
Preliminary Financial Study

EUETH

EUROPE-UKRAINE
Energy Transition Hub

Roadmap for a climate-neutral,
sustainable Ukrainian energy sector
and its role in an integrated EU
energy market



Roadmap for a climate-neutral, sustainable Ukrainian energy sector and its role in an integrated EU energy market

The post-war rebuilding of Ukraine's energy sector is a critical task requiring substantial finance and meticulous planning. To secure the necessary funds, a comprehensive financial plan is essential to assess available mechanisms and determine optimal implementation options. This study aims to identify effective financial mechanisms, evaluate funding sources, assess risks and benefits, and address unique challenges faced by Ukraine. Barriers to financing are identified, and strategies developed to overcome them with the support of international organizations and stakeholders. These findings provide inputs to a comprehensive financial plan that adheres to legal requirements and international practices.

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Introduction

A significant financial effort will be required to rebuild Ukraine from the damage caused by Russia's aggression. The reconstruction of Ukraine, particularly in terms of energy infrastructure, should take place in alignment with the latest European policies and standards. The recovery of Ukraine's economy and society should respect the principles of sustainability, inclusiveness, and market-based mechanisms, and be based on a green and digital transition as a major pillar. Given the extent of the war damage so far, the financial cost of the reconstruction is expected to be substantial, and the rebuilding efforts could last more than a decade.

This publication is one of the three main outputs of the Ukraine Energy Roadmap project, which comprises three preliminary studies – technical, financial, and legal. The Roadmap is funded by Breakthrough Energy and implemented by the Institute for Climate Protection, Energy and Mobility (IKEM) and its project partners. It aims to catalogue Ukraine's current energy system and map out a sustainable and climate-neutral future for the country after Russia's invasion ends.

The introduction of new financial mechanisms and schemes in Ukraine's energy sector can significantly improve energy efficiency, reduce energy costs and reduce emissions. The country has major untapped potential for financial support. It needs ongoing initiatives and discussions around the best ways to ensure efficient, transparent, and responsible utilization of resources, and platforms that unify and streamline multiple instruments such as the Ukraine Energy Support Fund, various government funds, or the Presidential Office initiative of Ukraine Recovery Fund.

The study analyzes the financial risks and benefits of each mechanism and carries out a review of existing financial mechanisms that have been used successfully in Ukraine and other countries in the past. It aims to identify any barriers to financing and to develop strategies to overcome them. It also takes into account the unique circumstances and challenges faced by Ukraine in the aftermath of the war.

The methodology of this preliminary financial study involves a multi-disciplinary approach that integrates insights and methods from a range of fields, including economics, comparative law, and political science, as well as expert interviews. This approach will help to ensure that the study is comprehensive, rigorous, and relevant to the needs of stakeholders in Ukraine's post-war energy sector.

The study is divided into three parts: a description of the current donor landscape, an overview of the available financial mechanisms, and an evaluation of those mechanisms for suitability in the Ukrainian context.

1. Inventory of current donor initiatives and future prospects

This section of the preliminary financial study describes the current landscape of financial support to Ukraine. It inventories aid received before and after the full-scale invasion in early 2022, and proposes principles for future endeavours.

1.1. Aid to Ukraine before the 2022 Invasion

Ukraine has been a regular recipient of bilateral and multilateral support since its independence in 1991.¹ This was boosted by Russia's aggression, which began with the occupation of Crimea and invasion of the Donbas region in 2014. EU institutions provided most of the aid received by the country in the years 2014-2021 in the form of grants and loans. The aid comprised several financial aid packages amounting to a total of €17 billion and consisted of macro-financial assistance loans and programs, loans from the European Bank for Reconstruction and Development (EBRD) and the European Investment Bank (EIB), and grants, as well as other financial support mechanisms, from the EU's Neighborhood Investment Facility.²

The EBRD's strategy for Ukraine immediately before the war focused on fostering economic growth and investment through policy engagement in key areas such as privatization, energy security and efficiency, the financial sector, trade, and infrastructure. One of the five pillars of the operational and strategic priorities of the EBRD in Ukraine was strengthening energy security through effective regulation, market liberalization, diversified

and increased production, and energy efficiency. The EBRD also focused on promoting renewable energy and increasing resource efficiency.³

Since 1994, Ukraine has also been involved in eight joint programs with the IMF, including the Systemic Transformation Facility (STF), Stabilization Loan (Stand-By), Development Support Loan (EFF arrangement), and Precautionary Stand-By. The IMF granted Ukraine a USD16.4 billion loan in October 2008, and a \$15.15 billion loan in July 2010 (conditional on a 50% increase in household natural gas utility prices in July 2010). In February 2014, the IMF mandated Ukraine to reform its natural gas price subsidies in exchange for a \$15 billion aid package (leading to another 50% increase in natural gas prices for domestic consumers). In March 2015, the IMF approved a four-year, \$17.5 billion Extended Fund Facility (EFF) for Ukraine, with tranches disbursed in subsequent years. In June 2020, the IMF's executive board approved an 18-month, \$5 billion standby arrangement for Ukraine, with an immediate disbursement of about \$2 billion and the remaining amount planned to be released in phases over four reviews.⁴

1 'Ukraine Foreign Direct Investment - Net Inflows - 2023 Data - 2024 Forecast'.

2 Trebesch et al., 'The Ukraine Support Tracker'.

3 EBRD, 'Ukraine: Overview'.

4 Ministry of Foreign Affairs of Ukraine, 2019.

1.2. Aid from January 2022 to July 2023

The nature of financial aid to Ukraine changed dramatically after Russia's full-scale invasion in 2022. To coordinate it as much as possible, the EU and the G7 launched the Multi-Agency Donor Coordination Platform to support Ukraine's repair, recovery, and reconstruction process on 26 January 2023. Its goal is to ensure that support is

provided coherently, transparently, and account-able.⁵ The platform is co-chaired by the Minister of Finances of Ukraine, Deputy National Security Advisor for International Economics for the United States, and Director-General for Neighborhood and Enlargement for the EU Commission.⁶

1.2.1. The European Union

In addition to the resources allocated to assist its member states in accommodating Ukrainian war refugees, the EU has already provided a total of €67 billion to Ukraine between the start of Russia's aggression and August 2023.⁷ In 2022, the EU provided or guaranteed support amounting to €11.6 billion, including €7.2 billion in macro-financial assistance, €1.8 billion in loans, and €1.4 billion in grants. Furthermore, the EU is implementing a support package worth up to €18 billion for the year 2023. This assistance takes the form of highly advantageous loans, which have allowed Ukraine to continue paying wages and pensions, sustain essential public services such as hospitals, schools, and housing for relocated individuals, maintain macroeconomic stability, and facilitate the reconstruction of critical infrastructure.⁸

Between February and May 2023, the total value of recorded commitments to Ukraine from the EU increased by a significant €13 billion, reaching a total of some €165 billion. Out of this amount, nearly €9 billion was allocated for military aid, most of

it from Germany. The EU also stepped up its support through the European Peace Facility, adding two additional tranches worth €1 billion each and bringing the total to €5.6 billion.

A proposal by the European Commission on 20 June 2023 introduced the Ukraine Facility, a dedicated financial instrument aiming to provide coherent and predictable support to Ukraine from 2024 to 2027. Operating in partnership with EU member states and European financial institutions, as well as international financial institutions, and coordinating with the Multi-Agency Donor Coordination Platform, the facility comprises three pillars: the Support to Ukraine Plan, the Ukraine Investment Framework, and Assistance Programmes. With up to €50 billion in grants and loans, the Facility aims to sustain macro-financial stability, foster recovery, and facilitate reforms for Ukraine's EU accession, emphasizing the EU's unwavering commitment amid Russia's ongoing aggression.⁹

5 European Commission, 'Multi-Agency Donor Coordination Platform for Ukraine Kick-Starts Work'.

6 Ukraine's Cabinet of Ministers, 'Відбулось Перше Засідання Наглядової Ради Міжвідомчої Координаційної Платформи Донорів України'.

7 European Commission, 'Factsheet: EU Solidarity with Ukraine'.

8 European Commission.

9 'Recovery and Reconstruction of Ukraine'.

Generally speaking, the proportion of military aid has tended to increase as the full-scale invasion has worn on. During the first 10 months of the war, military and financial aid were fairly bal-

anced, but by early 2023, over half of the newly pledged aid was designated for military purposes, and in April and May of 2023, the proportion was over 70 percent.¹⁰

1.2.2. International Financial Institutions

From February 2022, the World Bank and its development partners successfully mobilized financial support exceeding USD 34 billion for Ukraine. More than \$21 billion of this support has already been disbursed.¹¹ In April 2023, the World Bank announced \$200 million in grant financing specifically to repair Ukraine's energy infrastructure. These funds will come from Ukraine Relief, Recovery, Reconstruction and Reform Trust Fund. Additional funding of up to \$300 million is expected from partners as the project expands.¹²

Between the start of the full-scale invasion and the end of 2022, Ukraine's economy contracted by approximately 30%, significant capital stock was destroyed, and poverty rates increased. Despite these challenges, effective policymaking and substantial external support have enabled the Ukrainian authorities to maintain macroeconomic and financial stability. Ukraine terminated its

existing IMF program and requested emergency assistance from the Fund to instead address the economic repercussions of the Russian invasion. Following two Rapid Financing Instrument (RFI) purchases, totaling 100% of the available quota of USD 2.7 billion, the authorities successfully met all quantitative targets and structural benchmarks under the program monitoring.¹³

In June 2023, the board of the IMF completed the initial review of Ukraine's Extended Funding Facility, allowing for the disbursement of approximately \$890 million (SDR 663.9 million) to support the budget. The EFF, which is part of a broader \$115 billion package for Ukraine, was approved in March 2023, and aims to anchor policies for stability, support economic recovery, and strengthen institutions in the context of reconstruction and Ukraine's path to EU accession.¹⁴

10 Kiel Institute for the World Economy, 'Ukraine Support Tracker - A Database of Military, Financial and Humanitarian Aid to Ukraine'.

11 World Bank Group, 'World Bank Group Financing Support Mobilization to Ukraine'.

12 World Bank, '\$200 Million Grant Supported by the World Bank Will Help Repair Energy Infrastructure in Ukraine'.

13 IMF, 'IMF Executive Board Completes the First Review under the Extended Fund Facility (EFF) Arrangement for Ukraine'.

14 IMF.

1.3. Possible Parameters for Financing Programs, Mechanisms, and Schemes

Any plan to rebuild the energy sector must take into account Ukraine's whole economy and society. For example, at least thirteen cities in Ukraine have been destroyed by late 2023 (Andriivka, Avdiivka, Bakhmut, Izium, Marinka, Mariupol, Popasna, Rubizhne, Sievierodonetsk, Soledar, Trostianets, Volnovakha, and Vuhledar) and their population is unlikely to return to prewar levels even if they are rebuilt. In 2022, electricity consumption dropped by a third to 36.5 TWh.¹⁵ Furthermore, the available power generation capacity has nearly halved, decreasing from 37.6 GW to 18.3 GW in the course of 2022. There is a critical shortage of maneuvering capacities within the system, particularly as the available capacity of thermal power plants, the primary source of electricity, has plummeted by 68%, from 14.3 GW to 4.6 GW. Lastly, transmission grid capacity is still weakened due to repeated attacks between January and April 2023.¹⁶ By June 2023, the cumulative direct damage to Ukraine's infrastructure resulting from the war surpassed USD 150 billion, of which \$8.8 billion is direct damage to energy infrastructure.¹⁷ Energy demand is expected to be significantly lower in the affected regions of Ukraine even after the war.

A major part of defining a future vision is choosing strategic priorities. The experts interviewed for the Ukraine Energy Roadmap project have underlined that Ukraine urgently needs financial and technical assistance as well as well-designed financial support programs essential for the post-war reconstruction. They emphasized that the scope and direction of the reconstruction effort

must be determined in very early stages, including defining the priority segments of the energy sector (e.g., generation, transmission, distribution, renewable energy sources, energy efficiency etc.) and the scale of the interventions required. These topics are discussed at greater length in the preliminary technical study which is also published under the auspices of the Ukraine Energy Roadmap project. This financial study has the potential to provide valuable insights into this issue and define overall financing needs as well as propose potential sources of funding and recommendations to build a secure investment environment.

The consensus is that post-war financial aid should concentrate on high-added-value sectors such as manufacturing, because economies that rely on natural resource extraction tend to suffer from reduced economic growth.¹⁸ Strengthening productive rather than extractive activities in Ukraine can also help foster more accountable post-war government.¹⁹ These topics are also partly handled in the technical and legal preliminary studies carried out in parallel with this financial study under the auspices of the Ukraine Energy Roadmap project.

To take manufacturing as an example, Ukraine's value added – the total estimated net output of all resident manufacturing activity units obtained by adding up outputs and subtracting intermediate consumption – has fluctuated significantly since independence, from USD 33 billion in 1992 to \$30 billion in 2008 and \$20.5 billion in 2021.²⁰ As a proportion of GDP, however, the decline has been

15 'Ukraine Energy Market Report | Energy Market Research in Ukraine'.

16 UNDP, 'A Green Transition of the Energy Sector in Ukraine. Update on the Energy Data Assessment'.

17 Kyiv School of Economics, 'The Total Amount of Damage Caused to Ukraine's Infrastructure Due to the War Has Increased to Almost \$138 Billion'.

18 Binetti, 'Rebuilding Energy Infrastructures and the Manufacturing Sector in Post-Conflict Countries'; Gylfason, 'Natural Resources and Economic Growth'; Mavrotas, Murshed, and Torres, 'Natural Resource Dependence and Economic Performance in the 1970–2000 Period'.

19 Binetti, 'Rebuilding Energy Infrastructures and the Manufacturing Sector in Post-Conflict Countries'.

20 World Bank Open Data, 'Manufacturing, Value Added (Current US\$) - Ukraine'.

precipitous, with manufacturing in total economic output falling from 45% in 1992 to 10% in 2021.²¹

Investing in energy infrastructure is particularly effective in supporting the manufacturing sector.²² This must involve special grants for the training of local technical experts, because the country suffers from a shortage of experts. Investments can also incite skilled workers who fled during the war and to eventually return. At the same time, if the production factors are gross complements (that is, the elasticity of factor substitutes is below unity), rebuilding energy infrastructure boosts the productivity of labor and the stock of private capital, especially in municipalities that have been hard-

est hit by the war. Furthermore, such reconstruction will have a positive impact on the private sector, especially small enterprises, as it decreases the dependency of firms on energy back-up systems and reduces adjustment and entry costs that might prevent them from responding to shocks.²³

Strategies should be developed and accompany any financing program to address potential financial, technical, and political risks associated with energy sector-reconstruction projects. Moreover, incentives for commercial banks must be created to encourage the private sector to join public-private partnerships. Specific recommendations can be found in section 2 of this report.

21 World Bank Open Data, 'Manufacturing, Value Added (% of GDP) - Ukraine'.

22 Binetti, 'Rebuilding Energy Infrastructures and the Manufacturing Sector in Post-Conflict Countries'.

23 Binetti.

1.4. Green Finance Regulatory Framework

Even before the war, Ukraine was one of the European countries with the most pollution and environmental degradation.²⁴ This situation has been made even more dramatic by the devastation (direct or indirect) wrought by the Russian aggression. Moreover, the energy intensity and carbon intensity of Ukraine's GDP were over three times greater than those of the EU-28 in 2015.²⁵ This makes it all the more important that future rebuilding of the energy sector focus on sustainable principles.

It has been reported that local banks offered unfavorable financing conditions to both foreign and domestic stakeholders seeking to invest in energy infrastructure projects before the war. This was primarily due to the high proportion of non-

performing loans (NPLs) experienced by local banks, which, according to the OECD, stood at 49% overall – and 65% in state-owned banks. This situation limited credit growth in the private sector and impeded equity investments. In 2019, for instance, retail loans in Ukrainian hryvnia increased by 25% (largely driven by consumer lending), while loans to enterprises declined by 8%.²⁶

Rebuilding the energy sector in Ukraine after the war can reduce its greenhouse gas-intensity and improve resilience and lower costs for consumers. This will guarantee a sustainable transition and a robust and resolutely green and resilient policy framework. This framework should rely on the following key elements:

- establishing a strong and credible pricing mechanism to internalize the cost of emissions,
- implementing regulatory measures when pricing alone is not effective, and
- advancing low-emission technologies to a commercially viable stage, while preparing for more ambitious emission reductions.²⁷

Ukraine can use the EU taxonomy for sustainable activities to guide its reconstruction to attract more international and EU investor support, even though it is not legally obligated to do so before becoming an EU member state.²⁸ This would be a challenge for Ukrainian businesses and investors in case of adoption – however, it would also help country speed up its European integration. The EU Green Taxonomy is part of the sustainable finance and reporting package, which promotes technological advancement and evolving economic ac-

tivities.²⁹ There are several reasons to prioritize its adoption in Ukraine.

Firstly, adopting the EU taxonomy would align Ukraine's classification system with internationally recognized standards. Other EU legal instruments through which the taxonomy aims for cross-sectoral implementation should be considered for pre-accession adoption. In particular, early implementation of the Corporate Sustainability and Responsibility Directive in Ukraine can

24 Toteva, 'Green Taxonomy in Ukraine'.

25 Holovko, 'Ukraine and the European Green Deal'.

26 OECD, OECD Energy Investment Policy Review of Ukraine.

27 OECD, Aligning Policies for a Low-Carbon Economy.

28 European Union, Regulation (EU) 2020/852 of the European Parliament and of the Council of 18 June 2020 on the establishment of a framework to facilitate sustainable investment, and amending Regulation (EU) 2019/2088.

29 Toteva, 'Green Taxonomy in Ukraine'.

encourage businesses to operate more sustainably and responsibly, contributing to overall economic and environmental progress.³⁰ The adoption of the Sustainable Finance Disclosure Regulation will promote sustainable practices, attract responsible investments, enhances transparency, risk management, and market competitiveness, and align the country with international standards, contributing to postwar recovery.³¹

This would encourage foreign investment and align the reconstruction with best green measurements, facilitating the integration of Ukraine's energy sector into global markets, and fostering economic growth.³² It would also enable Ukraine to benefit from its partners' expertise and experience in sustainable energy transition. The environmental and social eligibility criteria and guidelines of multilateral development banks in Europe are reflected in the EU taxonomy and overlap with it, which could give Ukraine access to additional financing of green projects, including projects in the energy sector.

Secondly, The EU Green Taxonomy provides clarity and transparency on sustainable economic activities, enabling investors to identify environmen-

tally friendly projects. By adopting the taxonomy, Ukraine can more easily attract green investment and demonstrate its commitment to sustainable development, enhancing investor confidence in the country's energy sector. The EU is a significant trading partner for Ukraine, and aligning with the EU green taxonomy would also facilitate market access for Ukrainian energy products. Meeting the EU's sustainability criteria would increase Ukraine's competitiveness and open opportunities for exporting energy resources, technologies, and services to the European market. Adopting the taxonomy would also give the Ukrainian government leeway to incentivize both private and public green investment.³³

Thirdly, adopting EU standards would enable Ukraine to prioritize and promote investments in renewable energy, energy efficiency, and other low-carbon technologies, leading to reduced greenhouse gas emissions and enhanced environmental protection. Of course, the taxonomy should be adapted to the particularities of the Ukrainian situation, giving due consideration to issues of war damage, economic development, and domestic capital markets.³⁴

30 European Parliament and Council of the European Union, Directive (EU) 2022/2464 of the European Parliament and of the Council of 14 December 2022 amending Regulation (EU) No 537/2014, Directive 2004/109/EC, Directive 2006/43/EC and Directive 2013/34/EU, as regards corporate sustainability reporting (Text with EEA relevance).

31 European Parliament and Council of the European Union, Regulation (EU) 2019/2088 of the European Parliament and of the Council of 27 November 2019 on sustainability-related disclosures in the financial services sector (Text with EEA relevance).

32 Toteva, 'Green Taxonomy in Ukraine'.

33 Toteva.

34 Toteva.

2. Analysis of Financial Mechanisms

This section analyzes the role of international financial institutions and the potential of various financial mechanisms, instruments, and options to finance post-war reconstruction in Ukraine's energy sector. This includes both existing and proposed financial mechanisms, especially financing options such as public & private investment and international loans & grants. Regulatory recommendations promoting investment in the energy sector are also explored, and the potential impact of new financial mechanisms on the energy sector's rebuilding process assessed. The focus is on financing options which foster renewable energy, improve energy efficiency, and reduce greenhouse gas emissions. The subsection related to each instrument comprises a set of recommendations.

2.1. International Financial Institutions

Most international financial institutions (IFIs) have relevant experience in facilitating modernization and EU convergence in other post-socialist nations. Moreover, their leading shareholders, who possess a strong interest in supporting Ukraine, instill trust in their capabilities. They also work together with the Ukrainian government and other partners to assess damage, estimate reconstruction needs, and develop a comprehensive strategy to support the country's energy sector reconstruction. For in-

stance, the World Bank's Rapid Damage and Needs Assessment estimated reconstruction and recovery needs in Ukraine to around USD 411 billion in March 2023. These costs are estimated for a period of 10 years, and consider inflation, market conditions, surge pricing in construction, higher insurance premiums, and a shift toward lower energy intensity and more resilient, inclusive, and modern design.³⁵ Figure 1 shows the extent of damage in Ukraine by region as of February 24, 2023.

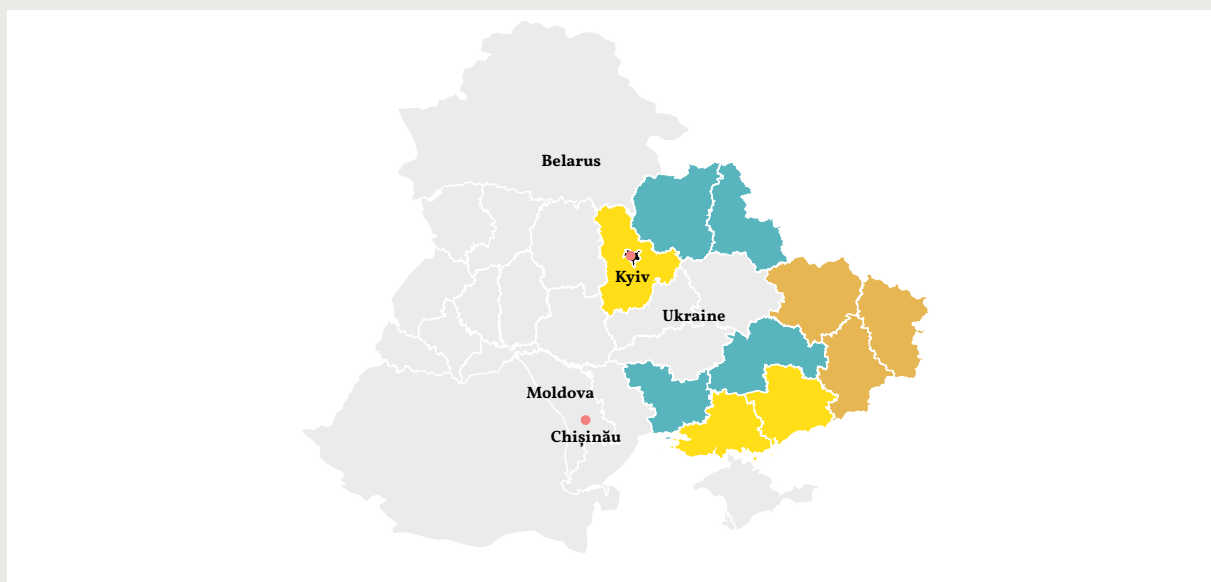


Figure 1: Extent of damage by region on 24 February 2023

Source: World Bank, 'Ukraine Rapid Damage and Needs Assessment', 12.

35 World Bank, 'Ukraine Rapid Damage and Needs Assessment'.

The involvement of IFIs is essential in addressing the extensive damage caused by the war and ensuring the long-term viability and resilience of Ukraine's energy sector. Firstly, IFIs can mobilize financial resources, especially to bridge the funding gap and enable Ukraine to undertake large-scale reconstruction projects that would be challenging to finance domestically. Moreover, IFIs play a vital role in attracting private sector investment to the energy sector in Ukraine. They facilitate public-private partnerships, create a favorable investment climate, and provide risk mitigation instruments to encourage private-

sector engagement in reconstruction projects. IFIs' involvement often helps address barriers and uncertainties that deter private investors, such as political and economic risks. By leveraging private sector resources and expertise, IFIs contribute to the efficiency, innovation, and sustainability of energy infrastructure development in Ukraine. For example, the EBRD is actively promoting and expediting the involvement of the private sector, with a particular emphasis on increasing the level of public-private partnership (PPP) activities in the regions where it operates.³⁶

Recommendations

International financial institutions (IFIs) will play a crucial role in supporting Ukraine's energy reconstruction and recovery after the war. Their involvement immediately after the war will be particularly significant due to their local expertise, commercial focus, emphasis on good governance, and ability to mobilize talent. As far back as 2016, international financial institutions were involved in efforts to privatize state-owned banks by the Ukrainian government, which invited them to acquire significant minority stakes in two state banks to help prepare them for privatization to strategic investors. Fur-

thermore, the National Bank of Ukraine (NBU) invited international financial institutions to operate in the local currency market.³⁷

It is important to acknowledge that Ukraine and its financial sector will continue to face heightened geopolitical risks even after the war concludes. Therefore, the provision of longer-term country risk coverage, whether by the EU or multilateral development banks, may remain necessary for an extended period.³⁸

Capacity to absorb funding assessment

The success of any financing mechanism depends not only on the availability of funds but also on the capacity of the recipient country to effectively use those funds. IFIs typically have stringent requirements for project design, implementation, and monitoring, and they require that recipient countries have the necessary capacity to effectively utilize the funds. It is vital to assess Ukraine's additional debt absorption capacity early on, as it might be limited by the financial capacity to service it or technical ability to process and imple-

ment projects. The international donors' financing should be distributed according to these results. A recent study by the consultancy Boston Consulting Group (BCG) shows that Ukraine is currently able to absorb less than USD 100 billion in additional debt, while needing around \$750 billion according to the National Recovery Plan. The Boston Consulting Group and the National Council for the Recovery of Ukraine from the War (NRC) summarizes the time frame for implementing the National Recovery Plan as follows:³⁹

³⁶ EBRD, 'Public-Private Partnerships (PPPs)'.

³⁷ De Haas and Pivovarsky, 'The Reconstruction and Development of Ukraine's Financial Sector after the War'.

³⁸ De Haas and Pivovarsky.

³⁹ Boston Consulting Group, 'A Study on Potential Recovery Strategies for Ukraine'.

- Urgent resilience (2022) – addressing severe needs that are due to the military situation and resulting destruction of infrastructure – USD 60-65 billion;
- Recovery (2023–2025) – Enabling Ukraine’s economy to return to full capacity – \$250-300 billion; and
- Modernization (2026–2030) – Facilitating long-term transition into a modern and sustainable economy – \$400-450 billion.⁴⁰

The study suggests that technical capacity to absorb additional debt depends on the following factors:

- institutional capacity,
- technical expertise, and
- the capacity of the construction sector.

It proposes that institutional capacity can be strengthened through well-organized screening and monitoring mechanisms. Technical, legal, and policy expertise to support efficient procurement and reform implementation can be imported in areas where it is lacking. And measures can be tak-

en to boost the capacity of Ukraine’s construction sector to implement new project needs, focusing especially on shortages in labor, machinery, and materials.⁴¹ Furthermore, it is advisable to collaborate with objective research partners to establish a comprehensive project pipeline tailored to the energy sector in Ukraine, aligning it with stringent international funding criteria. Such a strategic approach would enhance Ukraine’s prospects for securing crucial financial support and advancing its energy infrastructure development goals.

Immediate and mid-term measures to support macroeconomic stability

In the near term, Ukraine has managed to secure funding for its immediate fiscal and current account requirements. As mentioned above, the country may need USD 60-65 billion for reconstructing damaged infrastructure, \$250-300 billion for reconstruction during the first two years after the war, and \$400-450 billion for the modernization of the economy until 2030.⁴²

However, the sustainability of these needs hinges on maintaining confidence in the banking system and exchange rate. To bolster this confidence, it is crucial to ensure transparency regarding external financial support and future requirements. Without a significant proportion of grants or highly

concessional loans, there is a risk that Ukraine’s gross financing needs could become unsustainable, thereby hampering the prospects of economic recovery. The European Union has so far agreed to provide Ukraine with €50 billion (USD 54.58 billion) in aid for the years 2024-27. This includes €17 billion in the form of free grants and €33 billion in low-interest loans, which is very helpful even if it covers only a part of the USD 250-300 billion needed within the first years after the war.⁴³

International financial institutions (IFIs) should consider the following actions to maintain macroeconomic stability and facilitate the process of rebuilding in Ukraine:

- Sustain fiscal and current account support by prioritizing grants or loans with extended repayment terms and low fixed interest costs. Seeking clarity and pre-agreements from international partners regarding timing and disbursement volumes would provide policymakers and the private sector with greater certainty. By limiting the public sector’s gross financing needs, pressures on spending can be reduced, particularly during the initial years of the recovery phase.
- Offer loan guarantees to enable high-productivity firms to continue operating. Public loan guarantees can protect viable companies from the adverse effects of the crisis without posing significant risks of keeping nonviable “zombie” firms afloat. Moreover, this approach ensures that firms

40 De Haas and Pivovarsky, ‘The Reconstruction and Development of Ukraine’s Financial Sector after the War’.

41 Boston Consulting Group, ‘A Study on Potential Recovery Strategies for Ukraine’.

42 De Haas and Pivovarsky, ‘The Reconstruction and Development of Ukraine’s Financial Sector after the War’, 6.

43 Baczynska, ‘EU Offers Ukraine 50 Billion Euros through 2027’.

have the flexibility to transition into activities with better prospects if their existing operations are no longer viable.

- Promote the return of skilled individuals who have left Ukraine. One possibility is to (temporarily) reduce taxes for Ukrainian professionals returning from abroad or foreign professionals establishing themselves in the country – such schemes have been implemented in Italy and the Netherlands to some effect. Retaining talented workers within the country is crucial for sustaining the economy during the war and facilitating postwar rebuilding efforts. By maintaining macroeconomic stability and identifying the necessary financing for recovery, confidence can be fostered, encouraging individuals to contribute to Ukraine’s future development.⁴⁴
- Introduce job placement programs that connect returning skilled individuals with employment opportunities in Ukraine and create possibilities for their successful reintegration. IFIs can provide funding and technical assistance to support skills development and training programs for Ukrainians abroad connected with return of skilled individuals after the war. Moreover, IFIs can engage in policy dialogue with the Ukrainian government to advocate for measures that promote the return and utilization of skilled individuals.

Demand and supply for long-term green lending

A green loan is a form of financing that enables borrowers to use the proceeds to exclusively fund projects that make a substantial contribution to an environmental objective. Similar to a green bond (see chapter 2.2.4 Green Bonds) a green loan raises capital for green eligible projects. Green loans are typically smaller than bonds and subscribed in private operations.⁴⁵

The green loan market is experiencing rapid growth. There is an opportunity for Ukraine to tap into this evolving market. Green loans offer several advantages, particularly in aligning lending activities with environmental objectives. They enable borrowers to effectively communicate their commitment to greening their operations and supply chain (similar to green bonds, see section 2.2.4 Green Bonds). Additionally, green loans may be more appealing to potential issuers in emerging markets like Ukraine due to factors such as higher

transaction costs associated with bond issuance, as well as the minimum bond size required for tradability.⁴⁶

Despite the impressive increase in renewable-energy systems in Ukraine in recent years, the country still has a proportionately quite small green portfolio given the entirety of its energy-production and industrial sector. In 2021, the share of renewable sources in electricity production was just 8.2%.⁴⁷ In the industrial sector, the largest energy consumer was the carbon-intensive iron and steel industry (for more information on this topic, see the preliminary technical Study which accompanies this financial study). In Ukraine’s case, potential issuers may initially find it more favorable to opt for a green loan rather than issuing a green bond. As green projects become more common, however, green bonds may become more attractive.

44 OECD, ‘Shaping the Path to Economic Recovery’.

45 World Bank, ‘Climate Explainer’.

46 World Bank.

47 BP, ‘Statistical Review of World Energy 2021’.

Moreover, green loans can provide a more flexible and accessible financing option, allowing borrowers to pursue their environmental goals without incurring the challenges and costs associated with bond issuance.⁴⁸ Thus, long-term green lending offered through IFI-supported credit lines and disbursed

through local banks is of essence for the post-war rebuilding of the energy sector. However, the actions of the government, well-designed policy instruments and monitoring of responses of households and business are equally important.⁴⁹

Supporting housing stock and social infrastructure programs

The programs and credit lines aiming to support housing stock and social infrastructure can play an important role and have an indirect impact on the rebuilding of the energy sector as well as addressing a range of interconnected issues. Investing in housing is essential to ensure that the workforce has a place to live and can contribute to the re-

talization of the energy sector. Furthermore, the absence of sufficient housing can also hinder the return of refugees, leading to a similar challenge to that faced by East Germany, where the outflow of highly skilled workers slowed down the country's convergence with West Germany.⁵⁰

2.2. General Financial Mechanisms

The reconstruction of Ukraine's energy sector can also be funded through general financial mechanisms such as, public-private partnerships, project finance, and sovereign debt issuance, among others. A separate section looks into EU's Carbon Border Adjustment Mechanism as one of the potential means to support the decarbonization efforts of Ukraine.

2.2.1. Public-Private Partnerships and other Forms of Public Guarantees

The reconstruction of the energy sector and its sustainable transformation requires the scaling up of investment in low-carbon generation and more environmentally friendly infrastructure and production processes. The involvement of private sector actors is crucial to meeting these challenges. The existence of a strong banking sector is a key prerequisite for enabling green investment into energy projects.⁵¹ This makes it possible to provide loans directly to beneficiaries within the energy sector under a state guarantee, which significantly

improves distribution flows and increases ownership of end receivers.

The importance of climate change and sustainability has also become increasingly clear to financial institutions, including institutional investors, investment funds, and credit institutions. Climate finance has seen a surge in the use of different financial tools, prompting private-sector financial institutions to seek out climate-related products and collaborate with public sector and multilat-

48 World Bank, 'Climate Explainer'.

49 EaP Green Partnership for Environment and Growth, 'Environmental Lending in EU Eastern Partnership Countries'.

50 Becker et al., A Blueprint for the Reconstruction of Ukraine.

51 EaP Green Partnership for Environment and Growth, 'Environmental Lending in EU Eastern Partnership Countries'.

eral development banks (MDBs) to develop joint products and partnerships.⁵²

Large global investment funds should invest a share of their capital in climate financial products in emerging market and developing economies, including the post-war Ukrainian economy, thereby diversifying their risk, and fulfilling their climate commitments and investors' mandates by partnering with MDBs and the national public sector. While private-sector investors can provide a significant share of financing, the public sector can take on more risk such as equity/junior tranches, provide guarantees and credit enhancements, and assist with project selection and assessment, capacity development, and diversification for the private sector. Public-private collaborations in this area would have an important multiplier effect.⁵³

Public-private partnerships (PPP) have become effective instruments for developing energy infrastructure in Ukraine, including energy infrastructure, experiencing a significant surge in value from USD 24.5 million in 2017 to \$1.4 billion in 2019. This substantial increase in the value of PPPs in the energy sector can be directly attributed to the 2016 reform of the Law on Public Private Partnerships, which received support from the EBRD. According to the EBRD, Ukraine achieved a "high compliance" score against internationally accepted standards and best practices for concession and non-concession PPP laws. However, the evaluation of the institutional framework indicator and the PPP business environment indicator resulted in a "low compliance" score. In the bankability indicator, measuring the extent to which a country's legal framework includes essential requirements for viable PPP financing from a lender's perspective, Ukraine scored 68%.⁵⁴

Recommendations

With a strong commitment from both the public and private sectors, and an emphasis on effective communication, long-term commitment, flexibility, risk-sharing, and monitoring and evaluation, there is strong potential for successful PPPs in the

Ukrainian energy sector. Many of the private partners will hail from abroad, which is why it is essential to adopt a strong legislative and regulatory basis. This should include at least the following regulatory documents:

- **A Ukrainian link to the European recovery and resilience plan:** An institutional counterpart to the European recovery and resilience plan can open access to the Recovery and Resilience Facility of the EU and foster joint projects to increase cross-border transmission and transportation capacities with neighboring countries.⁵⁵
- **Production-sharing agreements:** Production-sharing agreements with western energy majors from Europe and North America, which have experience in renewable energy (especially onshore and offshore wind or hydrogen) and access to international financial resources, can be highly worthwhile.
- **National programs for supporting regional reconstruction:** Ukraine can establish national programs for regional reconstruction under the auspices of the European Alliance of Cities and Regions for the Reconstruction of Ukraine.⁵⁶ Such programs can provide targeted support and become

52 Oman et al., 'Mobilizing Private Climate Financing in Emerging Market and Developing Economies'.

53 Oman et al.

54 OECD, OECD Energy Investment Policy Review of Ukraine; EBRD, 'PPPs/Concessions Sector Assessment'.

55 Chubyk, 'Financial Mechanisms for the Green Reconstruction of Ukraine to Be More Attractive for European Banks and Investors'.

56 European Committee of the Regions, 'European Alliance of Cities and Regions for the Reconstruction of Ukraine'.

effective facilitators for the engagement of European communities, municipalities, and businesses in Ukraine’s reconstruction, including decentralized energy infrastructure. For them to function properly, the Ukrainian government and local authorities should establish an effective coordination structure as well as clear procedures and deadlines for the approval of projects.⁵⁷

2.2.2. De-risking Measures for Innovative Technologies

Achieving net-zero emissions by 2050 – an EU goal that Ukraine must adopt into the national strategic documents – will require great increases in annual investments in clean, innovative energy technologies in Ukraine. There are a range of innovative emissions-reducing technologies that align with a net-zero pathway (the preliminary technical study of the Ukraine Energy Roadmap describes many of them in more detail). Decarbonization through the

early deployment of these technologies is straightforward and cost-effective. However, private investments in this field currently face a range of challenges. The evaluation of investment risk regarding renewable technologies is a complex field with a range of relevant factors. Figure 3 shows the conditional value at risk of various technologies conditional on carbon pricing, where lower values indicate higher investment risks.

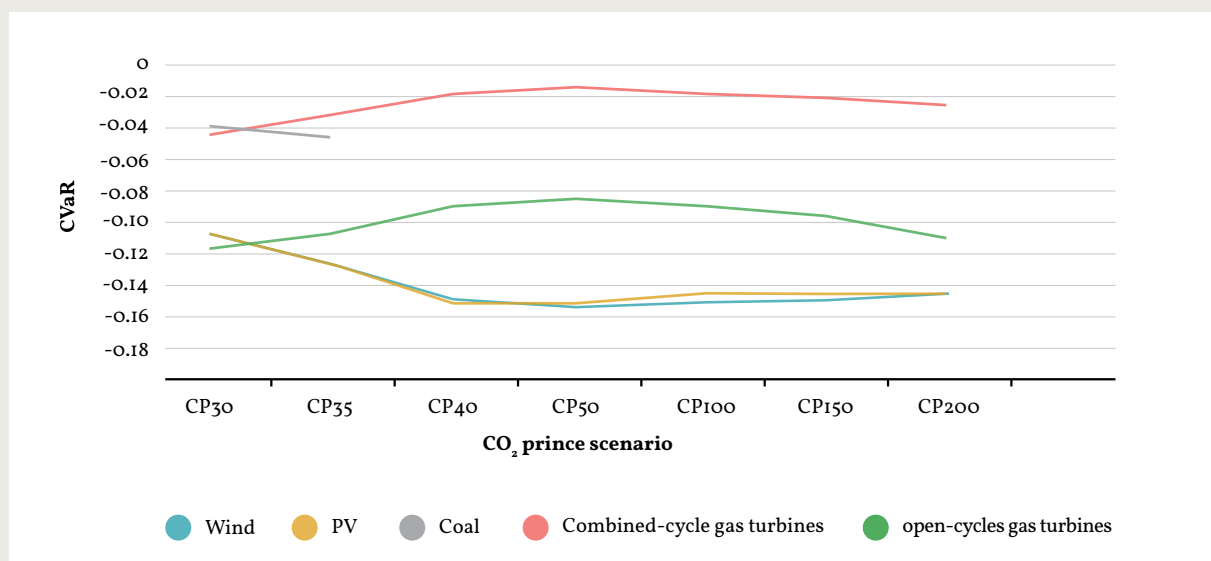


Figure 3: Conditional value at risk (CvaR) of wind, photovoltaic, coal, combined-cycle gas turbines, and open-cycle gas turbines conditional on carbon pricing⁵⁸

57 Chubyk, ‘Financial Mechanisms for the Green Reconstruction of Ukraine to Be More Attractive for European Banks and Investors’.

58 Tietjen, Pahle, and Fuss, ‘Investment Risks in Power Generation’.

However, the model illustrated in Figure 3 does not consider single cases or individual risk factors. On the one hand, this includes the high initial costs of renewable energy, the – in certain cases – higher operational costs and investment expenses of renewable energy compared to conventional carbon-intensive processes, and insufficient and uncertain carbon prices. The uncertainty stems partly from political factors, and partly from incomplete risk markets that make it difficult to hedge carbon prices over adequate time horizons.⁵⁹ On the other hand, energy production from fossil resources depends on the availability of fossil resources, which is linked to the situation on world markets and international relations. Moreover, their decentralized character means that renewable-energy systems are less susceptible to sabotage and disruption.

Depending on the region and project, a range of difficulties may undermine risk-adjusted returns for investors and the availability of bankable projects. These challenges include the absence of commercial arrangements that guarantee predictable revenues for capital-intensive investments, the creditworthiness of counterparties, and the accessibility of enabling infrastructure, among other project-level factors. Additionally, there are broader issues such as depleted public finances, currency instability, and weaknesses in local banking and capital markets, which create obstacles to attracting investment.⁶⁰ Geopolitical risks are an additional challenge for the mobilization of private investment into innovative clean energy technologies. De-risking measures can counter these problems, encouraging a shift of financial resources to low-carbon alternatives.

Financial de-risking measures transfer a significant portion of risk to other parties. This can be achieved through mechanisms such as risk insurance or guarantees provided by public sector actors like development banks. These measures aim to cover damages, potentially resulting in reduced or waived payments by the customer. For instance, lenders often have concerns about the creditworthiness of a power-purchase agreement. By offering partial loan guarantees, local banks can gain the necessary security to lend to project developers, thereby encouraging the involvement of the local financial sector in renewable energy.

Support to start-ups, new firms and small to mid-size enterprises promoting innovative technologies in the energy sector is crucial for the general economic stability but also for boosting innovative energy technologies in Ukraine. Also, governmental involvement in the commercialization of energy technologies can be related to the government's role as a customer: the government contracts substantially reduce market risks through a willingness to pay for early versions of an emerging technology.⁶¹

Policy de-risking measures, on the other hand, focus on reducing the likelihood of negative events by addressing barriers within the investment environment and improving local institutions. For example, streamlining the permitting process can help reduce the likelihood of construction delays. Clarifying institutional responsibilities and simplifying the number of process steps can also contribute to reducing risk. Additionally, capacity-building programs for program administrators can enhance their capabilities and improve the overall investment environment, further reducing potential risks.

59 Richstein and Neuhoff, 'Carbon Contracts-for-Difference'.

60 International Energy Agency, 'It's Time to Make Clean Energy Investment in Emerging and Developing Economies a Top Global Priority'.

61 Nanda, 'Financing "Tough Tech" Innovation'.

Recommendations

Based on the results of the expert survey carried out in the framework of the Ukraine Energy Roadmap project, as well as studies of experiences in oth-

er developing countries, this study focuses on the following de-risking measures for the financing of innovative energy technologies in Ukraine:

- blended finance,
- governmental catalytic funds,
- grants,
- concessional and non-concessional debt, and
- carbon contracts for difference.

Blended finance

Blended finance enables the combination of different types of capital from various sources to support the development and deployment of innovative technologies and serves as an effective means to attract private sector investment where it is most crucial, particularly for high-impact and high-risk projects that require support to initiate. In 2009, the EBRD launched the Ukraine Sustainable Energy Lending Facility (USELF), under which 20 projects at a combined value of €120 million were funded by December 2013. Thirty percent of the portfolio consisted of wind, solar, and biomass projects, including 58.2 MW of installed renewable energy capacity.⁶² In 2018, investments in blended finance instruments by public and private investors in Ukraine totaled USD 136 billion.⁶³

While commonly used in real-estate transactions – whether commercial or public – it has proven to be an effective method for channeling capital to-

wards projects which are critical yet challenging to fund.⁶⁴ This approach facilitates collaboration among philanthropic organizations, government funding, and private sector investors with diverse risk and return expectations. Investors willing to undertake higher risk can serve as a capital cushion for those seeking to invest in high-impact projects with lower risk thresholds.

It is important to note that blended finance does not address non-financial risks.⁶⁵ The involvement of public or philanthropic capital can provide risk coverage or concessional terms, which encourages private investors to participate in innovative energy projects. Blended finance is particularly effective in supporting high-impact projects that have high upfront costs.⁶⁶ The specific focus area and eligible projects for such funds should be determined by national energy policies, priorities, and funding guidelines.

Government catalytic funds

Concerns about risk perception and bankability are significant obstacles to private capital inflows. Creating a finance facility instead of pursuing a standalone project approach offers several advantages in this context, including the ability to

attract greater funds, expedited timelines, more efficient administration of pooled funds, and risk diversification across sectors and geographical areas. Moreover, such a facility should encompass project structuring and capacity building func-

62 UNFCCC, 'Ukraine Sustainable Energy Lending Facility (USELF) – Ukraine'.

63 'The State of the Evidence on Blended Finance for Sustainable Development. An Evidence Gap Map.'

64 Jarrett, 'OECD DAC Blended Finance Principle 4: Focus on Effective Partnering for Blended Finance', 7.

65 Bank of America, 'What Is Blended Finance, and Why It Matters'.

66 Bank of America.

tions, which are crucial for local government project sponsors, and can contribute to developing a pipeline of projects with strong bankability.

Additionally, cross-learning opportunities can be fostered through this facility, ideally positioned at the national government or national development finance institution level. Institutionalizing green frameworks within such an entity, along with implementing essential green policy actions such as project screening mechanisms, reporting, and monitoring, would instill greater confidence among global investors. A facility of this nature, supporting projects at different stages of development, could also tap into capital markets through green bonds to secure additional funding. Such a

Grants

Grants are typically designated for non-revenue generating activities, such as knowledge management programs, capacity building initiatives, ongoing activities that don't generate direct financial returns, and technical and costing plans. International financial institutions, bilateral institutions, and international climate funds have been the primary sources of grants for climate change initiatives.

Grants are often combined with debt capital as part of broader financing packages. Investment grants have been more commonly used in the early stages of renewable energy technologies and are still prevalent, particularly for newer and less proven technologies. However, for mature renewable energy

programmatic response could be vital for the rapid financing of climate projects in the aftermath of the war and seizing the window of opportunity presented by recovery stimuli.

An example of catalytic government funds is the INVEST initiative from the U.S. Agency for International Development (USAID). INVEST has helped mobilize over USD 140 million in new investment through catalytic-funding support to funds and financial vehicles between May 2019 and September 2022. The initiative is currently seeking to attract an additional \$98.5 million in investment capital. Target investees of INVEST are women-owned businesses, renewable energy firms, and SMEs in agricultural value chains.⁶⁷

technologies, investment grants are less common, as profitability is usually enhanced through mechanisms that improve project cash flows rather than directly contributing to initial investment costs. Nonetheless, both systems exist and can even be combined in certain cases.⁶⁸

Grants for innovative energy technologies are often provided by government agencies, international organizations, research institutions, and philanthropic entities. They can be allocated in a range of sub-sectors, with an ideal limit set on the grant component as a percentage of the total capital investment or ongoing payment. Grants can be utilized for a range of purposes, such as:

- Technical assistance, including activities like resource assessment, pre-feasibility studies, market development, capacity building, regulatory and legal reforms or development, and environmental and social studies.
- Investment as upfront partial financing for innovative energy technology projects, or as a subsidy element within the tariff structure. They can also support pilot projects that serve as catalysts for future investments in similar projects.

67 Yang, 'Mobilizing Investment for Development with Catalytic Funding'

68 Indonesia Green Growth Program, 'Product Analysis of Diverse De-Risking Financial Instruments Available in Indonesia's Market'.

In April 2023, the World Bank made an official declaration regarding the allocation of USD 200 million in grant financing for a significant initiative aimed at rehabilitating Ukraine's energy infrastructure. Furthermore, there is a prospective influx of up to \$300 million from collaborating partners, channeled through grants and other contributions. The project is designed to address critical issues in Ukraine's electricity transmission and heating infrastructure, to be accomplished through prompt procurement of essential equipment. Specifically, the project is meant to focus on the acquisition of emergency electricity equipment such as autotransformers, transmission transformers, switchgears, circuit breakers, and relay-protection devices. Similarly, urgent measures will be taken to enhance heating infrastructure by securing mobile heat-only boilers,

mobile mini-cogeneration units, and a spectrum of equipment and components necessary for the repair of district heating networks.⁶⁹

Furthermore, during the Ukraine Recovery Conference in June 2023, the EBRD collaborated with the Ukrainian government to secure a significant funding package totaling €600 million. This financial aid, provided in the form of loans and grants from international donors, was specifically designated for crucial sectors including electricity, gas, and hydro companies. These agreements facilitated the mobilization of €200 million each for the electricity transmission company Ukrenergo, the gas company Naf-togaz, and the hydropower entity Ukrhydroenergo, indicating a comprehensive and strategic approach to bolstering Ukraine's energy infrastructure.⁷⁰

Concessional and non-concessional debt

There are a range of loans that can be used for innovative energy technology projects:

- Non-concessional loans offered at or near market rates are typically utilized for infrastructure projects or projects that generate revenue.
- Concessional/flexible loans, which come with special features such as low or no interest rates, extended repayment schedules, and the ability to modify interest rates during the loan's lifespan, offer more favorable terms compared to market rates.
- Concessional/flexible loans through financial intermediaries are commonly employed by the public sector to enhance the confidence and knowledge of financial intermediaries in lending to new or less established markets. Concessions include zero or low interest rates, extended repayment schedules, or interest rate modifications throughout the loan's duration.⁷¹

It is important to note that the availability and suitability of concessional or non-concessional debt for specific innovative energy technologies may vary based on factors such as the maturity of the technology, project scale, and local market conditions. The financing approach chosen should

depend on project specificities and the financial viability of the technology.

Loans have already been agreed for Ukraine. For example, in June 2023 the World Bank approved the USD 1.5 billion Ukraine Relief and Recovery

69 World Bank, '\$200 Million Grant Supported by the World Bank Will Help Repair Energy Infrastructure in Ukraine'.

70 'EBRD and Ukraine Government to Mobilise €600 Million for Ukraine Energy Security'.

71 Indonesia Green Growth Program, 'Product Analysis of Diverse De-Risking Financial Instruments Available in Indonesia's Market'.

Development Policy Loan (DPL), a loan guaranteed by the Government of Japan that will support the functioning of markets during wartime and

contribute to economic recovery through reforms that target land, energy, and financial markets.⁷²

Carbon contracts for difference

The German government's 'carbon contracts for difference' program, which provides incentives to energy-intensive industries to reduce carbon-dioxide emissions and transition to climate-

friendly production, could serve as an inspiring model for Ukraine. Here's how this program could suit Ukraine's context:

- It can accelerate the transition in Ukraine's energy-intensive industries, aligning with its sustainability and climate goals.
- By offering compensation to cover additional costs (both operational and capital expenses) associated with adopting green technologies, Ukraine can attract domestic and foreign investments in its industrial and energy sectors. This can spur economic growth and promote innovation.
- The program encourages the conversion of production processes to green technologies, including hydrogen production. Ukraine can benefit from technology transfer and knowledge sharing, which can help develop its expertise in green energy solutions.
- The 15-year climate-protection agreements offered by the German program provide long-term certainty to companies. In Ukraine, this stability can encourage companies to invest in sustainable practices with confidence.⁷³
- The German program's inclusivity – it provides grants to companies of all sizes, including small and medium-sized enterprises (SMEs) – can be particularly relevant for Ukraine. SMEs play a significant role in the country's economy, and enabling them to adopt green technologies can have a substantial positive impact.
- If Ukraine allocates substantial budget to a similar program, it can provide the necessary financial incentives to boost the adoption of green technologies in energy-intensive industries. This aligns with the government's commitment to addressing climate change and promoting sustainability.⁷⁴

72 'World Bank's New \$1.5 Billion Loan to Ukraine Will Provide Relief to Households, Mitigate Impacts of Russia's Invasion'.

73 IEA, 'Carbon Contracts for Difference (CCfD) Program for Energy-Intensive Industries – Policies'.

74 IEA.

2.2.3. Green Bonds

Like conventional bonds, green bonds are financial instruments which raise capital from investors in the debt capital market and promise to repay it within a given maturity period with interest. The funds they raise are, however, allocated exclusively to sustainable projects, assets, or business activities, according to criteria determined by the issuer or another authorized entity. Green bonds can have a range of advantages over traditional bonds, such as reduced risk for investors, wider access to capital, and more attractiveness to investors.⁷⁵

In June 2020, Ukraine's parliament passed Law No. 738-IX "On Amendments to Certain Legislative Acts regarding the Simplification of Investment Attraction and Introduction of New Financial Instruments," with the aim of introducing new models of organized markets and financial instruments in line with EU legislation. This new regulation facilitates the creation of green and infrastructure bonds within Ukraine's capital market, offering a means to finance improvements in the country's energy infrastructure. The implementation of this law is expected to lead to an increase in the issuance of green bonds.⁷⁶

Corporate green bonds can be issued by several state-owned and private energy companies in Ukraine to quickly find financial resources for the

recovery of energy infrastructure compliant with sustainability criteria. Those companies have experience issuing bonds worth up to \$1 billion but will most probably need additional guarantees from the state or foreign partners to get reasonable interest rates.⁷⁷ The same applies to transition bonds (see chapter 2.2.3 Transition Bonds).

To facilitate access to sustainable finance, Ukraine's National Securities and Stock Market Commission has – with the support of the International Finance Corporation (IFC), the World Bank's private-sector arm – become a member of the Sustainable Banking Network (SBN). This community of regulatory agencies and banking associations from 40 emerging markets is dedicated to promoting sustainable finance. Thanks to its membership, Ukraine receives technical guidance on creating green and climate finance products, as well as implementing effective environmental, social, and governance (ESG) standards and practices, including support in formulating a roadmap for sustainable finance and developing an appropriate regulatory framework.⁷⁸

75 OECD, 'Green Bonds. Mobilizing the Debt Capital Markets for a Low-Carbon Transition. Policy Perspectives'.

76 Allen, 'Transition Bonds - New Funding for a Green World'.

77 Chubyk, 'Financial Mechanisms for the Green Reconstruction of Ukraine to Be More Attractive for European Banks and Investors'.

78 IFC, 'IFC Partners with Ukraine's National Securities and Stock Market Commission to Boost Green Finance'; OECD, OECD Energy Investment Policy Review of Ukraine.

Recommendations

The laws and regulations associated with the introduction of green bond have not been systematically developed in Ukraine to date. One answer is the adoption of the EU Green Bond Standard, which would provide a detailed and unified regulatory framework. The European Green Bond standard

follows best market practice and is compatible with existing market standards for green bonds, not least the International Capital Marketing Association's (ICMA's) Green Bond Principles.⁷⁹ Its adoption in Ukraine should involve the following:

- Development of regulatory and legal guidelines and procedures based on EU legislation for a Ukrainian green bonds market, including for both sovereign and municipal green bonds. This should comprise a procedure for evaluating and selecting green projects, mechanisms for financing and refinancing green projects, and procedures for monitoring the use and management of funds, control procedures and reporting standards.
- Development of regulatory incentives for the green bond market.⁸⁰

To avoid market fragmentation and make clear the benefits of the EU Green Bond Standard, Ukraine should strengthen the independence of external reviewers and avoid possible conflicts of interest.

It should develop measures to stimulate a deep and liquid market. And it should seek to properly regulate the entire green bond market and reduce greenwashing.⁸¹

2.2.4. Transition Bonds

Transition bonds aim to fund the transition of companies. They provide flexibility in choosing targets, such as lower greenhouse gas emissions at the company level or alignment with broader objectives tied to Nationally Determined Contributions under the Paris Accord or the UN's Sustainable Development Goals. Like green bonds, transition bonds also serve environmental objectives, but they differ in their focus. Whereas green bonds are explicitly earmarked for environmentally friendly projects, transition bonds are designed to support companies and projects transitioning from high-carbon to low-carbon practices, often encompassing a broader sustainability agenda (there is more information on green bonds in the following subsection).

actively working to transition to more sustainable and low-carbon practices. Furthermore, they help mitigate the risk of 'greenwashing,' where companies falsely claim to be more eco-friendly than they truly are. By doing so, they instill greater confidence in the ability of fossil-fired industries to transition towards greener business practices, enhancing the credibility of the transition market.⁸²

Transition bonds can be issued by a variety of entities, including governments, corporations, financial institutions, and other organizations that are

So far transition bonds have been issued only three times, including by the oil and gas major Shell (a USD 10 billion credit facility where interest payments are linked to progress in emission reductions) and by the utility Castle Peak Company (\$0.5 billion to finance a new combined-cycle gas turbine power plant in China). They may nonetheless be a promising financial instrument for improving energy efficiency, modernizing infrastructure, implementing clean innovative technologies, and improving gen-

79 Chen, 'Supporting Green Bond Development for Ukraine'.

80 Chen.

81 Chen.

82 Allen, 'Transition Bonds - New Funding for a Green World'.

eral sustainability in energy-intensive industries, e.g., oil and gas sectors.

Even though the renewable energy sector was strongly growing before the war (with the share of renewable sources in electricity production increasing from 1.8% in 2018 to 8.2% in 2021),⁸³ Ukraine still relies heavily on fossil fuels. In 2020, 70% of primary energy was supplied by coal, gas, oil and oil products.⁸⁴ Transition bonds can support the gradual phase-out of coal-fired power plants and industrial processes by providing funds for the development of alternative energy sources, such as modern natural gas applications, renewables, hydrogen, or nuclear power. Companies conducting mostly fossil-fired activities who are therefore unable to issue green bonds could instead fund their transition through transition bonds, which could allow them to secure capital to reduce their greenhouse gas emissions while continuing their regular business operations.

There are some issues with transition bonds, not least transparency and difficulties in benchmarking a given level of improvement. Moreover, they may

contradict the tightening criteria for green bonds, such as under the EU taxonomy. Further risks include the risks of corporate greenwashing that arise when focusing on incremental improvements rather than long-term solutions.⁸⁵

Apart from these disadvantages, transition bonds are a better fit for certain enterprises than others. This depends on whether it is more effective to shutter a company or practice than make it green. Certain heavily polluting industries like coal mining may be excluded from transition bonds altogether, as they are unlikely to successfully make the transition. On the other hand, transition bonds are especially suited to companies or state-owned enterprises which have to move to new technological approaches. This includes, for instance, carmakers switching from combustion engines to electric motors, state-owned district-heating enterprises switching from fossil-fuel plants to renewable-heating systems, or the iron and steel industry switching from coal and gas to green hydrogen (for more information, see the preliminary technical study that accompanies this financial study).

Recommendations

If this financial instrument is used in Ukraine, it should be deployed with particular focus on standards and transparency. This includes defining the eligibility criteria for transition projects, specifying the types of activities that qualify for transition financing, and setting measurable targets for emissions reduction. Transparent guidelines will provide clarity to market participants and ensure consistency in the evaluation and selection of transition projects. To maximize the impact of transition bonds, Ukrainian policy makers should also integrate them into their national climate and energy strategies. This alignment will help prioritize transition projects, ensure policy coherence, and provide a supportive framework for the issuance and deployment of transition bonds. It is essential to ensure that transition bonds contrib-

ute to the broader goals and targets outlined in Ukraine's climate and energy plans.

The government should work together with domestic and international financial institutions to promote transition bond offerings. Building partnerships with banks, especially those with experience in issuing other forms of bonds, as well as with asset managers and development finance institutions, can help create demand for transition bonds, attract investors, and facilitate the development of a robust market. Cooperation with financial institutions can also enhance knowledge sharing and technical expertise in structuring and marketing transition bonds.

83 BP, 'Statistical Review of World Energy 2021'.

84 State Statistic Service of Ukraine, 'Energy Balance of Ukraine'.

85 International Energy Agency, 'World Energy Investment 2020'.

Transition bonds, unlike green bonds that fund specific environmentally friendly projects, are typically used by organizations transitioning from high-carbon to low-carbon practices or addressing broader sustainability goals. A mature project pipeline should be developed as it will help issuers clarify how they intend to achieve their sustainability and transition objectives. It can provide transparency to investors about the initiatives and activities that will be supported by the proceeds from the transition bonds, which can

enhance investor confidence and attract those interested in supporting organizations in transition. Furthermore, there should be a clear regulatory base for transparency and reporting requirements, including on disclosure of relevant environmental and social performance indicators, carbon reduction targets, and progress reports on emissions reductions. Transparent reporting – aligned with the EU Corporate Sustainability Reporting Directive – will help investors assess the credibility and impact of transition projects, reducing the risk of greenwashing and boosting accountability.

2.2.5. Free Economic Zones for Energy Systems

Another potential mechanism for financing the energy sector rebuilding process in Ukraine is the creation of free or special economic zones (FEZs). There are dozens of them in the EU, where European law (which refers to them as Free Zones) defines them as “enclosed areas within the customs territory of the Union where non-Union goods can be introduced without paying import duties, taxes, and other commercial policy measures.”⁸⁶ FEZs are designated geographic areas where companies are subject to rules that differ from those applicable elsewhere in the relevant jurisdiction. Typically, investors there enjoy benefits such as tax breaks, duty exemptions, and other financial incentives, as well as access to high-quality infrastructure and simplified administrative procedures.

These zones are widely used in emerging and developing countries as a policy tool to create a favorable investment climate and compensate for weaknesses in the national business environment. Their primary objectives are to attract foreign direct investment, boost exports, diversify economic activity, and create employment opportunities.

Governments also expect the domestic economy to benefit from knowledge and technology transfers in the long term.⁸⁷ Moreover, at least one study from China shows that developing low-carbon FEZs can reduce regional carbon emissions.⁸⁸

It is important to note that FEZs do not by definition host green or low-carbon activities. FEZs with a narrow focus on economic growth without an innovative focus already exist in Ukraine. Since 1997, there have been five public and eleven private FEZs in the sectors food processing, metalworking, coal, and chemicals.⁸⁹

Given the challenges and opportunities of the energy transition, a rational approach today might be to create so-called Low-Carbon Zones, that is, FEZs with a comparatively low carbon footprint that provide a testing ground for pilot projects and policies for reducing the environmental impact of industrial operations. Such areas may be well placed to attract significant investments and set the benchmark for production standards.⁹⁰

86 Karakas, Stamegna, and Zachariadis, ‘Public Economic Support in the EU State Aid and Special Economic Zones’.

87 Kiel Institute for the World Economy, ‘Ukraine Support Tracker - A Database of Military, Financial and Humanitarian Aid to Ukraine’.

88 Chen, Long, and Lin, ‘Special Economic Zone, Carbon Emissions and the Mechanism Role of Green Technology Vertical Spillover’.

89 World Bank, ‘Special Economic Zones, Performance, Lessons Learned, and Implications for Zone Development’.

90 The World Bank Group, ‘Low-Carbon Zones. A Practitioner’s Handbook’.

Recommendations

To develop a free economic zone (FEZ) that will attract low-carbon innovative technologies, it is crucial to operate within a robust framework encompassing four essential components:

- **Greenhouse-gas mitigation target setting:** a FEZ should have established methodologies and processes for regular emissions inventories, enabling zone authorities to measure and analyze performance in effective emissions reductions.
- **Sustainable infrastructure:** FEZs should demonstrate commercially viable and implementable solutions for low-carbon infrastructure, resulting not only in emissions reduction but also cost savings and additional co-benefits such as skill development and job creation.
- **Low-carbon policy and institutional framework:** Voluntary initiatives alone are often insufficient for the success of FEZ, which also require robust and reliable policy frameworks encompassing compliance requirements, incentives, and effective governmental and non-governmental institutions.
- **Carbon financing:** Demonstrating measurable reductions in emissions can attract additional financial resources from mechanisms like clean development mechanisms and voluntary carbon markets. This can help compensate for the initially unattractive short-term returns on investment. The development of an energy service companies market can also provide support for companies lacking the financial resources to fund their mitigation projects.⁹¹

The activities and investments of FEZs should be aligned with the criteria of the EU taxonomy for green activities related to environmentally sus-

tainable economic activities, facilitating the flow of green investments, and ensuring compliance with EU sustainability standards.

2.2.6. Carbon Border Adjustment Mechanism (CBAM)

The Carbon Border Adjustment Mechanism (CBAM) aims to prevent carbon leakage by equalizing the carbon price of domestic and foreign products. This measure may also encourage partner countries to adopt carbon pricing, following the so-called “Brussels effect”. The European Commission plans to phase out free allocations to the sectors covered under its Emission Trading Scheme (ETS) by 2026, ensuring a level playing field for EU producers and third-country importers.⁹²

The CBAM will initially apply to imports of certain goods and selected precursors whose production is carbon intensive and at most risk of carbon leakage: cement, iron and steel, aluminum, fertilizers, electricity, and hydrogen. The CBAM entered into force in its transitional phase on 1 October 2023, and will apply in a complete and permanent way from 1 January 2026. Importers will have to pay for the greenhouse gases embedded in the goods they bring into the EU based on the weekly average auction price of EU ETS allowances.⁹³ The CBAM will apply to imports from all countries that are not in the EU ETS. By 2027, the European Commis-

91 The World Bank Group.

92 European Parliament, ‘EU Carbon Border Adjustment Mechanism Implications for Climate and Competitiveness’.

93 European Commission, ‘Carbon Border Adjustment Mechanism’.

sion will conduct a complete review of the CBAM, focusing in part on its impact on the exports of least developed countries.⁹⁴

In 2021, 39.5% of Ukraine's exports went to the EU, making it by far the country's most important trade partner.⁹⁵ Figure 1 below shows that Ukraine is also among the EU's trade partners who will be most affected by the CBAM, with over one-third of the country's exported goods – especially steel, minerals, and chemicals – likely to fall under its purview. More than 25% of Ukraine's steel and

steel production is sold to the EU; in 2019 the value of this export was €2.5 billion. The carbon intensity of Ukraine's steel, at 2.38 tons of carbon dioxide equivalent per ton (tCO₂t), is higher than that of the EU (1.95 tCO₂t) as well as other significant competitors. Moreover, Ukraine produces relatively little steel from scrap with more climate-friendly electric arc furnaces. Before the full-scale Russian invasion, Ukraine had hoped to carve out exemptions from the CBAM, but this is unlikely to be successful in the long run.⁹⁶

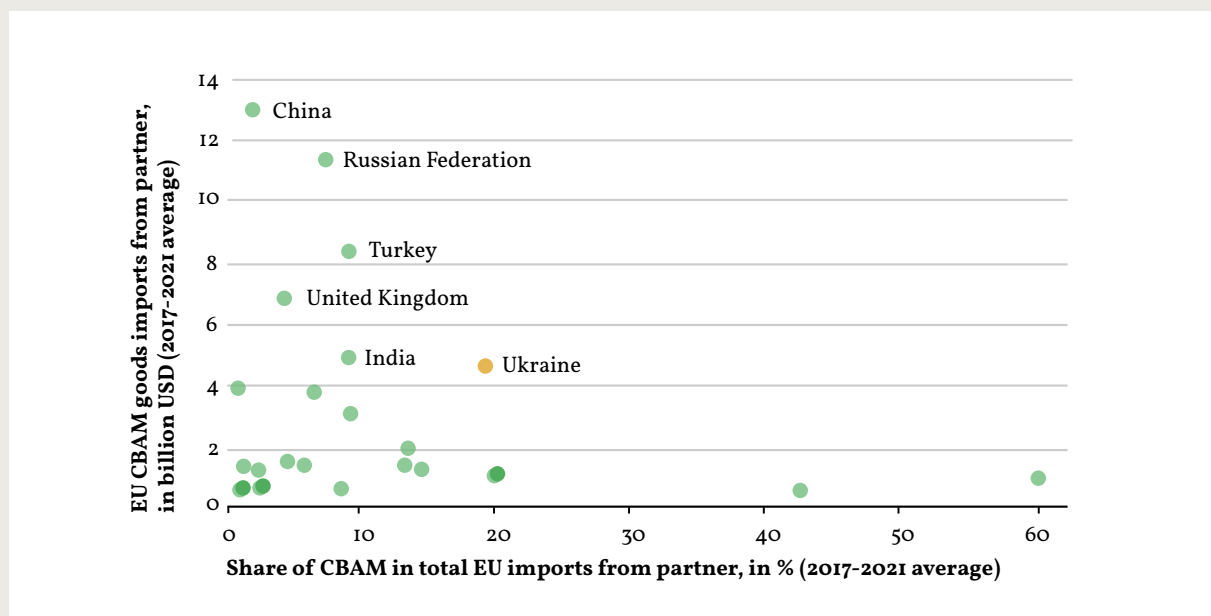


Figure 2: Annual EU CBAM goods import value (billion USD) and share in EU import mix (%) by partner⁹⁷

94 Benson et al., 'Analyzing the European Union's Carbon Border Adjustment Mechanism'.

95 European Commission, 'EU Trade Relations with Ukraine'.

96 Holovko, Marian, and Aperi, 'The Role of the EU CBAM in Raising Climate Policy Ambition in Trade Partners'.

97 Holovko, Marian, and Aperi; Kommerskollegium, 'How to Facilitate Ukraine's Transition into CBAM'.

Recommendations

Implementation of the CBAM: special measures for Ukraine

The findings above suggest that the implementation of the Carbon Border Adjustment Mechanism (CBAM) could present a challenge to Ukraine's economic recovery, as a significant portion of its exports would incur additional costs.⁹⁸ Considering that most CBAM revenues will contribute to the EU budget, however, the EU could allocate a portion of these revenues to support the decarbonization efforts of trading partners such as Ukraine. This approach would improve the perception of the CBAM, strengthen its role in promoting ambitious climate policies, and foster collaboration with low- and middle-income countries.⁹⁹

Moreover, the implementation of CBAM in Ukraine would serve as a form of green finance in terms of the Paris Agreement by incentivizing carbon-reducing practices, generating revenue for climate-related initiatives, and aligning the country with international climate goals. Direct financial support can play a critical role in mitigating the negative impacts of the CBAM and increasing its potential to boost climate policy ambitions in Ukraine. It can take the form of affordable loans,

international climate funds, regional/national climate funds, or direct financing for modernization programs in the public sector.

The latest version of the CBAM regulation entered into force in May 2023 and does not foresee any exemptions for Ukraine. An elaborate study should be conducted on how Ukraine can adapt to CBAM requirements in the most cost-effective way. To help carbon-intensive businesses maintain their competitiveness in the EU market, a special focus should be given to financial incentives as part of transitional finance strategies. Transition finance, a spotlighted concept for financial institutions, involves providing financial support to carbon-intensive businesses in the EU market as they transition to more sustainable practices, aligning with environmental, social, and governance goals and mitigating climate-related risks. FIs use tools like green bonds, sustainability-linked loans, and sustainability reporting to encourage businesses to reduce their carbon footprint while maintaining economic competitiveness.¹⁰⁰

Re-designing the CBAM

Russia's aggression against Ukraine has resulted in disruptions to the country's industrial infrastructure, including its steel production facilities, which are primarily located in the eastern regions of the country (Azovstal, for instance, was one of Europe's largest iron and steel works).¹⁰¹ It will be important for Ukraine to attempt to rebuild the infrastructure of the iron and steel industry by deploying new clean technologies.

This will require substantial financial support, however. While the CBAM is a crucial component of the EU's Fit for 55 packages, the EU also aims to support the green reconstruction of Ukraine's economy. To square this circle, some or all of the revenues from the CBAM which originate in Ukraine can be reinvested there to help them decarbonize their exporting industries.¹⁰² This can be done in two main ways:

⁹⁸ Kommerskollegium, 'How to Facilitate Ukraine's Transition into CBAM'.

⁹⁹ Holovko, Marian, and Apergi, 'The Role of the EU CBAM in Raising Climate Policy Ambition in Trade Partners'.

¹⁰⁰ Baker McKenzie, 'Transition Finance: New Opportunities and Challenges for Financial Institutions'.

¹⁰¹ France-Presse, 'One Of Europe's Biggest Steel Works Damaged in Ukraine's Mariupol'.

¹⁰² EcoPolitic, 'Why the War in Ukraine Requires a Rethinking of CBAM'.

- Revenue generated from the CBAM which originate in Ukraine can be returned directly to Ukraine to finance its energy transition, through a financial mechanism such as a carbon fund or a special purpose vehicle. The revenue can be used to finance renewable-energy projects, energy-efficiency measures, and other green initiatives.
- The funds can be reinvested indirectly through technical assistance. This can be done through capacity-building programs, technology transfer, and other forms of support.

Both these options are in line with the changes the CBAM is expected to bring, namely, creating incentives for third-country governments to put in place greener policies and third-country producers to reduce their emissions.¹⁰³

2.2.7. Risk Insurance/Guarantee Mechanisms

The investment climate in Ukraine may be negatively influenced by geopolitical risks even after the war ends. At the same time, the country needs massive amounts of investment to rebuild and modernize its economy. Much of this should come from the private sector, but investors are understandably cautious. Even before the war, Ukraine's investment climate was widely considered too risky for sufficient levels of investment, both foreign and domestic.¹⁰⁴ The country therefore needs to create refinancing and reinsurance funds with preferential obligations to cover insurers' risks.

The insurance market in Ukraine faced challenges already before Russia's full-scale invasion in 2022. Many private insurers stopped offering coverage due to the annexation of Crimea and fighting in the Donbas region after 2014. A few insurers continued to provide limited coverage, primarily for non-war-related risks. The private sector insurance market in Ukraine has largely ceased operations since the invasion began.¹⁰⁵

In terms of risk mitigation tools, guarantees and insurance play a crucial role. These tools transfer project risks from private lenders to third parties and can cover various types of risks such as commercial, political, and trade risks. They are used in different types of investments, including equity investments, project finance, public-private partnerships, and debt products, and can be provided by a range of institutions, such as multilateral development banks, bilateral donors, development finance institutions, specialized guarantee providers, private insurance companies, and sovereign governments.¹⁰⁶

Contributions by international donors will be essential in this context.¹⁰⁷ The donor community will need to take on early risks that can later be transferred to Ukraine and the private sector. These initial insurance and guarantees can build the confidence needed for private sector investments to flow into Ukraine.¹⁰⁸ The United Kingdom, for instance, has declared its willingness to cover risks by British investors through the national export credit agency UKEF, while the German Gov-

103 European Parliament, 'EU Carbon Border Adjustment Mechanism Implications for Climate and Competitiveness'.

104 Staguhn and Bandura, 'Insurance as a Critical Enabler for Investing in Ukraine'.

105 Staguhn and Bandura.

106 Staguhn and Bandura.

107 Ukraine's Cabinet of Ministers, 'Для Залучення Інвесторів в Україну Треба Запустити Механізми Страхування Воєнних Ризиків, - Юлія Свириденко у Брюсселі'.

108 Staguhn and Bandura, 'Insurance as a Critical Enabler for Investing in Ukraine'.

ernment provides risk coverage for their national investors through PricewaterhouseCoopers (PWC).¹⁰⁹ Another option is the World Bank's Multilateral Investment Guarantee Agency (MIGA), which insures against politically motivated acts of war or civil disturbance in a country.¹¹⁰ The American International Development Finance Corporation (DFC) has also demonstrated interest in insuring Ukrainian investors. However, MIGA's and DFC's guarantees for international investors are dependent on reinsurance opportunities.¹¹¹

The insurance needs in Ukraine are significant and vary depending on the type of investment, sector, and risk. Investors require political risk insurance, standard insurance policies for various events, and coverage for commercial and credit risks. Lessons from other countries prior conflicts, such as Spain (after its civil war) and Israel (due to its geopolitical situation), provide potential models for Ukraine.¹¹²

Recommendations

Enabling the private-insurance market in Ukraine, especially in the early stages, will require the establishment of a donor-backed political risk or war pool to provide coverage despite ongoing uncertainty, including support for green technologies. This coverage could initially focus on war insurance for inland transit of goods and gradually expand to cover property damage and agricultural losses. Coordination between the international community, technical assistance, regulatory reforms, and addressing currency controls are essential for the development of the insurance market in Ukraine. Significant policy and regulatory reforms will be necessary for this purpose, facilitating the growth of sustainable and environmentally friendly energy initiatives in the region.¹¹³

Nuclear, biological, chemical, and radiological (NBCR) risk coverage is of particular interest for Ukraine given security risks – the legacy of Chernobyl and the recent Russian occupation of the Zaporizhzhia nuclear plant are good examples. Moreover, Ukraine operates multiple nuclear power plants within its borders. While they are generally quite safe, any disruption could lead to immediate and massive shortfalls in power-generation capacity. Decentralized systems are less susceptible to disruptions and show greater resilience, especially in the case of attacks – something that should make them easier to insure.

109 Ukraine's Cabinet of Ministers, 'Для Залучення Інвесторів в Україну Треба Запустити Механізми Страхування Воєнних Ризиків, - Юлія Свириденко у Брюсселі'.

110 MIGA, 'War and Civil Disturbance'.

111 Ukraine's Cabinet of Ministers, 'Для Залучення Інвесторів в Україну Треба Запустити Механізми Страхування Воєнних Ризиків, - Юлія Свириденко у Брюсселі'.

112 Staguhn and Bandura, 'Insurance as a Critical Enabler for Investing in Ukraine'.

113 Staguhn and Bandura.

2.2.8. Public-Private Partnerships and other Forms of Public Guarantees

The reconstruction of the energy sector and its sustainable transformation requires the scaling up of investment in low-carbon generation and more environmentally friendly infrastructure and production processes. The involvement of private sector actors is crucial to meeting these challenges. The existence of a strong banking sector is a key prerequisite for enabling green investment into energy projects.¹¹⁴ This makes it possible to provide loans directly to beneficiaries within the energy sector under a state guarantee, which significantly improves distribution flows and increases ownership of end receivers.

The importance of climate change and sustainability has also become increasingly clear to financial institutions, including institutional investors, investment funds, and credit institutions. Climate finance has seen a surge in the use of different financial tools, prompting private-sector financial institutions to seek out climate-related products and collaborate with public sector and multilateral development banks (MDBs) to develop joint products and partnerships.¹¹⁵

Large global investment funds should invest a share of their capital in climate financial products in emerging market and developing economies, including the post-war Ukrainian economy, thereby diversifying their risk, and fulfilling their climate commitments and investors' mandates by part-

nering with MDBs and the national public sector. While private-sector investors can provide a significant share of financing, the public sector can take on more risk such as equity/junior tranches, provide guarantees and credit enhancements, and assist with project selection and assessment, capacity development, and diversification for the private sector. Public-private collaborations in this area would have an important multiplier effect.¹¹⁶

Public-private partnerships (PPP) have become effective instruments for developing energy infrastructure in Ukraine, including energy infrastructure, experiencing a significant surge in value from USD 24.5 million in 2017 to \$1.4 billion in 2019. This substantial increase in the value of PPPs in the energy sector can be directly attributed to the 2016 reform of the Law on Public Private Partnerships, which received support from the EBRD. According to the EBRD, Ukraine achieved a “high compliance” score against internationally accepted standards and best practices for concession and non-concession PPP laws. However, the evaluation of the institutional framework indicator and the PPP business environment indicator resulted in a “low compliance” score. In the bankability indicator, measuring the extent to which a country’s legal framework includes essential requirements for viable PPP financing from a lender’s perspective, Ukraine scored 68%.¹¹⁷

114 EaP Green Partnership for Environment and Growth, ‘Environmental Lending in EU Eastern Partnership Countries’.

115 Oman et al., ‘Mobilizing Private Climate Financing in Emerging Market and Developing Economies’.

116 Oman et al.

117 OECD, OECD Energy Investment Policy Review of Ukraine; EBRD, ‘PPPs/Concessions Sector Assessment’.

Recommendations

With a strong commitment from both the public and private sectors, and an emphasis on effective communication, long-term commitment, flexibility, risk-sharing, and monitoring and evaluation, there is strong potential for successful PPPs in the

Ukrainian energy sector. Many of the private partners will hail from abroad, which is why it is essential to adopt a strong legislative and regulatory basis. This should include at least the following regulatory documents:

- **A Ukrainian link to the European recovery and resilience plan:** An institutional counterpart to the European recovery and resilience plan can open access to the Recovery and Resilience Facility of the EU and foster joint projects to increase cross-border transmission and transportation capacities with neighboring countries.¹¹⁸
- **Production-sharing agreements:** Production-sharing agreements with western energy mayors from Europe and North America, which have experience in renewable energy (especially onshore and offshore wind or hydrogen) and access to international financial resources, can be highly worthwhile.
- **National programs for supporting regional reconstruction:** Ukraine can establish national programs for regional reconstruction under the auspices of the European Alliance of Cities and Regions for the Reconstruction of Ukraine.¹¹⁹ Such programs can provide targeted support and become effective facilitators for the engagement of European communities, municipalities, and businesses in Ukraine's reconstruction, including decentralized energy infrastructure. For them to function properly, the Ukrainian government and local authorities should establish an effective coordination structure as well as clear procedures and deadlines for the approval of projects.¹²⁰

2.2.9. Green Bonds

Like conventional bonds, green bonds are financial instruments which raise capital from investors in the debt capital market and promise to repay it within a given maturity period with interest. The funds they raise are, however, allocated exclusively to sustainable projects, assets, or business activities, according to criteria determined by the issuer or another authorized entity. Green bonds can have a range of advantages over traditional bonds, such as reduced risk for investors, wider access to capital, and more attractiveness to investors.¹²¹

In June 2020, Ukraine's parliament passed Law No. 738-IX "On Amendments to Certain Legislative Acts regarding the Simplification of Investment Attraction and Introduction of New Financial Instruments," with the aim of introducing new models of organized markets and financial instruments in line with EU legislation. This new regulation facilitates the creation of green and infrastructure bonds within Ukraine's capital market, offering a means to finance improvements in the country's energy infrastructure. The implementation of this

118 Chubyk, 'Financial Mechanisms for the Green Reconstruction of Ukraine to Be More Attractive for European Banks and Investors'.

119 European Committee of the Regions, 'European Alliance of Cities and Regions for the Reconstruction of Ukraine'.

120 Chubyk, 'Financial Mechanisms for the Green Reconstruction of Ukraine to Be More Attractive for European Banks and Investors'.

121 OECD, 'Green Bonds. Mobilizing the Debt Capital Markets for a Low-Carbon Transition. Policy Perspectives'.

law is expected to lead to an increase in the issuance of green bonds.¹²²

Corporate green bonds can be issued by several state-owned and private energy companies in Ukraine to quickly find financial resources for the recovery of energy infrastructure compliant with sustainability criteria. Those companies have experience issuing bonds worth up to \$1 billion but will most probably need additional guarantees from the state or foreign partners to get reasonable interest rates.¹²³ The same applies to transition bonds (see chapter 2.2.3 Transition Bonds).

To facilitate access to sustainable finance, Ukraine's National Securities and Stock Market Commission has – with the support of the International Finance Corporation (IFC), the World Bank's private-sector arm – become a member of the Sustainable Banking Network (SBN). This community of regulatory agencies and banking associations from 40 emerging markets is dedicated to promoting sustainable finance. Thanks to its membership, Ukraine receives technical guidance on creating green and climate finance products, as well as implementing effective environmental, social, and governance (ESG) standards and practices, including support in formulating a roadmap for sustainable finance and developing an appropriate regulatory framework.¹²⁴

Recommendations

The laws and regulations associated with the introduction of green bond have not been systematically developed in Ukraine to date. One answer is the adoption of the EU Green Bond Standard, which would provide a detailed and unified regulatory framework. The European Green Bond standard

follows best market practice and is compatible with existing market standards for green bonds, not least the International Capital Marketing Association's (ICMA's) Green Bond Principles.¹²⁵ Its adoption in Ukraine should involve the following:

- Development of regulatory and legal guidelines and procedures based on EU legislation for a Ukrainian green bonds market, including for both sovereign and municipal green bonds. This should comprise a procedure for evaluating and selecting green projects, mechanisms for financing and refinancing green projects, and procedures for monitoring the use and management of funds, control procedures and reporting standards.
- Development of regulatory incentives for the green bond market.¹²⁶

To avoid market fragmentation and make clear the benefits of the EU Green Bond Standard, Ukraine should strengthen the independence of external reviewers and avoid possible conflicts of interest. It

should develop measures to stimulate a deep and liquid market. And it should seek to properly regulate the entire green bond market and reduce greenwashing.¹²⁷

122 Allen, 'Transition Bonds - New Funding for a Green World'.

123 Chubyk, 'Financial Mechanisms for the Green Reconstruction of Ukraine to Be More Attractive for European Banks and Investors'.

124 IFC, 'IFC Partners with Ukraine's National Securities and Stock Market Commission to Boost Green Finance'; OECD, OECD Energy Investment Policy Review of Ukraine.

125 Chen, 'Supporting Green Bond Development for Ukraine'.

126 Chen.

127 Chen.

2.2.10. Crowdfunding

Crowdfunding refers to the collaborative effort of individuals who pool their funds, often through online platforms, to invest and support initiatives initiated by others. It has emerged as a unique fundraising approach, facilitated by internet platforms. Unlike traditional financial intermediaries, crowdfunding platforms enable direct engagement between project proponents and contributors, fostering transparency, open communication, and active involvement. Crowdfunding platforms not only serve as alternative funding sources but also act as communication tools. They promote transparency by allowing project details to be openly shared, and investors can actively participate in online communities, sharing information and providing suggestions.¹²⁸

Crowdfunding was introduced in the energy sector in 2012, stemming from reduced investments in transitioning to decarbonized energy systems and the need for increased access to capital for a sustainable, low-carbon economy. The transformation of energy systems, driven by industry restructuring, liberalization, and the push for renewable distributed generation, enabled smaller investments and the entry of new players such as citizens, local authorities, and small firms. This shift towards decentralization aligned with the “localism” agenda, empowering citizens, communities, and organizations to become energy producers and fostering community energy and shared ownership approaches.¹²⁹ According to one study, the most investigated samples of crowdfunding projects related to renewable energy went to solar energy projects, while the highest amount of investments flowed to hydro energy, and wind and biomass had high investment flows (see Table 1).

| Project type | Number (share of all projects) | Capital raised in thousands of euros (median values of capital raised) | Funding success rate (mean values of the capital raised and success rate, ratio between capital raised and initial target capital) |
|-----------------------------|--------------------------------|--|--|
| Solar energy | 240 (56.7%) | 216.26 (75.00) | 115% |
| Wind energy | 89 (21.0%) | 485.20 (179.00) | 139% |
| Biomass plants | 22 (5.2%) | 488.36 (109.00) | 98% |
| Mix of different renewables | 22 (5.2%) | 3,419.43 (435.00) | 119% |
| Hydro energy | 5 (1.2%) | 542.64 (683.00) | 96% |
| Other green technologies | 45 (10.6%) | 169.63 (136.00) | 168% |

Table 1: crowdfunding campaigns in Poitou-Charentes (France), Gelderland (The Netherlands), Catalonia (Spain), Pays de la Loire (France), Noord-Holland (The Netherlands), Midi-Pyrénées (France) and other European regions from 2011-2017. Source: Adhami, Giudici, and Anh, ‘Crowdfunding for Green Projects in Europe: Success Factors and Effects on the Local Environmental Performance and Wellbeing’.

128 Candelise, ‘Smart Financing and Empowerment: The Use of Crowdfunding in the Energy Sector’.

129 Candelise.

When the full-scale Russian invasion began in February 2022, Ukraine's President Zelensky announced the launch of the national crowdfunding platform United24. The platform allows one-click donations to Ukraine from anywhere in the world and is designed for collaboration with charities, partners, donors, and public figures. Donors can choose from five directions of support: defense, humanitarian demining, medical aid, construction, and education & science. The entirety of the donated funds are transferred to the National Bank of Ukraine, and then assigned to relevant ministries. The funds from different accounts

cannot be mixed and can only be spent in the direction specified by the donor. The report of funds raised and spent is updated weekly.

By October 2023, the total amount of donations was USD 481,753,480. While no projects related to renewable energy are planned as of yet, most projects in the category "rebuild Ukraine" include housing projects.¹³⁰ The residential sector is crucial for the green transition, especially in terms of energy efficiency (for more information see the preliminary technical study).

Recommendations

Ukraine can expand on the success of its United24 crowdfunding platform by integrating fundraising specifically for the energy sector and the energy transition on the municipal level. Residential solar panels, community solar farms, small-scale wind turbines, hydroelectric micro-projects – are some examples of the projects that can be financed on the municipal level by this financial instrument. However.

Furthermore, United24 should be consolidated with DREAM (the Digital Restoration Ecosystem for Accountable Management, a digital ecosystem that provides a single pipeline for all reconstruction projects in Ukraine – see section 2.3.2 Digital Restoration Ecosystem for Accountable Management (DREAM) of this study for more information). Furthermore, remittance fees should be made fully transparent and decreased towards the target of 3% outlined in the UN's Sustainable Development Goals and G20 Roadmap on cross-border payments. The accessibility of remittance services should be continually increased

by expanding agent networks and further advancing digital service offerings.¹³¹

To foster crowdfunding in the energy sector, collaboration should be encouraged between municipalities, local banks, and citizens, and the establishment and operation of regional renewable energy projects should be boosted through crowdfunding platforms. Successful crowdfunding models in countries like France, the Netherlands and Spain that have already effectively utilized crowdfunding in the renewable energy sector should be adapted to Ukraine's post-war reality and energy sector.¹³²

Crowdfunding should be deployed to finance small-to-medium-sized energy projects in economically robust regions. These policies can help harness the potential of crowdfunding in the energy sector, promote sustainable and renewable energy projects, and encourage citizen engagement and participation in the country's energy transition.

¹³⁰ 'UNITED24 - The Initiative of the President of Ukraine'.

¹³¹ Extrabanca et al., 'Remittance and Related Technical Service Providers in Ukraine'.

¹³² Adhami, Giudici, and Anh, 'Crowdfunding for Green Projects in Europe: Success Factors and Effects on the Local Environmental Performance and Wellbeing'.

2.3. Approaches and Instruments Specific to Ukraine

Following on the description of instruments in the preceding paragraphs, this section examines approaches that aim to create a favorable financial environment and efficiently manage financial flows when rebuilding Ukraine's energy sector. Existing and proven methods as well as proposed new and innovative concepts are explored.

2.3.1. Ukraine Reconstruction Platform and RebuildUkraine

Coordination between donors, government, civil society, and other stakeholders is crucial for Ukraine's future rebuilding and development. Since multiple organizations and donors are active in Ukraine, strategic communication and cooperation are essential for generating the maximum potential impact. This can help international financial institutions (IFIs) direct their efforts based on successful past investments in Ukraine as well as their core expertise.

There are ongoing discussions between the EU Commission, the Ukrainian government, the G7, and the EU considering the establishment and functional modalities of a political platform at a senior level that can coordinate financing among donors and Ukrainian authorities.¹³³ While the compatibility of these various proposals remains uncertain, the Commission's Communication on RebuildUkraine offers the most detailed plan for discussing long-term reconstruction assistance for Ukraine. It envisions a Ukraine Reconstruction Platform, jointly led by officials from the European Commission and the Ukrainian government, which would bring together representatives from EU member states, other bilateral and multilateral partners, and international financial institutions. Its primary role would be to coordinate international support in line with the Ukrainian government's reconstruction plans, serving as the main body for strategic governance and coordination.¹³⁴

RebuildUkraine, which involves a mix of grants and loans, is envisaged to be the main reconstruction plan and legal instrument for EU support. In its communication document on "Ukraine Relief and Reconstruction", the Commission notes that, since Russia's full-scale invasion started, the EU has mobilized around €4.1 billion for Ukraine's economic, social and financial resilience in the form of macro-financial assistance, budget support, emergency assistance, crisis response, and humanitarian aid. Military assistance measures under the European Peace Facility, amounting to €1.5 billion, have also been provided to Ukraine and the mobilization of an additional €500 million is under way.¹³⁵

RebuildUkraine will determine priority areas and specific projects to be financed by the EU and its partners, and will coordinate funding sources and their allocation to optimize their utilization, ensure transparency, accountability, and sound financial management, and monitor the plan's implementation progress. It will draw upon the EU's experience with the Recovery and Resilience Facility but tailored to address the unprecedented challenges of reconstructing Ukraine and supporting its European integration.¹³⁶ Grants for Ukraine could be financed through additional contributions from member states, third countries, and existing Union programs, or through a targeted revision of the Multiannual Financial Framework

133 Skidmore, Wessel, and Asdourian, 'Financing and Governing the Recovery, Reconstruction, and Modernization of Ukraine'.

134 Bergmann and Romanyshyn, 'Rebuilding Ukraine: How the EU Should Support Ukraine's Reconstruction and Recovery'.

135 European Commission, Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions: Ukraine Relief and Reconstruction.

136 European Commission, 'Ukraine's Financing Gap and Longer-Term Reconstruction'.

(MFF). As for loans, the concept proposes raising funds on behalf of the EU or securing national guarantees from member states.¹³⁷

The precise source of the funding may be a significant point of contention. Member states may have limited interest in renegotiating the MFF to allocate additional resources for Ukraine's recovery. The current MFF was established after arduous and lengthy negotiations, making further negotiations challenging. Additionally, the proposal to raise funds for loans by borrowing capital on the markets on behalf of the EU, as adopted in Next Generation EU (NGEU), is likely to face resistance from some member states. The German govern-

ment, for instance, has agreed to joint debt under MFF and NGEU, but on the express condition that they be one-time, temporary measures.¹³⁸

The RebuildUkraine platform will emphasize climate, environment, and digitalization measures, with a special focus on rule of law and transparency.¹³⁹ This will strengthen both domestic and international investor confidence – the expert survey carried out under the Ukraine Energy Roadmap project indicates that corruption is still seen as one of the main obstacles for any reform in Ukraine. Moreover, transparent and accountable governance practices help optimize the allocation of resources.

Recommendations

Several challenges need to be addressed during the establishment of the coordination platforms:

- The reconstruction plans should be based on shared knowledge and joint capabilities and skills, as well as clearly stated and distributed roles in line with the expertise and experience of each international financial institution (IFI) in Ukraine.¹⁴⁰
- The framework in place should ensure that IFIs are not in competition but complementary to each other.
- The platform should include at least the following IFIs: the European Investment Bank, the World Bank, the European Bank for Reconstruction and Development, the German investment and development bank KfW, the Japan International Cooperation Agency, the United States Agency for International Development, and the UK Department for International Development.
- The platform should have an operational organ to share information, discuss policy, and coordinate with local authorities.¹⁴¹
- Coordination should be ensured with other platforms and initiatives.¹⁴²
- The platform should incorporate a long-term investment plan for the energy sector.

137 Bergmann and Romanyshyn, 'Rebuilding Ukraine: How the EU Should Support Ukraine's Reconstruction and Recovery'.

138 Bergmann and Romanyshyn.

139 European Commission, 'Ukraine's Financing Gap and Longer-Term Reconstruction'.

140 Boston Consulting Group, 'Revolution in the Driver's Seat, The Road to Autonomous Vehicles'.

141 International Expert Conference on the Recovery, Reconstruction and Modernisation of Ukraine, p. 10.

142 Stubbe and Saha, 'How to Implement a Green Reconstruction for Ukraine'.

The following steps can help ensure the efficient functioning of the platforms and address the challenges mentioned above:

- **Comprehensive strategy**

A comprehensive reconstruction and development strategy should be developed with the involvement of all stakeholders, including donors. The strategy should identify priority areas for investment, such as energy, infrastructure, social services, and economic development.

- **Transparency and accountability**

Donors and other stakeholders should be clear about their activities and funding. Precise reporting mechanisms should ensure that the resources are used effectively and efficiently. This can help prevent waste like double financing.

- **Partnerships**

Donors and other stakeholders should work in partnership with each other and local actors, including civil society and the private sector, to maximize the impact of their efforts. Such fostering will help ensure that the needs of the affected communities are met. Initiative screening provided by project teams can help identify partners and initiatives to cooperate.

- **Local capacity building**

Donors and other stakeholders should build local capacity and empower local actors to lead the reconstruction and development process. This can help ensure the local communities' sustainability and ownership of the process and reduce dependence on international partners. Furthermore, to ensure sustainable reconstruction and recovery in Ukraine, including rebuilding of the energy sector, the EU and its member states should combine ad hoc humanitarian assistance with predictable long-term support.

Immediate reconstruction efforts should focus on addressing the devastation caused by the war. In a longer run, comprehensive modernization and institutional reforms should be pursued to align with the eventual goal of EU accession. Funding for this phase should be conditional on reforms, particularly in areas such as public financial management and the rule of law. This policy lending has – according to the World Bank – a significant positive effect on the quality of social policies and institutions. Given the volatile security environment, long-term reconstruction projects should be rolled out gradually.¹⁴³

Ukrainian ownership will be crucial to these efforts. The platforms described above should develop governance mechanisms for planning, administering, and auditing funds, and ensuring accountability, transparency, and coordination between the Ukrainian government and international partners. Local governments and civil society actors should be included to incorporate local expertise and address local needs. Furthermore, timely agreement on funding and governance of the EU's contribution will be necessary to expedite reconstruction efforts.¹⁴⁴

¹⁴³ Bogetic and Smets, Association of World Bank Policy Lending with Social Development Policies and Institutions.

¹⁴⁴ Bergmann and Romanyshyn, 'Rebuilding Ukraine: How the EU Should Support Ukraine's Reconstruction and Recovery'.

2.3.2. Digital Restoration Ecosystem for Accountable Management (DREAM)

One of the challenges of Ukraine's eventual recovery will be the sheer number of projects – tens of thousands are likely to be taking place simultaneously, at different stages, throughout the country, at any given time for many years. Such a large-scale recovery plan involves attracting huge amounts of funding, which must be spent transparently. This is why the Ukrainian government launched a digital platform – Digital Restoration Ecosystem for Accountable Management, or DREAM – to ensure the transparency and accountability of all reconstruction procedures in 2022.¹⁴⁵

The Ministry for Communities, Territories and Infrastructure Development of Ukraine presented a communication platform for DREAM on May 5, 2023. This platform will contain information on the objectives, structure and principles of the DREAM ecosystem, as well as a step-by-step plan for its implementation in 2023. DREAM is state-operated and provides a single digital route for all recon-

struction projects. It collects all project data online, displays this data in the form of convenient tables, graphs and charts, and ensures the publication of open data in accordance with the global Open Contracting Data Standard.¹⁴⁶ DREAM makes it possible to control every stage of the project lifecycle – from the registration of damage and destruction to financing, procurement and construction works, and commissioning of facilities. It has two levels. The first is existing state registers, systems, and services that create a single route for project development: the Register of Damaged and Destroyed Property (RDP), Geographic Information System (GIS), Sectoral Infrastructure Reconstruction Management System, DIA, USR, Unified State Electronic System in the Construction Sector (USESCS), Prozorro, and [Spending.gov.ua](https://spending.gov.ua). The second level is an umbrella system that collects data from all the first level systems at each stage of the project, and provides open access to them as well as management and control tools.¹⁴⁷

The DREAM platform has many explicit benefits:¹⁴⁸

- Streamlined planning and management
- Open data and enhanced control
- Internationally standardized reporting
- Tools for public participation
- Efficient risk management
- Trust and sufficient funding
- Emphasis on a “build back better” principle

145 Ukraine's Cabinet of Ministers, 'Кабінет Міністрів України - Мінінфраструктури презентувало комунікаційну платформу електронної екосистеми управління відновленням DREAM'.

146 Ukraine's Cabinet of Ministers.

147 Ukraine's Cabinet of Ministers.

148 'DREAM Benefits'.

Recommendations

The following reforms and improvements should be considered for DREAM:

- **Specialized energy sector module:** A dedicated module within the DREAM platform that focuses solely on energy sector projects can streamline the process for energy-related initiatives, making it easier for international partners to identify, fund, and track these specific projects.
- **Energy-specific reporting standards:** Standardized reporting templates tailored to energy projects and aligned with international best practices should be developed. Clear and comprehensive reports can provide potential investors with a better understanding of the projects, their impact, and the potential return on investment.
- **Integration of renewable energy projects:** Inclusion of renewable energy projects in the DREAM platform would highlight the benefits of renewable energy, such as sustainability and long-term cost savings, and attract more interest from international investors and funding organizations.
- **Public-private partnerships:** The DREAM platform should promote and facilitate public-private partnerships. Collaborating with private companies is expected to bring in expertise, technology, and additional funding sources, accelerating the implementation of energy projects.
- **Clearer project selection criteria:** More transparent and well-defined criteria for selecting energy sector projects on the DREAM platform would provide more clarity, ensuring that viable and impactful initiatives are presented to potential funders.
- **Capacity building and training:** Training programs and capacity-building workshops to local stakeholders involved in energy sector projects should be offered to enhance their skills in project development, management, and reporting, and make them more appealing partners to international investors.

2.3.3. The Energy Efficiency Fund

Ukrainian government established an Energy Efficiency Fund (EEF) in 2017 to support energy efficiency initiatives in multi-family buildings. It is financed by Ukraine's state budget and financial support from the EU and the German government, and involves support and expertise from the International Finance Corporation (IFC), Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), and the United Nations Development Program (UNDP). The expected amount of grants under the EEF was UAH 1,181 million (€30 million) until 2020, in which year there were 2,643 projects under implementation.¹⁴⁹

The Fund provides a comprehensive strategy for thermal renovation, covering expenses for materials, equipment, and labor costs. It ensures that mandatory energy audits are carried out to determine feasible measures for each building. Since Russia's

full-scale invasion began, it has also been funding the restoration of damage to residential buildings.¹⁵⁰

The EEF only deals with homeowners' association, which excludes individual homeowners and multi-household residences without such associations, potentially hindering broader energy-saving efforts. Moreover, homeowners' associations often have complex decision-making structures, which may slow down upgrades and energy efficiency measures. Other EU member states face similar obstacles, and have found solutions to them. In Spain, for example, certain arrangements with third parties, including rehabilitation works, the law grants homeowners' communities a sort of legal personality.¹⁵¹ Since 2021, work on energy-efficiency measures has to be confirmed by just 60% of all owners instead of all of them.¹⁵² A similar set of rules can be considered in Ukrainian law.

Recommendations

Possibilities to broaden the EEF's financing should be explored to strengthen its ability to support more energy efficiency projects and post-conflict restoration efforts in Ukraine, with a particular focus on sustainable solutions such as rooftop solar panels and smart home technologies. Additionally, capacity building should be pursued through regular training and knowledge-sharing among regional consultants and stakeholders involved in the implementation of thermal renovation, rooftop solar installations, and smart home integration projects. Such a multifaceted approach would not only aid in postwar recovery but would also advance Ukraine's sustainability goals by enhanc-

ing energy efficiency and utilizing cutting-edge technologies for a greener and smarter future.

An independent research institute involved in capacity building and supported by international partners could offer technical assistance in project planning, implementation, and monitoring. This can ensure that energy efficiency projects funded by the EEF are designed and executed effectively, leading to optimal energy savings. Furthermore, such an institution could conduct research on emerging energy efficiency technologies and innovations that could be implemented in EEF-funded projects.

149 Energy Efficiency Fund, 'Energy Efficiency Fund Strategy 2020-2025'.

150 Energy Efficiency Fund, 'Про Державний Фонд Енергоефективності: Інформація Про Місію Та Діяльність Фонду'.

151 de Arriba Segurado, 'Energy Renovation of Buildings in Spain and the EU'.

152 Jefatura del Estado, Act No. 49/1960, of 21 July on horizontal property, Ley 49/1960, de 21 de julio, sobre propiedad horizontal.

2.3.4. Market-Based Approaches to Ukraine's Financial Sector

Market-based approaches to Ukraine's financial sector are a complex topic, and it is beyond the scope of this preliminary study to provide a detailed analysis. This section provides a short overview of the financing of energy technologies by financial institutions.

The World Bank estimated that the cost of reconstruction, recovery, and the decontamination of mines and explosive remnants of war will exceed €350 billion as of September 2022, which is almost twice the pre-war GDP of Ukraine. To channel these funds effectively, it is crucial to balance the need for swift project implementation with financial stability. This will be a significant challenge during Ukraine's short to medium-term financial reconstruction. A robust and dynamic financial sector can facilitate long-term economic growth by effectively mobilizing both domestic and foreign savings and allocating them towards profitable investments.¹⁵³

Recommendations

To ensure that the financial sector can effectively drive economic growth in Ukraine, several challenges related to the rule of law and corruption must be addressed. This includes the establishment of an effective macroeconomic policy framework that reduces wartime fiscal dominance and returns to inflation targeting. Additionally, social policies aimed at reducing income inequality and increasing self-reliance, including promoting long-term private savings, can create a local investor base. Moreover, international reconstruction support should be channeled towards commercially viable projects through commercial investors, often with the involvement of international financial institutions.¹⁵⁴

To achieve these goals, Ukraine should focus on swift recovery in the banking sector, including the rapid resolution of non-performing loans and related bank recapitalizations. The country can-

The main priority is to develop a stable and transparent regulatory framework that encourages foreign investment. It is also essential to create an enabling environment for businesses to access long-term financing. Developing an effective credit infrastructure, promoting financial inclusion, and improving payment systems can also contribute to deepening the financial sector.

Overall, two strategic considerations will guide Ukraine's financial development. Firstly, Ukraine's EU candidacy will provide a useful institutional anchor for regulatory alignment and re-engagement with foreign investors. Secondly, given the continued geopolitical uncertainty, financial deepening may depend on risk-sharing arrangements with the EU, bilateral donors, and multilateral development institutions.¹⁵⁴

not afford to have its banking sector bogged down for years with problematic legacy loans, which would complicate funding for new investments. Additionally, a more market-based approach to resource allocation, including the privatization of state banks and domestic tools for mobilizing local savings, is needed to counteract Ukraine's history of misallocation of resources by the state and related governance challenges. Furthermore, developing a local investor base and equity culture, increasing the share of sustainable finance, and fostering financial inclusion are also essential for the long-term health and stability of Ukraine's financial sector.¹⁵⁵

As an EU candidate country, Ukraine should use the economic advantages achieved by aligning its regulatory and institutional frameworks with existing EU standards even prior to accession. This alignment can enhance the robustness of

153 De Haas and Pivovarsky, 'The Reconstruction and Development of Ukraine's Financial Sector after the War'.

154 De Haas and Pivovarsky.

155 De Haas and Pivovarsky.

156 De Haas and Pivovarsky.

its regulatory and supervisory framework, leading to increased resilience in the banking sector. Specifically, this alignment would be well served by adopting the EU's bank prudential framework, including the Capital Requirement Regulation (CRR) and Directive (CRD), which implement the Basel Committee standards in the EU.¹⁵⁷

This alignment process will involve an assessment conducted by the European Banking Authority (EBA), followed by the issuance of a positive equivalence opinion by the European Commission. The achievement of regulatory and supervisory alignment would create a level playing field

for subsidiaries of international banking groups, promoting long-term sustainability for cross-border activities in Ukraine. For instance, aligning Ukraine's framework for professional secrecy and confidentiality with EU standards would enable Ukrainian representation in joint supervisory and resolution colleges. Furthermore, attaining equivalence in supervision with the EU would substantially reduce regulatory costs for European banks operating in Ukraine. Consequently, this would incentivize foreign banks to continue supporting their Ukrainian subsidiaries and encourage other financial institutions to consider entering or re-entering the country's market.¹⁵⁸

2.3.5. Territorial Cooperation between EU and Ukraine: City Twinning and Regional Partnerships

Territorial cooperation as a form of governance that transcends state borders could be a worthwhile cooperation framework to fund local energy projects in Ukraine in the future. Given the previous experience of Ukrainian communities as well as international practice, this mechanism can be especially useful for the financing of capacity building in energy-related spheres. In 2022, Ukrainian cities had over 1,000 twinning agreements with foreign partners, while regional and district authorities had signed nearly 350 such agreements.¹⁵⁹

The geographical orientation of cooperation between Ukraine cities and foreign partners was clearly oriented towards the EU even before the large-scale invasion of Russia in 2022. In 2020, 72.5% of all cooperation agreements concluded by Ukrainian cities and regions were with local and regional authorities in the EU countries.¹⁶⁰ The reasons for this strong cooperation with Europe in particular are of course geographical and cultur-

al proximity – the largest number of agreements were with local and regional authorities in adjacent countries such as Poland, Slovakia, Hungary, and Romania.¹⁶¹

Apart from territorial cooperation programs, there are several initiatives under the European Neighbourhood Policy that support decentralization processes in Ukraine. These initiatives focus on knowledge transfer and cooperation at a range of administrative levels, such as U-LEAD with Europe. Additionally, within the Eastern Partnership framework, there are other programs that involve territorial cooperation with local and regional authorities in Ukraine. For instance, there are initiatives related to energy transition (Covenant of Mayors-East) and economic development (Mayors for Economic Growth).¹⁶² The EU also provides several financing mechanisms for territorial cooperation both within the EU and with neighboring countries, including Ukraine. The Interreg territorial cooperation pro-

157 De Haas and Pivovarsky.

158 De Haas and Pivovarsky.

159 Policy Department for Structural and Cohesion Policies Directorate-General for Internal Policies, 'Cooperation between EU Cities and Regions with Their Ukrainian Partners'.

160 Smętkowski et al., Cooperation between EU Cities and Regions with Their Ukrainian Partners.

161 Policy Department for Structural and Cohesion Policies Directorate-General for Internal Policies, 'Cooperation between EU Cities and Regions with Their Ukrainian Partners'.

162 Policy Department for Structural and Cohesion Policies Directorate-General for Internal Policies.

grams represent one of the main instruments of the EU Cohesion Policy, for instance.¹⁶³ In the period 2014-2020, 12 Ukrainian regions participated in four cross-border Interreg partnerships (illegally occupied Crimea and Sebastopol were excluded). Ukraine is eligible to take part also under the current financing period 2021-2027.¹⁶⁴

Furthermore, the European Commission and the government of Ukraine have signed an agreement in June 2023 that welcomes Ukraine into the Connecting Europe Facility (CEF) program.¹⁶⁵ This enables Ukrainian project promoters to apply for EU funding for vital projects in transport, energy, and digital sectors, enhancing Ukraine's connectivity with EU neighbors. It supports Ukraine's integra-

tion with the EU Single Market, fostering growth, job opportunities, and competitiveness. Cross-border renewable energy projects, for instance, can receive CEF-Energy support.¹⁶⁶

Territorial cooperation agreements yield direct and tangible outcomes, notably the advancement of cross-border infrastructure.¹⁶⁷ To give an example, the cities of Myrhorod in Ukraine and Anykščiai in Lithuania signed a partnership agreement in 2017 which led to seminars enabling knowledge transfer to Ukrainian housing and communal services employees, budgetary institutions, and local deputies on renewable energy sources, energy savings in the residential sector, and waste management, among other things.¹⁶⁸

Recommendations

Despite the Russian aggression, there are opportunities for Ukraine to renew existing and establish new partnerships in Europe. European organizations can contribute significantly, not just in humanitarian aid but also in postwar reconstruction through the European Alliance of Cities and Regions for the Reconstruction of Ukraine.¹⁶⁹

Twinning between cities and cross-border regions should be enabled so as to facilitate joint energy projects on a local level, such as the exchange of energy and power equipment, developing renew-

able energy sources like solar, wind or biomass, or implementing energy conservation programs. Pooling resources and expertise can lead to more effective and economically viable projects. Moreover, such partnerships open access to EU funding. Energy sector development in twin cities can support sustainable urban development initiatives, including energy-efficient buildings, green transportation, and waste-to-energy projects. Any knowledge transfer received by Ukrainian partners can be disseminated further within the country as well.

163 Regulation (EU) 2021/1059 of the European Parliament and of the Council of 24 June 2021 on specific provisions for the European territorial cooperation goal (Interreg) supported by the European Regional Development Fund and external financing instruments.

164 Smętkowski et al., Cooperation between EU Cities and Regions with Their Ukrainian Partners.

165 European Commission, 'Connecting Europe Facility'.

166 European Commission, 'Commission Further Integrates Ukraine into EU Single Market through the Connecting Europe Facility for Infrastructure Funding'.

167 Policy Department for Structural and Cohesion Policies Directorate-General for Internal Policies, 'Cooperation between EU Cities and Regions with Their Ukrainian Partners'.

168 Smętkowski et al., Cooperation between EU Cities and Regions with Their Ukrainian Partners.

169 Policy Department for Structural and Cohesion Policies Directorate-General for Internal Policies, 'Cooperation between EU Cities and Regions with Their Ukrainian Partners'.

2.3.6. Capacity building in terms of human capital

A mechanism that can mean a lot for Ukraine's energy sector recovery and transformation is capacity building through improvements to the knowledge, skills, and resources necessary to enable sustainable and efficient energy infrastructure. The expert survey under the auspices of the Ukraine Energy Roadmap project and informal discussions with Ukrainian stakeholders have shown that capacity building initiatives are most welcome in the energy sector in fields such as technical and managerial skills, regulatory frameworks, and innovation promotion in energy technologies.

The issue of human capital in Ukraine's energy sector has become increasingly acute since the country's independence and has been addressed as such in the latest Energy Strategy of Ukraine till 2050, among others.¹⁷⁰ On the one hand, technical and en-

gineering specializations are becoming less popular among students every year. On the other hand, there is a lack of government incentives to develop human resources and maintain research programs in this field, which also reduces the potential number of engineers.

Since 2010, the participation of specialists and scientists in decision-making on technological progress in the energy sector has significantly decreased, and the work of scientific and technical councils of specialized agencies has been virtually frozen. In 2022, this problem was turbocharged by Russia's full-scale invasion. Some five million people moved abroad, a significant population is trapped in occupied territories, and university education is conducted remotely, reducing the quality of training.¹⁷¹

170 Ukraine's Cabinet of Ministers, 'Energy Strategy of Ukraine until 2050'.

171 OECD, 'Shaping the Path to Economic Recovery'.

Recommendations

Ukraine is planning for many new energy projects after the end of the war, which means it will need people to build and operate a large number of new facilities in the future. The following measures can be of help in the necessary capacity building.

- Training programs could include programs for engineers, technicians, and other professionals, covering topics such as renewable energy technologies, energy efficiency, and smart grid systems. The government can work with universities and training institutions to develop and implement these programs.
- Knowledge transfer could involve partnering with international organizations, such as the International Renewable Energy Agency (IRENA), to share best practices and knowledge on renewable energy development. The government can also establish partnerships with other countries that have experience in renewable energy development, e.g., Germany, Poland, USA etc., to learn from their experiences.
- Regulatory reform based on in-depth analyses and evidence-based recommendations is also important. It needs to be built on solid advocacy and education about the necessity of reform, engagement with policymakers and stakeholders, and mobilization of public support. Technical assistance and capacity building support to government agencies and other stakeholders can help them implement regulatory reforms as well as monitor and evaluate their implementation.
- Research and development involving the latest technological advances, such as renewable energy, smart grids, energy storage systems, and energy efficiency measures, should be a part of any postwar energy sector reconstruction. Innovative solutions should be identified and developed in a way that suits Ukraine's specific needs and challenges. Ukraine's diaspora of scientists and researchers can be reconnected with the home country by strengthening existing networks and establishing new ones.¹⁷²

Capacity building efforts in the energy sector on the national level could benefit from a single anchoring and coordinating institution embedded in the central government which could foster consistency in the approach taken and see that resources are used efficiently by avoiding duplication of efforts and ensuring that the most pressing needs of the sector are being addressed. This institution could also fulfill the role of a thinktank that researches the latest tendencies in the energy sector and translates them into concrete actions, and shares best practices and lessons learned.

However, it is important to note that creating a new institution can be costly and time-consuming, and there are no homegrown thinktanks in Ukraine active in the relevant domains with a broad portfolio of projects at this time. It may be more practical to build on existing institutions or to establish a network of institutions that can work together to implement capacity-building measures. International thinktanks and research centers already have expertise and experience in the fields of energy transition, energy tech, climate change and climate mitigation and further related fields of expertise. They can also be well-connected in the international community and could help attract international funding and support for climate and energy-related projects in Ukraine.

172 OECD, 'Shaping the Path to Economic Recovery'.

3. Evaluation of Financial Instruments for Suitability in the Ukrainian Context

The financial instruments analyzed in section 2.2 General Financial Mechanisms have particular potential to make a large-scale contribution to the reconstruction and upgrading of Ukraine's energy system. They are therefore evaluated separately in this section. The criteria have been chosen based on their contribution to how deployable a given instrument is in the Ukrainian context. They are as follows:

- dependence on international donors,
- compliance with the EU Green Taxonomy,
- previous experience in Ukraine,
- suitability for the funding/supporting of innovative technologies, and
- need for regulatory reforms.

Each instrument is given a score between 1 and 5, with better performances receiving higher grades. The findings are shown in Table 2.

| Criteria | PPP | De-risking measures | Transition bonds | Green bonds | Free economic zones | CBAM | Risk insurance | Crowd-funding |
|---|-----|---------------------|------------------|-------------|---------------------|------|----------------|---------------|
| Dependence on international donors | 3 | 2 | 2 | 2 | 3 | 4 | 3 | 1 |
| Compliance with EU Green Taxonomy | 4 | 4 | 4 | 5 | 3 | 5 | 3 | 2 |
| Previous experience in Ukraine | 5 | 3 | 4 | 3 | 4 | 0 | 2 | 4 |
| Suitability for innovative technologies | 4 | 5 | 4 | 5 | 4 | 4 | 2 | 3 |
| Need for regulatory reforms | 4 | 4 | 4 | 3 | 3 | 3 | 3 | 1 |
| Overall | 20 | 19 | 18 | 18 | 17 | 16 | 13 | 11 |

Table 2: Evaluation of Financial Instruments for Suitability in the Ukrainian Context

As with any evaluation matrix, it is essential to consider the context, objectives, and stakeholders involved when selecting the most suitable financial instruments for financing the energy sector rebuilding in Ukraine. The matrix provides a starting point for further analysis and decision-making.

- Dependence on international donors: This criterion assesses the extent to which each financial instrument relies on funding from international donors to support the energy sector rebuilding in Ukraine. The Carbon Border Adjustment Mechanism (CBAM), being a policy mechanism imposed on imports, may have some degree of international support (rating 4). Crowdfunding may involve little to no support from international donors (rating 1). Public-private partnerships (PPPs) may have moderate reliance on international partners (rating 3). And transition bonds, green bonds, and risk insurance mechanisms could have some international investor participation (rating 2).

- Compliance with the EU Green Taxonomy: This criterion evaluates how well each instrument aligns with the EU Green Taxonomy to ensure environmentally sustainable investments. CBAM and green bonds are explicitly designed to comply with the EU taxonomy (rating 5). Crowdfunding may have limited direct alignment (rating 2). PPPs may have moderate alignment depending on the specific projects (rating 4).
- Previous experience in Ukraine: This criterion considers the past implementation or presence of each financial instrument in Ukraine. PPPs and green bonds have already been deployed in the country (rating 5), whereas CBAM has not (rating 0). There may be limited previous experience in Ukraine with risk insurance mechanisms and de-risking measures for innovative technologies (rating 2 or 3). Crowdfunding may have some presence but it may not be directly linked to energy sector rebuilding (rating 2).
- Suitability for funding/supporting innovative technologies: This criterion assesses how well each instrument supports the implementation of innovative technologies in the energy sector. Green bonds and de-risking measures are well-suited for innovative technologies (rating 5). CBAM and PPPs could also promote some technological advancements (rating 4). Crowdfunding may have limited impact on supporting innovative technologies (rating 3).
- Need for regulatory reforms: This criterion evaluates the extent to which each instrument requires changes in existing regulations or policies for effective implementation. CBAM and de-risking measures may need some regulatory adjustments to fit Ukraine's specific context (rating 4). Crowdfunding and remittance may not necessitate major regulatory changes (rating 1). PPPs, transition bonds, green bonds, and risk insurance mechanisms may require moderate reforms in local legal frameworks (rating 3).

The evaluated approaches collectively demonstrate a multifaceted and comprehensive strategy for funding innovative energy technologies while rebuilding the energy sector after the Russian aggression. By leveraging international cooperation, digital accountability, energy efficiency, market-based incentives, and regional partnerships, Ukraine can pave the way for a more sustainable and resilient energy future. However, successful implementation will depend on effective coordination and continuous efforts to ensure transparency, inclusivity, and expertise at all levels of these initiatives.

The specific Ukrainian approaches collectively demonstrate a multifaceted and comprehensive strategy for funding energy transition and implementation of innovative energy technologies while rebuilding the energy sector after the war. By leveraging international cooperation, digital accountability, energy efficiency, market-based incentives, and regional partnerships, Ukraine can pave the way for a more sustainable and resilient energy future.

However, successful implementation will depend on effective coordination and continuous efforts to ensure transparency, inclusivity, and expertise at all lev-

els of these initiatives. Ukraine's Digital Restoration Ecosystem for Accountable Management (DREAM) is another promising approach that can significantly affect funding for innovative energy technologies in Ukraine. By utilizing digital technologies and accountable management practices, DREAM can enhance transparency and efficiency in resource allocation, reducing the likelihood of corruption and misappropriation of funds. This streamlined approach can attract more investors and donors to support innovative energy projects, instilling confidence in the credibility of the initiatives.

The Reconstruction and Energy Efficiency Fund is a valuable mechanism for channeling resources towards energy-efficient projects. By incentivizing investments in sustainable and eco-friendly technologies, this fund can lead to significant advancements in Ukraine's energy sector while simultaneously lowering energy consumption and environmental impact.

Market-based approaches to Ukraine's financial sector will play a vital role in stimulating private sector investments in innovative energy technologies. By creating favorable market conditions,

such as tax incentives, reduced regulatory barriers, and access to financing, the country can attract both domestic and foreign investors, driving innovation and progress in the energy sector.

Territorial cooperation between the European Union and Ukraine through twin-cities and regional partnership cooperation can foster technology transfer and knowledge sharing. Such collabora-

tions can be beneficial in funding innovative energy technologies, as they enable Ukraine to tap into the expertise and financial resources of its EU partners. Capacity building is equally critical, as it ensures that local stakeholders are equipped with the necessary skills and knowledge to effectively manage and implement energy projects, thus maximizing the impact of funding efforts.

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