No. 009 October 2024

ukrainian analytical digest

www.laender-analysen.de/uad https://css.ethz.ch/publikationen/uad.html

UKRAINE'S ENERGY AND CLIMATE CHALLENGES

Special Editors: Susanne Nies and Olha Bondarenko

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INTRODUCTION BY THE SPECIAL EDITOR

Ukraine's Energy and Climate Challenges

This issue of the Ukraine Analytical Journal is devoted to Ukraine's energy and climate challenges. How can the country deal with the paramount heat and power deficit expected for the coming winter? What solutions are at hand? And how can these short-term solutions be consistent with the needs of a more mid- and long-term clean energy transition? Since 2010, Ukraine has worked towards aligning the regulatory setting through membership in the Energy Community based in Vienna.[1] Ukraine and the EU have successfully synchronised their power systems one month after the Russian full-scale invasion had started in February 2022. At unprecedented speed, while in war, Ukraine, together with Moldova, were able to first qualify as candidate countries to the EU (June 2022), and then to be invited to formal membership negotiations (June 2024). Implementing energy (EU chapter 15) and climate (EU chapter 27) legislation forms an intrinsic part of the EU integration trajectory.

The authors of this issue include experts from the Green Deal Ukraïna Project (GDU) at Helmholtz-Zentrum Berlin, as well as their Ukrainian partners, Ukrainian NGOs such as the Energy Act for Ukraine Foundation, as well as major players such as the Gesellschaft für Internationale Zusammenarbeit, GIZ. The Green Deal Ukraïna project is dedicated to establishing an independent energy and climate think tank in Kyiv, aimed at empowering Ukrainian governmental institutions, policymakers, and society in making informed energy and climate policy decisions. The project is a project of Helmholtz-Zentrum Berlin (HZB) in Germany and is funded by the Federal Ministry of Education and Research (BMBF). Though most authors have an academic background this issue focuses on urgently needed practical measures.

In the first contribution Georg Zachmann, Frank Meissner, Robert Carr and Vlad Mikhnych explore the urgent challenges and proposed solutions for Ukraine's energy infrastructure, which suffers from frequent blackouts due to ongoing attacks and advocate for the creation of an "energy situation room" to coordinate resilience strategies and call for significant investments and reforms to stabilise and enhance the electricity system's long-term functionality and sustainability.

Susanne Nies and Oleh Savytskyi analyse the critical energy supply issues in Ukraine due to targeted infrastructure attacks and propose enhancing cross-border electricity connections with EU countries as a solution. The article presents six practical measures to quickly increase Ukraine's power import capacity, including upgrading transmission lines, speeding up new projects, and implementing advanced grid technologies to ensure significant improvements by the winter of 2024/25 and 2025/26.

Julia Jesson discusses Ukraine's strategic efforts to integrate climate policy into its national agenda during wartime and EU accession, highlighting the Ukrainian Climate Office (UCO) which aims to play a critical role in promoting sustainable practices and EU integration. She emphasises that effective leadership and flexibility in climate mainstreaming are key to Ukraine's environmental and economic resilience.

Mykola Iakovenko reviews the Ukrainian Decarbonisation and Energy Efficiency Transformation Fund established in 2023, emphasising its role in supporting Ukraine's green recovery post-war and aligning with EU standards. He recommends launching a Ukrainian emissions trading system, enhancing EU financial support, and improving transparency and strategic planning—steps that aim to amplify the fund's role in Ukraine's green recovery and economic stability.

Yulia Loshakova and Alisa Schubert explore the effectiveness of Municipal Energy Plans (MEPs) in Ukrainian communities for boosting energy efficiency and resilience, highlighting the GDU ongoing capacity-building program ProGreenDeal Smart Cities, which enhances local expertise and implementation strategies.

Yuliana Onishchuk discusses the Energy Act for Ukraine Foundation's response to the energy crisis caused by ongoing conflict, focusing on its initiative to install hybrid solar power stations at critical facilities like schools and hospitals. The article also explores the broader implications of these installations for Ukraine's sustainable recovery and energy independence, emphasising the strategic shift towards decentralised energy solutions that can withstand wartime challenges and contribute to long-term environmental goals.

We wish you an interesting read.

Susanne Nies and Olha Bondarenko

About the Special Editors

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1 Ukraine Energy Support Activities–Energy Community Homepage (energy-community.org)

ANALYSIS

Strategies to Avert Ukraine's Emerging Power Crisis

Georg Zachmann, Frank Meissner, Robert Carr, Vladyslav Mikhnych (all Green Deal Ukraïna)

DOI: 10.3929/ethz-b-000696570

Abstract

Ongoing Russian attacks on Ukraine's energy infrastructure are causing widespread blackouts. Without coordinated action, the situation is expected to worsen over the coming winter. While technical solutions are available to improve the supply situation, their rapid implementation requires the input of significant resources and effective coordination. To achieve this, we propose the creation of an 'energy situation room' to improve information sharing and the coordination of Ukraine's energy resilience strategy, as well as mechanisms to empower local and private actors to invest in targeted, systemic solutions.

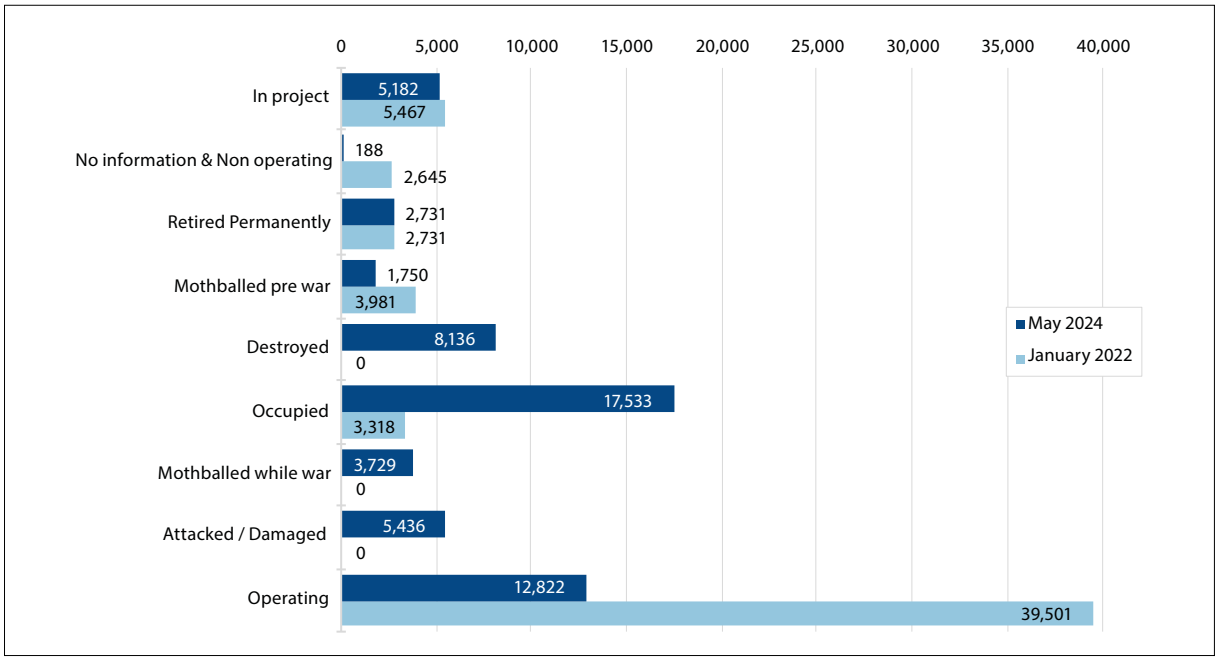
Ukraine's Energy Crisis: A Nation at Risk

In the next 12 months, every Ukrainian consumer is expected to experience power outages lasting several hours nearly every day.

Russia is targeting Ukraine's electricity infrastructure with the goal of depriving the population and economy of energy. The first wave of attacks in 2022 focused on the transmission system. When these efforts did not collapse the Ukrainian electricity network, Russia shifted its focus to the conventional power plants (Castelvecchi, 2022). The damage inflicted on these plants has severely strained the grid, compounding various socioeconomic, health, and environmental impacts (Naddaf, 2023). By May 2024, Ukraine had lost approximately 70% of the electricity production capacity that was operational before the war. Approximately 35% of the total capacity has been partially or entirely destroyed, whereas another 35% is located in currently occupied areas (see Figure 1 below).

This has led to a significant electricity supply shortage, necessitating planned rolling power outages that started in spring 2024. The situation is expected to deteriorate further in the winter, as the demand for electricity increases while energy generation from solar and hydropower decreases. The supply is also constrained by the need for extensive maintenance and refueling work for the remaining 7,500 megawatts (MW) of nuclear capacity in advance of winter. The power outages are substantial, particularly given that the electricity demand has already decreased by 20% from prewar levels due to reduced economic activity and the loss of territory to occupation. Under the current conditions, it is projected that 20% of the remaining demand will be unmet in the coming months (Meissner *et al.*, 2024).

Figure 1: Operation Status of Ukraine's Generation Fleet (Meissner et al., 2024)



As a result, load shedding, i.e., the intentional reduction of electricity demand, will need to be implemented on a scale typically seen in developing countries or during natural disasters (Oluwasuji *et al.*, 2019; Stürmer *et al.*, 2024)many developing countries frequently resort to disconnecting large parts of the power grid from supply, a process termed load shedding. This leaves households in disconnected parts without electricity, causing them inconvenience and discomfort. Without fairness being taken into due consideration during load shedding, some households may suffer more than others. In this paper, we solve the fair load shedding problem (FLSP. If no additional measures are implemented over the next 12 months, load shedding will be necessary for approximately 7,900 out of the total 8,760 hours, or 90% of the time. During more than 1,000 of those hours, the reduction will exceed 4,000 MW, and in some situations, load shedding will reach up to 6,500 MW—approximately one-third of the anticipated peak demand (Figure 2 below).

Every electricity consumer is expected to endure several hours of power cuts nearly every day over the next 12 months. These outages have severe impacts on households, businesses, and public services (Mabunda, Mukonza and Mudzanani, 2023; Tsagkaris *et al.*, 2023; Lebepe and Mathaba, 2024)small businesses play a significant role in the wellbeing of rural dwellers and are a major tool for local economic development. At present, there is limited evidence in the literature pointing out the small and medium-sized enterprises (SMEs. At the very least, they reduce the quality of life and production and income opportunities. But they also threaten lives and health. At present, the market balance is set by centrally determined (by the TSO) shutdowns for individual consumers and regions. There are not (yet) any price signals that could lead to a reduction in supply.

Exploring Technical Solutions

This dire situation is exacerbated by any additional attacks on a system already stretched to its limits. Therefore, an essential effective mitigation step is to provide Ukraine with adequate air defence capabilities. Recent commitments from Ukraine's allies to supply additional air defence systems and eventually Western fighter jets suggest that this need is finally being acknowledged (Zelenskyy, 2024).

To reduce power cuts over the next 12 months and beyond, rapid and substantial investments in the electricity supply are essential. Modelling of the electricity system, carried out using PyPSA (Python for Power System Analysis, see e.g. Brown, Hörsch and Schlachtberger, 2018), reveals the potential of various technical solutions to reduce the need for load shedding, as shown in Figure 3 (Meissner *et al.*, 2024). These solutions include repairing damaged facilities, increasing import capacity, and establishing new generation capacities.

The damaged energy generation capacity in Ukraine needs to be restored as much as possible. Given that the status of individual units is not publicly known, there is significant uncertainty regarding how much can be repaired before winter. However, if Ukrainian technicians manage to reactivate half of the currently affected and inactive capacity, the proportion of load shedding could drop from 18% to 6% of the total demand (Figure 3 "limited repairs"). This would substantially reduce the frequency and duration of power outages.

In addition to repairs, increasing electricity imports from neighbouring countries would be beneficial. Currently, the transfer capacity between Ukraine and its

Figure 2: Projected Load Shedding If No Additional Measures Are Taken (Meissner et al., 2024)

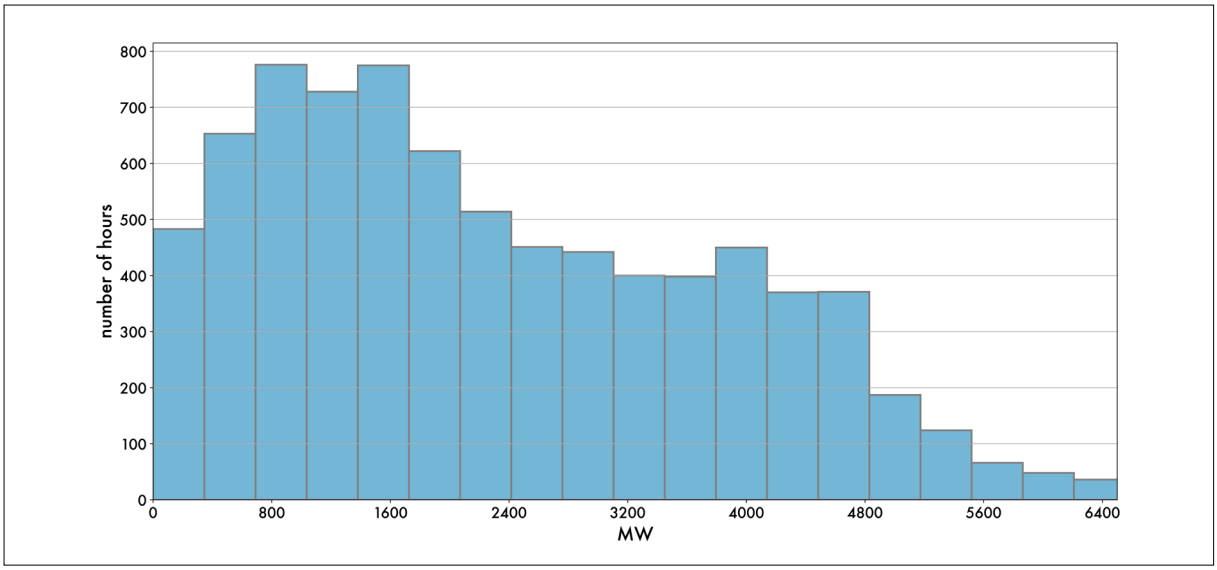
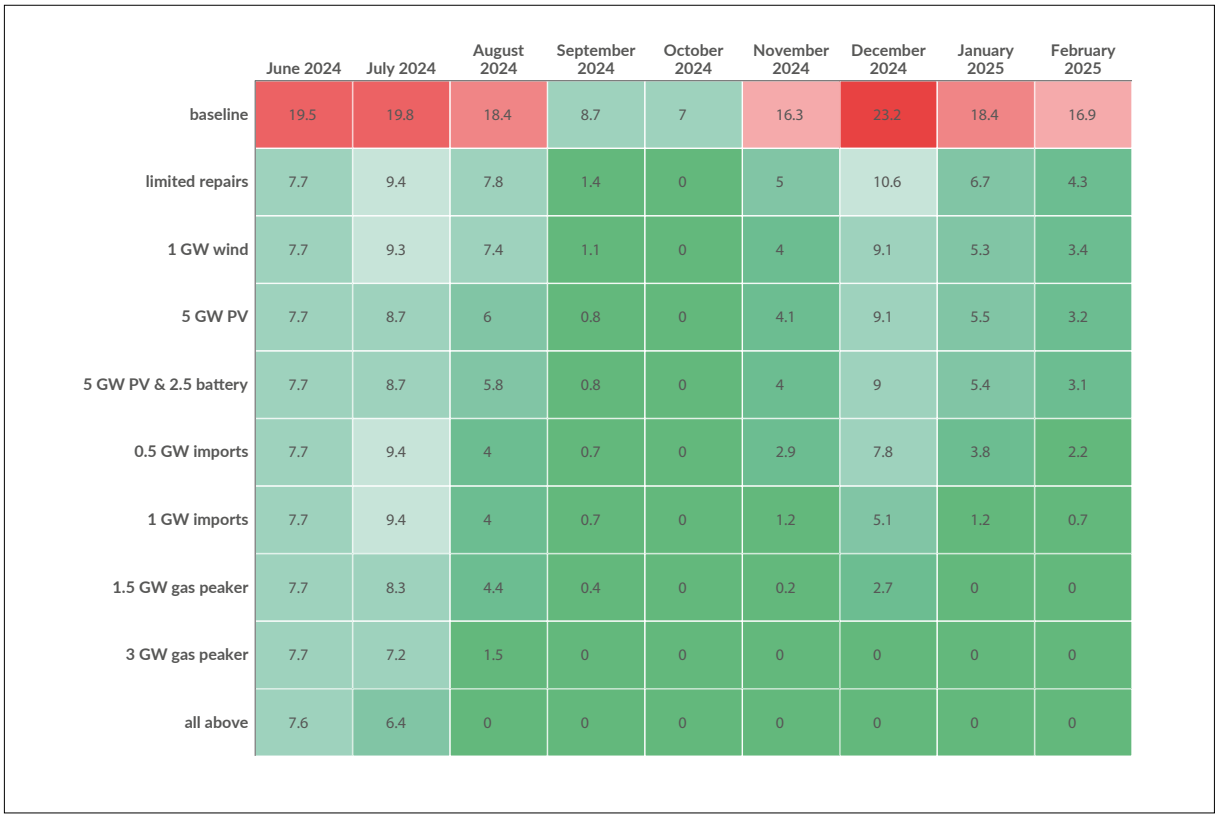


Figure 3: Modelled Impacts of Technical Solutions on Load Shedding (%)



	June 2024	July 2024	August 2024	September 2024	October 2024	November 2024	December 2024	January 2025	February 2025
baseline	19.5	19.8	18.4	8.7	7	16.3	23.2	18.4	16.9
limited repairs	7.7	9.4	7.8	1.4	0	5	10.6	6.7	4.3
1 GW wind	7.7	9.3	7.4	1.1	0	4	9.1	5.3	3.4
5 GW PV	7.7	8.7	6	0.8	0	4.1	9.1	5.5	3.2
5 GW PV & 2.5 battery	7.7	8.7	5.8	0.8	0	4	9	5.4	3.1
0.5 GW imports	7.7	9.4	4	0.7	0	2.9	7.8	3.8	2.2
1 GW imports	7.7	9.4	4	0.7	0	1.2	5.1	1.2	0.7
1.5 GW gas peaker	7.7	8.3	4.4	0.4	0	0.2	2.7	0	0
3 GW gas peaker	7.7	7.2	1.5	0	0	0	0	0	0
all above	7.6	6.4	0	0	0	0	0	0	0

EU neighbours is 1,700 MW, allowing imports to cover approximately 10% of Ukraine's peak demand. Expanding this transfer capacity would help reduce power cuts. If an additional 500 MW could be made available from Poland—likely the most feasible short-term option—load shedding could be reduced by more than a quarter. Further increasing the capacity by expanding the interconnections with Hungary, Slovakia, and/or Romania to import an additional 500 MW could roughly halve the load-shedding volumes compared with a scenario that relies solely on repairs. More details on the available options are discussed in the article by Nies and Savitskyi on this issue.

Deploying new generation capacities is another important step for sustainably addressing the electricity shortfall. In the short term, smaller decentralized systems are particularly advantageous, as they are more costly to target with air attacks and can be deployed more rapidly. The security of the energy supply can be enhanced by installing a mix of different types of gas-fired power plants, solar photovoltaic (PV) systems, and wind generators. Combining these options allows for an optimal balance of their respective advantages and disadvantages, such as generation volatility (where gas-fired power plants are more reliable than wind and solar), scalability (where microturbines and PV systems are more flexible than wind and open-cycle gas turbines), reliance on other infrastructures (such as the gas supply), and costs.

There are viable solutions that can be implemented before winter. Items such as batteries, PV panels, and gas generators are available for immediate purchase, either off the shelf or on the secondary market. Additionally, individual transformers and wind turbine components are available in Europe. The key challenges lie in prioritizing their deployment within Ukraine and ensuring that there is sufficient engineering capacity to support these efforts. Similarly, expanding the cross-border transmission capacity before winter seems technically feasible.

Aligning Efforts for the Rapid Deployment of Solutions

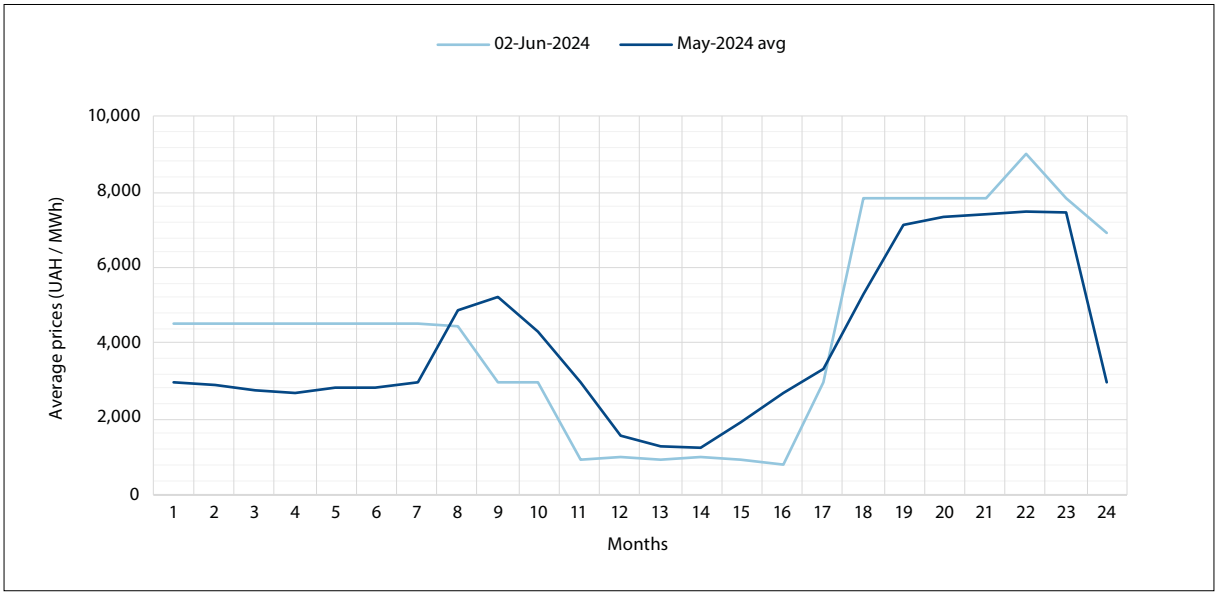
To achieve effective coordination and efficient allocation of resources, we propose three complementary strategies:

1. *Utilise market mechanisms to direct donor support.*
2. *Empower municipalities to implement local solutions.*
3. *Establish a comprehensive energy situation room for Ukraine.*

Utilise Market Mechanisms to Direct Donor Support

Ukraine's electricity wholesale market functions by providing day-ahead signals for hourly dispatch, cross-

Figure 4: Day-ahead Market Prices



border trading, and reserve provisioning. Current prices (see, for example, Figure 4) partially indicate the system's scarcity, and their elevated levels are, in principle, attractive for private investments, particularly in flexible energy units (see Figure 4).

However, the current regulatory framework, war-related risks, uncertainty about the future of the electric system, and high capital costs make investment less appealing. This situation creates a vicious cycle that hampers market-based investments: limited confidence in future market revenues leads to high-risk premiums for financing, meaning that projects become viable only if they secure extremely high electricity prices with Ukrainian customers. Owing to these elevated prices, consumers often back out of costly contracts after investments have been made, which in turn raises future risk premiums even further. Resolving this issue is challenging because investors lack trust that the Ukrainian state and other market participants will uphold their long-term commitments. As a result, donors frequently focus on financing individual projects by means outside of market mechanisms. These projects are often unique, leading to high administrative costs and long lead times, and they can also reduce market returns for private ventures.

Establishing a joint trust fund that guarantees a minimum level of market revenue for private investors in technologies compatible with decarbonization could significantly increase investment incentives. Competing profit-driven investors would then be motivated to integrate various components, such as using war-risk insurance, employing export credits, securing project financing and land plots, making grid connections, and identifying Ukrainian customers. With a guaranteed minimum return, both the government and the market could fulfil their obligations over time, fostering trust and creating a genuine market. Additionally, donors could require Ukrainian authorities to avoid negative interventions in the electricity market or even advocate for competition-enhancing sector reforms. With a well-structured and executed system, investments could greatly surpass what donor grants alone would achieve.

Empower Municipalities to Implement Local Solutions

Local authorities generally possess the most accurate understanding of the local electricity supply needs, particularly with regard to critical infrastructure such as public water, sewage, heating, and transport systems and hospitals. The decentralization reforms enacted after 2014 provided local authorities with the fiscal flexibility and legitimacy needed to address local issues (OECD, 2022). However, they continue to face challenges in securing loans for investments and reliably guaranteeing investors a long-term revenue stream, and they often lack the capacity to effectively execute targeted energy projects.

To empower local authorities, we propose a program that enables them to lease new energy generation installations. International financial institutions (IFIs) could underwrite these leasing contracts, potentially with local banks acting as intermediaries. Municipalities could then engage with private investors to negotiate the specific project details. With IFI backing, investors could prefinance these projects at acceptable rates. The Ukrainian government should initiate a process to negotiate and develop a suitable financial framework in collaboration

with partners, IFIs, and local authorities that meets the needs of all stakeholders.

Compared with individual donor-funded projects, this approach has the advantages of leveraging local knowledge and private sector capacity to quickly identify and implement targeted solutions.

Establish a Comprehensive Energy Situation Room

Currently, the most reliable information on the state of the national energy system comes from Ukrenergo, the Transmission System Operator, which has been remarkably effective at maintaining the system's operations. However, Ukrenergo's ability to communicate the system's current needs to domestic stakeholders and international partners is significantly constrained. Establishing an energy situation room could greatly enhance coordination efforts both within Ukraine and between Ukraine and its partners.

The envisioned situation room would function as a relatively independent permanent secretariat, staffed with more than ten permanent members and overseen by a high-level political supervisory council. This secretariat would be tasked with gathering detailed information on the system's status, running scenario forecasts, identifying needs, and soliciting offers for implementing technical solutions. It would work closely with all the relevant stakeholders, including initiatives such as the G7+, the Ukraine Energy Support Fund, and USAID's Energy Security Project. Both domestic and international stakeholders would contribute data and expertise to the secretariat, which would then disseminate this information back to actors within the energy sector to facilitate their operations.

Like Ukraine's National Security and Defence Council, the energy situation room should involve key authorities because highly political decisions need to be made. These include determining how to allocate scarce electricity and heat among consumers; prioritizing technical solutions in terms of political capital, funding, and the allocation of limited engineering resources; and deciding who should bear the financial risks and costs. The supervisory body should comprise the energy minister, the head of the parliamentary energy committee, and representatives from the President's office, the national security council, the energy regulator, municipalities, the transmission system operator, state-owned and private generators, Naftogaz, international partners, and the energy community or the European Union. Ideally, partner countries would also appoint well-resourced special envoys to coordinate support from their respective nations. A well-staffed, adequately funded, and properly mandated energy situation room could significantly accelerate and improve decision-making processes essential for revitalizing Ukraine's energy system.

Owing to the critical nature of energy-related data and decision-making in times of war, measures should be taken to ensure that the items discussed in the energy situation room do not fall into the wrong hands (e.g., Russian spies).

Conclusion

Ukraine urgently requires sufficient investments to restore its vulnerable electricity system. To effectively direct both domestic and international resources, Ukraine and its partners need to enhance their administrative capacities and optimize the functioning of Ukraine's electricity market. The structural reforms proposed above will help stabilize the electricity system, support its gradual recovery, and foster its long-term competitiveness and sustainability.

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ANALYSIS

Boosting Power Grid Integration with the EU Can Help Ukraine Survive the Next Winter

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DOI: 10.3929/ethz-b-000696570

Abstract

The deliberate attacks on energy infrastructure, especially since April 2024, have led to a massive supply gap in Ukraine, to power cuts lasting more than 10 hours a day, and to fears of a winter 2024/25 in the dark and cold. While repairing damaged power plants and deploying decentralized solutions and new capacities are crucial parts of a response to this challenge, the expansion of the power networks that link Ukraine and neighboring EU countries is another. Our paper analyses options for improving cross-border grid links so that more power reaches Ukraine in a timely manner. Six short-term solutions have been identified.

Introduction

Since the start of the full-scale invasion, more than two-thirds of Ukraine's conventional power plant capacity has been occupied, partly- or entirely destroyed. This translates into a significant supply–gap that can lead to frequent and long-lasting power cuts for the war-torn population. In Bucha, for example, close to Kyiv, or in Ivano-Frankivsk, in Western Ukraine, daily power cuts of 10 hours were reported in June 2024. The scheduled maintenance of the nuclear power fleet further exacerbated the situation until early August 2024.

Electricity is needed to keep the lights on, supply water to the population, and keep heating systems work. In winter, when temperatures drop below zero, the elec-

tricity demand reaches maximum levels. Water- and heating infrastructure can be damaged by freezing in the case of prolonged power outages. Hence, there are many reasons for concern about the economic and humanitarian situation in Ukraine in the short- and medium-term.

To prevent worst-case scenarios from becoming reality, Ukraine has four action areas regarding electricity supply security: firstly ensure air defence strategies mainly also around energy infrastructure and critical substations; repair legacy power plants and deploy decentralised and mobile new capacities; boost imports through transmission grids, and finally promote energy efficiency and demand-side management. Actions in all four areas should be applied simultaneously and as quickly as possible.

Several reports and publications Bilek 2024; (IEA 2024; Kubrushko 2024; Meissner 2024) have provided useful guidance, including discussions of repairs and alternative supply solutions, such as implementing flexible and decentralised power generation, including cogeneration and renewables.

Electricity imports from the EU provide another source of support. Since the emergency synchronisation on February 16, 2022, grid connections with EU member states have provided a combined 1.7 GW of import capacity, equivalent to about 10% of the current demand of Ukraine. Further enhancing grid interconnections between Ukraine and EU member states can play a vital role in the overall efforts. One could ask here, if a country like Hungary or possibly Slovakia, that have openly been siding with Putin, could disagree with broader exports to Ukraine, or see it as detrimental to their own supply. It should be noted here that power exchange in the integrated European market, the densely meshed power network, does not work on a country-to-country basis, but on a broader regional basis, thus through exchanges across many borders, and an established solidarity scheme among interconnected systems. Therefore, it is not Hungary or Slovakia that will export ´their 'power, but the entire European system, based ideally on market signals, or otherwise political decisions by the European policy makers. As Ukraine has started to undertake market reforms so that it is actually at many moments beneficial for countries like Hungary or Slovakia (or Poland or Romania) to export to Ukraine.

Finally, on the list of measures demand side management is the fourth option: this means energy efficiency and the planned supply cuts in the best possible -meaning fair among regions- way.

This paper is based on the Green Deal Ukraïna's own data research (using the Python for Power System Analysis Tool PyPSA) as well as qualitative interviews. Given the sensitivity of the topic, the sources are not disclosed in detail. They include the European Commission, the Ukrainian TSO Ukrenergo, the Polish TSO PSE, and power system experts from EU countries. This paper is based on a longer publication available at the Green Deal Ukraïna website.

Background: The Power Grid of Ukraine

The high-voltage power system of Ukraine has a total length of 19,000 km and includes 103 substations. Before synchronisation, the system featured more than 50 cross-border links (Ukrenergo, 2021). Owing to its Soviet heritage, Ukraine still operates a very high-voltage 750 kV backbone, which is typically related to very large supply (such as large nuclear or coal plants) or very high industrial demand, as well as the need for long-distance transmission. In the EU there is only one of these legacy 750kV lines remaining, linking Ukraine and Hungary. Most of Ukraine's operational domestic and cross-border lines have the more standard voltage levels of 110, 220, and 400 kV, and then the atypical 330kV quite widespread in the former Soviet Union, but not in Western countries.

Until 23 February 2024, Ukraine and Moldova were connected through powerful 4.2 GW links as part of the post-Soviet IPS/UPS[1] energy system. This connection only remains today for some of the occupied territories.[2] Today, the IPS/UPS includes Russia, as well as the Baltic states, Belarus, Georgia, and other former Soviet bloc countries. Since 2002, the western part of Ukraine has had preestablished connections with the continental Europe grid (UCTE) through the so-called Burshtyn energy island and power lines dedicated for exports from two thermal power plants in the Ivano-Frankivsk and Lviv regions. The first one, the eponymous Burstyn thermal power plant, had a capacity of 2.3 GW, was the largest in the region and provided approximately 90% of the power generated in the EU-synchronised region of Ukraine. The second thermal power plant in Dobrotvir provided a large portion of the energy exported to Poland (Zamość) through a 220 kV line. It is important to note that those power plants and lines were not part of the Soviet system, but participated in the Western one.

Ukraine's electric power system was originally designed for much higher consumption and transfer in

1 IPS/UPS stands for Integrated Power System/ Unified Power System. It is a system run in a centralised manner by Moscow, and includes common rules for all countries the grids of which form part of IPS/UPS. As electricity moves at near to speed of light such common rules are essential to keep the lights on.

2 ENTSO-E is the European network of Transmission System Operators, set up through the Third package of the European Commission in 2009, and responsible for the coordination of the EU Transmission System Operators in Electricity.

all directions. This provided some reserves and redundancy that helped the system cope with massive damage from Russian attacks. Nevertheless, new challenges necessitate redesigning the system, including instituting bidirectional trading with EU member states, the decentralisation of generation capacities, and the integration of variable renewables (see Fig. 1 on p. 12).

Why Grids Need Special Attention

Leveraging the available opportunities to establish a better electricity interface between Ukraine and the EU will provide not only tremendous short-term benefits, literally saving people's lives but also critical medium- and long-term benefits.

To support Ukraine's resilience and economic recovery, restoring, upgrading and building new grid infrastructure can create high-quality jobs and stimulate economic growth. It can also attract investments in renewable energy projects by providing a more stable and regionally integrated market.

To explore this area of action, which was previously not discussed outside of technical expert circles, the Green Deal Ukraïna project conducted a study, "Six options to boost power grid transfers from Continental Europe to Ukraine for the next two winters". In that paper, we provided a detailed assessment of the situation and mapped the potential solutions.

The peak winter load in Ukraine is expected to be between 18 and 19 GW, depending on the ambient temperature. According to our estimates, made on the basis of expert consultations and the available data, the power deficit during the winter of 2024/25 could be as high as 5.8 GW, nearly equal to the capacity of the occupied Zaporizhzhia nuclear power plant. Despite all possible efforts being focused on making repairs and building new capacity, this enormous deficit cannot be fully covered in a short period of time.

Recommendations: Six Options for Enhancing the Eu-Ukraine Interface

An increased capability to both export and import energy will be a no-regret option for Ukraine. Our analysis reveals six available grid options at hand that can be implemented relatively swiftly:

- fixing grid bottleneck issues in both Ukraine and neighbouring countries. This can be done rather quickly in Romania and Poland, but it would take more time in Hungary. In Hungary, a huge substation, Szabolcsbaka, needs to be technically updated. In Romania, fixing the loopflows can be addressed faster. Therefore, flows should be shifted among interconnections so that ENTSO-E can increase exports to Ukraine;
- expanding interconnections between Poland and Ukraine by upgrading the Rzesow-Khemlnitskyi 400kV line and repurposing the existing 220kV Zamość-Dobrotvir line;
- speeding up the construction and commissioning of planned transmission projects between Ukraine and EU member states, particularly Slovakia and Romania (Energy Community 2024; Tumanova 2024);
- using advanced technologies, including dynamic line ratings and power electronics, to optimise the functioning of the existing grids (IRENA 2020; Karki 2015);
- using the 110 kV grids that are abundant in Ukraine, including five 110 kV interconnections to Moldova, as an additional way to import electricity or connect new generation capacities outside of Ukraine (Hoffrichter 2017), and
- addressing the bottlenecks in the supplier market for electric equipment and spare parts needed for repairs, upgrades, and the construction of new grids, which are now scarce globally, given the high demand in energy transition contexts. Solutions need to be found with suppliers to support Ukraine faster, considering joint ventures with local companies and, generally, the regional European industry.

The solutions outlined above can be implemented relatively swiftly if there is political will, a constructive approach from key stakeholders, and sound coordination between them.

In the short term, an additional 0.5 GW of import capacity in Ukraine is realistically possible to prepare for the upcoming winter, even if only some of the measures listed above are implemented. For the following winter, in 2025/26, with the same all-hands-on-deck approach, another 1.4 GW could be added to the cross-border EU-Ukraine capacity. Our analysis shows that reaching a total of 3.6 GW of transfer capacity from EU member states to Ukraine is a realistic goal.

It is time for action. Winter is coming to Ukraine, and Europe's help is essential to keeping Ukrainian cities livable and the economy running despite ongoing Russian attacks.

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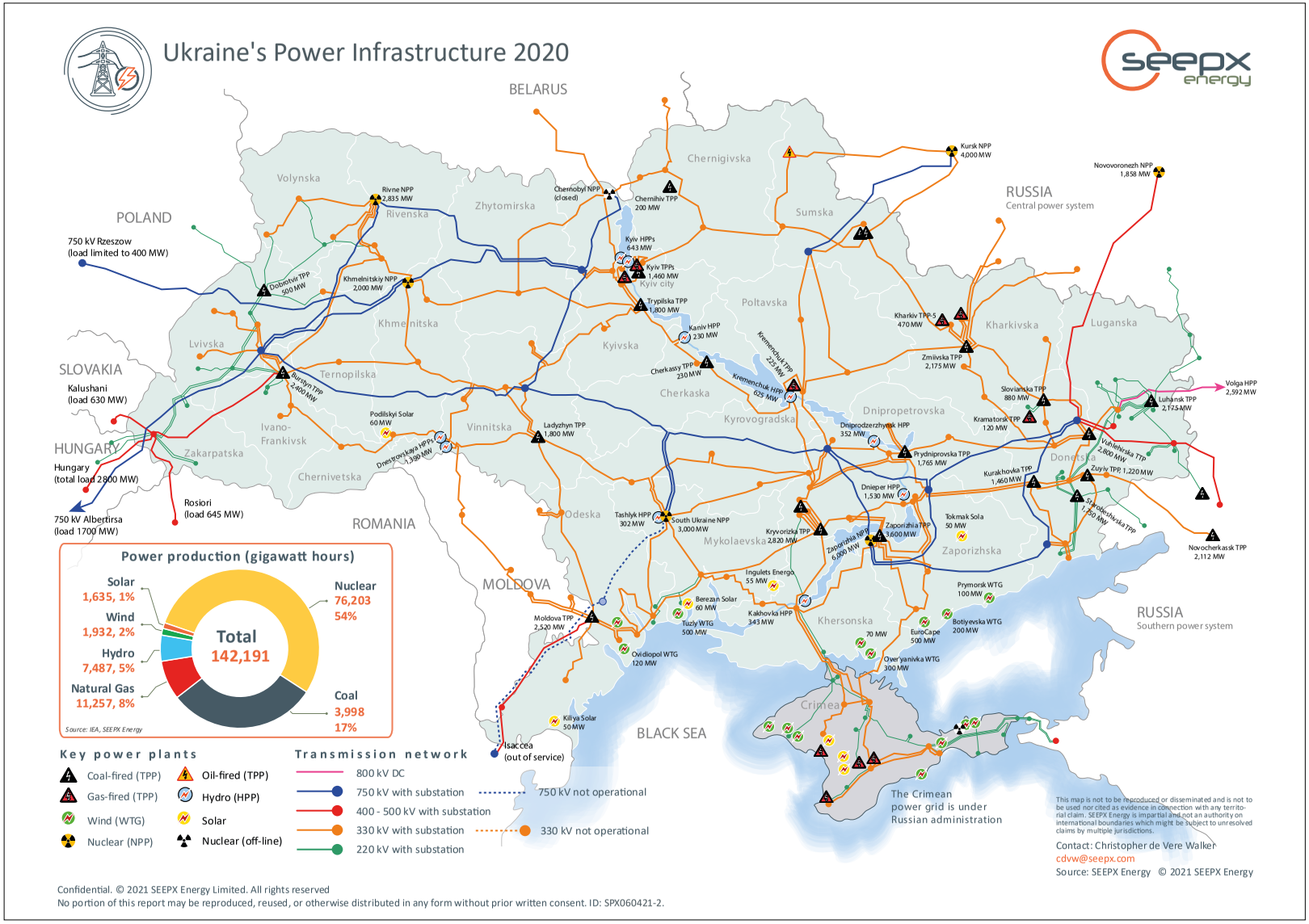
Figure 1: Interconnectors Between Ukraine and Neighbouring Countries Before the War



Source: SEEPX Energy, Ukraine Power Industry Map 2020, https://www.seepx.com/research/#Maps.

ANALYSIS

Rebuilding Resilience: The Role of the Ukrainian Climate Office in Green Transformation

Julia Jesson (Ukrainian Climate Office)

DOI: 10.3929/ethz-b-000696570

Abstract

This article assesses the pivotal role of the Ukrainian Climate Office (UCO) in steering Ukraine's green transformation amidst wartime challenges and EU integration efforts. It argues that the UCO's establishment as an independent governmental institution is essential for integrating climate considerations into national policies, enhancing cross-sector collaboration, and building resilience[1]. Effective climate mainstreaming and support for EU accession are crucial for Ukraine's sustainable[2] future.

Introduction

"*While retaining all our attention, the horrible war that Ukraine is suffering does not stop climate change and its additional disruptions. If we use our action on climate intelligently, we can use it to drive regeneration in Ukraine. We expect that the Ukrainian Climate Office will not only help Ukraine fulfil its international climate obligations, build back fairer and greener, leaving the destruction of the war behind but also to become an example, an international frontrunner in green transition,*"[3] said Virginijus Sinkevičius, EU Commissioner for Environment, Oceans, and Fisheries, at the launch of the Ukrainian Climate Office (UCO) in October 2023. Nearly a year after his speech, this contribution reflects on the progress and future role of the Ukrainian Climate Office (UCO) in steering climate action in the face of war and reconstruction. With Ukraine navigating its EU accession amidst conflict, the UCO must focus on its core responsibilities. This piece will (1) discuss the challenges of implementing climate action during war, (2) explore the UCO's role in advancing Ukraine's EU accession by aligning climate policies with European standards and (3) assess how the UCO can support national climate policy while balancing diverse stakeholder expectations.

In 2020/21, the Ukrainian Ministry of Environment, in collaboration with the German government and the European Union, began discussions on establishing a center of excellence for climate topics in Ukraine. The aim was to contribute to Ukraine's climate neutrality by 2060 and to develop the capacities of various stakeholders, including through the creation of a new institution. From these discussions, the project "Capacities for Climate Action" was developed, commissioned by the German Government via the International Climate Initiative, cofunded by the European Union and implemented by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH. At the UNFCCC Conference of Parties, former Environment Minister Ruslan Strilets formally announced the initiative under the name "Ukrainian Climate Office" (UCO). Although often perceived as an already established entity, the UCO remains currently a project-based initiative funded by these two international donors. Despite the full-scale Russian invasion in February 2022, which significantly escalated challenges and time pressures, the UCO's core objective has not changeds to contribute to the climate neutrality of Ukraine by 2060, potentially aligning with the EU's 2050 target. However, within the context of war, how should UCO prioritise its role to be most effective?

The Complex Context of Reconstruction During War

A country that found itself at large-scale war virtually overnight, with a population that was forced to rapidly migrate to safer regions both domestically and abroad, faces the enormous challenges of recovery amidst an ongoing conflict and widespread infrastructure destruction. The able-bodied male population, often those with the necessary skills and experience in infrastructure construction, are largely engaged in fighting, exempt from fighting, as they are serving the nation in other essential roles, or unwilling to risk making themselves known to authorities (often by crossing checkpoints without military exemption documents)

1 Resilience—an ability of a system, community or society exposed to hazards to resist, absorb, accommodate, adapt to, transform and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions through risk management (UNISDR, 2009).

2 Sustainability—meeting the needs of the present without compromising the ability of future generations to meet their own needs (UN, 1987).

3 Virginijus Sinkevičius, EU Commissioner for Environment, Oceans, and Fisheries at the Inauguration of the Ukrainian Climate Office on 24.10.2023, Capacities for Climate Action Unveils the Inauguration of the Ukrainian Climate Office | EEAS (europa.eu)

to avoid being drafted and sent to the front line. Furthermore, as a designated candidate country for the EU, Ukraine needs to fulfil the obligations that come with this status while under constant attack from missiles and drones. These obligations are primarily related to aligning national laws, policies, and institutions with the EU acquis communautaire—the body of EU legislation and standards—and with the European Green Deal, which outlines specific obligations such as achieving carbon neutrality by 2050, integrating into the Emissions Trading System (ETS), and being subject to the Carbon Border Adjustment Mechanism (CBAM). Chapter 27 of the acquis Environment and Climate) sets ambitious targets for decarbonisation, waste management, air and water quality, and biodiversity protection.

While the flow of donor aid into the country is extremely welcome, it nonetheless presents a significant challenge for Ukrainian institutions to absorb and utilise these resources effectively. A shortage of personnel in ministries due to the war, combined with limited donor coordination, has led to fragmented climate change assistance. Similar projects to the UCO, commissioned by organisations such as the German Federal Ministry of Education and Research, UN institutions, and the British Embassy, also focus on establishing platforms and institutions with overlapping aims. For instance, the Green Transition Office, will be placed under the Ukrainian Ministry of Economy, while the Green Deal Ukraïna project operates more as an independent think tank focusing on energy and climate transition. There is, of course, room for all these initiatives given the scale of the challenges ahead. Coordination between these projects are often managed by the projects themselves.

How can UCO effectively help mainstream climate policies and support Ukraine's EU accession efforts in such a complex environment?

Expectations for the UCO—vary across key stakeholders. The Ministry of Environment and Natural Resources in Ukraine (MEPR) views the UCO as an operational extension, assisting with daily climate policy tasks such as drafting climate legislation and reporting on international commitments. Donors see the UCO as an independent driver for Ukraine's climate neutrality and its alignment to EU Green Deal as future EU member state, as a centre of excellence to provide research and expertise on climate-related tasks, as well as promote climate action across all levels of government, business, academia, and civil society. Civil society organisations are partnering with the UCO to serve as a bridge between civil society and the government, while other stakeholders expect the UCO to contribute to developing educational curricula on climate issues. Balancing these expectations presents a significant challenge, and defining the most suitable legal form for UCO is crucial to enable it to prioritise its role effectively.

UCO Current Status and Operational Challenges

Currently, the UCO operates as a donor-funded project "Capacities for Climate Action" and was started in January 2022. It was held for almost all of 2022, before its activities resumed after the MEPR's restructuring in early 2023. Officially announced by the Minister for the Environment of Ukraine, Ruslan Strilets, at the 27th UNFCCC Conference of Parties in Egypt and launched in October 2023, the Kyiv-based team of seven people finally became fully operational in January 2024, although the leadership and financial management team remains based in Berlin. The UCO objectives which were agreed among the two donors and the Ukrainian government are twofold: (1) to support the development and implementation of policies aimed at transitioning Ukraine to a climate-neutral, resource-efficient country and (2) to strengthen capacities for effective climate policy implementation.

As part of its first objective, the UCO focuses on aligning Ukrainian legislation with the EU climate acquis, developing climate governance architecture, and supporting international participation in forums such as the UNFCCC Conferences of Parties. It has been instrumental in drafting Ukraine's Climate Law, is scheduled for parliamentary approval in January 2025, and will now be engaged in creating the roadmap for aligning with EU climate directives. The UCO has also played a key role in Ukraine's international representation, financially supporting Ukrainian pavilions at COP 27 and COP 28 and offering training and support for climate negotiations.

As part of its second objective, the UCO focuses on the setup of the office as a legal Ukrainian institution and a centre to act as a repository for climate initiatives. It also prioritises the institutional development of stakeholders, including hosting events such as capacity-development workshops on EU funding programs, developing a webinar on the "Do No Significant Harm" principle, and piloting projects to help local industries decarbonise their energy supply. Additionally, the UCO has initiated events, expert discussions, and roundtables on topics such as the Donor Project Coordination Meetings on Climate, the Emissions Trading Scheme, the Carbon Border Adjustment Mechanism, and green criteria for reconstruction. Finally, the UCO conducted a perception study on public opinion regarding climate topics in Ukraine, laying the groundwork for a strategic communication campaign to increase climate awareness among the general population.

Originally, the idea for the UCO's first year was to experiment with various tasks, activities, stakeholders, and actors to find the right role and positioning of the institution. This approach aimed to provide significant support in line with the result indicators agreed upon by all partners under the Capacities for Climate Action project. These indicators were established to guide the initial project phase. However, as the process of formalising the UCO into a permanent Ukrainian institution continues, its long-term objectives, tasks, and indicators will need to be clearly defined to ensure alignment with national climate goals and international commitments.

Due to the Russian full-scale invasion, the significant range of responsibilities resulted in a heavy and unsustainable workload for the UCO team, especially as unscheduled tasks were frequently requested under intense time pressures. Strategic and systemised thinking, which requires time and space for reflection, is often sacrificed for immediate problem-solving. The urgency of Ukraine's situation calls for a clearer focus: how can UCO support climate policy efforts in the country?

Prioritising Climate Mainstreaming and EU Accession

Climate mainstreaming must guide all recovery efforts in Ukraine. This involves integrating climate considerations into policies, plans, and programs across all sectors of government, industry, and society, ensuring that climate risks and opportunities are systematically accounted for in decision-making processes. Even before the war, Ukraine needed a fundamental transformation of its economic model to move away from low energy efficiency, high pollution, and significant greenhouse gas emissions. Currently, with the war underscoring the vulnerability of its centralised energy network, Ukraine urgently needs to shift towards decentralised renewable energy and energy-efficient buildings to increase resilience and promote sustainable development.

Given the diverse expectations from government, donors, civil society, and the private sector, mainstreaming climate action poses a significant challenge for the UCO. As a bridge between these stakeholders, the UCO must balance long-term decarbonisation goals with urgent reconstruction needs. Its ability to set priorities depends on its coordinating role, fostering cooperation among these actors. The war has increased the urgency of addressing climate issues but has also stretched institutional capacity, with ministries facing personnel shortages and language barriers that hinder coordination with international actors. While UCO has some influence as an advisory and expert hub, the project UCO remains financially dependent on external assistance for some time. This dependency can shape its priorities, requiring a delicate balance between national interests and donor expectations.

Institutional capacity, particularly in implementing projects, remains a critical issue. Limited staff in ministries and high personnel turnover due to the war have slowed the absorption of results from initiatives like the UCO. Additionally, language barriers, the focus on ad-hoc tasks, and siloed thinking about responsibilities within the sector ministries have made interministerial cooperation difficult. This hinders the UCO's ability to fully mainstream climate action across sectors.

Therefore, to maximise its impact, the UCO must prioritise climate mainstreaming in all its approaches, as it is essential for building a more resilient Ukraine that can withstand future shocks, whether from climate change or war. The successful integration of climate goals across all sectors demands strong interministerial cooperation, and the Ukrainian Climate Office could serve as the crucial linking element. It should work with all sectoral ministries, businesses, academia, and civil society involved in reconstruction.

Additionally, by supporting Ukraine's EU accession, the UCO can help align national policies with EU standards and facilitate stronger interministerial cooperation to meet European climate and energy requirements (Chapter 27 of the EU Acquis Communautaire). Aligning climate policies and modernising industries sustainably is critical for Ukraine's accession and integration into European markets. "Ukraine should take advantage of the EU accession momentum to make this critical transition to an environmentally sustainable economic model. "[4] Integrating climate action into the "Build Back Better" efforts will not only enhance resilience but also mitigate climate change by reducing greenhouse gas emissions, promoting sustainable development, and attracting investments.

This calls for a legal form in which the UCO should operate as a nonpolitically aligned, independent entity rather than being subordinated to a single ministry. However, what legal form would best enable UCO to fulfil these objectives?

Evaluating Legal Options for the UCO

A feasibility study commissioned by the UCO project in 2023 explored several options for the UCO's future legal form: An advisory body would be a nonlegal entity operating outside the central government, offering flexibility and inclusivity by incorporating diverse perspectives. However, it would lack the authority to enforce or implement policy directly.

4 An Environmental Compact for Ukraine, High-level working Group on the Environmental Consequences of the War, 9 February 2024, p. 15

A State Agency would provide formal authority, enabling the UCO to influence policy directly and align with national strategies. However, as a government entity, it could face bureaucratic constraints that restrict engagement with nongovernmental stakeholders. A structural division/department operates within an existing ministry or agency. While this could facilitate coordination with other entities, it would lack the independence needed to act autonomously. A Governmental Institution would be a state-owned entity with a separate legal status from the central government. It could be subordinated to various state agencies, conduct commercial activities, and perform advisory functions. This structure balances formal authority with operational flexibility, enabling independent action and diverse revenue streams. While it does not have the full executive power of a central government agency, it provides significant operational scope to advancing climate goals. A nongovernmental organisation (NGO) offers maximum independence but may lack formal policy influence and face funding uncertainty.

Establishing the UCO as a governmental yet independent institution appears to be the most beneficial. This structure would empower the UCO to lead Ukraine's climate mainstreaming efforts and support EU accession by balancing authority, flexibility, and stakeholder engagement. It would enable the office to remain independent while aligning with national and European climate priorities, fostering collaboration among government sectors, businesses, and civil society. As a separate government institution, the UCO will hold the status of a legal entity with a standalone budget and the ability to conduct commercial activities. Its initial financing would likely be mixed, combining state budget and external donor funding, with additional income from commercial activities. Given the challenges of securing state budget funding during the war and the difficulty of achieving financial sustainability early on, external donor support remains the most realistic option. UCO staff may be contracted through donors rather than on the payroll, with future funding contingent on reforms and measurable outcomes.

Later on, the UCO could reduce reliance on donor and state funding, transitioning to financial sustainability by offering paid services such as information, analytics, and consulting. The ongoing work, supported by external expertise, to develop a concept for these future tasks should provide valuable insights into these possibilities.

The Role of the UCO in Ukraine's Green Reconstruction

The UCO while still in the process of being formally established as an independent institution through the Capacities for Climate Action project, is already simulating its future role as a multistakeholder platform. It is activelybringing together government, businesses, academia, international finance, and civil society to drive green reconstruction efforts. Although the full development of the UCO as a hub for knowledge exchange, best practices, and innovative solutions will take time, its already implementing activities in this direction ensuring that climate considerations are integrated into all aspects of reconstruction and development.

Merging with other donor-funded initiatives, such as the Green Deal Ukraïna, the Green Transition Office, and the Green Reconstruction Platform, could further enhance the UCO's role by creating a dual-track climate institution with interconnected branches focusing on policy implementation, coordination, research, and innovation. This would strengthen Ukraine's capacity to navigate its complex reconstruction challenges while positioning it as a leader in climate resilience and sustainability.

The UCO's main tasks should focus on climate mainstreaming and supporting EU accession to climate topics. Mainstreaming climate considerations into all sectors of government, industry, and society is essential to ensure that Ukraine builds back not just better but also greener and more resilient. The war has underscored the urgency of this shift, revealing vulnerabilities in energy security and infrastructure that demand a transition to decentralised renewable energy systems and energy-efficient buildings. By concentrating on these priorities, the UCO can help Ukraine mitigate climate change, enhance resilience, and align with European standards.

Conclusion: A Strategic Path Forwards

The ongoing war has made it clear that climate action cannot wait. By prioritising climate mainstreaming and providing EU accession support, the Ukrainian Climate Office can play a critical role in rebuilding Ukraine in a more sustainable, resilient way. However, several challenges remain. The UCO must navigate diverse stakeholder expectations, from national ministries to international donors, while contending with institutional capacity constraints, such as limited staffing. Language barriers and the pressure to address immediate war-related needs further complicate long-term strategic planning.

Despite these challenges, the UCO presents significant opportunities. By continuing to act as a coordinating body, it can drive interministerial cooperation, foster partnerships with external actors, and ensure alignment with EU climate goals. Establishing the UCO as a formal governmental institution would provide the necessary balance of authority, flexibility, and engagement to lead Ukraine's green transformation. This will position the UCO not just as a hub for climate action, but as a key player in steering Ukraine towards a sustainable, climate-resilient future.

"We all see the connections between European integration, green reconstruction and climate ambition. Our sincere hope is that the Ukrainian Climate Office will be instrumental in accelerating Ukraine's European integration by supporting and mobilising the whole Ukrainian economy to develop innovative solutions and raise awareness about climate opportunities."[5]

About the Author
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The views expressed in this article reflect the author's opinion and do not necessarily represent those of the donors or beneficiaries involved.

5 Kurt Vanderberghe, Director General of EU Directorate General for Climate Action, Capacities for Climate Action Unveils the Inauguration of the Ukrainian Climate Office | EEAS (europa.eu)

ANALYSIS

Boosting Ukraine's Decarbonisation and Energy Efficiency Transformation Fund: Developing a Sustainable Instrument for Financing Green Recovery

Mykola Iakovenko (Green Deal Ukraïna)

DOI: 10.3929/ethz-b-000696570

Abstract
This article explores the possibilities of reforming governance and improving the profitability of the Ukrainian Decarbonisation and Energy Efficiency Transformation Fund, which was established in 2023. The establishment of this fund has already marked an important milestone in the introduction of green financial instruments to ensure sustainable postwar recovery in Ukraine. At the same time, the mode of operation of the Fund can be further improved to enable a more efficient allocation of sources and a stable increase in profitability. The activity of similar funds in EU countries can serve as an essential benchmark for further reform activities in Ukraine. Moreover, the process should also acknowledge the specific postwar recovery needs of the country.

Introduction
In May 2023, the Decarbonisation and Energy Efficiency Transformation Fund of Ukraine was established as a special fund within the state budget designed for supporting green investment, energy efficiency measures and decarbonisation activities, with the national carbon tax provided as its primary source of income. As one of the lowest carbon taxes in Europe (0.75 EUR),[1] the Ukrainian carbon tax could only contribute to the Fund's activity. For instance, the planned revenues for the Fund in its first year of activity (2024) are expected to be 759 million UAH (less than 20 million EUR), which is lower than the national recovery needs in Ukraine. The Ministry of Infrastructure and the State Agency for Energy Efficiency manage the Fund under the newly adopted guidelines, which suggest allocating funds on a case-by-case basis under the prescribed criteria for assessing its projects (only a part of the support is supposed to be allocated under the state programmes by the Ministry).[2] The projections by the Government of Ukraine include an increase in the income

1 Tax Fondation (2024) Carbon taxes in Europe [Online]. Available at: https://taxfoundation.org/data/all/eu/carbon-taxes-europe-2024/#:~:text=The%20lowest%20carbon%20tax,as%20of%20April%201%2C%202024 (Accessed: 3 September 2024).

2 Cabinet of Ministers of Ukraine (2024) *The Decree on establishing the Order of utilisation of the funds of the State Fund for Decarbonisation and Energy Efficient Transformation from the 21st of June 2024 No. 761* [Online]. Available at: https://zakon.rada.gov.ua/laws/show/761-2024-%D0%BF#Text (Accessed: 3 September 2024).

of the Fund in upcoming years. For example, in 2025, the incomes are expected to double in line with the plans for increasing taxation, including future extra taxation of fuels and electricity according to the Energy Tax Directive No 2003/96/EU to be implemented in Ukraine.

Nevertheless, the Fund would still need a much greater revenue increase to support Ukraine's green recovery efficiently. Considerable opportunity exists for improvement in the operation and profitability of the Fund if necessary adjustments are made in line with best practices of similar national Funds in the EU. In particular, a combination of utilising future ETS revenues and EU support can serve as essential contributions to transforming the activity of the Fund into a powerful tool for enabling Ukraine's green recovery. The necessary improvements in the transparency and governance of the Fund are another crucial element to ensure the efficiency of the Fund's allocations and provide better opportunities for introducing additional EU support.

Linking the Fund's Revenues to Future ETSs

The revenues of the EU Emission Trading System (ETS) are appropriated for decarbonisation activities and climate action at both the EU and national levels. Thus, ETS revenues are the revenue source for EU modernisation and innovation funds, which are also used to support the activities of Member States, while some ETS revenues are also directly appropriated for the national climate and decarbonisation funds. Recent EU legislation, namely, the newest version of the ETS Directive, requires Member States to allocate 100% of their national ETS revenues for climate action.[3] In comparison, the previous version of the Directive benchmarked only 50% of revenues from stationary installation and 100% from aviation. Thus, the appropriate operation of national decarbonisation and climate action funds are essential for meeting this requirement and for establishing a clear source allocation channel for necessary decarbonisation and climate activities.

Examples from EU Member States demonstrate how ETS revenues have become essential for enabling large-scale climate investment and innovation in national economies. For example, EU ETS revenues used by the German Climate and Transformation Fund (Klima und Transformations Fund—previously Klima und Energie Fund) have more than doubled from 3.5 billion EUR in 2019 to almost 8 billion EUR in 2023, providing approximately 18.5 billion EUR for climate action when combined with the National German ETS.[4] In addition, the Fund receives extra revenues from the EU Innovation Fund and other national and EU instruments, totalling more than 20 billion EUR of investment in 2023 with a stable increasing trend.[5]

Currently, the introduction of ETSs in Ukraine is under development. It remains an essential international obligation of Ukraine under the Association Agreement and a necessary step in the EU accession of the country. Considering the war-related impact on the economy and particularly on large GHG emitters, estimating the potential postwar ETS market in Ukraine is complicated. Moreover, the exact ETS revenues will depend on the established caps for freely allocated allowances, where Ukraine may also apply specific derogations, such as maintaining freely allocated allowances for electricity generation, which is the same as the eligible EU Member States having negative deviation from the average EU GDP per capita level as established under the provisions of the EU ETS Directive. According to the Green Deal Ukraïna (GDU) project, the estimated ETS revenues in Ukraine prior to its full-scale invasion were comparable to that of the Polish ETS, which was 5.6 billion EUR in 2021.[6] Further clarification and recalculation is needed for improved estimates of the current ETS trade capacity in Ukraine. However, the ETS sectors in Ukraine may still significantly contribute to climate investment. A more complex situation persists with potential support from EU funds, which were originally designed to support EU Member States only. Nevertheless, some additional mechanisms may also be discussed for Ukraine, including the return of future CBAM payments or enabling extra payments under the Ukraine Facility.

Further reform of the Ukrainian Decarbonisation and Energy Efficiency Transformation Fund would enable an extra EU contribution to its operation.

Possible Institutional Reform of the Fund

Ukraine's Decarbonisation and Energy Efficiency Transformation Fund is established as the special fund within the state budget, and is managed by the Ministry of

3 Directive (EU) 2023/959 of the European Parliament and of the Council of 10 May 2023 amending Directive 2003/87/EC establishing a system for greenhouse gas emission allowance trading within the Union and Decision (EU) 2015/1814 concerning the establishment and operation of a market stability reserve for the Union greenhouse gas emission trading system (OJ L 130, 16.5.2023).

4 Bundesministerium der Finanzen (2023) *Berichte über die Tätigkeit des Energie- und Klimafonds - Bundesfinanzministerium – Themen* [Online]. Available at: https://www.bundesfinanzministerium.de/Content/DE/Standardartikel/Themen/Oeffentliche_Finanzen/Bundeshaushalt/energie-und-klimafonds-berichte.html (Accessed: 3 September 2024).

5 Ibid.

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Infrastructure together with the State Agency for Energy Efficiency, allocating support to the recipients. Such a mode of operation is possible, considering the experience of similar national funds in the EU. For example, the German Climate and Transformation Fund was also established as a "budget line" of the annual state budget in Germany. However, additional measures for ensuring transparency and good governance of the Ukrainian Decarbonisation and Energy Efficiency Transformation Fund would increase its operation and reliability.

Some other examples of the national climate funds in the EU Member States offer potential solutions. One solution may be to establish the fund as a separate legal entity having a supervisory board and involving international and local experts, an approach that has been adopted in the Polish National Fund for Environmental Protection and Water Management[7] and the Czech State Environmental Fund[8]. Adopting this approach for Ukraine, specifically reforming the State Agency for Energy Efficiency, would benefit climate action activities. In addition, the representative of the relevant EU funds may also be involved in overseeing the State Agency's activity, including allocating sources and providing extra credibility for the institution. Importantly, the allocations of the national climate and decarbonisation funds are also considered state aid in the context of EU legislation, which empowers the Commission to undertake necessary oversight and control activities. Similar provisions are also prescribed in Ukrainian law on state aid. However, this provision has been postponed due to martial law. In this situation, the involvement of EU representatives in overseeing the State Agency for Energy Efficiency's decisions on funding may be essential to ensure at least partial compliance with the control of allocated aid.

Another critical aspect of EU national climate and decarbonisation funds is a clear linkage of the allocation of sources to preestablished programs, which have clear prescribed final goals. The Ukrainian Decarbonisation and Energy Efficiency Transformation Fund currently mostly supports allocation on a case-by-case basis, allowing extra ambiguity to occur (only a part of support is to be allocated through the state target programmes)[9] Thus, it is necessary to establish a nationwide consensus on the priorities in decarbonisation and climate action in Ukraine that may serve as the essential benchmark for future investment and the Fund's activity.

Reforms of the Ukrainian Decarbonisation and Energy Efficiency Transformation Fund intended to increase its transparency and good governance, and link the provided funds to the clear strategic goals of green transformation, would support the necessary conditions for involving extra revenue sources and cooperating with EU financial institutions.

Conclusions

Establishing the Ukrainian Decarbonisation and Energy Efficiency Transformation Fund during the Russian full-scale invasion of Ukraine in 2023 was the start of important reform to enable sustainable postwar recovery of the country, which was also in line with the EU accession requirements.

However, the initial success may not yield the desired outcome unless it is further supported by the systemic reform of the carbon pricing and governance of the Fund in alignment with the best practices in the EU.

The following activities can be outlined to support further progress:

- A successful launch of the Ukrainian ETS trade and designing of a mechanism for transferring revenues to support the Fund's activity.
- The development of additional mechanisms for EU support may also involve the return of CBAM payments to Ukraine.
- The improvement in the transparency and governance of the State Agency for Energy Efficiency by establishing a supervisory board and enabling the involvement of the EU representative.
- The clarification of strategic goals for green recovery in Ukraine and link the Fund programme to these goals.

These steps in transforming the Ukrainian Decarbonisation and Energy Efficiency Transformation Fund can provide important support, making the Fund an important component of Ukraine's future green transition and postwar recovery.

About the Author

Mykola Iakovenko holds a PhD in EU law, specialises in energy, and has worked for more than six years on various projects related to the green transition in Eastern Europe and Ukraine.

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ANALYSIS

The Role of Municipal Energy Plans in Reducing Energy Consumption: Experiences from Participants in the Green Deal Ukraïna Pro Green Deal for Smart Cities Program

Yulia Loshakova (Kyiv School of Energy Policy) and Alisa Schubert (Green Deal Ukraïna)

DOI: 10.3929/ethz-b-000696570

Abstract

Despite the ongoing Russian aggression, local communities in Ukraine must prioritise the energy and climate agenda, which is essential for Ukraine's immediate reconstruction, long-term resilience against climate change, and energy security. To effectively transition to clean energy, local communities in Ukraine have been requested by the Ministry of Infrastructure to develop municipal energy plans (MEPs). MEPs are meant to address the effective management of energy resources. They provide a systematic approach to increasing energy efficiency, reducing greenhouse gas emissions, and increasing the share of renewable energy sources (RESs) in the total energy consumed by communities. In the context of the war in Ukraine, MEPs become even more relevant. Military actions have led to significant changes in the structure of energy consumption and the forced modernisation of the energy infrastructure. This has allowed local communities to reconsider their approaches to energy planning, given the new challenges and opportunities in the context of reconstruction and recovery. Interestingly, decentralisation in Ukraine is primarily driven by energy security concerns and only secondarily by the sustainability paradigm.

Introduction

This paper explores the main factors influencing the development and implementation of municipal energy plans (MEPs) in Ukraine's local communities by reviewing the data collected from the 25 communities that participated in the Pro Green Deal for Smart Cities program and with surveys. Both internal and external factors, including stakeholder participation, financing, technical resources, and the political will of local authorities, were considered. While the primary goal of MEPs is to implement the use of renewable energy sources (RESs), MEPs offer additional benefits. They help build community resilience against climate change by increasing energy independence, enhancing energy efficiency, and reinforcing social and economic stability.

This work was made possible by the Green Deal Ukraïna project, under the umbrella of Helmholtz-Zentrum Berlin, and was implemented in collaboration with the Kyiv School of Energy Policy and the Florence School of Regulation. The project was designed to support Ukrainian communities in implementing innovative energy solutions and promoting their integration into the European energy space (Verkhovna Rada of Ukraine 1994, 2003; Cabinet of Ministers of Ukraine 2015).

The Green Deal Ukraïna project, in close partnership with the Kyiv School of Energy Policy and the Florence School of Regulation, launched its inaugural Pro Green Deal for Smart Cities program in July 2024 to support the next generation of Ukrainian energy and climate decision-makers at the local level. The program was designed to train the next generation of local energy advisors in Ukraine, with the main objective of providing participants with practical skills and experiences that they can apply directly to their local communities. The program includes the application of theoretical knowledge in real-world settings, mentoring from experienced energy experts, the development of concrete deliverables in the form of municipal energy plans (MEPs), and the development of professional networks, all of which contribute to strengthening energy sustainability and industry collaboration at the local level. The data and analysis described in this paper come directly from the information gathered from the participants in this program.

The Green Deal Ukraïna Capacity Building Program Methodology for Implementable Teaching

The urgency of the need to empower Ukrainian municipalities has increased since the European Council's decision to initiate accession negotiations. While EU accession negotiations will take time, prioritising the energy and climate agenda is essential for Ukraine's immediate reconstruction. Two crucial aspects of this reconstruction are the empowerment of local decision-makers to lead the transition to clean energy and the practical implementation of reforms. To achieve these aims, it is necessary to build the capacity of local energy experts and equip them with the knowledge, skills, and resources to drive change at the community level.

The Green Deal Ukraïna project, in close partnership with the Kyiv School of Energy Policy and the Flor-

ence School of Regulation, launched its inaugural Pro Green Deal for Smart Cities program in July 2024 to boost the next generation of Ukrainian energy and climate decision-makers at the local level.

The Pro Green Deal for Smart Cities was designed to have local communities work on concrete, directly actionable projects. As the municipal energy plans (MEPs) will need to be submitted by local Ukrainian communities by November 2025, this program was created to be one of the first capacity-building programs to directly support participants in drafting their MEPs. Comprehensive training was provided to 25 regional advisors on energy, climate, and the environment. The program included integrated modules aimed at developing professional skills in the areas of energy efficiency, renewable energy, digitalisation, and strategic planning.

As a result of the program, participants developed templates for 24 MEPs, each containing specific measures to improve energy efficiency, implement renewable energy sources, and reduce greenhouse gas emissions in their communities. The plans also included mechanisms for monitoring and evaluation, as well as for the active involvement of local stakeholders in the implementation process. These outcomes will contribute to the sustainable development of communities and align with the overall goals of the European Green Deal.

Impact of Municipal Energy Plans (MEPs) and Justification of Methodology

According to the order of the Ministry of Infrastructure „On Approval of the Methodology for Developing Local Energy Plans," the first municipal and regional energy plans for the period until 2030 must be developed by the end of 2025. MEPs are meant to integrate energy goals into the overall development strategies for communities, considering everything from resource allocation to infrastructure investments. This, in turn, will contribute to energy goals being prioritised in political discourse, thereby increasing awareness among local stakeholders and residents of the importance of energy efficiency and the use of renewable energy sources (RESs).

Furthermore, the development and implementation of MEPs encourage active participation from the public and stakeholders in the decision-making process. This is achieved through conducting surveys, developing public engagement strategies, and building the capacity of local communities. The involvement of stakeholders, including business representatives, nongovernmental organisations, and residents, increases the accountability of local authorities, encouraging citizens to engage in the implementation of energy initiatives while fostering environmental awareness.

Data on the reduction in energy consumption in the selected communities are presented in Table 1 on p. 24. The table shows the effectiveness of MEP implementation with regard to reducing dependence on fossil fuels by providing a comparison of the amount of energy consumed in megawatt hours (MWh) before and after plan implementation and the percentage of consumption reduction.

As seen in the table, cities that have implemented MEPs have seen reductions of up to 28% in the number of megawatt-hours (MWh) consumed. This finding illustrates the importance of strategic planning and energy investment to achieving energy consumption reductions reductions in various Ukrainian cities. Furthermore, to achieve such reductions, close cooperation among different stakeholders, such as local authorities, energy companies, civil society organisations and investors, is vital to preparing a comprehensive approach to addressing local energy challenges.

The key stakeholders and their roles in the MEP development process are outlined in Table 2 on p. 24, emphasising the importance of collaboration for the success of energy initiatives.

A significant advantage of MEPs is the ability to attract additional financial resources, such as international grants and investments, which allows the implementation of large-scale projects to modernise the energy infrastructure. For example, the Boryslav community secured funding from the European Union to install solar panels on public buildings, reducing energy costs and their dependence on nonrenewable sources. Similarly, the Dolyna community received a grant from the Nordic Environment Finance Corporation (NEFCO) to modernise its district heating system, leading to a 30% reduction in energy consumption. These initiatives not only promote the economic development of communities and improve residents' quality of life but also support communities' efforts to reduce their dependence on fossil fuels and increase the share of RESs.

The methodology for selecting communities for the Pro Green Deal for Smart Cities program was based on the potential impact of their MEPs and their relevance to a comprehensive understanding of current energy policy. The selection of communities was based on several criteria: active engagement with implementing energy-efficient solutions, the willingness to cooperate with various stakeholders, and the presence of the infrastructure needed to implement energy initiatives. This approach ensured a focus on the most promising communities with the potential for successful MEP implementation and the ability to serve as examples for others.

The choice of data collection methods was also carefully considered to ensure complete information. The use of surveys and questionnaires targeted specific groups, including nearly 100 local government officials, energy sector professionals, and represent-

atives from nongovernmental organisations across 24 communities. This approach enabled the collection of high-quality primary data from a wide sample, enabling the identification of key trends in energy policy and any relevant barriers. For example, one key trend that was identified was a growing interest in integrating renewable energy sources into MEPs, whereas a significant barrier was the lack of access to financing for small-scale energy projects. The collection of statistical data from official sources provided an objective basis for analysis, and expert interviews offered a deeper understanding of specific aspects of MEP implementation, such as the challenges of coordinating between different levels of government. Additionally, the analysis of documents and policies allowed an assessment of the legal context and identification of opportunities to support the improvement of the regulatory framework.

This comprehensive approach to data collection and community selection provided a thorough understanding of the role of MEPs in the development of local communities and allowed the formulation of recommendations for MEP optimisation.

Discussion

Municipal energy plans (MEPs) play a crucial role in ensuring the sustainable development of local communities. Although, on paper, the goal of MEPs is the implementation of renewable energy sources (RES), these plans have positive ripple effects. They enhance the overall resilience of communities in the context of climate change by increasing energy independence, improving energy efficiency, and strengthening social and economic resilience.

One of the key aspects of MEPs is the integration of energy goals into community development strategies to not only optimise resource consumption but also strengthen energy independence. By implementing RESs, such as solar and wind power plants, communities can significantly reduce their reliance on fossil fuels and external energy supplies. For example, in communities where solar panels and wind turbines have been successfully implemented, there has been a noticeable reduction in energy consumption, making these communities less vulnerable to price fluctuations in the global energy market.

Energy efficiency is another critical element that contributes to the resilience of communities. Through building modernisation programs, such as insulation and the installation of energy-efficient windows and doors, communities can reduce their energy costs and improve living conditions. For example, in the Zhytomyr community, a large-scale building retrofit project funded by the European Investment Bank (EIB) led to a 40% reduction in heating costs for residents. As seen in the Zhytomyr community, these measures not only decrease greenhouse gas emissions but also increase communities' ability to withstand extreme weather conditions, such as heat waves or severe cold spells.

In addition to technical measures, MEPs foster social resilience by involving communities in the planning and implementation of energy initiatives. For example, in the Vinnytsia community, the „Energy-Efficient Homes" program included a series of workshops and public meetings that engaged more than 500 residents in discussions about energy-saving practices and the benefits of renewable energy. This initiative increased the transparency and accountability of local authorities and fostered environmental awareness and support from residents. Such educational programs and information campaigns conducted within the framework of MEPs can motivate citizens to actively participate in implementing energy strategies, stimulating environmentally responsible behaviours.

MEPs also play an important role in strengthening the economic resilience of communities. Both domestic and foreign investments in RESs and energy-efficient technologies can contribute to job creation and local economic development. For example, in the Ivano–Frankivsk region, the community reduced energy consumption by 30% through RES integration and energy infrastructure modernisation. This not only increased energy independence but also strengthened the community's economic and social resilience. A similar approach was implemented in the Lviv region, where a cooperative initiative to build a wind power plant provided the community with energy and created new jobs. Such initiatives can serve as catalysts for entrepreneurship development and the creation of new business opportunities in the region.

Successful cases of MEP implementation in the communities that participated in the Pro Green Deal for Smart Cities program demonstrate the effectiveness of MEPs and the potential for scaling up. Overall, this program has shown that MEPs are effective tools that contribute to enhancing community resilience by increasing energy independence, reducing vulnerability to climate change, fostering social cohesion, and supporting economic growth.

Conclusion

The participating communities in the Pro Green Deal for Smart Cities program have shown that implementing Municipal Energy Plans (MEPs) in Ukraine's local communities is a crucial step towards sustainable development and greater resilience in the context of energy challenges. MEPs have the potential to significantly improve energy efficiency, promote the development

of renewable energy sources (RES), and enhance the overall resilience of communities.

Key Findings:

1. *Increased energy independence*: The use of RESs reduces communities' reliance on external energy suppliers, increasing their energy security and reducing their vulnerability to price fluctuations in global markets.
- *Reduced vulnerability to climate change*: MEPs contribute to reducing greenhouse gas emissions and improving energy efficiency, making communities less vulnerable to extreme weather conditions.
- *Social and economic resilience*: Community involvement in energy planning processes increases social cohesion and supports economic growth through job creation and the development of entrepreneurship.
- *Successful cases and recommendations*: Successful examples of MEP implementation in various regions of Ukraine demonstrate the effectiveness and scalability potential of MEPs. It is recommended that strategies be adapted according to each community's unique needs and resources.

Recommendations

To further develop and optimise MEPs in local communities, the following is proposed:

- Strengthen support and cooperation with international partners to attract funding and exchange experience in energy efficiency and RESs.
- Expand educational programs into other regions to increase citizens' awareness of the importance of energy resilience and encourage environmentally responsible behaviours.
- Ensure the adaptation of policies and regulatory frameworks to facilitate the implementation of innovative energy solutions and stimulate investments in RESs.

Overall, MEPs are effective tools that contribute to achieving sustainable development and enhancing community resilience to various modern challenges.

About the Authors

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The Kyiv School of Energy Policy (KSEP) is an independent centre of expertise in the energy sector, established by the DiXi Group think tank. The school specialises in executing education focused on modern energy markets, policy, and regulation. In addition, the KSEP actively engages in the development and training of human capital for the energy sector, including business companies, state institutions, NGOs, and other stakeholders. The school has also conducted comprehensive research to support the effective development of human capital in the energy sector.

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Appendix

Table 1: Energy Consumption Statistics

Community	Energy Consumption Before MEP (MWh)	Energy Consumption After MEP (MWh)	Reduction (%)
Kyiv	2,500,000	1,800,000	28%
Lviv	1,200,000	900,000	25%
Kharkiv	2,000,000	1,500,000	25%
Dnipro	1,800,000	1,350,000	25%
Odessa	1,600,000	1,200,000	25%

Sources: International Energy Agency; Enerdata; ENEF Cities

Table 2: Key Stakeholders and Their Roles and Connections in the MEP Process

Stakeholder	Role in the MEP Process	Impact	Connections
Local Government	Planning and implementation of MEP	High	Collaborates with energy companies for technical resources, engages NGOs for community outreach, and seeks investment from investors.
Energy Companies	Technical support and resource provisioning	Medium	Provides technical expertise to local government, collaborates with NGOs to provide community education about energy technologies.
Non-Governmental Organisations (NGOs)	Community information and engagement	High	Works with the local government for project promotion and educates the community in partnership with energy companies.
Investors	Project funding	Medium-High	Engages with local government to assess project feasibility and funding opportunities and potentially collaborates with energy companies to obtain technical insights.

Source: Authors 2024

DOCUMENTATION

How Ukrainian Schools and Hospitals Are Managing the Energy Crisis in Ukraine

Yuliana Onishchuk (Energy Act for Ukraine Foundation)

DOI: 10.3929/ethz-b-000696570

Abstract

In the face of an unprecedented energy crisis caused by the ongoing russian war in Ukraine, Ukrainian schools and hospitals are finding innovative solutions to maintain their operations. One of the first initiatives during the war came from the Energy Act for Ukraine Foundation: installing hybrid solar power stations across Ukraine in regions most affected by the war. This initiative ensures uninterrupted access to energy for critical facilities and lays the groundwork for a sustainable future in Ukraine.

Introduction

Nine educational and medical institutions in communities affected by russian aggression have received hybrid solar power stations within the "100 Solar Schools" and "50 Solar Hospitals" campaigns by the Energy Act for Ukraine Foundation. This free aid aims to provide educational and healthcare institutions with their own energy supply, ensuring uninterrupted power

in cases of blackouts or emergencies. By the end of 2024, the Energy Act for Ukraine Foundation plans to build solar stations at more than ten additional critical and social infrastructure facilities in the Mykolaiv, Kharkiv, Khmelnytskyi, Kirovohrad, Rivne and other regions.

This is an opportunity to maintain the operation of socially significant facilities during the energy crisis in Ukraine, to continue working even during blackouts, and, of course, to survive the winter of 2024. However, the mission to provide the solar stations goes beyond these aims. The war will end, and solar stations represent a new way to rebuild Ukraine sustainably, preparing it for the modern landscape.

Mykolaiv Regional Children's Clinical Hospital

The Ukrainian charitable organisation "Energy Act for Ukraine Foundation" equipped Mykolaiv Regional Children's Clinical Hospital with hybrid solar stations with energy storage systems.

In the Mykolaiv region, 21 out of the 52 territorial communities were in the war zone, and 108 settlements were occupied as a result of the ongoing military deployment of russian troops in the region, which began on February 24, 2022.

The Mykolaiv Regional Children's Clinical Hospital is a leading institution for the treatment of children in the region and is the main medical institution in the Kherson region. In total, the hospital has 15 specialised departments with modern equipment, requiring a constant power supply. In addition, the hospital premises were damaged as a result of the hostilities, including by rocket attacks near the hospital buildings. In this context, there was a need to fortify the hospital with a reliable, autonomous source of electricity to ensure a seamless environment for patient treatment.

The solar plant consists of 128 photovoltaic modules with a capacity of 58.24 kW and an energy storage system with a capacity of 98.24 kWh. The station provides the power needed by critical departments in the main building: the operating block, the surgical department, the intensive care unit, the department for newborns and premature babies, and the maternity hospital.

As of today, this solar power station can provide enough energy to cover up to 10 hours of the hospital's electricity consumption during outages. This was also noted by the Chief Doctor, Oleksandr Plitkin:

> "Recently, power outages have become more frequent. While this previously caused significant inconveniences for the hospital's operations, these disruptions have become unnoticeable thanks to the solar power station. There have been several instances where outages occurred during surgeries, but neither the doctors nor the patients felt them because the station switched on instantly and flawlessly. Thanks to this equipment, we can provide high-quality and uninterrupted care to our patients."

Effectiveness in Numbers

The performance outcomes of the solar power station are also important. For example, the station has helped save over 2,500 euros during its operation. The hospital can allocate these funds to address other needs. By the beginning of June 2024, the reduction in CO_2 emissions had reached 13.05 tons. The hospital's expected savings on electricity costs will amount to approximately 5672 euros annually, and the reduction in CO_2 emissions will reach 1625 tons over the course of the 25 years the system is expected to operate.

Solar Initiatives: "100 Solar Schools" and "50 Solar Hospitals"

The Energy Act for Ukraine Foundation has already completed nine projects, including five schools and four hospitals. The completed projects are in deoccupied territories, which are areas close to the front line. These locations need the greatest support, particularly in terms of the electricity supply. Therefore, the Foundation is making every effort to direct its resources there.

4 Hospitals:

- Mykolaiv Regional Children's Clinical Hospital (also the main medical facility for the Kherson region in southern Ukraine)
- Chernihiv Regional Children's Hospital (northern Ukraine)
- Ivankiv Central District Hospital (Kyiv region)
- Chernihiv Regional Hospital (northern Ukraine)

5 Schools:

- Irpin Academic Lyceum "Mriya" (Kyiv region)
- Chernihiv School No. 3 (northern Ukraine)
- Chernihiv Secondary School I-III Grades No. 19 (northern Ukraine)
- Bucha Lyceum No. 3 (Kyiv region)
- Irpin Lyceum No. 1 (Kyiv region)

The Energy Act for Ukraine Foundation was established in April 2022 to support the recovery of schools and hospitals affected by russian aggression using a sustainable approach, which involved the installation of solar power stations and storage systems. Russian attacks on the energy system in October 2022 confirmed the need for the mass installation of equipment that not only generates but also accumulates electricity, as such a system guarantees the provision of several hours of autonomous power to critical facilities in case of a blackout. By November 2022, the Foundation had

launched its first solar-powered school—the Mriya Lyceum in Irpin.

The Energy Act for Ukraine Foundation helps children receive a comfortable education even during power outages. It provides hospitals with solar solutions so that people can receive medical care during power cuts. Among our core values are access to education and health care, energy independence, climate action, and the expansion of opportunities for education in green energy.

Currently, the Energy Act for Ukraine Foundation is building solar power stations for various social and critical infrastructure facilities, including schools, hospitals, water utilities, administrative buildings, and more. These facilities are chosen because their uninterrupted operation is vital to society.

The Energy Act for Ukraine Foundation has been at the forefront of the solar initiative, installing hybrid solar power stations at critical infrastructure sites to ensure an uninterrupted power supply. It is important to highlight the advantages of the solar power stations that have already been installed.

Economic Benefits

The installation of 9 solar power stations by the Foundation has resulted in 11,935 Euros in savings on electricity. It is important to note that 5 of these solar facilities were launched in 2024, so the economic impact is expected to be significantly greater in the near future. For example, hospitals equipped with hybrid solar power stations can save an average of 160,000 UAH (about 3,500 Euros at the current exchange rate) on electricity annually, which is equivalent to the cost of performing 32 cardiographs. Such savings allow hospitals to allocate more resources to patient care and other essential services.

Schools can save an average of 100,000 UAH (slightly more than 2,000 Euros at the current exchange rate) per year each, which is equivalent to the cost of, for example, 5 interactive boards. The financial relief provided by hybrid solar power stations ensures that hospitals and schools can more effectively maintain their activities. Reducing dependence on traditional energy sources also means that institutions can better manage their budgets and reinvest savings in further infrastructure and service improvements.

Environmental Benefits

By reducing reliance on fossil fuels, the facilities put into operation by the Foundation have already reduced CO_2 emissions by 65.61 tons, which is equivalent to 270,000 km driven by an average passenger car with a gasoline engine. Over the course of 25 years, these nine facilities alone will save 3,316 tons of CO_2 emissions. Schools and hospitals that run on solar energy become more environmentally friendly and set a precedent for other institutions. Transitioning to renewable energy sources helps conserve natural resources and fosters a culture of environmental responsibility in communities.

Social Benefits

Installing hybrid solar power stations also provides educational benefits and promotes the development of community expertise in renewable energy. Communities engage in grant programs and training, helping them understand how to apply for such projects and what it means to build a solar power station on social infrastructure sites. Moreover, at all facilities, technical personnel receive training in installing and maintaining solar power stations. This training helps develop expertise in renewable energy within the community, thereby creating a qualified workforce that is knowledgeable in "green" technologies.

Additionally, in all schools where the Energy Act for Ukraine Foundation installs solar power stations, it conducts an educational course for children titled "Sustainable Development and Green Energy" to promote a culture of conscious consumption of natural resources in Ukraine and advance the green transition. To date, 500 children in five schools have completed the training, and there is a plan to expand this initiative to at least seven communities by the end of the year. These programs are provided with the aim of raising awareness and improving the understanding of renewable energy among the younger generation, inspiring future leaders to advocate for and implement sustainable practices.

Thus, the Foundation's hybrid solar power stations provide numerous benefits that go beyond mere financial savings. They provide social and critical infrastructure facilities with a reliable and uninterrupted power supply, contribute to Ukraine's green transition and efforts to improve the environment, and offer valuable educational opportunities to both children and communities.

In the context of the acute energy crisis caused by the war, the approach to developing generating capacities in the country must be local. Thermal Power Plants and Combined Heat and Power Plants, as well as nuclear power plants, are large facilities on which entire cities depend and are easy targets for russian attacks. As long as the war continues, the development of decentralised generating capacities, such as solar power stations or hybrid solar stations, is a partial solution to the problem of supplying electricity to the population. This approach is, first and foremost, a local solution that makes the electricity supply to households independent of external conditions. It is about increasing security and guaranteeing a power supply during the war; moreover, significant advantages of such systems are their sustainability and long-term viability, unlike traditional generators.

As Ukraine continues to develop renewable energy, the work of organisations such as the Energy Act for Ukraine Foundation is a testament to the positive changes that sustainable development can bring to communities. Combining economic efficiency, environmental care, and expanded educational opportunities, the program to implement these hybrid solar power stations paves the way for a greener, more sustainable, and, most importantly, energy-independent future for our country.

Education

It is important to note that the Energy Act for Ukraine Foundation installs solar power stations to support vital infrastructure and engages in educating the population.

When we talk about the future, we primarily talk about children. The Foundation has a course on sustainable development that we conduct with children in schools where they install solar power stations.

Additionally, the Foundation is now preparing community training events. These trainings are dedicated to the discussion of the future prospects and benefits of installing solar power stations, how to install them, why they are crucial, and how to maintain them.

Furthermore, the Energy Act for Ukraine Foundation will soon launch a project to support the involvement of women in solar energy. This educational project has multiple goals: attracting talent to the solar energy sector, increasing the proportion of women in this field, raising awareness of the industry, providing women with promising professions, and developing renewable energy in Ukraine.

As Ukraine navigates its path toward recovery, the efforts of organisations such as the Energy Act for Ukraine Foundation highlight the importance of sustainable development. By providing schools and hospitals with reliable, clean energy, the Foundation is not only mitigating the immediate effects of the energy crisis but also promoting a greener, more resilient future. The Foundation's work serves as a model for other communities, showcasing the potential of renewable energy to transform infrastructure, safeguard access to essential services, and inspire future generations.

About the Author
Yuliana Onishchuk is the founder and CEO of the Energy Act for Ukraine Foundation.

ABOUT THE UKRAINIAN ANALYTICAL DIGEST

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The Ukrainian Analytical Digest (UAD) is a bimonthly internet publication jointly produced by the Research Centre for East European Studies at the University of Bremen (www.forschungsstelle.uni-bremen.de), the Center for Security Studies (CSS) at ETH Zurich (www.css.ethz.ch), the Center for Eastern European Studies (CEES) at the University of Zurich (www.cees.uzh.ch), and the German Association for East European Studies (DGO). The Ukrainian Analytical Digest analyzes the political, economic, and social situation in Ukraine within the context of international and security dimensions of this country's development. All contributions to the Ukrainian Analytical Digest undergo a fast-track peer review.

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Responsible editor for this issue: Heiko Pleines
Layout: Marta Warmińska, Cengiz Kibaroglu, Matthias Neumann, and Michael Clemens
ISSN 2941-7139 © 2024 by Forschungsstelle Osteuropa, Bremen and Center for Security Studies, Zürich
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