



Low Carbon Ukraine
Policy advice on low-carbon
policies for Ukraine



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Putting the green reconstruction of Ukraine into action: Requirements for programme design and policy

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About Low Carbon Ukraine

Low Carbon Ukraine is a project that continuously supports the Ukrainian government with demand-driven analyses and policy proposals to promote the transition towards a low-carbon economy.

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1 Introduction

As the Russian war against Ukraine rages in its fifth month and countless lives have been lost, damages to civilian infrastructure have also reached a staggering toll of over USD 100 bn according to the June 8, 2022, Kyiv School of Economics damage assessment¹. Over 10% of those damages relate to industrial enterprises, about 30% concern roads and infrastructure and almost 40% relate to residential buildings. In addition, at least 270 thousand km² of land require demining according to the Ministry of Internal Affairs². Ukraine, with support from the international community, will have to undertake a massive effort to reconstruct damaged or fully destroyed civilian infrastructure and restore its agricultural and natural land.

While the fight to liberate Ukrainian territory continues, discussions on the reconstruction process have already begun and several proposals have already been circulated by various organisations and stakeholders (for example CEPR³, CMU⁴). Although each proposal for a reconstruction programme contains references to a “green reconstruction”, plans have so far been relatively vague on the precise meaning of this term. In our previous article⁵, we have argued that a green reconstruction is not a luxury but an economic necessity to ensure the survival and competitiveness of Ukraine’s economy.

In order to advance the discussion during the upcoming Lugano conference⁶ and beyond, the necessary transformations and technology options for each sector, as well as the key barriers and appropriate policies for realising a green reconstruction now need to be identified. Against this backdrop, Low Carbon Ukraine, together with Centre for Environmental Initiatives “Ecoaction” and CEE Bankwatch, have organised a roundtable conference on May 31st. This roundtable brought together over 60 representatives from civil society and industry, as well as national and international experts, to discuss what green reconstruction means concretely in every sector, what barriers to a green reconstruction currently exist, and how an optimal policy mix could overcome these barriers. This article reflects the insights the organisers gained from the conference.

2 Overarching conclusions

In the different breakout sessions and panels, several overarching themes emerged as crucial to a robust and successful green reconstruction.

- **Implementing green reconstruction requires a combination of programme design and policy:** Green reconstruction must be implemented in several sectors by a multitude of actors. To ensure that decentralised decision-making is guided towards green reconstruction requires overcoming existing obstacles to green investment (for example

¹ <https://kse.ua/about-the-school/news/direct-damage-caused-to-ukraine-s-infrastructure-during-the-war-has-reached-over-105-5-billion/>

² <https://mvs.gov.ua/uk/news/denis-monastirskii-v-ukrayini-potribno-rozminuvati-shhe-priblizno-270-tis-kvadratnix-kilometriv-teritoriyi>

³ <https://cepr.org/content/blueprint-reconstruction-ukraine>

⁴ <https://www.kmu.gov.ua/en/news/rozpochalasya-pidgotovka-propozicij-do-kompleksnogo-planu-vidnovlennya-ukrayini>

⁵ <https://voxukraine.org/en/economic-reasons-for-a-green-reconstruction-en-programme-for-ukraine/>

⁶ <https://www.urc2022.com/>

unfavourable market regulation in the electricity sector, subsidised consumer tariffs for largely fossil-based heat, and the public service obligation scheme on electricity for households) to be eliminated. In that context, wasteful direct and indirect price subsidies should be replaced by usage-independent and more targeted subsidies to vulnerable consumers. At the same time, the reconstruction programme itself must be designed to encourage prioritising the long-term, lifetime efficiency of green technology and project investments over generally higher initial investment costs. Where coordination problems between and within sectors may emerge (for example on electrification of the economy), programme design may have to become more interventionist and specific to overcome market failure.

- **A strategic decision is required regarding whether to make Ukraine a showcase model for selected frontier technologies.** Many of the technologies needed for a truly green reconstruction are already widely in use and commercially efficient. But in some cases (for example green steel or cement production, heat pumps), green technologies are in earlier stages of deployment. While a reconstruction using some of these frontier green technologies would be comparatively costly, reconstructing with old technology would risk creating stranded assets in future (for example when subject to stringent EU rules and prices for Greenhouse Gas (GHG) emissions). For these areas, a strategic decision by Ukraine and its international partners will be required to determine if Ukraine could indeed become a showcase country for modern technologies. This would also require coordination with other sectors, as it would most likely imply substantially faster electrification of the economy and the need for renewables-based hydrogen availability in the longer term, for example in industry.
- **Affordable financing is vital for green reconstruction:** As the costs of capital were already high in Ukraine before the war and will not improve after the war ends, access to affordable financing for investments will be vital. Otherwise, the higher capital costs of green investments cannot be outweighed by lower operational costs. Affordable financing could be provided by international financial assistance through discounted credit or grants, probably in the context of a post-war reconstruction programme as that proposed by the EU⁷. In particular, the Ukrainian government together with international financial institutions should ensure access to affordable funding for small- and medium-sized enterprises.
- **Efficient administration of green reconstruction projects is necessary to secure speedy implementation:** Replacing old, dirty and inefficient assets which are damaged or destroyed by the war with newer and clean technologies will generally require more sophisticated planning and construction processes that can otherwise lead to a lower speed of implementation. To avoid stalling or impeding the green reconstruction, effective and fast project management and implementation processes are needed. At the same time, authorities and investors should guarantee access to projects' information including meaningful public participation compliant with the Aarhus

⁷ https://ec.europa.eu/commission/presscorner/detail/en/ip_22_3121

Convention. For project appraisal on a local scale, for example, innovative mechanisms involving the local population such as participatory budgets might be considered.

- **Governance of reconstruction programmes and a continuation of reform processes are required to attract financing.** Ukraine's international partners, especially the EU and USA, declared their willingness to substantially assist Ukraine's post-war reconstruction. Still, Ukraine will need to provide the conditions to allow this investment to take place. Most notably, the actual reconstruction programme vehicles need to reflect international best practice in governance. Anti-corruption, rule of law efforts (i.e., judicial and police reforms), protection of human rights and other reforms, many of which were not showing much progress in the period preceding the war, need to be restarted with redoubled effort, also in view of recent positive legislative developments and requirements for EU membership. While the donors are expected to coordinate their reconstruction efforts, Ukrainian authorities are expected to transparently provide the information on the funds they'll receive and improve their accountability, involving the community in decision-making, and facilitating access to information. Transparency and accountability are necessary across the wider value chain, including in amongst others, government procurement, public financial management and investment decisions. Good governance must be ensured out of respect for the millions of Ukrainians suffering incredible hardship for their dream of a sovereign country free from corruption.
- **International private investment will require political risk insurance.** The potential role of international private investment should not be overlooked. Private investment could complement and enhance the financing provided by countries and international financial institutions. It would benefit Ukraine to improve productivity through joint ventures or create competition on previously monopolistic markets. However, private investors will be very cautious in a post-war situation, with security concerns likely not fully resolved for years to come. The availability of investment insurance, covering relevant risk categories such as military risk, would be a necessary precondition to attract any such investment. As it would reduce the need for financial assistance from public budgets, the provision of investment insurance should be a win-win for international partners. It could be especially useful if provided at a larger scale, for example, by the EU, to avoid a multitude of different bilateral investment insurance schemes. Potentially, frozen Russian assets could be used as collateral for such risk insurance.

To allow a consistent integration of the above considerations, there is a strong need for Ukraine and its partners to agree on a basic **architecture of the reconstruction programme** as soon as possible. While the European Commission's recent communication⁸ did outline an initial and preliminary structure including joint Ukrainian and EU political governance over a multitude of actual financing instruments and institutions, the structure of these institutions and their mode of operation remains unclear. To allow more constructive debate on programming and policy, this should be addressed as early as possible. Ideally, joint Ukrainian and EU political ownership should be coupled with the EU's expertise in handling large-scale financial programmes. At implementation level, existing project management capacities, for example of international development banks active in Ukraine should be utilized and successful models such as the

⁸ https://ec.europa.eu/commission/presscorner/detail/en/ip_22_3121

Energy Efficiency Fund should be used as a blueprint for designing necessary additional institutions. The European Code of Conduct on Partnership should be followed to ensure the involvement of all stakeholders, including civil society organisations and municipalities in all stages of decision-making and implementation.

3 Sectoral challenges and opportunities

Across the different sectors covered in the workshop, substantial differences exist in their specific reconstruction challenges. This starts with the actual need for reconstruction: While destruction in the electricity sector has remained relatively limited and mainly focussed on transmission and distribution grids, there are massive damages to residential buildings. The industrial sector as well as agricultural and other lands in the areas affected by the war have also been heavily affected. Differences also exist in the economics of green reconstruction. While in some areas, the benefit from green reconstruction is clearly evident, in other areas or sectors it is more conditional on circumstances or developments. And finally, specific policy impediments or issues potentially affecting green reconstruction exist in many sectors.

3.1 The buildings and heat sectors

Although technically these are two sectors, we combined discussion in one panel due to their inextricable linkage. While providing one basic element of subsistence to people, housing has been subject to terrible damage, especially in the areas affected by ground fighting and artillery attacks. Before next winter, heating and housing must be adequately reconstructed and secured for all the people in Ukraine. The challenge of green reconstruction in this area hence needs to reconcile more long-term considerations for energy-efficient houses including heating systems (which are no longer dependent on fossil fuels) with the immediate need for shelter and warmth. While trade-offs will be necessary political will and action will be necessary to ensure to prevent the same mistakes of yesteryear.

The technologies for more energy efficient houses have already existed for a long time. Improving energy efficiency for Ukraine's highly energy-inefficient housing stock was not only environmentally but also economically necessary even before the war (although incentives for homeowners were often distorted by inadequate tariffs in district heating) and was supported, for example, by the Energy Efficiency Fund. In the area of heating, the technological issue is somewhat more challenging: Heat pump technology is developing rapidly and allows often highly efficient generation of heat by consuming relatively modest amounts of electricity (which can be produced using relatively cheap and fast-built renewable energy sources (RES)). In fact, heat pumps are commonly three to seven times as efficient⁹ as natural gas boilers. For district heating systems, considered to be relatively efficient designs in principle, utility-scale heat pumps could be used. These would replace the old gas- or coal-fired heat or combined heat and power plants (CHPs), further reducing fossil dependency, especially on gas. However, heat pump technology is still relatively expensive, and the investment costs may require additional support to be commercially attractive in comparison to conventional, but dirty and fossil-based

⁹ <https://www.iea.org/reports/heat-pumps>

options. In that context, it is also important to phase out direct and indirect subsidies to fossil-based heat to level the playing field.

In order to implement green reconstruction in this sector, some challenges will need to be overcome. A comprehensive analysis of the efficiency of different technology configurations of the housing-heat nexus is required to confirm whether, for example, heat pump technology and different grades of energy-efficiency in houses will be a feasible component of rebuilt housing structures and district heating systems (Low Carbon Ukraine is working on such an analysis). Such analysis should then inform programme design for the financing of reconstruction. In addition, existing obstacles in the sector must be addressed, such as the regulation of district heating companies and their price setting or the lack of enforcement of existing energy efficiency norms for buildings. Finally, if heat pump technology is to be used at a large scale, this will increase electricity demand and should be coordinated with increased deployment of green electricity provided by RES. Overall, it is expected that in the buildings/heat and energy sectors, green reconstruction will be a clear win-win, reducing system costs and emissions and improving the energy security of Ukraine.

3.2 Electricity

Despite the high-profile news and justified fears generated by fighting in and around Zaporizhzhia and Chornobyl nuclear power plants, overall damage to Ukraine's power system has been comparatively limited. While smaller power stations and CHPs in areas of intense fighting have been heavily damaged or destroyed and households disconnected from power, Ukrenergo, the transmission system operator, has been able to ensure the stability of the national grid even prior to the emergency synchronisation with ENTSO-E despite various damages to grid infrastructure. RES plants (wind and solar), even though often in or near active conflict areas are continuing to produce power at only slightly lower scale than in the same period of last year according to market data.

Green reconstruction efforts in the electricity sector should start with fixing destroyed and damaged transmission and distribution infrastructure. Then, the issue of generation capacity needs to be addressed. Damaged or destroyed generation capacity must be replaced. In addition, green reconstruction in other sectors may increase electricity demand. Furthermore, a phase-out of highly inefficient coal mining and coal-based power generation may become even more urgent than before the war should coal mines near the active conflict zone become more affected. For this, wind and solar power are competitive and should be used at the widest possible scale. They are more cost-effective and, due to their technology and decentralised deployment, more secure and resilient than nuclear power. In addition, there are doubts that Ukraine's international partners and IFIs will be able to support new nuclear projects in a country with such military risks. At the same time, the question remains about the future decommissioning of old NPPs. Under the current circumstances the process of decommissioning is nearly impossible to be planned properly which will increase security risks of the currently operating NPPs. In any case, additional flexible balancing capacity will be required in the longer term. As hydropower cannot be expanded indefinitely – at most the reconstruction of old HPPs - all options from battery storage to sustainably-sourced biomass should be considered.

The corresponding policy challenge will be to ensure functioning markets and the availability of attractive sales channels for power generators. Too many market restrictions and failures limit

incentives to invest. Price caps are necessary due to lack of competition, but hinder investments in balancing capacity only running in times of need. Reconstruction could help bring in new market actors and strengthen competition. Regulated consumer tariffs require widespread redistribution of revenues inside UkrenergO and should be phased out in favour of targeted social assistance to households in need. Finally, completion of ENTSO-E integration will allow Ukrainian generators to create income streams from exporting power to EU markets. This requires both investment in transmission infrastructure to prevent grid stability issues resulting from trade as well as policy action, notably the transposition of ENTSO-E commercial codes and implementation of REMIT regulation.

3.3 The industrial sector

Traditionally concentrated in the East and South of the country, Ukraine's industrial sector has suffered extensive damage and destruction due to the war. Around the world, people saw the pictures of the last stand of the defenders of Mariupol in the destroyed Azovstal steel mill and now of the ongoing fighting in the Asot plastics plant in Severodonetsk. Without these industrial assets, Ukraine would lose valuable sources of merchandise exports and the economic basis for the livelihoods of many people.

Green reconstruction of the industrial sector is not a trivial task, mostly due to timing: Technologies for low- or zero-carbon industrial production are not as advanced as for example in power generation. Although green technologies already exist (for example the hydrogen- and electricity-based Direct Reduced Iron and Electric Arc Furnace (DRI-EAF) technology for producing steel or electricity-based clinker production with carbon capture and storage for green cement), they are now mostly being pioneered in pilot projects. Lessons will be learned, and the technology will eventually become cheaper.

However, reconstructing the industrial assets using the previous, fossil-heavy technologies will often not be viable and would risk vast stranded assets: Due to the immense capital investment required, heavy industrial plants require long amortisation periods, but it is uncertain whether they will be competitive in a future with policies such as the EU's proposed Carbon Border Adjustment Mechanism (CBAM), or, due to Ukraine's eventual accession to the European Union, EU CO₂ prices, and other regulations applying throughout Ukraine. At the same time, some structural change should be allowed to occur in reconstruction. Ukraine has been gradually moving away from heavy industry¹⁰, often still integrated in post-Soviet supply chains, towards lighter manufacturing and services over the past years. However, some heavy industrial sectors such as the steel industry will most probably still have a comparative advantage in Ukraine (in the case of steel due to the iron ore availability) and should not be rashly abandoned.

It is unlikely that Ukrainian industrial companies would undertake green reconstruction on their own, as they have experienced large operational losses and write-offs of assets and even when operating often lack traditional export routes. As stated above, green reconstruction in the industrial sector would require a strong commitment and the strategic decision of the government and donors to turn Ukraine into a showcase of new technologies. Whilst obviously risky in a post-war situation, this would also be an excellent opportunity to create a blueprint for other carbon-intensive transition and developing economies in a situation where financial assistance is required at a large scale. Even if such a decision is taken, policy challenges will

¹⁰ https://www.german-economic-team.com/wp-content/uploads/2022/02/GET_UKR_PB_01_2020_en.pdf

include the interaction of the financial institutions of reconstruction with oligarchic business groups and how to ensure successful joint ventures of international technology leaders with the Ukrainian business groups. Meanwhile, the Ukrainian government should adapt its legislation to European environmental standards, with significant emphasis placed on implementing the Industrial Emissions Directive.

3.4 Agriculture

The agri-food system of Ukraine became a target and a weapon of Russian aggression. Prior to the large-scale invasion, it accounted for 10% of Ukraine's GDP, 40% of total export revenues, and steady growth in international trade. Ukraine, being one of the leading producers and exporters of grains and vegetable oil, is disabled by war to sustain the global food supply, posing acute risk to global food security. The agricultural sector is affected directly by destruction of facilities, infrastructure and fields, and also indirectly via harm to the environment. It is estimated that currently approximately 30% of arable land in Ukraine cannot be used due to the war, and part of it won't be used for years and decades to come because of mines and pollution.

Recovery and reconstruction efforts should target not only large-scale, but foremost small and medium-sized farms and private peasant husbandries, which are the workplace for 80% of all agricultural workers, including informal employment, that supply over 50% of the labour-intensive agricultural production (potatoes, fruits, vegetables, meat, etc.). These parts of the agricultural sector are of great importance for national food security and carry social significance. Furthermore, they are more resilient to supply chain disruptions or targeted military aggression. At the same time, such farms harbour substantial potential for greening agriculture for example by adopting organic farming practices. Access to natural and financial resources, knowledge and information technologies need to be ensured for small-scale, medium producers and their cooperatives for the revitalisation of the rural areas and agricultural production.

Green reconstruction of the agricultural sector should aim for food production based on a circular economy model and best available technologies and practices. This can be achieved for example through conservation agriculture (e.g. no-, low-till, crop rotation and crop diversity), precision agriculture and nature-based solutions for better nutrients, water and soil management, biodiversity conservation, climate-smart irrigation, etc.

By implementing international best practices, Ukraine can benefit not only through reduction of pressure on water sources, lower greenhouse gas emissions, and soil degradation, but also reduce dependency on fossil fuels. An evident example of such approach is agricultural waste (livestock waste/by-products, plants residues, etc.) reuse into renewable energy sources and fertilisers, that together with good farming practices (for example nutrients management), reduce fossils and agrichemicals use, as well as their cost. Another case would be distorted and polluted arable lands that cannot be used for food production, but can be conserved instead, helping to foster GHG emissions reduction and sequestration, keeping the balance of arable lands and natural ecosystems within communities and regions.

Policy measures on the national and community levels should include state and international donors support for small and medium producers, as well as cooperatives. Achieving environmental sustainability and climate targets (for both mitigation and adaptation) within the sector is possible via the EU integration process for Ukraine, including existing environmental

regulations and those expected with the EU Green Deal and Farm to Fork strategy. This needs to be supported by state-level policy measures, including systematic and transparent data collection on production performance and associated environmental variables and impacts, monitoring of natural and agricultural resources, and climate parameters, which will help well-grounded and site-specific decisions on technological needs and efficient implementation.

3.5 Biodiversity and ecosystem management

Since the beginning of Russia's invasion, NGOs and the State Environmental Inspectorate registered¹¹ more than 250 cases of damage to the environment caused by the war. Oil spills and fires, forest wildfires, chemical pollution, soil contamination and water became a sad reality during the war time affecting people and ecosystems. 44% of Ukraine's protected areas including unique forests, steppes, and coastal ecosystems either were or remain temporarily occupied¹² without any guarantee of preservation. Some of these areas are located in the war zones and are heavily affected by fighting. Even though some biodiversity components like fish fauna could potentially benefit from reducing exploitation pressure¹³, military-driven pollution, disturbance and land degradation pose considerable risks for the ability of the ecosystem to provide regular services (such as clean water, healthy soil) in the near future.

Green post-war reconstruction of the country cannot happen without ensuring restoration of damaged ecosystem services. Returning life to the previously occupied territories means not only physical rebuilding of infrastructure but also providing people and nature with basic natural resources to flourish on: clean water, air and healthy soil. Moreover, achieving the pan-European goal of climate neutrality by mid-century is almost impossible without carbon sequestration and storage by carbon sinks (forests, peatlands, soil storage).¹⁴ All these cannot be achieved without building a climate resilient and nature-positive economy in Ukraine as a long-term vision for development.

To achieve this goal, efforts must be undertaken to expand protected areas to at least 20% of terrestrial land and at least 10% of aquatic land through conservation and restoration in the next decade. This includes various regimes of protection and use, including highly protected reserves and national parks and Emerald network lands with limited use. Damaged soil ecosystems, difficult-to-remediate chemical pollution and the high costs of agricultural land restoration after hostilities make the decision on granting the protection status to such territories the default and cheapest option. Among important steps toward building a nature-positive economy are restoration of degraded hayfields and pastures, flooding of drained wetlands, preservation of self-seeding forests and wetlands, and wide-spread application of nature-based solutions in urban planning during reconstruction of cities.

Policy-wise, protection of the environment during war time starts with the possibility to understand, monitor and analyse threats and opportunities. It is thus crucial to have a qualitative evaluation of the impact of hostilities on the environment and ensure monitoring of long-term impacts. Meanwhile, preparing ecosystem management and restoration specialists, including

¹¹ <https://en.ecoaction.org.ua/warmap.html>

¹² <https://uncg.org.ua/44-najtsinnishykh-pryrodnykh-terytorij-ukrainy-okhopleni-vijnoiu-doluchajtesia-do-initsiatyvy-riatuiemo-pryrodu-u-dni-vijny-razom/>

¹³ <https://zn.ua/ukr/ECOLOGY/jak-povnomasshtabna-vijna-vplivaje-na-ribalstvo-v-ukrajini.html>

¹⁴ See for example <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52018DC0773&from=EN>

through international capacity building, is a crucial task to ensure higher-quality implementation. Considering Ukraine's constant struggle with availability and proper use of environmental funds (from carbon tax proceeds and other sources), this issue must be addressed and resolved through adequate governance of such funds. All these require adoption of a series of legislation pieces, strengthening compliance with previous international commitments, and creation of financial and regulatory incentives. Thus, Ukraine should follow EU standards on environmental control and public participation, as these are the only mechanisms that could allow a true green reconstruction of the economy with people and nature in the heart of the process.

4 Outlook

It becomes clear that planning for a Green Reconstruction of Ukraine is a multifaceted challenge that demands policy coordination across a multitude of domestic and international actors. This requires a well-designed overarching institutional framework which needs to be developed as soon as possible by Ukraine together with its international partners.

While there are good economic reasons to build back greener, a number of obstacles from strategy, policy design and implementation, financing and risk insurance, administrative efficiency, and redoubled reform implementation need to be overcome. Important strategic decisions need to be taken at the highest political levels such as turning Ukraine into a showcase for selected frontier technologies, becoming a producer of technologies instead of raw material exporter and dedicating a share of militarily affected and polluted land to nature conservation. Sectoral policy design and implementation will require further elaboration and discussion, for which the above sections might provide a first starting point.

Meanwhile, Ukraine needs to develop a clear vision for its reconstruction in terms of the priorities and desired transformations. In other words, Ukrainians need to come together and decide which kind of country will be rebuilt. As our roundtable conference has shown, and as we have attempted to outline here, many concrete ideas for an economically-sound, environmentally-friendly and socially-just green reconstruction exist. Today's fight is for the liberty of the Ukrainian land and people. Tomorrow, we should all strive to rebuild a more liveable, greener, and more climate-resilient Ukraine.