Federation of July 2, 2021.

15 Towards green transformation of Ukraine: State of Play in 2021, OECD (2022), <https://www.eu4environment.org/app/uploads/2022/04/Towards-green-transformation-of-Ukraine-State-of-Play-in-2021-ENG-1.pdf>.

have long-term consequences. For example, Naftogaz (the largest and state-owned energy company in Ukraine) decided to invest in several biomass district heating systems in the Eastern part of Ukraine¹⁶. Such approach must be governed, multiplied and enhanced by an overarching vision, to ensure that other efforts, including reforms, investments and aid, contribute to energy security through a climate oriented and resilient framework.

Green reconstruction will also include other elements, such as preserving natural capital and biodiversity, and diminishing pollution. However, it is climate change mitigation and adaptation that need to serve as a core building block. Similarly, the European Green Deal is built around climate neutrality and integrating climate change considerations into new agricultural, industrial, energy, food, and other policies. From this perspective, Ukraine's green reconstruction plan may well serve the purpose of a Ukrainian Green Deal. Just as Franklin D. Roosevelt's New Deal helped the US to emerge as a major global economy from economic collapse in the 1930s, Ukraine's post-war recovery plan should help Ukraine to fully integrate into a new future green EU and global economy, and to build a prosperous country.

Climate Change Dimension of the EU Accession Process

During the first days of the Russian invasion in 2022, Ukraine sent its EU membership application to Brussels and was already granted EU candidate status in June¹⁷. This means that Ukraine expects to go through

accession negotiations while recovering from the destruction of the war and, in fact, while hostilities are still taking place.

EU accession negotiations do not resemble the way one understands the word "negotiations". It is a process where the EU and its member-states come to an agreement that a country can fulfil all of the obligations stemming from the EU acquis (legislation)¹⁸. Adoption of established EU law, preparations to be in a position to properly apply and enforce it, and implementation of judicial, administrative, economic and other reforms necessary for the country to meet the conditions for joining are known as accession criteria¹⁹. In other words, Ukraine needs to fully implement all European legislation in 35 areas (the so-called negotiating chapters).



A green post-war recovery will support both a more resilient and secure future economy and accession negotiations

Climate change is not a separate negotiating chapter, being integrated into various relevant chapters (Environment, Energy, Transport and others). However, given the highest priority attached to climate change in the European Green Deal and a very complex climate change legislative framework in the EU, Ukraine will face a challenging task on its way into the EU. This task – rapid and painful reforms in major carbon intensive sectors – cannot be implemented “on paper”.

16 <http://sm.gov.ua/ru/arkhiv1/29269-na-sumshchyni-realizovuvatymetsya-proekt-zi-vstanovlennya-kotla-na-alternatyvnomu-vydi-palyva-dlya-okhtyrskoyi-tets.html>

17 European Council conclusions, 23-24 June 2022, <https://www.consilium.europa.eu/media/57442/2022-06-2324-euco-conclusions-en.pdf>.

18 Katarina Maternova, Deputy Director-General, in an interview to European Pravda, Sep 22, 2022, <https://www.euointegration.com.ua/interview/2022/09/22/7147286/>.

19 European Commission, https://neighbourhood-enlargement.ec.europa.eu/enlargement-policy/steps-towards-joining_en

In many areas, Ukraine is already showing quite significant progress in terms of climate change indicators. For example, it has already reduced its greenhouse gas emissions by 66% compared to 1990²⁰. Similarly, Ukraine is already more advanced than the EU (or even its targeted indicators) in use of fertilisers, and its share of railway cargo transportation²¹.

Yet, as discussed above, some of these advances came at the sake of economy collapse, and recent positive trends in energy intensity (productivity) of the economy are still insufficient to bridge a huge gap between the EU and Ukraine. Some key instruments and reforms are yet to be introduced, such as carbon pricing, to ensure that the Ukrainian economy can be part of the EU's joint market.

It is inevitable that Ukraine will carry out the necessary reforms and will need to implement measures to ensure its law and economy is in line with the most recent EU climate legislation and policies. Combining these reforms with a green post-war reconstruction is therefore a necessity, not a dream.

Conclusion

Ukraine and its partners are working on a common vision for the post-war reconstruction. This is a process which will include both immediate reconstruction

of the destroyed assets, and a mid-term recovery and growth strategy. It will also be accompanied by a reform process and EU accession negotiations.

A green post-war recovery will support both a more resilient and secure future economy and accession negotiations. For this to happen, green post-war recovery must include climate change considerations as its main building block. A climate mitigations policy and measures will directly contribute to Ukraine's energy security. Associated climate change reforms will enable Ukraine to close several negotiating chapters on its way into the EU, including those relating to energy, transport and the environment.

Lastly, by adopting a green post-war recovery vision, Ukraine can leapfrog to a modern, climate neutral, resilient economy that ensures energy supply, industrial growth, and food security as well as the well-being of the Ukrainians.

Andriy Andrusevych is a co-founder and senior policy expert at Resource & Analysis Center "Society and Environment", a Ukrainian environmental think tank organisation. More recently, he has been involved in several research projects related to environmental and climate change aspects of Ukraine's post-war reconstruction, the EU access process and reparation of the environmental damages from the Russian aggression.

20 UNFCCC, https://di.unfccc.int/time_series

21 Mapping of strategic targets of Ukraine and the EU in the context of the European Green Deal: development vectors and flagship initiatives." Policy paper. – Resource and Analysis Center "Society and Environment" (2021), <https://www.rac.org.ua/uploads/content/615/files/enggreendealflagshipmapping2021.pdf>.

CLIMATE PERSPECTIVES FOR POST-WAR UKRAINE

Dr Olena Melnyk

*ETH Zurich (Switzerland),
Sumy National Agrarian University (Ukraine)*

Dr Iryna Vaskina

Sumy State University (Ukraine)

This article describes the effects of the active hostilities on the environment in the short and long term, as well as examines the EU's nature-oriented policy and solutions for energy safety in the global climate context of the war. The new opportunities for low-carbon post war development in Ukraine are considered.

By 2040, an increase in the average annual temperature in Ukraine is expected, within the range of 0.8–1.1 C¹. Taking into account the drastic influence of the war, the worst scenario can be foreseen. Temperatures are expected to rise significantly during the summer months, leading to more drought and more heat. During the next several years, a redistribution of precipitation is expected, with an increase in the cold season and a decrease in the warm one. At the same time, the intensity of precipitation will increase in the warm period of the year. This could lead to an increase in flash floods. The number and frequency of spontaneous hydrometeorological phenomena will rise.

In the territories where active hostilities are taking place, we observe deliberate destruction of the environment by Russia, in order to create economic and infrastructural problems. The movement of heavy military equipment, bombings and air strikes, missile

attacks, the construction of fortifications, and the use of phosphorus ammunition all cause a negative impact on every aspect of the ecosystems. The destruction of potentially dangerous industrial facilities, in particular the nuclear, chemical, and oil refining industries, is constantly taking place, and generating a negative impact on the environment. The cost of damage to Ukraine's ecosystems, according to preliminary estimates of the Ministry of the Environment, at the beginning of June had already exceeded UAH 200 billion².

Military operations on the territory of Ukraine directly affect the environment by changing the landscape; causing loss of natural resources and damage to the soil; as well as losses to the forest and nature reserve fund; polluting water, atmospheric air, and soil. The frequency of fires in Ukraine's ecosystems have increased due to the hostilities. This, in turn, leads to the degradation of vegetation

1 Official website of the Ministry of Environmental Protection and Natural Resources of Ukraine (MEP) [<https://mep.gov.ua>]

2 Digest of the MEP of Ukraine about the environmental consequences of the Russian aggression in Ukraine [<https://mep.gov.ua/news/39034.html>]

and increases wind and water erosion, and causes the loss of biodiversity. In addition, there are obvious threats to nuclear security through radiation leaks.

Military actions threaten the sustainable development of the entire planet, in particular in the context of achieving climate goals. According to the National Oceanic and Atmospheric Administration (NOAA), in May, 2022, the carbon dioxide concentration index was 420.99 ppm. In the same period in 2020 it had been 417 ppm³. Military actions undoubtedly increase the concentrations of GHG (Greenhouse gases), mainly due to the use of large amounts of fossil fuels, as well as specific components that cause other negative reactions in the atmosphere.



Military operations on the territory of Ukraine directly affect the environment by changing the landscape; causing loss of natural resources and damage to the soil; as well as losses to the forest and nature reserve fund; polluting water, atmospheric air, and soil

Thus, as a result of the hostilities on the territory of Ukraine, the number of emissions of pollutants into the atmospheric air is increasing, including greenhouse gases (CO₂, methane, nitrogen oxides, and chlorofluorocarbons). During the detonation of rockets and artillery shells, a number of chemical compounds are formed:

carbon oxides, water vapour, nitrous oxides, formaldehyde, and vapours of cyanic acid, as well as a large number of toxic organics. During the explosion, all substances undergo complete oxidation, and the products of the chemical reaction are released into the atmosphere. For example, 1 kg of explosives also forms several tens of cubic meters of toxic gases among which there are also dangerous under-oxidized organic compounds, in particular aromatic ones⁴.

Reducing the transparency of the atmosphere due to the accumulation of a large amount of dust, ash and soot also affects the strengthening of the greenhouse effect. Forest fires lead to a significant reduction in the area of green vegetation, which in turn reduces CO₂ fixation (assimilation) and deepens the consequences of climate change. Since the beginning of 2022, fires have been recorded in the forests of Ukraine on a total area of 5.5 thousand hectares – this is 96 times higher than the previous year's⁵. Currently, according to EcoZagroza⁶, 85,000 tons of petroleum products have been burned during the war, resulting in about 300,000 tons of emissions from combustion products.

Currently, we do not have open up-to-date statistical data on the dynamics of air pollution in the regions of Ukraine where active hostilities are taking place, but “the amount of emissions of pollutants into the atmospheric air during hostilities on the territory of Ukraine can already be equal to the emissions of one metallurgical enterprise for the entire year of operation”⁷.

3 Global Monitoring Laboratory at Manua Loa [<https://gml.noaa.gov/ccgg/>]

4 Assessment of environmental damage and priorities of environmental restoration in Eastern Ukraine [https://www.osce.org/files/f/documents/6/3/362581_0.pdf]

5 Digest of the MEP of Ukraine about the environmental consequences of Russian aggression in Ukraine [<https://mepr.gov.ua/news/39034.html>]

6 Ecozagroza – Dashboard of the Ministry of Environmental Protection and Natural Resources of Ukraine with data on environmental threats [<https://ecozagroza.gov.ua/>]

7 Digest of the MEP of Ukraine about the environmental consequences of the Russian aggression in Ukraine [<https://mepr.gov.ua/news/39034.html>]

The experience of eight years of armed conflict in the Donetsk and Lugansk regions also does not give grounds for optimism. A significant increase (by 5-8 times) in the concentration of SO₂, NO₂ and CO₂ had already been recorded by the automated monitoring station operating in Shchastya by mid-August 2014⁸.

All of this adds up to costs for future generations, jeopardising public health, infrastructure, economic growth, and overall human survival. There is a risk that Ukraine will not fulfil the already set climate goals, because the war is a contribution to climate change, and the recovery of the country will inevitably be accompanied by significant emissions of greenhouse gases.



Foreign investments will require a clear position to be taken by the authorities and foreign donors regarding the prevention of further damage to the environment

In terms of climate, unusual features are coming into play that can interact in many ways with the consequences of the war in Ukraine, such as the lingering effects of the pandemic and protracted conflict situations, and either these may lead to or aggravate the major humanitarian crisis⁹. Such changes will lead to the profound need to rebuild the energy system and infrastructure of settlements and communities in the post-war period. Hence, climate adaptation policy has to be embedded into the strategies for the post-war restoration of the local economic and social development, as soon

as possible. Although Ukraine has gradually modernised its production capacity by introducing new technologies, many of its capital and production technologies were outdated. The reconstruction gives Ukraine the possibility of making a “technological leap”. The most obvious possibility is to create a carbon-free economy as a way to coordinate investments in the future, and to reduce dependence on fossil fuels as much as possible.

Foreign investments will require a clear position to be taken by the authorities and foreign donors regarding the prevention of further damage to the environment. This means a check-up of all state institutions providing safety, including those involved in environmental safety and climate change prevention. Although the war is not fully controllable, it reveals areas for development in the sphere of public administration and areas of risk. The following environmental risks are expected to be very high:

1. A risk of maximising the use of natural resources for the post-war reconstruction, destruction of natural areas with the “mandate to prevent famine”;
2. A risk of increasing carbon emissions due to the production of building materials for the reconstruction;
3. A risk of exploiting part of the natural territories that decrease the carbon footprint during the development or restoration of the Ukrainian cities and towns;
4. A risk of reconstruction of destroyed buildings without meeting environmental standards, thus reducing the resilience of buildings in terms of climate change;

8 Assessment of environmental damage and priorities of environmental restoration in Eastern Ukraine [https://www.osce.org/files/f/documents/6/3/362581_0.pdf]

9 REPowerEU: A plan to rapidly reduce dependence on Russian fossil fuels and fast forward the green transition, 18 May 2022 Brussels [<https://www.eurointegration.com.ua/experts/2022/07/7/7142746/>]

5. A risk of shifting the accent from investments in RES to investments in Nuclear Power Stations (including small modular nuclear reactors with a capacity of 50 to 300 MW) that are very vulnerable to terrorist attacks;

6. A risk of increasing the capacity of the country's own gas production and neglecting Green Deal decarbonisation principles;

7. A risk of ignoring the ecological obligations which were adopted in the frames of the EU-UA Association agreement, for instance cancellation of the strategic environmental assessment (SEA) of the restoration programmes of regions of the territorial communities.



The faster the pace of Ukrainian-European integration is, the more thoroughly and extensively the Ukrainian energy industry, as well as the other sectors of the economy should be transformed towards climate neutrality.

Considering all the above-mentioned risks, Ukraine faces large-scale and important tasks: restoration of the critical infrastructure, ensuring ecological and energy security, further implementation of the EU legislation, the fight against climate change and adaptation to it, etc. The faster the pace of Ukrainian-European integration is, the more thoroughly and extensively the Ukrainian energy industry, as well as the other sectors of the economy should be transformed towards climate neutrality. It has been suggested to create the International Agency for the Reconstruction of Ukraine, through which experts in various fields will be engaged in the modernisation and restoration of the country. Similar functions were performed

by the Economic Cooperation Administration (ECA) which administered the Marshall Plan for Europe after World War II. This Agency should engage experts from the Ukrainian civil society (that were not enough represented before the war, despite the requirements of many international donors), the EU, G7 and other countries which are eager to support Ukraine in post-war reconstruction.


An important event in terms of defining further international support for Ukraine took place on July 4-5th in Lugano (Switzerland). The Ukraine recovery forum was an opportunity to share Ukraine's Recovery Plan, and engage international partners to develop the best possible response to the enormous challenges lying ahead. During the conference, the process of rebuilding Ukraine in a sustainable manner was aligned with the 2030 Agenda for sustainable development and the Paris Agreement, integrating social, economic and environmental dimensions including green ones. A week before the conference, the Swiss Federal Council approved a bilateral climate protection agreement with Ukraine. The agreement establishes the legal framework for Switzerland to implement climate protection projects in Ukraine. These projects will aim at reducing CO2 emissions while also contributing to environmentally sustainable reconstruction in Ukraine. According to the signed agreement and conference highlights, Ukraine is foreseen as becoming a platform for the symbiosis of solutions, and for developing the best technologies available in the world today in the field of energy, with the support of the world community and distinguished experts.

Some important steps were implemented by the Ukrainian government before the conference. On April 21st, 2022, the National Council for the Recovery of Ukraine from the Consequences of the War was established (with the financial support of the Swiss Agency for Development and Cooperation).

Ukrainian government officials, with their European partners, are working on the big plan for the post-war reconstruction of Ukraine. No doubt this plan should be in line with the most recent trends of EU and Global Climate policy, especially now that Ukraine has become a candidate for EU membership, and the ethics of the restoration will concern the possibility of maintaining morality in environmental aspects.

It is very important for Ukraine, as a candidate for EU membership, to develop the infrastructure and energy measures within the framework of the EU's environmental protection requirements, in particular the Green Deal, REPowerEU plan, and possibly to get support from the Recovery and Resilience Fund (RRF), which is aimed at supporting the energy and infrastructure projects and reforms. The Recovery and Resilience Facility (RRF) is at the heart of the REPowerEU Plan, supporting coordinated planning and financing of cross-border and national infrastructure, as well as energy projects and reforms. The EU's External Energy Strategy is considered as a green transformation that will strengthen economic growth, security, and climate action for Europe and its partners. It is stated in the document that the EU, together with Ukraine, will continue to ensure the security of supplying and functioning the energy sector, while paving the way for the future electricity and renewable hydrogen trade, as well as rebuilding the energy system under the REPowerUkraine initiative¹⁰. Despite the expectation of Eurosceptics, who predicted the EU would reveal fewer ambitions, the EU Green Deal targets are based on attempts to end the EU's dependence on Russian fossil fuels, while REPowerEU has shown strong adherence to the

previously declared road map. Moreover, the Commission proposed to increase the headline 2030 target for renewables from 40% to 45% under the Fit for 55 packages. According to recent IPCC reports, there is still a window of opportunity to avoid the worst impacts of the climate crisis, but it is closing fast. It is a now or never moment for the EU to prove its climate leadership at the global level and get on the right energy transition track. REPowerEU relies on the EU Solar Strategy, Solar Rooftop and Heat Pumps Initiatives, Biomethane Action Plan, and acts on the definition and production of renewable hydrogen, etc. Renewables already constitute a cheaper investment compared to that into the existing gas-fired power. Prioritisation of these sectors can drastically decrease greenhouse gas emissions, to empower the effective adaptation to climate change, and avoid dependence on Russian fossil fuels.



In the context of the EU's strategy of transition to climate neutral development, it is important that a significant part of the exported electricity should come from renewable sources

These EU decisions have received responses not only at the level of governments but at the level of civil society all over the world. On June 2nd-3rd, the governments of Sweden and Kenya hosted a large-scale Stockholm+50 meeting conference for civil society activists, government officials and stakeholders from all over the world to mark the anniversary of the first UN conference on the environment, and, in particular, to

10 Andersson, Jan and Petryk Igor. Flexibility to future-proof the Ukrainian power system Solving the Ukrainian Green-Coal paradox. Wärtsilä Energy, 2018
[\[https://www.wartsila.com/docs/default-source/power-plants-documents/downloads/white-papers/europe/wartsila-flexibility-to-future-proof-the-ukrainian-power-system.pdf\]](https://www.wartsila.com/docs/default-source/power-plants-documents/downloads/white-papers/europe/wartsila-flexibility-to-future-proof-the-ukrainian-power-system.pdf)

contribute to the acceleration of the fair energy transition. During the event, the Fossil Fuel Non-Proliferation Treaty was announced, as a part of the campaign for the global and equitable phase-out of oil, gas and coal. The document will offer world governments a mechanism to work together to accelerate the transition to carbon-free renewable energy. The document will also regulate the cessation of the search for the new deposits and the extraction of new reserves of fossil fuels. The other goals include gradually abandoning the expansion and crediting of fossil fuel production, expanding access to RES, and other low-carbon solutions.

At the same time, when the world declares encouraging ambitious energy and climate targets, and stimulating the use of RES and energy efficiency, some controversial decisions have appeared. This concerns the decision taken on July 6th, 2022 by the EU Commission to recognise investments in fossil gas as “green” and environmentally friendly, and to include gas and nuclear projects into the EU investment taxonomy. While earlier gas, in particular Russian gas, was considered in Europe as a bridge fuel for the energy transition, now it is obvious that the “green” label for gas will primarily promote the construction of gas-powered plants in the EU. The decision to replace one fossil fuel with another is strategically neither sustainable nor profitable. Scientists, environmental activists and even a large part of the investment management industry^{11,12} say that including fossil gas in the “green”

taxonomy is deeply controversial, and will only create uncertainty for investors about what is truly sustainable; at the same time classifying fossil gas as a sustainable energy source would mean that Europe being able to meet its decarbonisation and zero emissions targets, stated in the EU Green Deal.

This decision might mean decreasing the amount of EU investments in Ukrainian RES, because Ukraine’s energy security is not able to rely on the expansion of the gas infrastructure, which by its very nature is critically vulnerable to military attacks, such as missile strikes, artillery or aerial bombardments. Up to today, according to the government’s assessment, Russian troops have destroyed more than 300 boiler houses, and significantly damaged the Kremenchuk, Chernihiv, Okhtyrka, Luhansk, and Severodonets’k thermal power plants. It is obvious that priority investments in post-war reconstruction should be aimed at the decentralised and sustainable production of electricity from renewable energy sources, as well as strengthening the national and local energy supply infrastructure, and deployment of battery storage. Ukraine will need huge financial support to implement the Clean Energy Package for the creation of an open and sustainable energy system¹³. Ukraine has a significant potential for investments; moreover, energy can become one of the drivers of the recovery of the Ukrainian economy. Electricity exports from Ukraine could replace 17% of the Russian natural gas consumed by the European Union

11 Ainger, John. EU Lawmakers Remove Last Hurdle to Label Gas, Nuclear as Green. Bloomberg, 2022 [https://www.bloomberg.com/news/articles/2022-07-06/eu-lawmakers-remove-last-hurdle-for-gas-nuclear-as-green?leadSource=verify%20wall]

12 Eviston, Henry. European Parliament to pull the trigger on the inclusion of fossil gas and nuclear power in EU Taxonomy, WWF [2022 https://www.wwf.eu/?7016216/European-Parliament-to-pull-the-trigger-on-the-inclusion-of-fossil-gas-and-nuclear-power-in-EU-Taxonomy]

13 Braun, Stuart. Will war fast-track the energy transition? Deutsche Welle, 2022 [https://www.dw.com/en/will-war-fast-track-the-energy-transition/a-61021440]

countries. In the context of the EU's strategy of transition to climate neutral development, it is important that a significant part of the exported electricity should come from renewable sources. The Finnish company Wärtsilä has calculated scenarios for Ukraine's electricity development till 2050, and has shown that it is more profitable to build new renewable energy power plants. The scenario providing the cheapest electricity assumes a share of RES of 83% by 2050¹⁴. At the same time, today, under conditions of electricity surplus, individual producers are forced to reduce electricity production. Most system restrictions to reduce generation are received by the owners of solar power plants. Such modes of operation significantly reduce the productivity of solar stations and jeopardise their economic profitability. According to calculations, the amount of system restrictions of only the SPSs is 573 GW/h, or approximately 30% of the potential generation. Instead of restrictions and underproduction, "green" energy can be exported to the EU countries in the future, reducing the financial burden and payments of the "green" tariff for system restrictions. The electricity surplus Ukraine currently has will allow individual countries to quickly abandon Russian gas. It should be pointed out here that the European Commission called in July for EU countries to reduce demand for natural gas by 15% over the foreseeable future, in an attempt to boost winter stocks of gas. Member states were also asked to give Brussels the power to introduce compulsory energy rationing, which would allow for a prioritisation of supplies, in case Russia cut off gas to Europe entirely¹⁵.

To help the EU meet this challenge and support the Ukrainian energy sector, two main steps have already been taken by the Ukrainian government: on March, 16th 2022, Ukraine joined the unified continental European electricity system ENTSO-E, and completed an emergency synchronisation of its power grids with the ENTSO-E; on June 30th 2022, Ukraine started selling electricity to Romania and in July to Slovakia. Currently, Ukraine has the following interconnections with the ENTSO-E countries:

- Hungary – 650 MW / 450 MW (export/import capacity)
- Slovakia – 600 MW / 600 MW (export/import capacity)
- Romania – 400 MW / 400 MW (export/import capacity)
- Poland – 210 MW / 0 MW (export/import capacity)

The energy sector in Ukraine is on the brink of major change. These changes are being made to provide energy transition and a favourable investment climate for RES enlargement in the after-war period. However, there are challenges that need to be addressed, to make this transition to a market-based energy system as smooth as possible. For further Ukrainian RES development, the government should:

- reduce the duration of the project approval procedures for wind and solar power plants;
- justify the "green" tariff. The present feed-in-tariff scheme for renewables is very lucrative for investors, but in the long run this will become expensive for the state;

14 Bonifacio, Rogerio, Pini, Giancarlo and Boeck Sebastian. Global Climate Context of the Ukraine War. June 2022 [https://reliefweb.int/report/ukraine/global-climate-context-ukraine-war-june-2022]


15 Connolly, Kate. Germany tables new crisis measures after Russian gas supply only partly restored. The Guardian. 2022 [https://www.theguardian.com/business/2022/jul/21/]

- decrease restrictions for energy providers and ensure maximum utilisation of electricity produced through RES;
- meet requirements for more power system reserves or back-up power, to add more flexibility to the RES;
- expand opportunities for RES owners to export electricity to the EU;
- implement a system of issuing guarantees of electricity produced from renewable sources and ensuring their recognition by the European Union and the Energy Community;
- provide support for reforms for the future full integration of the energy market of Ukraine with the EU.

Ukraine's energy transition should be based on an increase in wind and solar energy, and an increase in hydropower production from 13% of the energy balance to almost 30%. Ukraine's energy strategy also envisages a significant expansion of biomass and biofuel production. According to analysts, Ukraine can generate 6-8 billion cubic meters of biomethane by 2050. Biomethane retains the advantages of being a natural gas and it can be used for heat and electricity generation, in industry and in transport. At the same time, it is carbon neutral.

In order to ensure the development of RES, all new infrastructure in cities, rural areas and their communities must facilitate the transition from fossil fuels to renewable sources. This transition must take into account social, economic and environmental factors. It is necessary to find a balance between the "old" and "new", "smart", "green" cities. When rebuilding destroyed settlements, planning the city's infrastructure should be based on the local energy sources (waste heat, wind turbines, thermal power plants, biomass, etc.). It is important to diversify generation sources as much as possible

and reduce the distance from the place of energy generation to the consumers. One of the ways to achieve energy safety is to create self-sufficient energy communities. In case Russia decides to stop energy supply on a large scale, the provision of a huge number of microgrids would be needed. It is also important to make a shift from electricity production in a few big power plants to a system of small local energy sources that ensure supplies when energy is consumed as close to its source as possible, even on the level of individual residential buildings, e.g. the case of prosumers (individuals who both produce and also consume). Increasing the share of renewable energy sources in the city's energy balance, as well as energy saving measures, will make it possible to increase the energy independence of communities, and accelerate the achievement of national climate goals. Backup sources, such as batteries, can offer long-lasting protection in case of power outages, and ensure the continuous operation of crucial equipment.

 ***A bold climate and energy policy will allow Ukraine to break free from its fossil fuel shackles, while protecting its people from pollution and providing energy security***

When combined with the renewable energy source, the delivery point can stockpile green energy and save it for later use. To cover the most severe social aspects, reconstruction should prioritise the latest technologies in energy efficiency, and design in urban planning. In case some of the adaptation measures are included in planning infrastructure rehabilitation, this will not require significant investment and will allow consideration of the inevitable

consequences of climate change. A bold climate and energy policy will allow Ukraine to break free from its fossil fuel shackles, while protecting its people from pollution and providing energy security.

The principle of the Sendai Framework Programme for disaster risk reduction, “rebuilding better than it was”, should be the basis of the post-war reconstruction of Ukraine. It is this principle that most fully reflects the idea of sustainable development. It should serve as the main value and methodological guideline in the development of the Programme for the Reconstruction of Ukraine, and the corresponding action plan.

Olena Melnyk, PhD, Senior Researcher at ETH Zurich (Switzerland), Assoc. Prof. at Sumy National Agrarian University (Ukraine), project coordinator Erasmus+ Jean Monnet Chair EU Climate Leadership. Her research interests include the development of criteria for environmental safety, environmental policy of the European Union, rational use of natural resources, waste management and sustainable development. Author and co-author of more than 50 scientific publications, including patents for invention, manuals, articles indexed by Scopus, WoS.

Iryna Vaskina, PhD, Senior Lecturer at the Department of Ecology and Environmental Protection Technologies, Sumy State University (Ukraine), Head of the NGO “Ecotope”. Administers educational, scientific and public activities in the field of environmental engineering. The author and co-author of more than 50 publications in the field of environmental engineering, waste management and climate change.

THE EUROPEAN GREEN DEAL AND POTENTIAL CONSEQUENCES FOR UKRAINE OF ITS IMPLEMENTATION BY NEIGHBOURING STATES¹

Andriy Chubyk

and Maryna Iaroshevyh

Foreign Policy Council "Ukrainian Prism"

The article analyses the European Green Deal as a roadmap of actions designed to transform the European Union into a more competitive and efficient economy, and discusses what implications it can have for Ukraine. Russia's full-scale invasion of Ukraine accelerated efforts to rid the country of imported fossil fuels and streamlined different European initiatives and numerous national programmes in this regard. The EGD will have an extremely profound impact on economic and social life in Ukraine in the medium and long term. Faced with severe damage to enterprises and infrastructure, Ukraine is able to create conditions for a rapid recovery, based on EGD criteria and international support.

Coal and steel lay at the heart of the European project in the 1950s. Today's European Union (EU) has set a goal of achieving the opposite and phasing out the use of fossil fuels by 2050, which will mark nearly a century since the creation of the European Coal and Steel Community. In 2008, the EU proclaimed itself a leader in implementing policies that seek to "transform Europe into a low-carbon economy"². The global economic crisis, the lack of political support from China, as well as the US withdrawal from the Paris Climate Agreement in 2015, and a number of other developments, have hindered rapid progress towards this goal. The new composition of the European

Commission (EC), which took office in 2019, tackled the task with renewed vigour and ambition, declaring the European Green Deal one of its top priorities.

Russia's full-scale invasion of Ukraine accelerated efforts to end dependence on imported fossil fuels, streamlined combined European efforts through the RePowerEU initiative and led to numerous national programmes to reduce consumption and diversify energy imports. At the same time, Ukraine received promises of massive support for the recovery of its national economy and energy sector, based on green and sustainable criteria.

1 The original research was published within the project "European Green Deal and Potential Consequences for Ukraine from the Introduction by Its Neighborhood States" with the financial support of the International Renaissance Foundation

2 Harvey, Fiona and Jennifer Rankin, What is the European Green Deal and will it really cost €1tn?, The Guardian, 9 March 2020, <https://www.theguardian.com/world/2020/mar/09/what-is-the-european-green-deal-and-will-it-really-cost-1tn>

What is the European Green Deal?

The European Green Deal (EGD) is a roadmap of actions designed to transform the European Union into an efficient, sustainable and competitive economy. Its main objective is to develop and help member states to implement changes that will enable Europe to become the world's first climate-neutral continent by 2050. This goal is to be achieved by fostering the development of a circular economy, improving people's health and quality of life, and transforming climate and environmental challenges into opportunities in all EU sectors and policies, thus ensuring a fair and inclusive green transition.



Russia's full-scale invasion of Ukraine accelerated efforts to end dependence on imported fossil fuels, streamlined combined European efforts through the RePowerEU initiative and led to numerous national programmes to reduce consumption and diversify energy imports

European Commission President Ursula von der Leyen announced the official launch of the EGD in the European Parliament on 11 December 2019. Amid the economic and coronavirus crisis, the EGD has a unifying role to play, to increase the resilience of a vulnerable world. Its raison d'être is not so much to actualise the development of climate policy as to conceptualise the green modernisation of the economy and economic growth, to ensure human life is in

harmony with the planet and its resources.³ Accordingly, the key areas of the EGD are clean energy, climate action, construction and renovation, sustainable industry, sustainable mobility, pollution reduction, biodiversity and a sustainable agricultural policy (Farm to Fork Strategy).

More specifically, the EU has set the following tasks:

- Biodiversity: implementation of measures to protect the vulnerable ecosystem.
- Farm to Fork Strategy: finding ways to ensure more sustainable food systems.
- Sustainable agriculture: ensuring the sustainability of EU agriculture and rural areas through the Common Agricultural Policy (CAP).
- Clean energy: transition to completely clean energy, i.e. energy with minimal emissions of greenhouse gases and other pollutants.
- Sustainable industry: creating ways to ensure more sustainable, environmentally friendly production cycles, maximising the reuse of materials and minimising waste.
- Construction and renovation: creating conditions for an environmentally friendly construction sector.
- Sustainable mobility: the development of transport systems that maximise the use of low-carbon fuels.
- Pollution reduction: implementing rapid and effective measures to reduce pollution.
- Climate action: achieving EU climate neutrality by 2050.

³ European Green Deal, Mission of Ukraine to the EU, 15 April 2021, <https://ukraine-eu.mfa.gov.ua/en/2633-relations/galuzeve-spivrobitnictvo/klimat-yevropejska-zelena-ugoda>

Achieving climate neutrality will require all sectors of the EU economy to take action, in particular by

- investing in environmentally friendly technologies,
- supporting innovation,
- manufacturing cleaner, more affordable and more sustainable types of private and public transport,
- decarbonising the energy sector,
- making buildings more energy efficient,
- expanding cooperation with international partners to improve global environmental standards.

Thus, the European Green Deal is the EU's plan for the development of a sustainable economy in which:

- greenhouse gas emissions will be reduced to zero by 2050 (the interim target is to reduce emissions by 50-55% below 1990s levels by 2030);
- economic growth will not depend on an increased use of resources;
- no person or territory will be left out of the changes introduced.

International Dimension of the European Green Deal

The EU recognises that the success of the EGD depends not only on the organisation's ability to drive the necessary changes, but also on the extent to which the goals, norms and standards it sets are accepted and implemented both by neighbouring states and globally. To promote the EGD internationally, the European Commission

has committed to launching a large-scale diplomatic campaign to promote the Green Deal, including by using the instruments of the EU's trade policy, development assistance and foreign policy. In terms of the Southern Neighbourhood and within the Eastern Partnership, the Communication on the EGD envisages "a number of strong environmental, energy and climate partnerships"⁴.

However, since the EGD is a very long-term policy, its implementation will also have a significant impact on the EU's partners. In particular, the EU should be proactive in its relations with global players such as China, the USA and Saudi Arabia, and regional powers in the Mediterranean Sea and North Africa.



However, since the EGD is a very long-term policy, its implementation will also have a significant impact on the EU's partners

Whereas a few years ago ambitious climate goals looked unattainable, the year 2020 was a turning point. Not only the EU, but also Japan, South Korea and Australia announced their plans to achieve climate neutrality. China also committed to this goal, although somewhat later. The United States returned to the climate policy fan club, and is preparing a nationally determined contribution to the Paris Agreement, as far as plans to achieve climate neutrality by 2050 are concerned.⁵

4 European Green Deal: Shaping the Eastern Partnership Future, Resource and Analysis Center "Society and Environment", November 2020, <https://www.rac.org.ua/uploads/content/593/files/webeneuropean-green-dealandaepen.pdf>

5 Joint Statement following the visit of US Special Presidential Envoy for Climate John Kerry to the European Commission, 9 March 2021, https://ec.europa.eu/commission/presscorner/detail/en/statement_21_1093

Although the increase in the number of EGD supporters looks significant, the EU is facing a number of serious challenges, in particular due to its ambitious objectives. In particular, these include⁶:

- The EU should engage with oil- and gas-exporting countries to foster their economic diversification, including into renewable energy and green hydrogen.
- The EU should improve the supply security of critical raw materials and limit its dependence on other countries, primarily on China.
- The EU should establish a “climate club” of countries ready to introduce similar carbon border adjustment measures.
- The EU should become a global standard-setter for the energy transition, particularly in hydrogen and green bonds.
- The EU should promote global coalitions for climate change mitigation, such as one to protect the permafrost.
- The EU should promote a global platform on the new economics of climate action, to share lessons learned and best practice.

All these foreign policy efforts may provoke a geopolitical response from the EU's international partners, which will range from closer cooperation to attempts to redirect trade and investment flows, to downright hostile efforts to counter the effects of the Green Deal.

The European Green Deal and Ukraine

Ukraine started actively preparing its position on the EGD in autumn 2019.

On November 4, 2019, Sergiy Maslichenko was appointed Deputy Minister of Energy and Environmental Protection. He is a former Associate Director for Energy Efficiency and Climate Change, at the European Bank for Reconstruction and Development (EBRD), and co-author of the EBRD's thermal modernisation programme IQ Energy, as well as the alternative energy financing programme USELF (Ukraine Sustainable Energy Lending Facility).

On December 20, 2019, in response to the approval of the European Green Deal by the European Commission, Deputy Prime Minister for European and Euro-Atlantic Integration of Ukraine, Dmytro Kuleba, in a telephone conversation with High Representative of the European Union for Foreign Affairs and Security Policy Josep Borrell, said that Ukraine was interested in actively participating in the implementation of the EGD, in particular in joining the EU's efforts to achieve a climate-neutral economy. In addition, Ukraine said that it would submit specific proposals to the EU in this area.

On January 21, 2020, the Ministry of Energy and Environmental Protection presented the draft concept of Ukraine's green energy transition until 2050.⁷ According to the ministry, the concept offers realistic measures for energy transition that are acceptable for the economy and society.

On January 24, 2020, at the initiative of the Ministry of Foreign Affairs of Ukraine, the Cabinet of Ministers of Ukraine established an ad hoc Interagency Working Group on Coordination of Climate Change Mitigation

6 Leonard, Mark, Jean Pisani-Ferry, Jeremy Shapiro, Simone Tagliapietra, and Guntram Wolff. The geopolitics of the European Green Deal, ECFR, 3 February 2021, <https://ecfr.eu/publication/the-geopolitics-of-the-european-green-deal/>

7 The Draft Concept of the Ukraine Transformation to the European Green Deal is Presented. Cabinet of Ministers of Ukraine, 21 January 2020, <https://www.kmu.gov.ua/news/prezentovano-proekt-koncepciyi-zelenogo-energetichnogo-perehodu-ukrayini-do-2050-roku>

within the EGD. Among other tasks, the Group was to strengthen institutional cooperation between Ukraine and the European Commission, with a view to implementing the EGD. The group is headed by the Deputy Prime Minister for European and Euro-Atlantic Integration of Ukraine.


Despite these proactive first steps, the outbreak of the coronavirus pandemic and the subsequent economic downturn affected the implementation of the planned measures, having effectively postponed the dialogue with the EU for at least six months.

On August 13, 2020, Ukraine's policy paper on participation in the EGD was presented in a letter from the Prime Minister of Ukraine, Denys Shmyhal, to European Commission First Vice-President Frans Timmermans. Among other things, the document proposes a structured and regular dialogue with the EU on the modalities of Ukraine's early involvement in the development and implementation of EGD policies, and the development of a joint roadmap for Ukraine's participation in the EGD. The document also outlines promising areas of cooperation within the EGD.

In parallel with these practical steps, there were numerous discussions and meetings on the EGD's impact on Ukraine and its participation in it, both at the highest level between Ukraine and the EU, and at the national level: in parliament, business circles and civil society. In particular, the findings of the study "European Green Deal: Opportunities and Threats to Ukraine" provoked a number of discussions among stakeholders, on the role of the EGD as an external factor for Ukraine, the opportunities and challenges for each sector in Ukraine in terms of EGD components.

On January 19, 2021, the Prime Minister of Ukraine, Denys Shmyhal, chaired a meeting of the Interagency Working Group on

Coordination of Climate Change Mitigation, under the European Commission's European Green Deal initiative. The formation of the Ukrainian green deal based on the European Green Deal was discussed, and priorities in its main areas were presented. The key task of the government of Ukraine is to balance the vision of various ministries and agencies, taking into account the opinion of business, and to develop a common position on determining the level of climate ambitions, and steps within the country that will meet the stated goals.



When assessing the prospects of the EGD, it is extremely important for Ukraine to take into account the opportunities and challenges that can arise if neighbouring states (within and outside the EU) fail to implement their own plans within the EGD

Thus, the EGD sets at least two global goals for Ukraine:

1. To coordinate efforts with the EU and neighbouring states in the process of domestic green transition, to minimise economic and financial losses.
2. To transform security policy, following the reassessment of possible risks and threats, primarily from Russia, which is already actively cooperating with the EU in the context of climate policy, trying to circumvent and mitigate the effects of the existing sanctions.

When assessing the prospects of the EGD, it is extremely important for Ukraine to take into account the opportunities and challenges that can arise if neighbouring states (within and outside the EU) fail to

implement their own plans within the EGD. The following are the criteria against which Ukraine should make such an assessment.

Opportunities and Challenges for Ukraine from EGD Introduction by Neighbouring States

Ukraine is in a unique position on the geographical map of Europe, which always affects the geopolitical situation, and requires considering a number of political, economic and security factors. Neighbouring countries can be conditionally divided into the following groups:

1. The EU member states that will implement the EGD within the framework of the EU common policy are, in particular, Poland, Slovakia, Hungary and Romania.
2. States that are connected to the EU by the terms of the Association Agreement or European integration processes, in particular Moldova and Turkey.
3. States that have minimal obligations to support the EGD, but may not do so for political or other reasons, namely Russia and Belarus.

An analysis of the EGD's impact on Ukraine's foreign policy should be conducted, taking into account several criteria:

1. Whether or not the neighbouring countries have integrated energy and climate plans (or equivalents), their main goals in terms of greenhouse gas emission reduction, energy efficiency, renewable energy, ways of restructuring the energy sector, and the resources they plan to allocate to achieve the relevant indicators.
2. Pan-European discourse on a carbon border adjustment tax, and the mechanisms of its implementation at the national level in neighbouring countries.

3. The formation of national policy in economy and trade, taking into account expected changes in imports and exports, and ways to preserve the competitive advantage of domestic producers.

4. The impact of the EGD on security, in particular on Russia's policy towards EU member states and third countries, such as energy exports and transit, sanctions policy, access to climate finance and technology, etc.

5. The impact of the EGD on trade and economic relations between Ukraine and third countries, in particular in the context of signed agreements on free trade zones or similar agreements (the situation with Turkey deserves special attention).



Faced with severe damage to enterprises and infrastructure, Ukraine is able to create conditions for its rapid recovery, based on EGD criteria and international support

The EGD will have an extremely profound impact on economic and social life in Ukraine, in the medium and long term. Faced with severe damage to enterprises and infrastructure, Ukraine is able to create conditions for its rapid recovery, based on EGD criteria and international support. In this way, Ukraine is ready to minimise dependence on relations with Russia and Belarus, two aggressor states, and has to focus much more on cooperation with its western neighbours, committed to the EGD and REPowerEU, as well as enjoying financial and technical support from EU structural funds. Despite substantial support and understanding of hot war limitations from Ukraine's partner states,

it is of the utmost importance to work on further adoption of the EU acquis, create a legal and regulatory basis for green recovery, create attractiveness for investors and protection for realised projects in terms of ownership, and compensation for possible losses because of military hostilities.

Andriy Chubyk, *Energy Security Expert on the Security Study Programme, Foreign Policy Council Ukrainian Prism. Graduate of the Ivano-Frankivsk National Technical University of Oil and Gas with area of expertise in business economics of the energy complex. Chubyk has previous experience working as an expert at the think tank “Strategy XXI” and in state energy companies “Ukrenergo” and “Naftogaz”.*

Maryna Yaroshevych, *Co-director of the Ukraine Abroad Programme at the Foreign Policy Council Ukrainian Prism, and Advocacy Lead at Promote Ukraine (Brussels). Maryna Yaroshevych was a Ukrainian World Congress Liaison Officer at the EU (Brussels, Belgium) and an associated research assistant at Maastricht University. She is a graduate of Maastricht University (the Netherlands) and the College of Europe (Belgium), where she gained her respective Masters degrees in European Studies and EU International Relations and Diplomacy. Previously, Maryna worked as the project coordinator in the area of international security at the German political foundation and the Ministry of Foreign Affairs of Ukraine.*

ROMANIA'S GREEN DEAL POLICY AND UKRAINE¹

Sergiy Gerasymchuk

Foreign Policy Council "Ukrainian Prism"

The Green Deal Policy causes contradictions between Romanian and European politicians, government officials and environmentalists, and business circles. From a quality of life perspective, the environmental benefits and social progress (offered by the EGD) are attractive and rightly deserve to be identified as long-term, worthy cultural and historical goals, but there is a risk of failure to reach them. If the EGD fails in achieving its goals, the level of political, economic, social, and military development will be significantly reduced, which is an unacceptable option in the light of the ongoing Russian aggression, and the task for both Ukraine and Romania is preventing such a scenario by all available means.

Romania's direct involvement in the European Green Deal policy is determined by its membership of the EU, which, after joining the Paris Climate Agreement, committed itself to playing a leading role in achieving the climate goals set out in the Agreement, and agreed the following energy and climate targets by 2030: a 40% cut in greenhouse gas emissions from 1990 levels, 32% of energy to stem from renewable sources, a 32.5% improvement in energy efficiency, 15% cross-border electricity interconnectivity.²

The nature of Romania's participation in the EU's EGD is determined by the fact that the country's national electricity grid (the transformation of which is one of the elements of the EGD) is technically outdated, and requires significant investments to ensure its compatibility with new types of renewable energy generators. However,

such investments require the development of a transparent regulatory framework and a significant period of time. It is noteworthy that as of 2020, 12.4% of electricity in Romania was generated by wind energy, 3.4% by photovoltaic solar panels and 27.6% by hydropower. In general, renewables accounted for 16% of total electricity production.

Reaction of Romanian Officials and Expert Circles to The European Green Deal

Bucharest's initial reaction to the EGD policy was mixed. Romania did not object to the introduction of the EGD. At the same time, Romanian officials expressed some reservations about the ability to single-handedly achieve the ambitious goals envisaged by the EGD, in a timely manner and without enhanced EU support.

1 The original research was published within the project "European Green Deal and Potential Consequences for Ukraine from the Introduction by Its Neighborhood States" with the financial support of the International Renaissance Foundation

2 The 2021-2030 Integrated National Energy and Climate Plan, European Commissions, April 2020, https://energy.ec.europa.eu/system/files/2020-06/ro_final_necp_main_en_0.pdf

It is also natural that the plans of the EGD supporters are at variance with those of the conventional energy lobby.

Activities of the legislature

Under the EGD, Romania has committed itself to preparing and advancing the required legislation on investments in the development of gas resources in the Black Sea, adopting the Decarbonisation Plan for the Oltenia Energy Complex (which is the country's main producer of electricity from coal), diversifying the sources of uranium supply for Nuclearelectrica (a nuclear energy company, 82.49% owned by the state), ensuring the longer operation of existing capacities and the construction of new nuclear capacities, improving the existing electricity and gas infrastructure and developing innovations to it. It was also envisaged to take into account the social aspects of a transition to hydrocarbon neutral energy.



Under the EGD, Romania has committed itself to preparing and advancing the required legislation on investments in the development of gas resources in the Black Sea, adopting the Decarbonisation Plan for the Oltenia Energy Complex

In this regard, an effective step was the regulation of the possibility of concluding Power Purchase Agreements (PPAs) under the green tariff. Such agreements allowed for the conclusion of long-term electricity supply contracts with large-scale consumers, which reduces the risks of market price fluctuations and allows for the freeing up of funds for renewable energy projects. In accordance with Regulation 943/2019, starting from January 2020, green-tariff energy purchase and sale agreements have

been allowed in all EU member states. Before Romania introduced the relevant legislative changes, all energy-related transactions were carried out in the centralised market only. This restriction led to a shortage of investments in new generation capacities, especially in the renewable energy sector.

There is also a need to establish a legal framework for Contracts for Difference (CfD), long-term contracts between electricity producers and consumers, which would stabilise producers' revenues. In Romania, it was assumed that producers would be able to conclude such contracts with OPCOM (Operatorul Pietei de Energie Electrica si Gaze Naturale S. A., a subsidiary of Transelectrica S. A., whose purpose is to administer the electricity market by ensuring long-term, efficient and transparent transactions and commercial contracts). This company carries out administrative activities in the centralised electricity and gas markets, ensuring impartiality, independence, transparency and non-discrimination, as well as organising and administering the green certificates market, and it acts as the administrator of the greenhouse gas emissions trading platform. In recent years, discussions on the launch of such a mechanism have been ongoing in Romania, but they have not been finalised and formalised, and later, given the priority of fighting the pandemic, they were postponed altogether. Currently, the Romanian government plans to resolve this issue by adopting a new electricity law, which is being developed with the support of the EBRD. The new law should also include the provisions of the EU legislation, ensure the flexibility of its systems, increase the interconnectivity of the networks, and liberalise the energy market.

Activities of the Executive

In this context, in the course of 2020, Romania presented its proposals for achieving the European climate goals to the European Commission, and the


latter in turn provided Romania with its recommendations. The National Energy and Climate Plan for Romania, which is one of the main instruments to support plans and mechanisms to ensure energy and climate transition, largely takes into account the above recommendations.

In particular, the EC recommended that the Romanian government should increase the share of renewable energy sources to at least 34%. The Romanian authorities partially heeded this recommendation and, instead of the planned share of 27.9%, agreed to increase the share of renewable resources to 30.7%. This figure was calculated in accordance with the recommendations of the European Commission, to take into account macroeconomic indicators. It is assumed that such indicators will be achieved by increasing energy production from renewable sources by 7 GW, of which about 3.7 GW will be solar energy projects.

By the end of 2020, the Romanian government had to develop the vulnerable consumer concept and legal framework, as well as appropriate support schemes. However, due to the COVID-19 pandemic, the development and implementation of these projects have been postponed. Vulnerable consumers will be sorted into four categories: by income, age (pensioners), health, as well as consumers living in infrastructurally remote areas. The government decided that the relevant legislation would enter into force on September 1, 2022, and not on September 1, 2021, as previously planned, given the need for local administrations, as well as energy and gas suppliers, to prepare for this. Accordingly, new subsidies under the legislation will be allocated, starting from the winter season 2022-2023.

At the same time, there are a number of measures that, despite their importance, have constantly been postponed. Among

them is the issue of state aid provision to the Oltenia Energy Complex. On February 24, 2020, the European Commission approved the Romanian government's state aid (loan) scheme for the complex in the amount of EUR 251 million. One of the conditions for providing assistance was either repayment of the loan within six months, or technological transformation of the complex to ensure its long-term viability, or liquidation of the enterprise. Considering the actual inability to repay the loan, as well as the inability to liquidate the complex, given that it accounts for about 25-30% of national energy generation, the only possible approach is the technological transformation of the complex and its transition to low-hydrocarbon energy sources.



because of the EU's decarbonisation plans, Romania risks losing 40% of its own energy generation (meaning electricity generated from coal), and solutions to compensate for this loss are required immediately

On December 4, 2020, with a noticeable delay, the Romanian government submitted to the European Commission a plan for the industrial restructuring of the complex for 2021-2025. On February 5, 2021, the European Commission announced the start of an in-depth study of the Romanian government's proposals. Depending on the European Commission's response, the Romanian government would have to develop measures to address the social consequences of cutting 14,000 jobs (7,000 of them by 2025), as well as the indirect loss of another 50,000 jobs in one of the poorest regions of Romania, where the complex is located.

Public discussion, opinions of the media, NGOs

According to Romanian MEP Siegfried Muresan, painful social consequences could be avoided by allowing power plants that have been working with coal to use gas. Muresan does not rule out the use of nuclear energy during the transition period, either. This is just one of the cases that is related to the strategy of technological transformation of the complex, as well as regulatory actions and the encouragement of new investments, in accordance with the EGD principles.

It is noteworthy that in January 2020, the then Prime Minister of Romania and current leader of the ruling coalition political force, the National Liberal Party, Ludovic Orban, expressed concerns about the prospects for decarbonisation under the European Green Deal. In particular, according to his estimates, because of the EU's decarbonisation plans, Romania risks losing 40% of its own energy generation (meaning electricity generated from coal), and solutions to compensate for this loss are required immediately. However, as compensation, the EU is to provide Romania with EUR 750 million in grants from the Just Transition Fund.

Thus, Romania is set to be among the three largest recipients of money from the fund, along with Poland and Germany. However, as former Romanian President and current MEP Traian Basescu noted in February 2020, many EU countries do not have enough resources to implement the EGD goals. The resources allocated by the EU for the shutdown of coal mines are not enough. Also, Basescu insists that Romania's true priorities should be the development of highways and railways, as well as the health care system. In addition, Basescu said that the differences between the EU's goals and the national priorities of individual member states could lead to fissures within the EU that could provoke the withdrawal of several states from the Union. Basescu believes

that the only way for Romania to achieve the European goals of reducing carbon emissions is to develop its own gas fields, and that Exxon Mobil (and thus Lukoil) are ready to prospect for these resources in the Black Sea.

In general, an analysis of the discourse and statements by representatives of the Romanian political establishment gives reason to believe that their message is that the EU has been imposing the European Green Deal on Romania.

European environmentalists are debating with Romanian politicians. In particular, Suzana Carp, head of environmental NGO Sandbag in Brussels, notes that, firstly, a significant proportion of the population (66% in 2019) supports the EU Green Deal. Secondly, the Just Transition Fund, as well as the European climate policy, will ensure that states like Romania will primarily benefit from the implementation of the Green Deal. She notes that in 2019, average energy prices in Romania were the fourth highest in the EU, and gradual decarbonisation would help to reduce them. Environmentalists also point out that Central and Eastern European states suffer from the heaviest air pollution in the EU, leading to early mortality. The shutdown of outdated and unprofitable coal mines, which lack proper filters, and the existence of which contradicts the European legislation, in her opinion, would help to solve this problem. As for the funds needed to ensure the transition, Carp noted that Romania can accumulate at least EUR 35-40 billion for energy transition over the next decade. She was primarily referring to the resources of the European Integration Fund, as well as revenues from the EU Emissions Trading System (according to preliminary estimates, Romania could additionally count on EUR 5.5 billion from the EU Integration Fund, including EUR 3.1 billion for the energy sector, as well as EUR 10.11 billion through the Just Transition Mechanism).

At the same time, environmentalists note that Romania, despite the modernisation of its power grid system, also needs to develop another component of the national infrastructure – motorways. At the same time, the movement towards the development of electric vehicles should be accompanied by decarbonisation of the energy system. In addition, one of Romania’s competitive advantages is that coal accounts for a small share of the country’s energy sector; and Romanian coal regions have a high potential for generating wind and solar energy.

Romania’s Possible EGD Specialisation

A window of opportunity for Romania to implement the goals of the European Green Deal is also provided by the fact that the EU Recovery and Resilience Facility (RRF) can and even should be used for green and digital transformation. One of the requirements for the use of RRF funds is that 37% of them should be directed to climate change³ mitigation and biodiversity measures. However, Romania has not been using this opportunity to the full extent. In particular, its national plans for recovery and resilience focus on mobility and water management, and therefore only EUR 1.3 billion (out of the available EUR 30 billion) is directed to renewable energy and energy efficiency.

Instead, the focus is on the use of natural gas, as well as on ways to supply natural gas to new consumers, despite the availability of renewable energy alternatives. This pragmatic approach of the Romanian government has become risky because, starting from 2022, the European Investment Bank will no longer finance

fossil fuel projects, including those involving natural gas. Gas production projects are not expected to be financed through the European Regional Development Fund or the EU Integration Fund either. Instead, one should not ignore the resource potential and soft interference/opposition of interested conventional energy companies, which act as a conditional global anti-EGD group.

An interesting area for the implementation of the EGD goals by Romania is the development of offshore wind farms in the Black Sea. According to World Bank analysis, Romania’s technical offshore wind potential (together with Bulgaria) is more than 100 GW⁴. This is significantly less than in the case of the North Sea, but five times more than Romania’s current energy generation capacity. The return on investment in wind capacities is not yet obvious, but the cost of developing such capacities is gradually decreasing. In addition, Romania already has the largest onshore wind farm in the EU, and the Romanian company Hidroelectrica announced the construction of a 300 MW offshore wind farm in 2020.

However, achieving this goal requires adequate funding from the EU, as in addition to investments directly in renewable energy production, it will also require funds for the development of sustainable and flexible infrastructure and stable power transmission lines, as well as the development of new energy saving technology.

Economic Relations Between Ukraine and Romania

Trade and economic relations between Ukraine and Romania have been showing positive dynamics. In 2020⁵, the volume

3 Towards a Green, Digital and Resilient Economy: our European Growth Model, European Commission, 2 March 2022, https://ec.europa.eu/commission/presscorner/detail/en/IP_22_1467

4 Bulgaria’s and Romania’s Offshore Wind Potential Exceeds 100 GW, Montel, 16 October 2020, <https://www.energetika.net/eu/novice/other%20countries/bulgarias-and-romanias-offshore-wind-potential-exceeds-100>

5 All statistics are according to the State Statistics Service of Ukraine, <https://ukrstat.gov.ua/>

of trade between Ukraine and Romania amounted to USD 1,760 million (USD 1,065 million in 2019), including USD 1,080 million in exports (USD 1,005 million in 2019) and USD 683 million in imports (USD 645 million in 2019). Ukraine had a trade surplus of USD 397 million with Romania in 2020 (USD 360 million in 2019). In 2021, the figures reached USD 1,543 million in exports and USD 796 million in imports.

In terms of economic cooperation, Ukraine and Romania mainly engage in macroeconomic diplomacy. Their bilateral economic relations lack dynamic intergovernmental contacts, strategic vision and a number of important elements of the contractual framework, which negatively affects the technological profile of Ukrainian exports and hinders sectoral cooperation. The lack of microeconomic communication impedes business activity, and reduces the countries' mutual interest in trade and investment cooperation. Ukrainian-Romanian economic cooperation does not live up to its potential, in particular in terms of dealings with customs and anti-corruption efforts, the automotive industry, the creative industries, container trailer transportation, and conventional and alternative energy, while competition for transit cargo flows in the Danube corridor and the story of the Kryvyi Rih Mining and Processing Plant of Oxidised Ores remain a bottleneck for the development of a strategic partnership. However, Romania's support for Ukraine's policy of partnership and integration into the EU and NATO, common security challenges in the Black Sea region, and solidarity in their positions towards Russia form a favourable international context for the advancing of economic relations. Still, the lack of information and communication, and sometimes a distorted view of the conceptual vision of the economic policy

of the parties, their strategic priorities, and certain peculiarities of business ideas determine the inherent extent of Ukrainian-Romanian economic relations.



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The positive dynamics of the Ukrainian-Romanian political dialogue in recent years⁶ has not spread to the strategic dimension of economic cooperation. Ukraine's strategic economic and sectoral documents do not offer a clear plan for building trade, economic, investment, energy and transport cooperation with Romania, or a future vision for cross-border relations. At the same time, the cross-sectoral export strategies provide an analysis that allows one to outline the direction of Ukrainian interests. In transport and trade facilitation, Romania is mentioned among the countries that are most successful in cross-border cooperation, automation, administrative procedures, and advance tax clarifications and information. In the export-oriented machine building sector, Ukraine and Romania are identified as commensurate players in the European automotive industry chain. In the creative industries, there is room for expansion of international cooperation in the European cinematographic and audio-visual organisations.

It should be obvious to Kyiv and Bucharest that economic issues are on the periphery of institutional cooperation between Ukraine and Romania. Security, infrastructure and education are among

6 See Annual Scorecards of the Ukrainian Foreign Policy, Foreign Policy Council "Ukrainian Prism", <http://prismua.org/en/scorecards2021/>

the priorities of interstate cooperation, while economic aspects, which should also be a priority, are mostly declarative. A number of intergovernmental agreements significant for the economy (on shipping, tax issues, etc.) remain uncompleted. The Ukrainian-Romanian Joint Commission on Economic, Industrial, Scientific and Technical Cooperation has met twice over the 13 years of its official existence. The key agreements on expanding bank cooperation and developing business infrastructure and special services, which were concluded at the last meeting of the Commission in 2017, have not been implemented. The microeconomic dimension of relations between the states is also weak. Opportunities to promote Ukrainian producers in the Romanian market, and to continue further cooperation within the framework of the Ukrainian-Romanian Bilateral Chamber of Commerce, have been neglected for a long time (the last mention of its activity dates back to 2017).

Despite the positive dynamics of bilateral trade, its qualitative profile is far below its potential, and needs to be adjusted to take into account strategic interests of the parties. In 2015-2020, the trade between the states doubled, with Ukraine maintaining a consistent surplus. Given the episodic nature of institutional economic cooperation, Ukraine owes the positive dynamics of exports to Romania primarily to the EU-Ukraine DCFTA. Although the basket of Ukrainian exports to Romania is quite diverse⁷ (the product concentration index fluctuated at the level of 0.2), more than 40% of its value is formed by raw materials (ferrous metals, ores, wood, etc.). Conductor and cable products, whose level of technological capacity is below average, accounted for 20% of Ukrainian exports. Thus, the technological breakdown of Ukraine's trade is disadvantageous: 75% of

its products exported to Romania are raw materials and low-tech commodity groups, while 60% of imports are medium- and high-tech products. In this situation, even taking into account the growing number of joint ventures, the governments' declared task of increasing trade in industrial goods with a high degree of processing is too optimistic as a means to identify potential areas of industrial cooperation between Ukraine and Romania.

An incomplete contractual framework, outstanding debts, corruption and raider risks deter Romanian investors from investing in Ukraine. Cross-border projects funded by the EU come to the fore against a background of the low potential of external investment and the multidirectional investment focus of both countries. Despite Romania's repeat appeals to Ukraine to speed up the ratification of the 1995 Agreement on the Promotion and Mutual Protection of Investments, the document has not entered into force. The stumbling block in this process is the case of the Kryvyi Rih Mining and Processing Plant of Oxidised Ores. Given that both countries are not leaders in terms of outbound investments even among Eastern European countries, bilateral economic projects of interregional and cross-border cooperation under the EU's financial umbrella are also important.

The points of contact between Romania and Ukraine in terms of transport currently create competitive friction rather than cooperation synergy. Despite important transport projects in the Ukrainian-Romanian border area, the spirit of competition for cargo flows continues to prevail between the two states. There has been no tangible progress in the implementation of the agreement of the bilateral Working Group on Transport and Infrastructure on the organisation of

7 Embassy of Ukraine in Romania, <https://romania.mfa.gov.ua/spivrobotnictvo/202-torgovelyno-jekonomichne-spivrobotnictvo-mizh-ukrajinoju-ta-rumunijeju>

RO-LA container trailer transportation through the territories of Ukraine and Romania. Its launch could partially solve the problem, with transit permits for Ukrainian carriers through the compensation mechanisms promised by the Romanian side as support for users of this system. Romanian seaports benefit from more moderate port dues and better transport infrastructure. Ukraine's desire to increase the volume of transit cargo handling in domestic ports has resulted in a long-term dispute with Romania over the construction of the Danube-Black Sea deep-water navigation course. Romania's arguments about the destructive environmental impact of the Ukrainian project are countered by evidence of its subversive significance for the Romanian monopoly on transit navigation on the Danube.

The lack of consensus on the economy of the Danube Delta negatively affects both countries' ecology, as well as the development of the common tourism and fishing resources, and hinders the implementation of the EU Strategy for the Danube Region. Obviously, this issue is directly related to the EU's EGD and should be high on the agenda in negotiations on EGD cooperation between Ukraine and Romania.

Energy is one of the most promising areas of interstate cooperation between Ukraine and Romania, whose benefits extend to neighbouring countries and contribute to strengthening regional security, as well as enhancing Ukraine's policy of partnership and integration into the EU and NATO. The signing of the technical agreement between the gas transport system operators of Ukraine and Romania has created legal grounds not only for the transportation of gas in the reverse direction, but also for the supply of gas via a new route – important from the point of view of energy security – from Southern Europe and Turkey through

Bulgaria and Romania to Ukraine, and further on to Moldova. Provided interconnectors between the gas transport systems of the two countries are built, Romania will be able to use Ukrainian gas storage services, as its own storage facilities are insufficient. There is potential for cooperation between Romanian and Ukrainian companies in the drilling of oil and gas wells. The equipment and experience of Romanian companies allow them to provide services to their Ukrainian partners at attractive prices and in a cost-effective way. A smaller but extremely important area of cooperation is alternative energy. Although Romania has been successfully developing this sector, it is not among the thematic priorities of cross-border cooperation. These aspects should also be addressed during negotiations on EGD cooperation between Ukraine and Romania. Moreover, a thorough analysis of the risks associated with the prospect of limited EU funding and support for gas projects is required.



Energy is one of the most promising areas of interstate cooperation between Ukraine and Romania, whose benefits extend to neighbouring countries and contribute to strengthening regional security, as well as enhancing Ukraine's policy of partnership and integration into the EU and NATO

There is a lack of information about public initiatives or bilateral negotiations on the European Green Deal between Ukraine and Romania. Their establishment should be among the current priorities of bilateral relations. The initiative should extend to establishing permanent contacts both at the sectoral and governmental levels, as well as between parliaments.

Recommendations for the Ukrainian Authorities and the Public

Working out foreign policy on Europe (including Romania) as far as the EGD is concerned, Ukraine should continue to make efforts to decarbonise its economy, in line with the Paris Agreement, the UN Sustainable Development Goals by 2030 and the EU Association Agreement (also emphasised in the Recommendations of the Parliamentary Committee Hearings on the European Green Deal on September 11, 2020). In the process of forming both state and European policy on the EGD, Ukraine should take into account the recommendations set out in the 2020 comprehensive policy paper "European Green Deal: Opportunities and Threats to Ukraine".

The study of the national analyses on the EGD and SWAT analysis of the EU's implementation of the EGD, the consequences for bilateral relations between Ukraine and Romania, and Ukraine's accession to the EGD in general, lead to the following generalisations that Ukraine should take into account in the framework of its departmental activities.

General Reservations about the EGD

1. Although it has been declared that while focusing on the environment, the EGD considers legal, economic, social and humanitarian aspects in a balanced way, it should be noted that the balance of EGD features and goals only appertains internally (within the EU) as evidenced, in particular, by the Romanian discourse on this topic. Intrinsic to the EGD are economic, social, institutional and humanitarian risks, which are directly proportional to the pace of implementation of measures to achieve the political goals of the deal.

2. It appears that in order to avoid hasty political and political-legal decisions, the scope and scale of the planned

economic transformations related to EGD implementation should be considered in the longer rather than medium term. After all, we are dealing not with a natural economic and historical transition to a new energy/technological basis of production and existence, but with a full range of front-on political and legal implications. The political history of the European Union offers several examples of dubious projects or those that failed due to insufficient political justification, or because the reality of inadequate state mechanisms and the inertia of socio-economic systems, plus the prevailing culture of political participation and the inherent conservatism of business were all ignored.

3. Among other things, in particular, the answer to one fundamental question remains unclear, which is the format of the governmental/EU control over maximisation of profits and minimisation of the costs of energy production by new monopolies during the transition period: how many will there need to be, and to what extent will market and administrative mechanisms be applied?

4. From the economically liberal point of view, the EU's EGD is considered excessive government interference in economic relations. One can even talk about indirect signs of political lobbying for certain corporate interests. The analysis of contradictions between Romanian and European politicians, government officials and environmentalists, and those in business circles, suggests that the European Green Deal announced by the EU is a violation of the political principle of decision-making based on the consensus of both elites and nations. It is not about getting approval by means of plebiscites/referendums, but about legitimisation – reaching a consensus between business circles, national governments and EU institutions, which would only then enact the EGD across Europe.

5. From a quality of life perspective, the environmental benefits and social progress (offered by the EGD) are attractive, and rightly deserve to be identified as long-term, worthy cultural and historical goals. However attractive and vibrant they are, they should not blind us to the fact that it would be foolish to ignore the seriousness of the risks of failure. Failure is fraught with the possibility of sectoral and regional decline, deindustrialisation of whole regions and countries, and, consequently, the economic degradation of the EU as a whole, with the inherent arrhythmia of competition, falling social indicators, limited professional employment options, social depression, festering corruption, paralysis of governance, possibly even a collapse of the EU's political system (both under the burden of its own problems and under the influence of external interference), which, in fact, is what the representatives of Romania in the European Parliament are worried about.

6. One of the explanations for the current European optimism and enthusiasm for the EGD – and its perception as a “new religion” – is that the EGD has a veiled potential to significantly sequester/annihilate both American and Sino-Russian influence on the EU. As most of the current EU establishment believes, such external influence will be totally eradicated. This reduction of influence (if the EGD is successful) is seen primarily (or only) in terms of reducing external energy dependence. It can also be predicted that in cultural and political dimensions, the EGD will give the EU the role of global leader. However, this policy does not address the problems of technological or security/defence dependence, as well as the threat of Russian geopolitical expansion into Europe. On the contrary, if the EGD fails to achieve at least one of its goals, the level of political, economic, social, and military development will be significantly reduced, giving the Russian project an advantage in terms of institutional resilience.

Actor-specific Proposals Concerning the EGD:

The Ministry of Economic Development, Trade and Agriculture, the Ministry of Energy, and the Ministry of Foreign Affairs should:

1. Hold a joint meeting with the Romanian-Ukrainian Bilateral Chamber of Commerce, and identify areas of institutional support for relaunching it, to develop a concept for the development of strategic dialogue on trade and investment, taking into account the EGD aspect at all possible levels – from intergovernmental contacts to joint events with the participation of representatives of the business circles, international institutions, concerned representatives of neighbouring countries, and the media, to exchange specific information on the relevant economic needs of each country's business environment; and to plan an information campaign, to promote the opportunities for doing business in Ukraine to Romanian companies.

2. *The Ministry of Infrastructure, the Ministry of Environmental Protection and Natural Resources, the Ministry of Energy, the Ministry for Communities and Territories Development, and the Ministry of Foreign Affairs should:*

3. Launch negotiations on preparing for the next meeting of the Ukrainian-Romanian Working Group on Transport and Infrastructure, with the agenda to include container trailer transportation, and cross-border projects in alternative energy, as part of the EGD goals and activities;

4. Focus efforts on the coordination of and communication among all responsible and competent institutions, to launch projects aimed at creating a system of joint environmentally-oriented management of the Danube Delta, using all available funding mechanisms (European Neighbourhood Instrument, Danube Transnational Programme, etc.) including the most promising one, the EGD.

The Ministry of Energy should:

1. Given the vague prospects for the Romanian gas sector (in the context of EGD implementation), while preparing a meeting of the Bilateral Working Group on Energy, it is necessary: a) to consider the possibility of involving Romanian companies in Ukrainian well drilling tenders, with the use of a contractor's drilling rigs and personnel; b) to propose to include on the agenda the discussion of possible Ukrainian-Romanian cooperation in EGD implementation, including by developing cooperation in alternative energy (as part of thematic priorities in cross-border cooperation), with regard to an analysis of the risks related to the EU's limited financing and support for gas projects;

2. Hold a meeting with PJSC Ukrtransgaz, to update the data on market demand and the interest of the leading gas market players in Ukraine and the EU (Romania) in the implementation of the project "Two-way natural gas transportation via the Trans-Balkan pipeline", so as to make a final decision on the feasibility of this project.

The Cabinet of Ministers of Ukraine, and the Ministry of Foreign Affairs should:

1. Initiate a direct intergovernmental dialogue with Romania on: a) interest in and opportunities for cooperation in EGD implementation; b) finding a political and economic consensus on the Danube

Delta economy, the lack of which affects the economic interests of both parties, the ecology of the subregion, the development of the common tourism and fishing resources, and the implementation of the EU Strategy for the Danube Region;

2. While developing a government policy, it is necessary to take into account the recommendations of the Parliamentary Committee Hearings on the European Green Deal on September 11, 2020, which, among other things, suggest exploring the possibility of strengthening the Lublin Triangle initiative by launching joint initiatives with its member states, and extending the initiative to Hungary and Romania;

3. Decide on an acceptable compromise, and offer Romania a final round of negotiations on the case of the Kryvyi Rih Mining and Processing Plant of Oxidised Ores, which is an unjustifiable obstacle to the development of investment cooperation between Ukraine and Romania.

Sergiy Gerasymchuk is Deputy Executive Director, Director of the Regional Initiatives Programme and Neighbourhood Programme of the Foreign Policy Council "Ukrainian Prism". He graduated from Kyiv-Mohyla Academy with an MA in Political Science and is a graduate of the Estonian School of Diplomacy. Sergiy is also a board member at Strategic and Security Studies Group and Advisor at Think Twice Initiative.

HYDROGEN DIPLOMACY: BILATERAL INTERESTS OF THE EU AND UKRAINE

*Dr Dmytro Sherengovsky,
Roman Stasiuk
Ukrainian Catholic University*

Following the Russian aggression in Ukraine, the EU prioritised the need for energy supply diversification and reducing overall energy dependency on Russian fossil fuels by 2030. Renewable hydrogen is seen as one of the possible sources. Based on previous calculations, Ukraine has the potential to become one of the major hydrogen exporters in the EU energy market. However, currently, Ukraine lacks the strategic documents or policies to implement such a vision. The paper will outline the bilateral interest of the EU and Ukraine, and identify the necessary steps Ukraine should take to meet the EU interests related to the energy transition to zero emissions by 2050.

Introduction

The world is experiencing a second wave of hydrogen energy development. Hydrogen has a high potential in energy, industry, transport, and construction. It enhances the trend towards decarbonising the global economy. Technologies for carbon-free hydrogen production, using water electrolysis from renewable energy sources, already exist. Hydrogen's physical properties allow it to integrate energy systems, increase energy efficiency, improve the balancing of energy systems, and reduce greenhouse gas emissions.

In 2021, 17 governments released details of their hydrogen strategies; more than 20 governments had publicly announced that they were working on developing

strategies, and numerous companies were looking to take advantage of the business opportunities¹ offered by hydrogen.

Russia's full-scale invasion of Ukraine, and the political consequences of the war for regional security, provided answers to several questions that have long been debated publicly and behind the scenes by European politicians. These issues included the diversification of the EU energy market, and the shift of member states towards renewable energy. In addition to ensuring energy security, these changes should also contribute to the sustainable development of economies.

For Ukraine, the issue of energy security is one of the priorities of post-war development. From the date of Ukraine's independence

1 International Energy Agency. *Global Hydrogen Review 2021*. Paris: IEA, 2021, p. 5
[<https://iea.blob.core.windows.net/assets/5bd46d7b-906a-4429-abda-e9c507a62341/GlobalHydrogenReview2021.pdf> access: 31 July 2022]

until 2019, Ukraine was among the top five countries with the highest energy intensity per unit of GDP. According to the Global Energy Statistical Yearbook 2022, only in 2019-2021 did this indicator drop sharply to the level of developed European countries such as Germany, France, the Netherlands, Belgium and Poland.² Nevertheless, energy efficiency will be a priority for the post-war redevelopment of energy and industry. Another component is a critical response to the need to restore energy connections and rebuild complexes that have been destroyed, alongside the development of alternative renewable sources. Ukraine's potential for renewable energy sources (RES) will probably provide an opportunity to satisfy both Ukrainian and European strategic interests and needs.

EU Strategic Plans for the Development of Hydrogen Energy

The strategic importance of renewable hydrogen for the EU lies mainly in its potential to reduce greenhouse gas emissions and, more recently, in the need to diversify energy sources, which increased due to the Russian-Ukrainian war. On April 18th, 2022, the European Commission issued the "REPowerEU" Plan, which aims to expand the use of rapidly renewable energy, diversify energy supply and reduce overall energy demand, following Russia's prolonged aggression in Ukraine³.


Earlier, on December 11th, 2019, the European Commission adopted the "European Green Deal," an action programme centred on a plan of transition to a climate-neutral Europe by 2050. That is the most ambitious European climate and environmental protection programme to date, which envisages a 55% reduction in greenhouse gas emissions compared to those of 1990⁴. It emerged as a renewed strategic vision and a tool for ensuring the EU's contribution to achieving the goals of the Paris Climate Agreement.

Andre Wolff and Nils Zander, from the Hamburg Institute of International Economics, point out that obtaining hydrogen as an energy carrier or raw material, using water electrolysis as a technological option, has been considered for a long time⁵. However, the debate surrounding the low efficiency of converting electricity from RES to hydrogen, and the dubious climate balance became an obstacle to the large-scale application of hydrogen in energy and other areas. Technological improvements in electrolyzers, and the widespread use of renewable energy sources in the EU during 2017-2020, influenced the decision of the European Commission to define hydrogen in the European Green Deal as a "priority technology for the transition of the industry to a clean and circular economy". In the Hydrogen Strategy, hydrogen is called "the key to achieving new climate ambitions,

- 2 World Energy & Climate Statistics – Yearbook 2022. *Energy intensity*. Enerdata. [https://yearbook.enerdata.net/total-energy/world-energy-intensity-gdp-data.html]
- 3 European Commission. *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 REPowerEU Plan*, COM(2022) 230 final, Brussels, 18 April 2022. [https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2022%3A230%3AFIN&qid=1653033742483 accessed: 31 July 2022]
- 4 European Commission. *Communication from the Commission The European Green Deal*, COM (2019) 640 final, Brussels, 11 December 2019. [https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1576150542719&uri=COM%3A2019%3A640%3AFIN accessed: 31 July 2022]
- 5 A. Wolf, N. Zander, *Green hydrogen in Europe: Do strategies meet expectations?*, "Intereconomics", vol 56, N6, 2021, pp. 316-323 [https://www.intereconomics.eu/contents/year/2021/number/6/article/green-hydrogen-in-europe-do-strategies-meet-expectations.html accessed: 31 July 2022]

reducing greenhouse gas emissions by at least 50-55% by 2030, in a cost-effective way”⁶.

Hydrogen is considered one of the priority energy sources for the EU for several reasons. First of all, it will help to reduce greenhouse gas emissions. Existing hydrogen production in the EU impacts the climate. Demand for hydrogen in European EU countries reached 8.3 million tons in 2018, while the carbon intensity of steam reforming, the most common hydrogen production process, is 10 kg CO₂ per 1 kg of hydrogen produced.⁷



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It turns out that hydrogen production in European countries generated at least 83 million tons of CO₂, not including emissions from coal mining. Hence, in 2018, hydrogen production probably accounted for 2% of the total CO₂ equivalent emissions in the EU⁸. That is, by only replacing “grey”

hydrogen with the renewable alternative, the EU would potentially achieve a reduction in CO₂ emissions of 2% every year.

Another goal is energy balance. Hydrogen provides the ability to store electricity generated from RES during low demand, and feed it back into the grid during peak loads⁹.

In addition, hydrogen has the potential to replace natural gas and coking coal in various industrial processes, thereby making EU countries independent from Russian fossil fuels. “REPowerEU” sets new targets for renewable hydrogen that go far beyond the already ambitious goals in the original EU 2020 Hydrogen Strategy. Instead of the planned 5 million tons by 2030, the European Commission proposes 20 million tons of renewable hydrogen. Among the proposed measures are revitalising hydrogen infrastructure development and expanding funding streams, including storage and port infrastructure, streamlining state aid processes, adjusting the regulatory framework, and creating a Global European Hydrogen Facility¹⁰. Therefore, Russian aggression against Ukraine and the EU’s desire for energy independence from the Russian Federation brings the topic of the hydrogen market, economy, and energy in general, up to a more ambitious level.

6 Ibid, p. 316.

7 Gmucova, N. *Future of Renewable and Low-Carbon Hydrogen in Europe*, Stratas Advisors 2020. [<https://stratasadvisors.com/Insights/2020/111620-Future-of-Renewable-and-Low-Carbon-Hydrogen-in-Europe>]

8 Gmucova, N. *Future of Renewable and Low-Carbon Hydrogen in Europe*, “Stratas Advisors”, 16 November 2020. [<https://stratasadvisors.com/Insights/2020/111620-Future-of-Renewable-and-Low-Carbon-Hydrogen-in-Europe> accessed: 31 July 2022]

9 European Commission. *Proposal for a directive of European Parliament and of the Council on common rules for the internal markets in renewable and natural gases and in hydrogen*, COM (2021) 803 final, Brussels, 15 December 2021(a). [<https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52021PC0803&qid=1640002501099> accessed: 31 July 2022]


10 European Commission. *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 REPowerEU Plan*, COM(2022) 230 final, Brussels, 18 April 2022. [<https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2022%3A230%3AFIN&qid=1653033742483> accessed: 31 July 2022]

Finally, there is support for decarbonisation. Hydrogen can also be an environmentally friendly solution for challenging industries to harness for electrification. Significant sources of pollution come from aviation, shipping, iron, steel production, chemical production, fertilisers, high-temperature industrial heat, long-distance vehicles, and building heating¹¹. Some industries still require incredibly high temperatures and cannot do without combustion. Previously, fossil fuel was considered the only option for such industries. However, renewable hydrogen and hydrogen technologies make it possible to use it in metallurgy, glass production, and fertilisers, without greenhouse gas emissions.

In its 2020 Hydrogen Strategy, the European Commission announced a plan to reach 6 GW renewable hydrogen electrolyser capacity by 2024 and 40 GW by 2030¹². The Strategy also included renewable hydrogen production targets of 1 million tons by 2024 and 10 million tons by 2030. The specified amount of hydrogen and production capacity until 2024, noted in the Strategy, are necessary for decarbonising existing hydrogen production, for example, in the chemical sector, and for using hydrogen in new areas of end-use (e.g. industrial processes and, possibly, freight transport). At this stage, there are studies on the siting of local RES near oil refineries, metallurgical and chemical plants, which are currently the main centres of demand for hydrogen.

The emergence of hydrogen value chains serving multiple industrial sectors and other end-uses could mean creating up to 1 million jobs, directly or indirectly. The Strategy cites

forecasts from analysts at BloombergNEF that pure hydrogen could satisfy 24% of global energy demand by 2050, with annual sales of around EUR 630 billion¹³.



even with the implementation of the planned goals in the EU Hydrogen Strategy by 2030, the volumes of renewable hydrogen will not be able to reach even those production indicators that, according to the latest data, satisfy the demand for hydrogen in the EU countries

The investment agenda in this area should be provided by the post-pandemic financial mechanism of the EU “InvestEU” and coordinated by the stakeholder platform European Clean Hydrogen Alliance. The EU expects to mobilise 372 billion euros of private and public investments during 2021-2027 to the “InvestEU” fund. This programme is envisaged as channelling the accumulated investments into projects related to the following four policy areas: permanent infrastructure, innovation research and digitalisation, small and medium-sized businesses, and social investments and skills. Investments in hydrogen projects are a priority task of the fund, and they will be given preference in the list of sustainable infrastructure projects.

In December 2021, the European Commission proposed a legislative initiative to revise and amend the Gas Directive 2009/73/EC and the Gas Regulation (EC)

11 International Energy Agency. *Global Hydrogen Review 2021*. Paris: IEA, 2021, p. 5 [<https://iea.blob.core.windows.net/assets/5bd46d7b-906a-4429-abda-e9c507a62341/GlobalHydrogenReview2021.pdf> accessed: 31 July 2022]

12 European Commission, *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 A hydrogen strategy for a climate-neutral Europe*, COM(2020) 301 final, Brussels, 8 July 2020 (b). [<https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52020DC0301> accessed: 31 July 2022]

13 Ibid

No 715/2009, called the Hydrogen and Gas Market Decarbonisation Package. It consists of a “Proposal for a Directive of the European Parliament and the European Council on general rules for the internal markets of renewable and natural gases and hydrogen”¹⁴ and “Proposals for the Regulation on the internal markets of renewable and natural gases and hydrogen”¹⁵. With these changes, The European Commission proposes bringing hydrogen to the same “regulatory” level as natural gas.

It is still difficult to predict the demand for renewable hydrogen in the coming decades. However, even with the implementation of the planned goals in the EU Hydrogen Strategy by 2030, the volumes of renewable hydrogen will not be able to reach even those production indicators that, according to the latest data, satisfy the demand for hydrogen in the EU countries. According to the Strategy, the 40 GW of planned capacity will produce only 5 to 10 million tons of renewable hydrogen annually¹⁶. Currently, according to Alejandro Núñez-Jimenez from the John F. Kennedy School of Government at Harvard, hydrogen production capacity in EU countries has reached 11.3 million tons per year. Only 0.4% of all production capacity is for low-carbon (blue) and 0.1% for renewable (green) hydrogen¹⁷. According

to this report, the expected annual demand for hydrogen in EU countries in 2050 will approach 76 million tons of hydrogen¹⁸.

Potential importers of renewable hydrogen with high infrastructural potential are Austria, Belgium, Germany, Italy, the Czech Republic, the Netherlands, and Slovenia. Croatia, Denmark, Estonia, Finland, France, Greece, Ireland, Lithuania, Latvia, Poland, Portugal, Spain, and Sweden possess the necessary resources for producing renewable hydrogen, as well as having highly developed infrastructure. Among non-EU countries, potential exporters are Albania, Turkey, Iceland, Morocco, and Norway. According to this paper, Ukraine belongs to the fifth group of countries, those with high production capacity but low infrastructure potential¹⁹. Such a positioning of Ukraine is probably caused by the great destruction due to the war with the Russian Federation. This group also includes Bulgaria and Romania, which are members of the EU.

Hydrogen Potential of Ukraine

In August, 2021, the Ministry of Energy set up a working group to design a strategy for developing hydrogen energy by 2030. However, there is currently only a Draft of the Hydrogen Strategy, which has never been

14 European Commission, *Proposal for a directive of European Parliament and of the Council on common rules for the internal markets in renewable and natural gases and in hydrogen*, COM (2021) 803 final, Brussels, 15 December 2021(a). [<https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52021PC0803&qid=1640002501099> accessed: 31 July 2022]

15 European Commission, *Proposal for a regulation of European Parliament and of the Council on common rules for the internal markets in renewable and natural gases and in hydrogen*, COM(2021) 804 final. Brussels: 15 December 2021(b). [<https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2021%3A804%3AFIN&qid=1640001545187> accessed: 31 July 2022]

16 European Commission, *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. A hydrogen strategy for a climate-neutral Europe*, COM(2020) 301 final, Brussels, 8 July 2020 (b). [<https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52020DC0301> accessed: 31 July 2022]

17 Nuñez-jimenez, A., De Blasio, N., *The Future of Renewable Hydrogen in the European Union Market and Geopolitical Implications*. Cambridge, MA, USA: Environment and Natural Resources Program, Belfer Center for Science and International Affairs, Harvard Kennedy School, 2022, p. 11 [https://www.belfercenter.org/sites/default/files/files/publication/Report_EU%20Hydrogen_FINAL.pdf accessed: 31 July 2022]

18 Ibid, p.17


19 Ibid, pp.19, 28

approved. The potential of RES, political signals from Germany and the EU, and the European energy crisis have prompted Ukraine to determine the most promising approaches to integrating hydrogen into its energy system.

According to the assessment of the Institute of Renewable Energy of the National Academy of Sciences of Ukraine, the country has the potential to create 537-771 GW of RES-based capacity, with an average annual electricity production of 1,516-2,273 billion kWh²⁰. That is 10-15 times higher than the current annual electricity consumption in Ukraine, and is enough for production of 337-505 billion/nm³ of hydrogen by electrolysis²¹. It is important to note that a large part of the territories with high RES energy potential are currently under occupation by the Russian Federation, and that significantly reduces Ukraine's overall potential for producing renewable hydrogen. Odesa, Kherson, Zaporizhzhia, Dnipro, and Luhansk regions have the highest potential for producing "green" hydrogen. The Autonomous Republic of Crimea, Kherson, Donetsk, and Luhansk regions account for 15.3% of Ukraine's total production potential of "green" hydrogen.

According to the Hydrogen Council and McKinsey & Company Report, gas pipelines can achieve a minimal cost of transporting hydrogen compared to alternative modes of transportation, such as land and sea transportation²². This is especially relevant to the Ukrainian situation, where modernisation of the existing infrastructure is an easier option compared to building a

new one. For example, the modernisation of pipelines can save 60-90% of the costs of constructing a new pipeline²³. Therefore, the advantages of Ukraine as an exporter lie in its existing and potential gas infrastructure. Also, Ukraine ranks second after Russia in terms of storage capacities in Europe, with 37.8 billion cubic meters, which can be partially converted into CCS (Carbon capture and storage from hydrogen production) carbon storage facilities.



Ukraine's weakest point regarding its hydrogen potential is the stagnation of the country's fuel and energy complex, in terms of innovation and new technologies

Ukraine is already negotiating with the European Commission regarding the development of this potential. An example of the movement in the direction of adapting the gas infrastructure to hydrogen is the "Regional Gas Company" (RGC). RGC started Ukraine's first hydrogen research project back in 2020. There are five particular test sites in the Volyn, Dnipropetrovsk, Zhytomyr, Ivano-Frankivsk, and Kharkiv regions. Currently, field research and laboratory experiments are being conducted, with the involvement of seven scientific partners (research institutes and universities). This first stage brings about scientifically confirmed conclusions on hydrogen-resistant equipment and materials. Starting from 2023, the project's

20 United Nations Economic Commission for Europe, *Draft Roadmap for production and use of hydrogen in Ukraine*, Geneva, 25 February 2021, p. 34 [https://unece.org/sites/default/files/2021-02/Draft_Report_H2_Roadmap_25.02.2021_e.pdf accessed: 31 July 2022]

21 Ibid

22 Hydrogen Council, McKinsey & Company, *Hydrogen Insights: A perspective on hydrogen investment, market development and cost competitiveness*, Hydrogen Council, 2021. [<https://hydrogencouncil.com/wp-content/uploads/2021/02/Hydrogen-Insights-2021.pdf> accessed: 31 July 2022]

23 Ibid, p.20

second stage should begin, using a gas-hydrogen mixture in practical application in several household clusters²⁴. This project is part of the Project Portfolio of the European Clean Hydrogen Alliance, of which RGC and several other Ukrainian gas companies and public organisations are members. The company had certain successes in connecting biomethane plants to the gas network in 2022. However, the latest results of the hydrogen project were published at the end of 2021, and it is difficult to predict its timing in the future, due to the problems that have arisen as a result of the war.

Ukraine's weakest point regarding its hydrogen potential is the stagnation of the country's fuel and energy complex, in terms of innovation and new technologies. In particular, the share of R&D expenditure in the GDP from 2014 to 2020 dropped from 0.6% to 0.41%. A shortage of qualified personnel is a characteristic of the Ukrainian fuel and energy complex, and this trend has worsened with the migration of labour resources.

Currently, no legislative framework would regulate the production, storage, and transportation of renewable hydrogen in Ukraine. That creates additional uncertainty for potential investors and restrains market growth. The Dixi Group notes that there are no references to hydrogen in Ukraine's current energy and transport strategies²⁵. The report also states that in the National Economic Strategy 2030, hydrogen is mentioned only as one of the possible options for energy export to the EU.

Germany will likely become the largest importer of renewable hydrogen in the EU. Over the past two years, Germany has been sending many political, business, and diplomatic signals indicating their early interest in importing Ukrainian green hydrogen. From 2021 to 2022, a few memoranda were signed between Ukrainian and German gas companies regarding the development of hydrogen energy. In addition, the Ukrainian company EcoOptima also plays a crucial role in the European partnership "H2EU-Store". This project involves the production of green hydrogen in Ukraine, and its transportation through the Slovak EUSTREAM pipeline network to Austria and Germany.

Ukraine's renewable hydrogen energy market is at an earlier stage of formation than that in the EU. Ukraine's potential is sufficient for producing and using renewable hydrogen not only within the country but also abroad. However, the Ministry of Energy of Ukraine is still only working on a single and basic document that would set the direction of the development of the hydrogen market in Ukraine, but it does not fully consider hydrogen export in relation to the EU.

EU Interests in the Import of Renewable Hydrogen

According to the report of the Hydrogen Europe Association, 7.5 GW of capacity for hydrogen production in the domestic market and 32.5 GW exported from the region of North Africa and Ukraine will

24 РГК, До 2023 року РГК закінчить перший етап підготовки газових мереж до транспортування водню, Регіональна газова компанія (RGK, By 2023, RGK will complete the first stage of preparing gas networks for hydrogen transportation, Regional Gas Company), 14 July 2021 [<https://rgc.ua/ua/news/voden/id/do-2023-roku-rgk-zakinchit-pershij-etap-pidgotovki-42324> accessed: 31 July 2022]

25 А. Корогод, Ю. Огаренко, Р. Ніцович, *Правова база для розвитку водневої енергетики: міжнародний досвід та ситуація в Україні*, "ГО «Діксі Груп»" (Korogot, A., Oharenko, Y., Nitsovysh, R., *Legal framework for the development of hydrogen energy: international experience and the situation in Ukraine*, "NGO Dixi Group"), 2021 [https://dixigroup.org/wp-content/uploads/2021/09/dixi_group_hydrogen_legal_policy-brief_final.pdf accessed: 31 July 2022]

allow for achieving a reduction in CO2 emissions by 82 million tons in the EU every year²⁶.

Although there is still no clarity on the future demand for renewable hydrogen in the EU, according to various forecasts, in 2050, it could range from 12 to 123 million tons per year, with an average demand of 76 million tons. According to Alejandro Núñez-Jimenez's paper, almost half of the EU member states will not be able to meet their demand independently²⁷. Therefore, the EU has two options for further action. The first option is to import from non-EU countries at a lower price, due to more significant production potential. An alternative option of expansion of its own production causes a higher price per kilogram of renewable hydrogen, but ensures more reliable energy security due to independence from external producers. EU member states have the potential to produce up to 106 million tons of renewable hydrogen. However, in EU member states, production costs per kilogram of hydrogen range from US\$2.7 to US\$4.4²⁸. Therefore, some EU countries will have to increase their production costs to satisfy their ever-growing demand, which will lead to an increase in prices and a decrease in competitiveness.

As a result, the EU is considering third countries that can offer higher production potential and lower prices, and has already started preliminary arrangements with them. In particular, Morocco can produce up to 68 million tons of renewable hydrogen at less than US\$3 per kilogram²⁹. Ukraine

has considerable potential for hydrogen production, but the expected production costs have not been calculated yet.

The annual potential of electricity generation from SPPs in Ukraine is about 45 million tons. Therefore, compared to the "export champion" Morocco, Ukraine has a lower average annual renewable hydrogen production potential. However, due to the lack of overall analysis of Ukraine's price competitiveness, the lack of data on projected investments in production facilities, and redesigning/modernisation of the gas transportation system, it is difficult to determine the competitive price of Ukrainian renewable hydrogen.

The advantage of Ukraine over other potential exporters of "green" hydrogen is its developed gas transportation system, and proximity to the largest centres of demand, such as Germany. Morocco also has a Maghreb-Europe gas pipeline, but it was decommissioned in 2021, and ended with connections to the Spanish and Portuguese gas networks, which are by no means the largest centres of projected demand. A longer pipe length, accordingly, requires more investments. Therefore, according to its strategy, Morocco will prefer a slightly more expensive type of hydrogen transportation – with the help of ships, given its well-developed maritime export infrastructure.

Reliability also includes a safety factor. Ukraine's entire energy infrastructure is under threat of destruction. Since the beginning of the war, the EU has been

26 van Wijk, A., Chatzimarkakis, J. *Green hydrogen for the European Green Course: 2x40 GW initiatives*, Dii, 2020 [https://dii-desertenergy.org/wp-content/uploads/2020/04/2020-04-01_Dii_Hydrogen_Studie2020_v13_SP.pdf access: 31 July 2022]

27 Nuñez-Jimenez, A., De Blasio, N., *The Future of Renewable Hydrogen in the European Union Market and Geopolitical Implications*. Cambridge, MA, USA: Environment and Natural Resources Program, Belfer Center for Science and International Affairs, Harvard Kennedy School, 2022 [https://www.belfercenter.org/sites/default/files/files/publication/Report_EU%20Hydrogen_FINAL.pdf accessed: 31 July 2022]

28 Ibid, p.31


29 Ibid, p.35

sending specialised energy equipment from member states to Ukraine through the EU Civil Protection Mechanism. This mechanism signals the EU's interest in long-term energy cooperation with Ukraine.

Morocco is also not a stable region due to the disputed territory of Western Sahara, and the severing of diplomatic relations with the neighbouring hydrocarbon giant – Algeria – which has spare underwater gas pipelines to the EU, bypassing Morocco. Due to Germany's political position on the sovereignty of Western Sahara, Morocco temporarily terminated the agreement on energy cooperation, which in particular provided for the development of renewable hydrogen³⁰. However, as early as in March, 2022, Morocco and Germany's cooperation on "green" hydrogen resumed, after a year of strained relations. The EU also stresses that it is ready to continue cooperation with Ukraine on hydrogen, as soon as favourable circumstances arise. The Commission will also support the development of three main hydrogen import corridors through the Mediterranean (Morocco), the North Sea region (Norway), and, as soon as conditions will allow, Ukraine. The EU is already working on a document with Ukraine on a renewable gas partnership, which they plan to sign in 2022.

The price factor plays an essential role in transportation. As we noted earlier, according to the Hydrogen Council and McKinsey & Company Report, gas pipelines are significantly more competitive than alternative modes of transportation such as land and sea transportation³¹. Therefore, a developed network of Ukraine's gas transmission system (GTS) is essential in satisfying the EU's interest in cheap and convenient transportation.

Finally, the energy trade between Morocco and the EU is limited to bilateral trade with Spain. Also, both countries have experience in gas transit to the EU: Ukraine – from Russia, Morocco – from Algeria. While Morocco no longer transits gas to the EU, Ukraine, according to the Contract for the transit of Russian gas to the EU, will transit it until 2024.



Similar to the LNG trade, the development of the international hydrogen market requires international agreements and other forms of international cooperation, to establish a common infrastructure, rules, and distribution of markets

Therefore, Ukraine, as a potential exporter of renewable hydrogen, satisfies the EU's interest in sufficiently integrating the exporter into the EU energy markets. Compared to Morocco, Ukraine is better integrated into EU energy markets and has more experience exporting electricity.

Ukraine's Need to Adopt a Hydrogen Strategy and Conduct Active Hydrogen Diplomacy

Similar to the LNG trade, the development of the international hydrogen market requires international agreements and other forms of international cooperation, to establish a common infrastructure, rules, and distribution of markets. The creation of international organisations and stakeholder organisations is also necessary. Therefore,

30 J. Ortiz, *Increase in Morocco's electricity exports*. Atalayar, 1 March 2022 [https://atalayar.com/en/content/increase-morocco-electricity-exports accessed: 31 July 2022]

31 Hydrogen Council, McKinsey & Company, *Hydrogen Insights: A perspective on hydrogen investment, market development and cost competitiveness*, Hydrogen Council, 2021, p. 20. [https://hydrogencouncil.com/wp-content/uploads/2021/02/Hydrogen-Insights-2021.pdf accessed: 31 July 2022]

“hydrogen diplomacy” should become an instrument of the revitalisation and creation of renewable hydrogen markets.

Germany is a successful example of using the tool of “hydrogen diplomacy”. Germany has planned to install electrolyzers, the production capacity of which should be equal to 5 GW, which roughly corresponds to 14 TWh, and thus covers only about a seventh of Germany’s projected hydrogen demand until 2030 (90-110 TWh)³². Germany plans to compensate for the limited production of hydrogen by importing it. As early as 2022, the German Foreign Ministry announced plans to establish hydrogen diplomacy offices in Luanda (Angola), Abuja (Nigeria), Moscow (Russia), Riyadh (Saudi Arabia), and Kyiv (Ukraine). The Future Package primarily provides financing for the first phases of the strategy implementation: 7 billion euros to accelerate the market entry of hydrogen technology into Germany, and another 2 billion euros to promote international partnerships³³. In addition, countries such as Canada, Chile, Italy, Japan, and Spain have explicitly mentioned potential bilateral hydrogen trade relations in their national strategies.

Even before the full-scale invasion by Russia, and the EU’s adoption of strategic decisions on hydrogen energy, the first dialogues regarding cooperation in this area had begun. Persistent rhetoric about “hydrogen cooperation” was at the forefront of German-Ukrainian relations before the full-scale Russian invasion. At the last pre-war meeting of the foreign ministers, Annalena Baerbock and Dmytro Kuleba, on

February 7, 2022, special attention was paid to the development of cooperation in the field of hydrogen energy.

With the beginning of the war, the issue of hydrogen diplomacy was put on the backburner. It is obvious that supporting Ukraine and ensuring the conditions for victory are a priority. However, another reason for the lull is that Ukraine does not consider the need for an active hydrogen export lobby in official documents and strategies.

In August 2021, the Ministry of Energy established a working group to create a Strategy for developing hydrogen energy by 2030. The strategy’s release was expected at the end of February 2022, but it was never published and approved, due to the war. However, as early as 2021, the Institute of Renewable Energy of the National Academy of Sciences of Ukraine, and the energy association “Ukrainian Hydrogen Council” published the Draft of the Hydrogen Strategy of Ukraine³⁴.

The general purpose of the Draft Strategy does not envisage the provision of hydrogen energy for the export of renewable gas to EU countries as a tool for deepening integration with the EU energy system. Although it is worth mentioning that the first stage (short-term goals) of the strategy involves launching the export market of “green” hydrogen, which requires reviewing the role of its GTS. The pipeline is the cheapest way to transport hydrogen, so Ukraine needs to prioritise the modernisation of its GTS, and set clear goals for the transportation of hydrogen mixed

32 Federal Government of Germany. *The National Hydrogen Strategy*, Berlin: Federal Ministry for Economic Affairs and Energy, 2020. [https://www.bmwk.de/Redaktion/EN/Publikationen/Energie/the-national-hydrogen-strategy.pdf?_blob=publicationFile&v=6 accessed: 31 July 2022]

33 *Ibid*, p.3

34 Інститут відновлюваної енергетики НАН України, *Воднева стратегія України: проєкт* (Institute of Renewable Energy of the National Academy of Sciences of Ukraine, *Hydrogen Strategy of Ukraine: Draft*), Kyiv, 2021 [<https://www.ive.org.ua/wp-content/uploads/Vodneva-Strategia-Cover.pdf> accessed: 31 July 2022]

with natural gas. It should also define the necessary amount of investment, develop a mechanism for financing such a project, and, possibly, attract foreign stakeholders such as Germany.

The medium-term goals for 2030-2035 include an increase in exports as a factor influencing the growth of the domestic Ukrainian market. Although such a statement does not fully correspond to the general purpose of the draft strategy, it well reveals the essence of the export orientation of the Ukrainian renewable hydrogen market. After all, hydrogen will be needed by those countries that have found solutions for the use of hydrogen in their sectors of the economy, and only later will Ukraine be able to adopt and finance them. That is, the expansion of the domestic market will take place in the medium term, due to the increase in exports.



Another risk that an export-oriented hydrogen strategy will help overcome is the potential halting of Ukrainian transit of Russian gas to the EU, when the current contract expires in 2024

In the third stage, from 2030 to 2050, the intention is to use 50% of Ukraine's available RES potential for hydrogen production by 2050. This is approximately 22,500 thousand tons of green hydrogen annually, allowing Ukraine to go beyond the European market to the global market, which is not mentioned in the project. Unlocking such a significant potential encourages us to strategise more widely about the sale of Ukrainian hydrogen to other centres of demand, apart from the European Union.

An obvious problem with the current Draft Hydrogen Strategy is the lack of quantitative indicators. That is, the strategy does not foresee conditions, does not forecast the amount of investments and expected production, and therefore it is impossible to draw a conclusion from the project about what quantitative indicators Ukraine needs to achieve so as to obtain profits or satisfy its interests.

Among the benefits to Ukraine from the large-scale production of green hydrogen, the following are mentioned in the Project of the Hydrogen Strategy of Ukraine: the creation of new jobs and the reorientation of people employed in the energy sector; the creation of a new economic sector with the attraction of multibillion-dollar foreign investments, which will contribute to the sustainable development of Ukraine, the provision of significant foreign exchange revenues for an extended period, additional growth of GDP due to the development of RES, which may amount to 4-6% in 2030 and 12-15% in 2050, and a decrease in budget expenditures for the health care of citizens, due to the diminishing of air pollution³⁵.

After the war's end, Ukraine will need not only to carry out post-war reconstruction but also to attract investments in various areas, to strengthen the weakened economy. This will be essential for fully or partially destroyed industrial sectors, such as metallurgy. Renewable hydrogen can open the way to entirely new technologies, aiming not only to rebuild the economy but to saturate it with new sectors, applications, investments, and markets, that will cause rapid growth.

Another risk that an export-oriented hydrogen strategy will help overcome is the potential halting of Ukrainian transit

35 Інститут відновлюваної енергетики НАН України, *Воднева стратегія України: проєкт* (Institute of Renewable Energy of the National Academy of Sciences of Ukraine, *Hydrogen Strategy of Ukraine: Draft*), Kyiv, 2021, p.60 [<https://www.ive.org.ua/wp-content/uploads/Vodneva-Strategia-Cover.pdf> accessed: 31 July 2022]

of Russian gas to the EU, when the current contract expires in 2024. Due to the Russian-Ukrainian war, there is a high probability that the next transit contract may not be signed, which will nullify Ukraine's transit capacities. If so, the potential of the Ukrainian GTS will remain unused. On the other hand, the EU's desire to diversify its energy supplies and abandon Russian natural gas has also prompted Ukraine to think differently about the future use of its own GTS. Its transformation into a hydrogen supply network is one of the most financially and organisationally beneficial options.

In total, hydrogen has the potential to account for 12 to 24% of the world's final energy use by 2050, with annual sales of up to 630 bln euros³⁶. Given the global and, in particular, the European agenda for decarbonisation and the Ukrainian potential for the production of renewable hydrogen, Ukraine can offer to fill the gap between the expectations and capabilities of the most ambitious players of energy transition to zero emissions, including the EU and the potentially largest consumer of hydrogen – Germany. Therefore, it is time to restore Ukraine's active "hydrogen diplomacy", while the EU forms just the foundations of its potential hydrogen market.

Recommendations for the Development of Hydrogen Diplomacy in Ukraine

To support a future export-oriented hydrogen strategy, Ukraine's current hydrogen diplomacy should address three main issues: to identify sales markets, find a potential exporter of hydrogen technologies, and define potential collaborators. At the present stage, Germany could be considered as the main trading partner. In addition,

Ukraine should make agreements with Morocco and other potential hydrogen exporters, to simultaneously conduct its hydrogen diplomacy with the EU, jointly taking a share of the export market.

Taking into account the evaluation and analysis of the Hydrogen Strategy Project of Ukraine, in order to improve it, we suggest focusing on the implementation and development of the following areas:

- to substantiate economically the goals of hydrogen production, taking into account the forecast demand in the EU, Ukrainian potential, and the capabilities of potential competitor countries;
- to model expected investments in the hydrogen infrastructure (production, storage, transportation, and application in the domestic market);
- to prioritise sectors of the economy for the use of renewable hydrogen in Ukraine, taking into account the interest of "green" exports to the EU;
- to include the factor of post-war reconstruction and the possibility of using hydrogen technologies in the restoration of the metallurgical industry, partly destroyed by the Russian invasion

It is also necessary to specify the recommendations regarding the legal framework, taking into account the experience of the EU, and the current problems and opportunities of the Ukrainian energy industry. At this stage, Ukraine still does not have any regulations for "transitional" hydrogen. However, using "pink" atomic hydrogen as a transitional stage, and using the Ukrainian GTS for hydrogen transportation, can become critical competitive advantages for Ukraine. In the EU and Germany, the transitional

36 Д.Г. Бобро, *Проблемні питання та перспективи розвитку водневої енергетики в Україні*, "Національний Інститут Стратегічних Досліджень" (D.G.Bobro, *Issues and prospects for the development of hydrogen energy in Ukraine*, National Institute for Strategic Studies), March 2021
[<https://niss.gov.ua/sites/default/files/2021-03/voden.pdf> accessed: 31 July 2022]

option is “blue” hydrogen, for increasing low-carbon hydrogen production with the simultaneous replacement of the “grey” hydrogen. “Blue” hydrogen is produced by steam recreating methane from natural gas, but using carbon capture and storage technology. “Pink” hydrogen is produced by an electrolyser powered by electricity from nuclear power plants. The Ukrainian atomic potential allows for this option, but requires the same calculations as in the case of “green” hydrogen. In connection with the introduction of gas and nuclear energy into the EU taxonomy, this transitional option for Ukraine can become an essential strategic leap in the direction of the hydrogen trade.

Currently, a wide range of stakeholders interested in developing hydrogen energy is being formed in Ukraine: gas and development companies, public organisations, universities, and research institutions. In addition, the EU member countries’ interest plays a significant role in shaping the future energy market. Separately, we can single out Germany, which is expected to become the leading importer of hydrogen in the EU, and, therefore, at the diplomatic level, is currently trying to involve Ukraine in cooperation in the production and supply of renewable hydrogen. The perspective of Ukraine is in export-oriented strategising, development of the hydrogen market, and the application of hydrogen technologies in reconstructing the Ukrainian domestic

economy. To achieve its goals, Ukraine needs to do its homework today: to adopt an updated Hydrogen Strategy, taking into account its export potential, and to start active “hydrogen diplomacy” with the EU, jointly building up the European hydrogen market.

Dmytro Sherengovsky, PhD is the Vice Rector for Academic Affairs and Internationalization at the Ukrainian Catholic University. He was formerly member of the Expert Council in the area of International Relations at the National Agency for Higher Education Quality Assurance (Ukraine). He was also a research fellow of the Nanovic Institute of European Studies, University of Notre Dame, USA. Former consultant to UNDP (Ukraine) for online-education on SDG for business. His major research interests focus on global challenges, SDGs, international relations theories, international conflicts, global and regional security.

Roman Stasiuk is a graduate student of the BA “Ethics-Politics-Economy” Program at the Ukrainian Catholic University. He was formerly editor of the Lviv Lab – Innovative Media, and a graduate of the Political School at the Eidos Center. He was also an intern in Transparency International Ukraine. His major research interests focus on international relations and diplomacy, energy security and the international economy.

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