UKRAINE
RAPID DAMAGE AND NEEDS ASSESSMENT

AUGUST 2022

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Disclaimer: The Ukraine Rapid Damage and Needs Assessment – August 2022 report was jointly prepared by the World Bank, the Government of Ukraine, and the European Commission. The report is based on data as of June 1, 2022, gathered in the timeframe between May 30 and July 30, 2022. The rapid assessment was produced in a short timeframe to ensure the relevance of the estimations and in-depth efforts have been made to improve the accuracy of the information that was collected, analyzed, and verified to the extent possible. Given the ongoing nature of the conflict and the lack of access in territories temporarily not under government control, the data collection is primarily remote-based but validated through ground-based information. The remotely sourced data have been triangulated and validated whenever possible against ground-based information obtained from the Government of Ukraine, local agencies, the United Nations, and other international partners. Given these constraints, the authors of the report cannot guarantee the absolute accuracy of the data included in this work. The report uses the exchange rate US$1 = UAH 27.28 from December 31, 2021.

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ABBREVIATIONS AND ACRONYMS

bcm	billion cubic meters
CBRN	chemical, biological, radiological, and nuclear
CHA	Confirmed Hazardous Areas
CHP	combined heat and power
CMR	cluster munition remnants
CoM	Cabinet of Ministers of Ukraine
COVID-19	Coronavirus Disease 2019
DaLA	Damage and Loss Assessment
DALY	disability-adjusted life year
DDos	distributed denial-of-service
DGF	Deposit Guarantee Fund
DRM	disaster risk management
EE	energy efficiency
EIB	European Investment Bank
ENTSO-E	European Network of Transmission System Operators
EOD	explosive ordnance disposal
EORE	explosive ordnance risk education
ERW	explosive remnants of war
EU	European Union
FIT	feed-in tariff
FX	foreign exchange
GDP	gross domestic product
GMI	Guaranteed Minimum Income
GWh	gigawatt hours
HACC	High Anticorruption Court
HCJ	High Council of Justice
HHI	Herfindahl-Hirschman Index
HLO	Harmonized Learning Outcomes
HUS	Housing Utility Subsidy
I&D	irrigation and drainage
IDP	Internally Displaced Persons
IMF	International Monetary Fund
IOM	International Organization for Migration
ISCED	International Standard Classification of Education
ISP	internet service provider
KSE	Kyiv School of Economics
LGBTI	lesbian, gay, bisexual, transgender, and intersex
Mbps	megabits per second
M&E	monitoring and evaluation
MinRegion	Ministry of Communities and Territories Development of Ukraine
MKIP	Ministry of Culture and Information Policy
MoD	Ministry of Defence
MoE	Ministry of Energy
MEPNR	Ministry of Environmental Protection and Natural Resources
MoES	Ministry of Education and Science
MoH	Ministry of Health
MIA	Ministry of Internal Affairs
MRTOT	Ministry for Reintegration of the Temporarily Occupied Territories
NABU	National Anticorruption Bureau of Ukraine

NACP	National Agency for Corruption Prevention
NBFI	nonbank financial institution
NBU	National Bank of Ukraine
NCD	noncommunicable disease
NGO	nongovernmental organization
NHSU	National Health Service of Ukraine
NMAA	National Mine Action Authority
NMAC	National Mine Action Center
NNP	National Nature Park
NPL	nonperforming loan
NRC	National Recovery Council
NTS	nontechnical survey
NUS	New Ukrainian School
OCHA	Office for the Coordination of Humanitarian Affairs
OECD	Organisation for Economic Co-operation and Development
OGP	Office of General Prosecutor
OHCHR	Office of the High Commissioner for Human Rights
OPD	organization of persons with disabilities
OSCE	Organization for Security and Co-operation in Europe
PHC	primary health care
PHC+	primary health care with additional capacity
PIT	personal income taxes
PMG	Program of Medical Guarantees
POS	point-of-sale
PPE	personal protective equipment
PV	photovoltaic
QoQ	quarter over quarter
RDNA	Rapid Damage and Needs Assessment
RE	renewable energy
SAPO	Special Anticorruption Prosecutor's Office
SAWR	State Agency of Water Resources
SDG	Sustainable Development Goal
SESU	State Emergency Service of Ukraine
SFRAU	State Forest Resource Agency
SGBV	sexual and gender-based violence
SHA	Suspected Hazardous Areas
SJA	State Judicial Administration
SMEs	small and medium enterprises
SoB	state-owned bank
SoE	state-owned enterprise
STEM	science, technology, engineering, and mathematics
ToT	training-of-trainer
TPP	thermal power plant
TRW	toxic remnants of war
TS	technical survey
TSO	transmission system operator
UCPM	Union Civil Protection Mechanism
UIP2	World Bank Second Urban Infrastructure Project
UN	United Nations
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNHCR	United Nations High Commissioner for Refugees
UNICEF	United Nations International Children's Fund
URC2022	Ukraine Recovery Conference
VET	vocational education and training
WEM	wholesale electricity market
WRM	water resource management
WPP	Wind power plant
WSS	water supply and sanitation
WUO	Water User Organisation
YoY	Year over year

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The Ukraine Rapid Damage and Needs Assessment (RDNA) was jointly prepared by the World Bank, the Government of Ukraine, and the European Commission, in coordination with government institutions, UN agencies and development partners, academia, civil society organizations, and the private sector. The RDNA core team consisted of government representatives, World Bank and European Commission staff and experts.

On the part of the Government of Ukraine, the RDNA was led by the Ministry for Communities and Territories Development, with support from the Ministry for Reintegration of the Temporarily Occupied Territories and the Ministry of Infrastructure. All relevant line ministries have participated in the assessment, in coordination with the Kyiv School of Economics (KSE).

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The full list of sectoral leads and contributors is included in **Annex 1.** The RDNA team would like to express its deep appreciation to all individuals and organizations who contributed to this assessment.

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FOREWORD

On February 24, 2022, the Russian Federation invaded Ukraine, resulting in civilian casualties, displacement of millions of people, and widespread and significant destruction to homes, businesses, social institutions, and productive and economic activity. The impact of the invasion will be felt for generations, with families displaced and separated, disruptions to human development, destruction of intrinsic cultural heritage and reversal of a positive economic and poverty trajectory.

The Government of Ukraine, the World Bank Group and the European Commission in cooperation with development partners, launched a Rapid Damage and Needs Assessment (RDNA). Following an internationally accepted methodology, the RDNA aimed to assess the impact of the war on the population, human development, service delivery, physical assets, infrastructure, productive sectors and the economy. For the purpose of this assessment, damage from the war between February 24 and June 1, 2022, is included, verified to the extent possible, and assessed. The RDNA results are preliminary, and damage, losses and needs should be considered as minimums. As the war continues, the social and economic impact will further increase and intensify. However, there is a need to start reconstruction and recovery now where it is safe and practical to do so.

As of June 1, 2022, direct damage has reached over **US$97 billion**, with housing, transport, and commerce and industry being the most affected sectors. Damage is concentrated in the frontline oblasts (74 percent), particularly Donetska, Luhanska, Kharkivska, and Zaporizka, and in oblasts that were brought back under government control (22 percent) such as Kyivska and Chernihivska. Disruptions to economic flows and production, as well as additional expenses associated with the war, are collectively measured as losses and amount to some **US$252 billion**. Ukraine's Gross Domestic Product (GDP) shrank by 15.1 percent year over year in the first quarter of 2022, and poverty is expected to increase from 2 to 21 percent (based on the poverty line of US$5.5 per person per day).

Reconstruction and recovery needs, as of June 1, are estimated at about **US$349 billion**, which is more than 1.6 times the GDP of Ukraine in 2021. Integrated into these needs are critical steps toward becoming a modern, low-carbon, disaster- and climate-resilient, and inclusive country that is more closely aligned with European Union standards. While the financing envelope is overwhelming, experience from other countries shows that reconstruction spans many years and a phased approach to reconstruction is critical. The report also details some **US$105 billion** needed in the immediate and short term to address the most urgent needs, including social infrastructure (such as schools and hospitals, especially in areas brought back under government control), preparation for the upcoming winter through winterization and restoration of heating and energy to homes, urgent repairs, gas purchases, support to agriculture and social protection, and restoration of vital transport routes. These actions will lay the groundwork for a safe, prioritized, and efficient reconstruction and recovery.

The report offers a strong analytical foundation for a comprehensive financial and operational strategy and plan to support the early recovery and long-term reconstruction of Ukraine, to which we are strongly committed. This next phase of planning should consider the balancing and prioritization of needs and investments, absorptive capacity, financing availability, the development of common systems and processes to ensure maximum efficiency, the development and expansion of the managerial and technical capacity of implementation units, the mobilization of funds for project preparation, and the development of financial strategies for different sectors.

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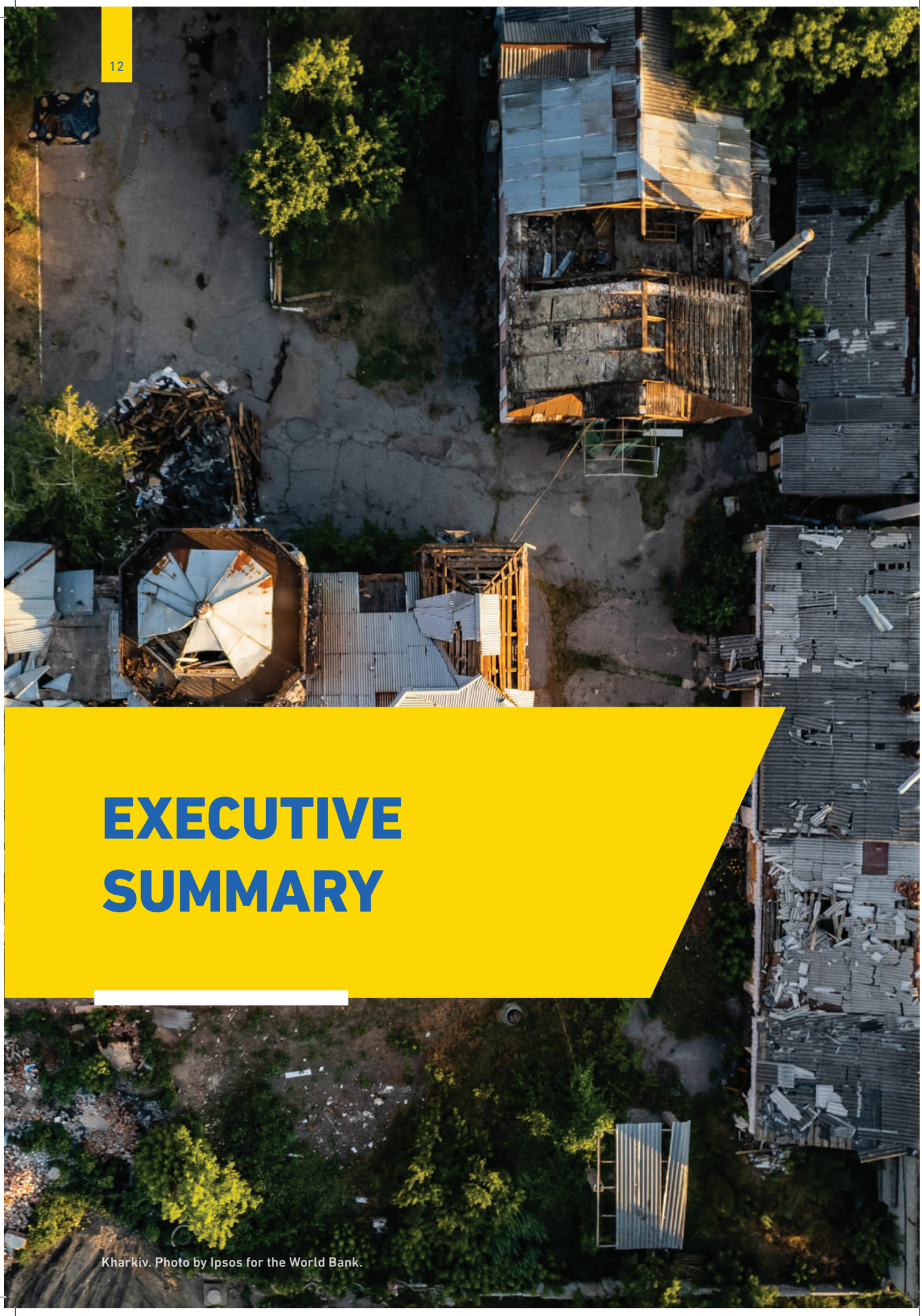


EXECUTIVE SUMMARY

Kharkiv. Photo by Ipsos for the World Bank.

The Russian Federation's invasion of Ukraine, which began February 24, 2022, has caused significant civilian casualties and damage to infrastructure and has taken a severe human, social, and economic toll. As a result of the war, which still continues after more than six months, dwellings and public infrastructure have been demolished or damaged, public services and economic activity have been impeded, and significant numbers of Ukrainians have been displaced from their homes.

This Rapid Damage and Needs Assessment (RDNA) is part of an ongoing effort, undertaken jointly by the Government of Ukraine, the World Bank, and the European Commission and supported by other partners, to take stock of Ukraine's damage and losses from the war—but just as importantly to assess the scale of economic and social needs for Ukraine's survival during the war and its prospering afterward. Detailed sectoral data for the assessment use June 1, 2022, as a cutoff; given the progress of the war since that date, the extent of damage, losses, and needs is clearly larger as of the date of publication. While the calculation of needs has been done by joint government and World Bank teams in each of the sectors covered, the differential availability of data has meant that the extent of coverage varies somewhat across sectors.

Still, the RDNA provides the first rigorous overview of the various economic needs that Ukraine and its people have as a consequence of the war. The objective of the RDNA is to deliver a **consistent, validated, and transparent assessment** of (i) quantified physical ***damage*** to infrastructure, buildings, etc.; (ii) quantified indirect ***losses*** for a time period of 21 months (3 months between February and June 2022, and 18 additional months), considering elements such as disrupted services, economic impacts, costs related to internally displaced persons (IDPs), debris management, restricted access and costs due to land contamination,[1] etc.; and (iii) corresponding recovery and reconstruction ***needs*** (Box 1 provides definitions). The RDNA also outlines general guiding principles for building back better and sequencing investments for a green, resilient, inclusive, and sustainable recovery and reconstruction, focusing on immediate and short-term needs (18 to 36 months) and medium- to long-term needs (up to 10 years).

An important limitation is that the RDNA presents the needs at a sector level and does not consider the balancing of one sector's needs against those of another sector. Strategic prioritization of reconstruction across all sectors is the next important step as part of recovery and reconstruction planning, with this RDNA providing analytical support to this critical decision-making. Further work will involve prioritizing needs based on absorptive and implementation capacity of different sectors, priorities related to different geographic areas, humanitarian and IDP needs, institutional capacity, financing availability, etc. This further work is critical for investment planning and implementation, and can form part of an immediate recovery plan for Ukraine.

Box 1. RDNA definitions

Damage: Direct costs of destroyed or damaged physical assets; valued in monetary terms with costs estimated based on replacing or repairing physical assets and infrastructure, considering the replacement price prevailing before the war.

Losses: Changes in economic flows resulting from the war; valued in monetary terms.

Needs: Value associated with the resumption of prewar normality through activities such as repair and restoration, including a premium linked to building back better principles (e.g., improved energy efficiency, modernization efforts, and sustainability standards). Needs do not equal the sum of damage and losses.

1 Land contamination refers to land that may contain land mines and/or explosive remnants of war.

Summary of Damage, Losses, and Needs

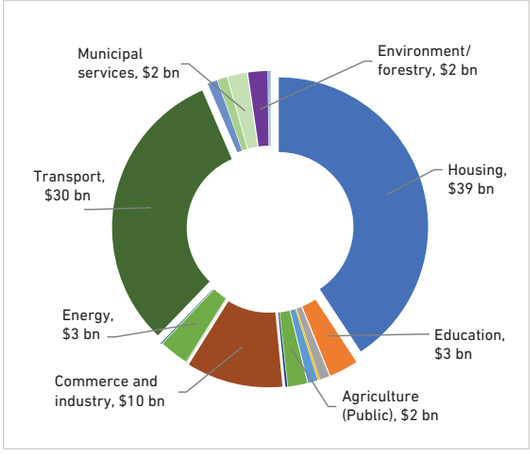
Considering the impact of the war between February 24 and June 1, 2022, the damage across sectors covered in the RDNA is estimated at approximately US$97 billion (Figure 1 and Table 1). The most damage-affected sectors are housing (40 percent of total damage), transport (31 percent), and commerce and industry (10 percent). The most affected oblasts are Donetska, Luhanska, and Kharkivska, followed by Kyivska, Chernihivska, and Zaporizka (Figure 4 and Table 2).

Aggregate losses total almost US$252 billion (Figure 2 and Table 1). It should be noted that losses in one sector flow into and intersect with those in other sectors. For example, reduction in agricultural production affects transportation needs, or loss of electricity affects commerce and industry in areas that are otherwise unaffected by the war. Losses are dominated by land decontamination (demining and clearance of explosive remnants of war) (29 percent), commerce and industry (19 percent), agriculture (11 percent), and transport (10 percent). Culture and tourism (8 percent), housing (5 percent), and energy (5 percent) contribute substantially to the remaining losses. As data by oblast were not available across all sectors.

The total reconstruction and recovery needs are estimated at about US$349 billion. As shown in Figure 3 and Table 1, the sectors with the highest estimated needs are transport (21 percent), land decontamination (demining and clearance of explosive remnants of war) (21 percent), and housing (20 percent). Other sectors, including commerce and industry (6 percent), social protection and livelihoods (6 percent), and agriculture (5 percent), contribute substantially to the remaining needs.

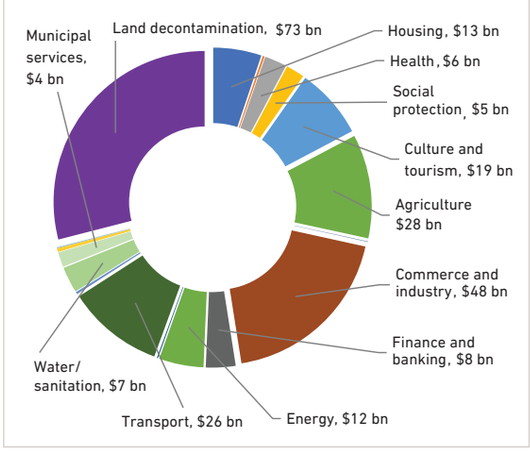
All these needs arise from a war that has spanned a large geographical area (including urban areas), and thus their magnitude is considerable. Meeting these needs will be critical for the long-term recovery from the war. **However, specifying these needs does not mean that they can be met immediately. How soon they can be met will depend on the availability of financing, but also on the absorptive capacity of the Ukrainian budget, line ministries, subnational entities, and implementing agencies; the readiness of the private sector to support capital investments; and the trajectory of the war.**

Figure 1. Total damage as of June 1, 2022: US$97 billion



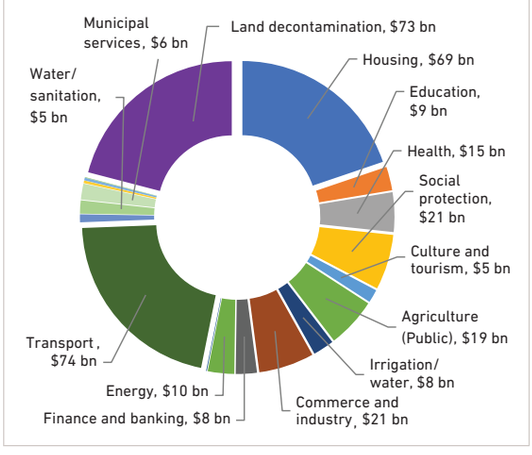
Source: Assessment team.

Figure 2. Total losses as of June 1, 2022: US$252 billion



Source: Assessment team.

Figure 3. Total needs as of June 1, 2022: US$349 billion



Source: Assessment team.

Figure 4. Extent of damage by region as of June 1, 2022

Source: Assessment team.

While the RDNA's assessment of damaged assets differentiates between public and private assets wherever possible, experience in disaster and conflict situations highlights the strong and very necessary role of public finances even for the restoration of privately owned assets, especially in the short term. For housing, for example, there are humanitarian and implicit public obligations associated with ensuring that Ukrainians have safe and warm shelter, and these entail public intervention in private assets. Similarly, productive sectors such as agricultural production may require significant public financing for recovery; the banking and financial sector will require capitalization; and the restoration of commerce and industry will need a certain level of initial funding by the public sector. Moreover, the public sector will likely play an important role in providing guarantees and other de-risking instruments (particularly insurance) to enable private sector participation. This will be particularly important to restore trade and commerce flows.

It is estimated that about 80 percent of the short-term needs, or some US$80 billion, will need to come from public financing. This includes a range of obligations—recovery and reconstruction of assets owned by the public sector (such as schools and roads), anticipated implicit support for humanitarian reasons of private assets (such as housing and energy), and the need to kick-start recovery in the productive sectors.

In the immediate and short term (in the next 18–36 months), about US$105 billion will be needed to address the most urgent needs across the analyzed sectors (Table 3). These include urgent needs related to the following:

- Preparation for the upcoming winter (e.g., heating, electricity, and winterization of lightly damaged buildings) and the purchase of gas
- Transport repairs for connectivity and service delivery
- Support for the next agricultural planting season
- Safeguarding of human development, especially in education and health, and support to the poorest and the displaced
- Immediate actions related to decontamination of land to enable safe reconstruction and recovery in critical areas

Beyond the coming winter, the short-term recovery and reconstruction needs are dominated by support to the social sector (45 percent of the total), though

cross-cutting issues such as land decontamination and environmental protection will need to be integrated into all investments in social, productive, and infrastructure sectors. The large share of needs in the *social sector* reflects the impacts on housing, health, and education services, the expanded social protection needs, and steps to protect cultural heritage from further damage. The short-term needs in *infrastructure* (22 percent) are dominated by energy and transport sector needs, though measures for water supply and sanitation and municipal services are also critical. In the *productive sectors*, the short-term needs (22 percent) cover support to agriculture as well as actions to support finance and banking and commerce and industry.

Table 1. Total damage, losses, and needs by sector (US$ billion) as of June 1, 2022

Sector	Damage	Share (%)	Losses	Share (%)	Needs	Share (%)
Social sectors						
Housing	39.2	40	13.3	5	69.0	20
Education	3.4	3	0. 5	0	9.2	3
Health	1.4	1	6.4	3	15.1	4
Social protection and livelihoods	0.2	0	4.5[a]	2	20.6[b]	6
Culture and tourism	1.1	1	19.3	8	5.2	2
Productive sectors						
Agriculture	2.2	2	28.3	11	18.7	5
Irrigation and water resources	0.2	0	0.1	0	7.5	2
Commerce and industry	9.7	10	47.5	19	20.8	6
Finance and banking	0.03	0	8.1	3	8.0	2
Infrastructure sectors						
Energy	3.0	3	11.7	5	10.4[c]	3
Extractives	0.1	0	0.3	0	0.3	0
Transport	29.9	31	26.1	10	73.8	21
Telecom and digital	0.7	1	0.6	0	3.3	1
Water supply and sanitation	1.3	1	6.8	3	5.4	2
Municipal services[d]	2.3	2	4.3	2	5.7	2
Cross-cutting sectors						
Environment, natural resource management, and forestry	2.5	3	0.7	0	1.2	0
Emergency response and civil protection	0.1	0	0.2	0	0.7	0
Justice and public administration	0.1	0	0.03	0	0.2	0
Land decontamination	-	0	73.2	29	73.2	21
Total	**97.4**	**100**	**252.0**	**100**	**348.5**	**100**

Source: Assessment team.

a. Under social protection, household income loss valued at US$46.1 billion is not included to avoid potential double-counting in relation to other sectors.

b. Means-tested social assistance programs and other benefits that depend on the changes in households' income and the cost of basic needs (including cost of food and energy) are assessed for the immediate/short term only.

c. The needs for the energy sector also include the short-term need for purchasing natural gas for the upcoming heating season (around 4.8 bcm), that would generate a financial gap in Naftogaz of around US$5 billion, depending on the weather and evolution of gas import prices. It is estimated that Naftogaz could need some 4.8 billion cubic meters (bcm) of additional gas to reach the estimated required level 15 bcm. Naftogaz will use its produced gas (up to 1.4 bcm), purchase from domestic producers/private stored gas (1.3 bcm), and import the remaining amount (2.1 bcm). The value of this volume can vary depending on the import price. Assuming that the domestic price for the gas from other domestic producers will be around US$1,000 and that imported gas is purchased at US$ 2,000 per 1,000 cubic meter, the total purchase costs would be US$ 5.1 billion if the import price is US$2,000, and US$7.2 billion if the import price is $3,000. Considering the selling price of the gas for Naftogaz at the level of US$190 per 1,000 cubic meters, the financial gap would be US$4.37 billion if the import price is US$2000 and US$6.47 billion if the import price is US$3,000.

d. Municipal governments in Ukraine are responsible for a wide range of municipal services, from own services (e.g., local roads, municipal transit, solid waste management, housing, urban parks, and utilities) to services delegated by the central government (e.g., education, health care, social welfare). In the RDNA, municipal service mainly covers assets related to solid waste management, urban spaces and facilities (e.g., local parks, community centers, cemeteries, sports, etc.), and local administrative buildings. Utilities and housing are covered by infrastructure and housing sections, respectively.

Table 2. Damage by oblast for select sectors (US$ billion) as of June 1, 2022

Oblast	Damage
Frontline regions, subtotal	**71.8**
Donetska	26.2
Zaporizka	6.0
Luhanska	16.7
Mykolaivska	3.7
Odeska	0.3
Kharkivska	14.4
Khersonska	4.4
Support regions, subtotal	**0.9**
Vinnytska	0.1
Dnipropetrovska	0.5
Kirovohradska	0.1
Poltavska	0.1
Cherkaska	0.1
Backline regions, subtotal	**0.2**
Volynska	0.0
Zakarpatska	0.05
Ivano-Frankivska	0.02
Lvivska	0.07
Rivnenska	0.02
Ternopilska	0.01
Khmelnytska	0.02
Chernivetska	0.00
Regions where government has regained control, subtotal	**22.4**
Kyiv (city)	1.1
Zhytomyrska	0.8
Kyivska	11.2
Sumska	2.9
Chernihivska	6.4
Not specified, subtotal	**2.2**

Source: Assessment team.

Note: Regions are grouped according to Government of Ukraine presentations at the Ukraine Recovery Conference in Lugano, Switzerland, in July 2022. Frontline regions are areas temporarily not under government control and areas of active conflict; support regions are providing logistics for defense and humanitarian cargo; backline regions are protecting export/import logistics hubs and evacuated enterprises; and regions where the government has regained control are areas recovering from sustained damage. Table data are incomplete, as damage data by oblast were not available for the culture and tourism sector; and for several sectors only nationwide (not oblast-specific) data were available, or only a fraction of available data was disaggregated by oblast. It is noted that for some sectors (for example, transport), Kyivska oblast also includes damage for Kyiv city. Losses data by oblast were not available for the following sectors: culture and tourism, finance and banking, energy and extractives, housing, and health sectors. Needs data by oblast were not available for most sectors and are not included here.

Table 3. Total recovery and reconstruction needs by sector (US$ billion) as of June 1, 2022

Sector	Immediate/short term	Medium- to long-term	Total
Social sectors			
Housing	33.1	35.9	69.0
Education	2.8	6.5	9.2
Health	1.2	13.9	15.1
Social protection and livelihoods	8.1	12.5[a]	20.6
Culture and tourism	1.6	3.6	5.2
Productive sectors			
Agriculture	10.0	8.7	18.7
Irrigation and water resource management	0.02	7.5	7.5
Commerce and industry	6.6	14.2	20.8
Finance and banking	6.4	1.6	8.0
Infrastructure sectors			
Energy[b]	7.3	3.1	10.4
Extractives	-	-	0.3
Transport	8.9	65.0	73.8
Telecommunications and digital	1.3	2.0	3.3
Water supply and sanitation	3.5	1.9	5.4
Municipal services	1.9	3.9	5.7
Cross-cutting sectors			
Environment, natural resource management, and forestry	0.4	0.9	1.2
Emergency response and civil protection	0.5	0.2	0.7
Justice and public administration	0.08	0.1	0.2
Land decontamination	11.0	62.2	73.2
Total	**104.5**	**243.7**	**348.5**

Source: Assessment team.

Note: - = not assessed.

a. Needs for means-tested benefits, benefits to IDPs, social services, and military social assistance include only estimates for the immediate/short term, given that a number of additional factors will influence them over the medium/long term, such as changes in incomes and cost of basic needs, including food and energy.

b. The needs for the energy sector also include the short-term need for purchasing natural gas for the upcoming heating season, in the amount of US$5 billion.

MACROECONOMIC AND SOCIAL IMPACTS

The damage, losses, and needs presented here contribute to the very significant economic, social, and poverty impacts of the war. Estimated gross domestic product (GDP) losses in 2022 go beyond physical asset losses and reflect disruption of economic activities via several channels: damage to productive assets and infrastructure, logistic problems, labor force losses, ruined supply-demand chains, uncertainty, and elevated risks. Ukraine's GDP shrank by 15.1 percent year over year (YoY) in the first quarter of 2022 (or 19.3 percent quarter over quarter, seasonally adjusted), driven by a 45 percent GDP contraction in March YoY. After Ukraine regained control of Kyivska oblast, economic activity in April showed the first signs of improvement, even though it remains much below the prewar level.

Poverty, based on the upper-middle-income poverty line of US$5.5 per person per day, is projected to increase by tenfold and reach at least 21 percent in 2022; war-affected regions are expected to experience even higher poverty rates. For instance, in Khersonska oblast, which is temporarily not under government control, food prices have increased by 62 percent since the start of 2022, compared to 21.5 percent for Ukraine as a whole.[2] Given food's large share in the budgets of low-income households, these high rates of inflation are bound to result in a spiking poverty rate.

The rise in poverty has been driven by the enormous costs to human lives and livelihoods. As of July 24, 2022, the number of civilians confirmed killed or wounded since February 24 officially stood at 12,272; however, the United Nations (UN) estimates that this figure is incomplete.[3] One-third of Ukrainians have been displaced by the war. Over 6.8 million Ukrainian residents have left the country, a large majority of them women and children.[4] An estimated 6.6 million people are internally displaced—fewer than in the previous month[5]—with many individuals displaced more than once since leaving their homes of origin.[6] According to the UN Office for the Coordination of Humanitarian Affairs (OCHA), the humanitarian situation is deteriorating rapidly, as access to critical services such as clean water, food, sanitation, and electricity declines, and 17.7 million people are left in need of humanitarian assistance.[7]

The projected increase in poverty, though large, is expected to be much larger if existing financing gaps are not addressed by a scale-up in external financing. Since the beginning of the war, tax revenue collection has deteriorated significantly, while public expenditure has increased sharply to ensure delivery of key public services during wartime. This has resulted in a large nonmilitary fiscal deficit. If partners do not continue to provide significant support to finance this deficit, Ukraine will need to further reduce its now bare-bones social expenditures and continue to avail itself of deficit monetization. In a scenario of continued deficit monetization, the poverty rate is expected to climb to 34 percent by the end of 2022—a level not seen since the early 2000s—as rising inflation erodes the purchasing power of low- and middle-income households. Going forward, if the extent of monetization is limited to avoid excessive inflation, sweeping expenditure cuts will be needed and will affect the most vulnerable segments of Ukrainian society. Under this scenario of austerity, poverty rates are projected to further increase to over 40 percent in 2022 and 58 percent by 2023. In this worst-case scenario, an additional 18 million Ukrainians would fall below the poverty line.

2 Data are as of June 2022 and are based on regional Consumer Price Indices published by the State Statistics Service of Ukraine, *Link*.

3 Most of the civilian casualties recorded were caused by the use of explosive weapons with a wide impact area, including shelling from heavy artillery and multiple launch rocket systems, and by missile and air strikes. The Office of the High Commissioner for Human Rights (OHCHR) believes that actual figures are considerably higher, especially in Mariupol (Donetska oblast), Izium (Kharkivska oblast), and Popasna (Luhanska oblast). OHCHR, "Ukraine: Civilian Casualty Update 25 July 2022," *Link*.

4 The number was 6,865,625 as of August 26, 2022. United Nations High Commissioner for Refugees; see Operational Data Portal: Ukraine Refugee Situation, *Link*.

5 IOM, "*Regional Ukraine Response: Situational Report–22 August 2022*," *Link*.

6 OCHA Ukraine, "*Situation Report*," August 17, 2022.

7 Ibid.

SECTORAL ASSESSMENTS

Social Sectors

Housing

The total damage to the housing sector as of June 1, 2022, is estimated at US$39.2 billion, with concentrated damage to urban housing. Around 817,000 residential units were impacted by the war, 38 percent of them destroyed beyond repair. This number includes apartment units, single family houses, and dormitories. Apartment buildings have been the most affected, a finding that highlights the significant impacts of the war on the urban housing stock and indicates that urban areas carry the bulk of the damage burden in housing. The extent of housing damage is spread unevenly across the oblasts, with the Donetska, Luhanska, Kharkivska, and Kyivska oblasts accounting for over 82 percent of total damage to housing stock in the country. **Losses in the housing sector are estimated at US$13.2 billion**, which reflects the cost of demolition and debris removal, loss of household goods, temporary rental and shelter provision by owners, and adjusted losses in rental incomes. The loss estimation does not reflect bank losses and mortgage defaults.

The recovery and reconstruction needs amount to US$69 billion, with US$33.1 billion needed in the immediate/short term, especially to address the needs for winter. Addressing housing recovery needs in postwar Ukraine will require an integrated green, resilient, and inclusive approach, with a focus on returning families to their homes and restoring livelihoods and services. There is an urgent need to provide temporary rental for displaced households, undertake winterization, repair partially damaged residential buildings, and establish a housing reconstruction and recovery strategy and implementation mechanism. In particular, providing repair and rental subsidies before cold, wet weather begins will mitigate the risk of further displacement. While the situation is fluid, measures for ensuring safety and adequate housing for households remain necessary to address the primary needs of IDPs, returnees, and host communities for safe housing options. There is also a need to establish a framework for housing reconstruction and recovery in the medium term. These actions can begin even during the war and will allow for appropriate sequencing of key actions and planning of budgets accordingly.

Education

As of June 1, 2022, the Ukrainian education sector has sustained US$3.4 billion in damage and US$0.5 billion in losses, with a particular impact on students/learners from Eastern Ukraine. A total of 1,885 education institutions have been impacted by the war, with 178 buildings destroyed and a further 1,707 partially damaged. The damage to infrastructure is pronounced in the east, especially in Kharkivska, Donetska, and Luhanska oblasts; nearly 1 million enrolled students (at all levels of education) are affected just in these three oblasts. Meanwhile, losses are driven by debris removal costs, unpaid teachers' salaries, and decreases in private sector revenues, and there have been additional costs associated with the use of education institutions as temporary shelters.

Recovery and reconstruction needs are over US$9.2 billion in the education sector, with U$2.8 billion urgently needed. These needs include the reconstruction of affected education facilities following new safety, sustainability, and quality standards, but also needs related to the restoration of interim and long-term teaching and learning services, such as investments to ensure safe access to in-person education where possible (e.g., the addition of bomb shelters to education institutions, acquisition of temporary learning spaces, and purchase of electronic devices). Recovery needs also cover educational catch-up programs and psychological support that are critical to limiting learning losses, particularly for the most vulnerable students. At the same time, the reconstruction and recovery of the sector must coincide with investments in reforms to increase quality and efficiency in education, which to a considerable extent had already been initiated before the war.

Health

The damage to the health sector is estimated at US$1.4 billion. This represents the monetary estimate of the cost of destroyed and damaged health infrastructure included in the inventory of damage compiled by the Ministry of Health. The actual level of damage is likely higher, given that damage reports are incomplete for facilities located in the territories temporarily not under government control and for private sector facilities. **The estimated losses of US$6.4 billion** include the removal of debris and demolition of the destroyed facilities, loss of income of private providers, losses from the financing of facilities that have not been fully operational during

the war, and the additional losses of the population's health. **The needs of the health sector are estimated to be US$15.1 billion to cover the accumulated infrastructure damage and losses to the health sector, as well as scale-up of critical health services for the population of Ukraine**. This amount includes the cost of building new infrastructure using a building back better approach and the immediate recovery of facilities that are partially damaged. It also includes a significant expansion of rehabilitation and mental health services in Ukraine, which will need to be scaled up to address the impacts of the war. The estimate of needs does not include the full cost of recovery for the health care sector. Of these total needs, **US$1.2 billion is urgently needed in the immediate/short term.**

Social Protection and Livelihoods

Damage to the social protection infrastructure (such as residential care units, social centers, and social services providers) is estimated at US$0.2 billion. Overall, 56 such stand-alone buildings were damaged or destroyed. Damage to the shared building space used for social protection purposes, such as offices in administrative buildings of the local governments, are included in other parts of the RDNA. **The losses in the social protection and jobs sector are much more substantial, amounting to US$50.6 billion**. They relate to (i) loss of jobs and household income from wages, (ii) resulting higher poverty and related increased expenditures under existing means-tested social programs, (iii) additional needs of programs such as survivor's benefits or programs related to disability, and finally (iv) lower affordability of basic needs, including energy and food, which will result in the need to significantly increase expenditure on a number of social programs linked to the subsistence minimum, ranging from pensions to means-tested programs. **The estimated social protection and jobs sector needs amounts to US$20.6 billion.** Most of these needs consists of recurrent expenditures related to social benefits and services, including payments to vulnerable populations such as IDPs and the newly impoverished. Significant expenditures are required to restore permanently lost jobs. Bringing Ukraine's workforce back would require additional efforts and costs, including through mobility grants, settling-in grants, or wage subsidies for the employers.

Culture and Tourism

The war is estimated to have caused US$1.1 billion in damage to the culture sector and a significant loss of US$19.3 billion. The sector has also sustained damage to its intangible cultural heritage and intrinsic values of spiritual, symbolic, emotional, and existential significance, as well as to the creative industries. **Over US$5.2 billion is needed for safeguarding the sector in Ukraine**. The value of culture is associated with its authenticity, shared values, and social connections, which cannot be monetized in market value. Thus, recovering culture does not directly translate into reconstructing physical/tangible assets. However, restoring and rebuilding the damaged cultural properties and rehabilitating them would be an initial step to reestablish the lost/broken cultural and social fabrics and restore their utility value, the sense of belonging they inspire, and people's affiliation with them, and any recovery efforts should lay the foundation for the sustainable, green, resilient, inclusive, and smart development of Ukraine. **The most urgent needs amount to US$1.6 billion.**

Productive Sectors

Agriculture

As of June 1, 2022, the war has resulted in total damage of US$2.2 billion for the agriculture sector, while the aggregate losses total US$28.3 billion. The damage includes partial or full destruction of machinery and equipment, storage facilities, livestock, and perennial crops, as well as lost inputs and outputs and agricultural land that needs recultivation.[8] The losses include production loss, including unharvested winter crops, higher farm production costs, and lower farm gate prices due to the export logistic disruptions, which are significant for Ukraine's export-oriented agriculture. **The total reconstruction and recovery needs from the public sector are estimated at US$18.7 billion, with private farmers having to invest considerably more in terms of their own resources over the next years.** The **most pressing investments of US$10 billion** include rebuilding the damaged assets, helping agriculture bounce back by addressing liquidity and other constraints, and restoring the agricultural public institutions to effectively support recovery and reconstruction.

8 The losses from mines on agricultural land and the need for agricultural land's demining, which is likely to be large, are not included in the agriculture sector estimates. They are presented separately in the RDNA.

Irrigation and Water Resources

As of June 1, 2022, damage in the irrigation, drainage, and water resource management (WRM) sector for several oblasts is estimated at US$0.2 billion, including damage to dams, irrigation canals, embankments, buildings, and agency premises. This is a partial number representing damage to areas previously taken by Russian forces and now under control of Ukrainian authorities, territories that had damage due to bomb attacks, and areas that were flooded to protect against attack. **The initial aggregate losses accounted for thus far are US$0.1 billion**. The losses include operational losses based on lost profit as reported by the different operational entities in the Ukrainian water system and collected by the State Agency of Water Resources (SAWR). **The total reconstruction and recovery needs in the public sector are estimated at US$7.5 billion for building back better irrigation, drainage, and flood protection assets**. The most pressing investments involve restoration of destroyed hydraulic assets and water storage structures in areas where control has been regained, as well as investments in areas that did not face hostilities; these investments will help the WRM sector rebound by addressing the major gap—the lack of water supply and lack of irrigation services to farmers, which must be addressed to increase crop productivity in the agriculture sector. They will also protect communities against flood-related risks and restore the public institutions involved in irrigation and WRM so they can effectively support recovery and reconstruction. These urgent needs total US$0.02 billion.

Commerce and Industry

Commerce and industry is one of the sectors most affected by the war. As of June 1, 2022, approximately US$9.7 billion of damage is estimated to have been sustained in this sector. Both privately and publicly owned enterprises in conflict-affected areas have been destroyed or bankrupted. Value chains have been disrupted through the destruction of, or damage to, connective infrastructure, the inability to access key inputs, and the severing of business links with firms located in affected areas. Damage to large factories accounts for most of the damaged assets, including the destruction of steel plants in Donetska that makes up almost 10 percent of the total damage. Approximately 2,900 retail shops, shopping malls, and warehouses have been damaged or destroyed. **Estimated aggregate losses equal US$47.5 billion**. The losses are estimated based primarily on expected lost income from firms over the course of 21 months and the costs for demolition and debris removal. **The total reconstruction and recovery needs are estimated at US$20.8 billion, with US$6.6 billion needed in the immediate/short term from both public and private actors.** More than 80 percent of the needs are for rebuilding and modernizing buildings, equipment, and inventory. For industry, the regions with the greatest needs for reconstruction and recovery are Donetska, with almost half of the total amount, followed by Kharkivska, Luhanska, Chernihivska, and Kyivska oblasts.

Finance and Banking

The Ukrainian financial sector has been significantly impacted by the war. The banking system entered the war in relatively good condition, and banks remain operational. However, loss of assets, collateral, and revenues will severely affect banks' profitability and solvency. During March–May, the banking sector accounted for US$1.1 billion of loan loss provisions for expected war-related credit losses. It can be anticipated that the nonbank financial institution (NBFI) sector will also suffer significant losses as a result of the war on top of prewar vulnerabilities but given its small size, the NBFI sector is not expected to have systemic impacts on the overall financial system. **From the preliminary estimates, the total damage is estimated at US$0.03 billion, and potential losses suffered by the banking sector are expected to be US$8.1 billion;** however, data on NBFIs are very limited. It will take many months for the true extent of damage to the financial sector to become fully apparent/quantifiable. The quantification of losses also does not recognize the inherent risks posed to the gains made over recent years by reforms to the financial sector, such as relaxation of prudential and state-owned bank governance rules; nor does it recognize the potential delays to the implementation of further reforms as a result of the need to address postwar problems first. **The total cost for reconstruction and recovery needs is estimated at estimated at US$8 billion, with US$6.4 billion for the immediate/short term and US$1.6 billion for the medium term.** This primarily includes provisions for banks' credit losses but also captures the cost of rebuilding damaged physical infrastructure of banks.

Infrastructure Sectors

Energy and Extractives

As of June 1, 2022, the war has resulted in total damage of around US$3 billion for the energy sector, while the aggregate losses total US$11.7 billion. The

value of damage includes damage in the power sector (US$1.4 billion), district heating (US$0.7 billion), gas sector (US$0.5 billion), transport fuel sector (US$0.4 billion), and coal mining (US$0.11 billion). The losses include lost revenues and production decreases, higher costs, losses due to deterioration of liquidity positions, and losses due to lost access to energy services. **The total reconstruction and recovery needs in the public sector are estimated at almost US$10.4 billion, including US$7.3 billion for the immediate/short term and US$3.1 billion for the longer term.** Given that the energy sector provides critical services, the above reconstruction and recovery investments are all considered as pressing. In addition, part of the losses can also be considered as pressing for short-term operations of the energy sector. This includes the need to close liquidity gaps in the power sector transmission system operator (Ukrenergo) and other stakeholders in the amount of US$2.6 billion. Naftogaz needs at least US$5 billion only for purchasing gas for the next heating season, assuming average purchasing gas price of approximately US$1,000 per 1,000 m^3. For the extractives sector, in the context of limited data available, US$0.1 billion in damage, US$0.3 billion in losses, and US$0.3 billion in needs were identified in addition to the energy sector estimates. In addition to the physical damages and loses generated by the war, some key energy market and governance reforms are suffering delays due to the need to implement temporary emergency measures to ensure the provision of basic energy services to the population.

Transport

Damage (US$29.9 billion), losses (US$26.1 billion), and needs (US$73.8 billion) in Ukraine's transport sector are large and indicative of the strategic value that combatants have placed on transport networks. Overall damages until June 1, 2022 include: (i) 8,699 km of motorways, highways, and other national roads; (ii) 7,619 km of oblast and village roads; (iii) 3 million m^2 of bridges on national roads; (iv) 428,470 m^2 of bridges on local roads; (v) 1,119 km of railway lines; (vi) 93 railway stations; (vii) 63,072 m^2 of railway bridges; (viii) 392,843 private vehicles; (ix) 9,473 km of communal roads; (x) 16 airports; and (xi) 850 units of urban public transport rolling stock. Losses include consideration for (i) loss of Black Sea transport; (ii) disruptions to road and rail transport services due to damaged infrastructure; (iii) losses associated with closure of Ukraine's airspace; and (iv) the cost of rail transport service provided free of charge for refugee evacuation as well as import of humanitarian supplies. Envisaged short-, medium-, and long-term needs reflect the enabling role that transport will play across sectors as well as the need to facilitate European Union (EU) integration.

Transport sector reconstruction is estimated to require US$73.8 billion, with approximately US$8.9 billion in the immediate/short term along with an additional US$64.9 billion in the medium- to long- term. The estimates are approximate and are subject to assumptions about the configuration and scope of Ukraine's transport networks after reconstruction. The nature and level of demands on that network may affect the economic viability of building back to a given set of standards. Under assumptions where Ukraine may not build back road and rail infrastructure to EU standards, needs could be US$ 2.1 billion to US$ 13.2 billion lower than RDNA projections. Conversely, needs may also be higher than RDNA estimates if actual costs to achieve a specific set of standards are greater than expected (if affordable). At this stage in Ukraine's recovery, it is important to note the inherent uncertainty around the configuration of post-war transport networks and the impact this has on estimated needs. The highest-priority needs for reconstruction are (i) restoration of basic network functionality (road, rail, and air) for both humanitarian aid flows and support to broader reconstruction efforts across sectors, as these will rely on transport access; (ii) enhancement of westward road and rail linkages to the EU to facilitate economic integration with Europe's single market and provide resilience to any potential future disruptions of Black Sea access; and (iii) transformation of legacy networks toward EU standards for safety, service quality, and interoperability as a complement to Ukraine's stated policy objective of EU accession, which will require alignment with the EU acquis.

Telecommunications and Digital

The damage in the telecommunications and digital sector has reached US$0.7 billion. This includes US$0.6 billion for telecom operators (fixed and mobile), US$0.08 billion for postal service companies, and US$0.04 billion for Ukraine's broadcasting provider. Donetska, Kharkivska, Khersonska, and Zaporizka oblasts account for 67 percent of the damage to telecom operators. The damage to postal services is similarly concentrated: Donetska and Kharkivska oblasts account for 68 percent of damage to postal infrastructure (post offices, depots, sorting centers, etc.). In broadcasting, there are 49 damaged and nonoperational TV towers as of June 1, 2022, 11 of them in Luhanska oblast and

12 in Zaporizka. **Losses of economic value added in the sector amount to US$0.6 billion for the period between the war's start and June 1, 2022. The needs for reconstruction and recovery are estimated at US$3.3 billion with an estimated US$1.3 billion needed in the immediate/short term.** Among the immediate recovery investments is restoring the broadband coverage in territories that have been brought back under government control. Internet coverage and postal service access are of strategic importance, given the need for connectivity among the local population.

Water Supply and Sanitation

The estimated damage for the water supply and sanitation (WSS) sector stands at US$1.3 billion. Given various challenges in data collection (especially for territories temporarily not under government control), this is a conservative figure; however, it provides a fair assessment of the magnitude of WSS infrastructure damage. **Losses have been estimated at approximately US$6.8 billion, noting similar challenges in accessing data.** The main part of the losses (over 50 percent) stems from lost revenues from WSS services provision. **The total reconstruction and recovery needs for the sector are estimated at around US$5.4 billion, with US$3.5 billion needed in the immediate/short term**. The building back better approach has been limited to the reconstruction of the damaged/destroyed WSS assets and not geared toward achieving compliance with the WSS Sustainable Development Goals. However, there is room to further optimize existing WSS systems and facilities (developed before the war) to meet increased standards and sustainability and climate change requirements.

Municipal Services

As of June 1, 2022, the estimated damage for the municipal services sector amounts to US$2.3 billion, while the aggregate losses total US$4.3 billion. The damage includes partial or full destruction of key municipal assets (for which data were available) as well as damage to goods and equipment. The estimated losses focus on revenue losses, debris removal, and increased operational costs. Over 90 percent of the total losses valued stem from incurred and projected revenue losses of local governments; this finding indicates that local governments will continue to face financial burdens and highlights the potential instability of service delivery maintenance in coming months. **The total reconstruction and recovery needs are estimated at US$5.7 billion, with US$1.9 billion needed in the immediate/short term.** This includes costs for building back better and inflation. The most pressing needs in the short term relate to the maintenance and increase of service delivery, rapid scaling up of investments in the waste management sector, and the formulation of citywide reconstruction and recovery strategies and action plans. Key guiding principles for recovery and reconstruction include the explicit prioritization and sequencing of investments based on technical assessments, and the facilitation of an enabling institutional and legal environment for the efficient implementation of plans.

Cross-Cutting Areas

Environment, Natural Resource Management, and Forestry

The war in Ukraine has significantly harmed the environment and natural resources of the country. Multiple air pollution incidents and potentially serious contamination of ground and surface waters and soil have already been observed, and the long-term impact of the war could be even more harmful—not only for the population's health and safety, but also for ecosystems and biodiversity. Most of the environmental risks are linked to the damage to industrial installations and houses (asbestos release), energy infrastructure (power plants, oil storage tankers, oil refineries, drilling platforms, and gas facilities and distribution pipelines), and ecosystems (forest fires and land mines). The main environmental risks include air pollution, water pollution, and soil pollution, with accumulation of hazardous wastes that affect the health and safety of the population as well as biodiversity. Losses and damage in monetary terms are estimated where feasible, such as for the forest sector. Due to the active war situation, measuring of key pollutants in air, water, and soil was not possible. The RDNA did not estimate damage and needs for these receptors due to the lack of monitoring data on environmental assets. Priority areas for cleanup and building back better are identified for a fundamental transformation of Ukraine toward a green and net-zero economy. The rebuilding process should be harmonized with the EU environmental and climate goals.

The forestry sector has been significantly impacted by the war. As of June 1, 2022, approximately 3 percent has been lost due to forest fires, and 38 percent is inaccessible due to the presence of mines. **Damage across growing stock, roads, buildings, and**

equipment is almost US$2.5 billion. Lost ecosystem services value—a result of mines making the forests inaccessible—is estimated at US$0.7 billion over the 21 months beginning in March 2022. However, forestry has a slow recovery rate and these losses may extend much further beyond this period. **Sectoral recovery and reconstruction needs, including building back with strengthened institutions, equipment, and nursery capacity, are estimated at US$1.2 billion with US$0.4 billion needed in the immediate/short term**. As part of the recovery and reconstruction needs, capacity building includes a functional review of the institutions in the sector, with a focus on modernized planning and on the best afforestation and reforestation methods for climate-smart forestry. Recommended for further study is the creation of investor-ready carbon projects and the potential for mass employment in afforestation and reforestation via "green wage" schemes.

Emergency Response and Civil Protection

As of June 1, 2022, the war has resulted in total damage of US$0.1 billion for the emergency response and civil protection sector, while the aggregate losses total US$0.2 billion. The damage includes partial or full destruction of vehicles, equipment, and buildings used for the purpose of civil protection and emergency response. The losses include debris removal and additional operational costs for increased involvement of first responders in emergency and rescue operations related to the war. **The total reconstruction and recovery needs from the sector are estimated at US$0.7 billion, with US$0.5 billion urgently needed**. The most pressing investments include repair, reconstruction, and replacement of damaged, destroyed, and seized assets, respectively. Support for scaled-up emergency response related to the war is also necessary; this includes preparedness for chemical, biological, radiological, and nuclear incidents; measures related to disaster risk management to prevent, prepare, and respond to disasters; and restoration of institutions to effectively support the recovery and reconstruction effort.

Justice and Public Administration

In the justice and public administration sector, a total of US$0.1 billion in damage, US$0.04 billion in losses, and US$0.2 billion in recovery and reconstruction needs have been estimated as a result of the war. Related to justice, damage is estimated at US$0.07 billion, while losses amount to US$0.03 billion. These figures include damage of US$0.06 billion for the judiciary and US$0.01 billion for law enforcement, comprising partial or full destruction of buildings, furniture, and vehicles used for judicial or law enforcement purposes. Losses include US$0.01 billion for the judiciary, and US$0.4 million for law enforcement. Losses consider items such as demolition and debris removal and loss of public services/fees. Reconstruction and recovery needs for the justice sector are estimated at US$0.2 billion. The most pressing needs include restoration of delivery of justice services, specifically through the availability and training of law enforcement, anticorruption officials, private lawyers, and judges, as well as the reconstruction of the judiciary and judicial infrastructure.

Damage of US$0.03 billion is also reported to central-level public administration infrastructure and services. Local-level administrative buildings are covered under the municipal services sector, and relevant line ministry buildings such as education and health are covered under those respective sectors. This damage is estimated based on government reports. **Losses, including debris removal, are estimated at US$3.4 million**. **Recovery and reconstruction needs are estimated at US$0.07 billion.** The recovery and reconstruction of central-level public administration should prioritize buildings from which the most-urgent public services are provided.

Land Decontamination (Demining and Clearance of Explosive Remnants of War)

Land decontamination, which covers demining and clearance of explosive remnants of war, is a precondition to safe rebuilding, resumption of service provision, and return to normality. The State Emergency Service of Ukraine (SESU) and Ministry of Internal Affairs estimate that 13 percent of Ukraine's territory may be contaminated. **Based on conservative estimates, land decontamination costs are expected to exceed US$73.2 billion.** Of this, US$0.06 billion needs to be urgently invested in equipment, training, and salaries to expand the work force of decontamination authorities in Ukraine. It will be critical to prioritize areas requiring the most urgent decontamination, such as areas with a high concentration of civilian populations, areas critical for restoring production and economic flows, etc. In the immediate/short term, close to US$11 billion is needed for nontechnical surveys, technical

surveys, and demining, including US$0.06 billion for procurement of varied equipment (demining machines, metal detectors, personal protective equipment, etc.); these efforts will ensure readiness for scaled-up decontamination and allow significant progress in areas where government control has been restored and where active military actions have ceased. It should be noted that land decontamination efforts may need to be sustained over decades, considering experience of other countries in land decontamination. Costs associated with the removal of anchored and floating sea mines in the Black Sea are yet unquantified. However, until decontamination of the Black Sea and Ukraine harbors is completed, (re)insurers of shipping vessels in the Black Sea will continue to charge high and even historic levels for insurance—a cost that will eventually be passed on to consumers, a particularly significant issue in relation to grain exports.

Toward Recovery and Reconstruction

There are already ongoing efforts by the Government of Ukraine to lead the country toward recovery and reconstruction. In July 2022, Ukraine presented a US$750 billion Recovery Plan.[9] Under the Ukraine Recovery Vision, US$150–250 billion is envisaged for restoration and modernization of housing and infrastructure. A three-stage reconstruction plan was presented: Stage 1 is a plan blueprint; Stage 2 is a plan drill-down and roadmap; and Stage 3 is implementation. The Recovery Plan has set targets for 2032: it aims to accelerate sustainable economic growth (with a plan for 7 percent annual GDP growth and an increase in investments); to reach the top-25 economies in the Economic Complexity Index and the World Bank Human Capital Index; and to achieve a 65 percent reduction in CO2 emissions from 1990. The key guiding principles of the government's Recovery Plan are to start now and ramp up gradually; grow prosperity in an equitable way; integrate into the EU; build back better (for the future); and enable private investment and entrepreneurship. The plan will be implemented in a region-focused and parameter-based approach. Within the plan, 15 national programs have been developed to support the achievement of short-, medium-, and long-term targets.[10]

The RDNA can be instrumental in supporting the Government of Ukraine's Recovery Plan and implementation efforts. The RDNA provides a baseline of sectoral and cross-cutting information on recovery and reconstruction needs that is linked to the damage and losses incurred as well as sectoral prewar baselines, while considering building back better, right-sizing, right-placing, and overall modernization efforts. This information creates a data set that can help guide recovery planning as well as monitoring and evaluation (M&E).

Beyond the guiding principles that the government's Recovery Plan establishes, the following principles could be considered based on international experience related to post-conflict and post-disaster recovery and reconstruction:

- **Balancing urgent needs and medium- to long-term goals:** The recovery and reconstruction planning will need to address the most urgent needs immediately and in the short term, while ensuring preparations for longer-term reconstruction and recovery. In the short term, there is a need to ensure safety and security of people and to address the most urgent and basic needs (including for vulnerable populations) through shelter, public services, and economic restoration activities. In the medium to long term, recovery and reconstruction should build on the foundation of green, resilient, and inclusive development; it should also ensure efficiencies by upgrading access to and quality of services and infrastructure and by right-sizing/right-siting service networks and infrastructure.

- **Strategic prioritization of reconstruction across all sectors**: Building on the identified baselines, damage, losses, and needs across sectors in a consistent manner as done under the RDNA, needs should be prioritized based on absorptive capacity of different sectors, priorities related to different geographic areas, and humanitarian and IDP needs, as well as financing availability, institutional capacity, and other elements.

9 URC2022, "Recovery Plan," 2022, *Link*.

10 See Government of Ukraine, "Plan for the Recovery of Ukraine (ПЛАН ВІДНОВЛЕННЯ УКРАЇНИ)," 2022, *Link*.

- **Inclusiveness and equity:** Recovery and reconstruction need to be closely aligned with efforts to decrease poverty, efforts to enhance social inclusion and gender equity, and investments targeting the most disadvantaged social groups.

- **Transparency and good governance:** The recovery process should be measured against established targets/performance indicators and timelines; and it should be monitored within a transparent M&E system and process, including consultation with the affected stakeholders.

- **Addressing needs of different (groups of) oblasts:** Ukraine will also need to balance its efforts across the different groups of regions of Ukraine—frontline, recovered, backline, and support areas—depending on the progress of the war. Specific recovery and reconstruction plans can help guide the recovery within relevant oblasts based on their highest needs.

- **Resilience and building back better:** Most of Ukraine's infrastructure was built during the Soviet era and has suffered from years of underinvestment and neglect. The country's economic infrastructure is in dire need of improvement to be done in alignment with broader climate change and sustainability goals and targets. For example, the road network suffers from chronic lack of maintenance and repair works and requires major upgrading. At the same time, about 40 percent of water supply networks are in critical condition. Social infrastructure is likewise deficient; schools, kindergartens, and basic medical facilities are outdated and need to be rehabilitated and modernized, while also being made more energy efficient and climate resilient. In addition, the country's agricultural assets are increasingly vulnerable to weather-related events, as most of Ukraine's small and medium farm enterprises have not yet adopted climate-smart technologies. Ukraine's industries and the energy sector too will need to adapt to more efficient and sustainable good practice and standards.

- **Leadership and coordination:** Continuous leadership from the highest level of government will be essential, together with strong operational support. To keep the momentum for the revitalization of the county, the highest levels of central government will need to be involved and strategically lead this process. The operational structure will also be key for delivering results and preserving a sense of perspective among the population.

- **Local solutions and local development:** Recovery and revitalization will need to be designed in a way that strongly supports local economies, with local governments at the helm of the planning and implementation efforts, especially in cities. Recovery and revitalization at the local level would necessitate adopting an integrated and place-based approach and ensuring the presence of strong intergovernmental, inter-sectoral, and inter-municipal coordination mechanisms. Any structure or process for recovery and revitalization should make use of the economic and human capital in the country, and local firms should be involved in the process. Partnerships between them and firms from other parts of Ukraine and abroad should be promoted and supported. Building reconstruction should rely as much as possible on the local industry and on solutions produced in Ukraine.

- **Focus on community needs:** Community-driven development with strong citizens' involvement is a crucial element for building ownership and ensuring sustainability of recovery and revitalization. Innovative approaches for ensuring that the entire local community participates in recovery and revitalization is instrumental. The needs of the community cannot be identified using a top-down approach, and any such attempts can only result in investments disconnected from the real needs on the ground and unlikely to achieve sustainable results.

Related to the implementation of the recovery activities, the following practical considerations could be taken into account based on international experience:

- **Project identification, prioritization, sequencing, and commercial strategy**: There is a need to identify and frame reconstruction and recovery project packages and to sequence them over time. This should reflect the relative priority of needs, a logical sequencing of interdependent works, and commercial considerations for bundling contracts according to the scale and scope that the market for engineering and contractor services can meet. The commercial strategy for delivering works at the scale envisaged for Ukraine's reconstruction would likely require an increase in the number of international construction firms that are active in

Ukraine in parallel with efforts to grow smaller domestic firms into internationally competitive firms.

- **Use of common systems and processes**: Where feasible, the use of agreed and common systems, processes, and procedures should be promoted for procurement, financial management, management of environmental and social risks, M&E, etc. across recovery and reconstruction activities/investments. This will ensure all government officials (horizontal and vertical) are using the same systems, thus maximizing efficiency, including benefits of training, and avoiding situations where the same implementing unit is using multiple different systems of donor organizations or international financial institutions.

- **Focus on developing institutional capacity and managerial and technical capacity of implementation units**: Recovery efforts should focus on developing the capacity of institutions across different administrative levels. Moreover, implementation units (or multiple units) that will manage projects in specific sectors, subsectors, and/or regions should be capable of preparing and managing projects to the requirements of bilateral or multilateral development institutions, with respect to technical, fiduciary, and environmental and social requirements. Therefore, capacity development should start early. Mobilization of external resources to augment capacity will also be critical.

- **Mobilization of technical project preparation**: The nature of reconstruction projects needed across many sectors with large infrastructure works will be technically complex and engineering intensive. Beyond debris and waste management and land contamination, many projects will require environmental and social assessments and potentially land acquisition processes with public consultation processes. Alignment with European Union peers will also require Ukraine to apply standards that are different or modified from those previously used. While it may be possible to temporarily apply foreign standards, Ukraine's own domestic standards would eventually need amendments to align with the EU acquis. Project preparation tasks would reasonably be expected to cost between 2 percent and 10 percent of total civil works investment. Mobilizing funds for these project preparation tasks immediately and beginning technical preparations for "no regret" investments that are highly likely to fall into highest-priority categories, is essential to rapid mobilization and Ukraine's ability to absorb reconstruction funding across different sectors.

- **Financial strategy and the roles of international funds, sovereign funding, and user charging in specific subsectors:** The scale of investment needed for Ukraine's reconstruction is beyond the financial capacity of the government and its subsidiary institutions in virtually all sectors. International assistance in the form of grants, loans, and/or guarantees from external sources is expected to augment the fiscal capacity of Ukraine during reconstruction. Beyond these sources, there will also be a role for user charging to support investment and long-term sustainability of public services. Each specific sector will accordingly need a financial strategy and indicative expenditure envelope that reflects credible funding sources and their role in supporting direct expenditures or underpinning different forms of financing (sovereign, nonsovereign, commercial, etc.). Providing financial strategies for relevant sectors during reconstruction is both necessary in the immediate term and likely to prove complementary for post-reconstruction efforts to ensure financial sustainability of critical public services.

INTRODUCTION

Macroeconomic context prior to the war

Responding to the unprecedented shocks of 2014–2015, Ukraine undertook a wide range of reforms to stabilize the economy, reduce large imbalances, and cushion the impact of the shocks on the population. Structural reforms included (i) moving to a flexible exchange rate; (ii) undertaking significant fiscal consolidation; (iii) reforming energy tariffs to reduce a key quasi-fiscal deficit and strengthening the social safety net to cushion the impact on the poor; (iv) stabilizing the banking sector by putting in place a framework to resolve and recapitalize weak banks and strengthen supervision; (v) taking steps to streamline the business environment; and (vi) establishing key anticorruption institutions and requiring asset disclosures for public officials. These reforms helped to stabilize confidence after two years of sharp economic contraction. Real GDP grew by 3.5 percent in 2018 and 3.2 percent in 2019, up from 2.4 percent in 2016–2017.

The improved macro-fiscal and financial policy fundamentals established after the 2014–2015 crisis helped Ukraine weather the COVID-19 crisis better than expected. Following a 3.8 percent contraction in 2020 (versus 7.8 percent initially projected), the economy grew by 3.4 percent in 2021 as COVID restrictions eased and a bumper harvest lifted growth in the last quarter of 2021. Fiscal revenues performed better than anticipated, with a trade and income tax revenue boost in both 2020 and 2021. The fiscal deficit reached 6 percent of GDP in 2020 (versus a pre-pandemic projection of 2.1 percent) and remained elevated at 4 percent in 2021 due to the added fiscal burden from fixed household gas tariffs (amidst steep increases in international gas prices). However, 2020 experienced a slight increase in social vulnerability as 23.2 percent people were recorded to live below the national poverty line (up from 23 percent in 2019).[11] Overall, however, the government's COVID-19 response measures helped limit the economic impact on citizens, particularly those below the poverty line. To support the economic recovery and address a lack of capital investment, Ukraine deepened reforms in 2020–2021 in the following areas: (i) de-monopolization and anticorruption institutions; (ii) strengthening of land and credit markets; and (iii) financial sector supervision improvements. Recovery began to be materially disrupted by a severe escalation in geopolitical tensions toward the end of 2021.

11 Measured by the actual subsistence minimum. This amounted to Hrv 3,661 per adult per month in 2019, which translates to US$14.5 per day in 2011 purchasing power parity (PPP). In 2015, one in two people lived below the poverty line.

Context of the War

2014 Crisis and Its Impacts

The invasion of Ukraine in February 2022 is deepening a period of political transition and insecurity that began before the outbreak of hostilities. In 2014, tensions between the Russian Federation and Ukraine ignited following the protests that led to the removal of former Ukrainian president Viktor Yanukovych in February 2014 and the Crimea crisis in March 2014, resulting in damage to civil infrastructure and large losses of civilian lives.[12] The country's overall development prospects plummeted, as the conflict between Ukrainian forces and separatist military formations in the two eastern territories paralyzed economic activity in the Donetska and Luhanska oblasts.[13] Disruptions in industry, transport, and small and medium enterprise activity led to widespread job losses throughout the country, with the greatest impacts in Eastern Ukraine. Investor confidence dropped to record lows. Forced displacement and conscription created significant labor market distortions. Trade with Russia declined significantly.

The social and human implications of the 2014 conflict further exacerbate the socioeconomic consequences of the 2022 invasion. An estimated 14,300 people died as a result of the conflict that began in 2014, including nearly 3,500 civilians. It is estimated that over 2.7 million people were displaced (5 percent of the country's population) by 2016, with 1.41 million persons remaining internally displaced within Ukraine into early 2022.[14] An estimated 2.9 million people in Eastern Ukraine faced difficulties in accessing medical care, accommodation, social services, and benefits, as well as compensatory mechanisms for damaged, seized, or looted property.[15]

As of November 2014, an assessment by the World Bank, European Union, and United Nations, *Ukraine: Recovery and Peacebuilding Assessment for Eastern Ukraine*, estimated the total recovery needs for infrastructure and social services at US$1.56 billion. An additional US$135.5 million was estimated for economic recovery, with an added US$126.8 million assessed for social resilience, peacebuilding, and community security.[16] In 2020, the COVID-19 pandemic compounded the shocks associated with ongoing hostilities, and Ukraine experienced a net outflow of investment, sharp increases in unemployment (affecting women more acutely than men), and stalled structural reforms. By February 2022, an estimated 4.4 million Ukrainians had been infected with COVID-19, resulting in 105,505 deaths[17] (pandemic-related excess morality deaths were estimated at 160,000–170,000).[18]

By early 2022, the buildup of Russian forces on the borders of Ukraine had left almost 38 percent of the Donbas (the combined territories of Donetska and Luhanska oblasts) outside of government control, separated from the rest of Ukraine by a 457 km line of contact. Together with the impacts of COVID-19 on the economy and communities, legacies of the fighting since 2014 had severely undermined economic recovery prospects in the Donbas and

12 In March 2014, the Autonomous Republic of Crimea and the city of Sevastopol each held a referendum on whether to join the Russia Federation. These referendums were widely criticized, and on March 27, 2014, the UN General Assembly passed Resolution 68/262 stating that the referendums had "no validity" and "cannot form the basis for any alteration of the status of the Autonomous Republic of Crimea or the city of Sevastopol." See UN General Assembly, "Resolution Adopted by the General Assembly on 27 March 2014 [without reference to a Main Committee (A/68/L.39 and Add.1)], 68/262. Territorial Integrity of Ukraine," April 1, 2014, *Link*.

13 These regions accounted for almost one-quarter of Ukraine's industrial activity and an equal share of its exports before the 2014 conflict began. World Bank, European Union, and United Nations, *Ukraine: Recovery and Peacebuilding Assessment: Analysis of Crisis Impacts and Needs in Eastern Ukraine*, Vol. 1: *Synthesis Report* (Washington, DC: World Bank, 2015), *Link.*

14 Ukraine Ministry of Social Policy, "Ministry Statistics 2022." See also World Bank, *The Economics of Winning Hearts and Minds: Programming Recovery in Eastern Ukraine* (Washington, DC: World Bank, 2021), p.13.

15 UN Office of the High Commissioner for Human Rights, "Report on the Human Rights Situation in Ukraine 16 August to 15 November 2015," *Link*.

16 See the full report, with a detailed breakdown of figures by sector: World Bank, European Union, and United Nations, *Ukraine Recovery and Peacebuilding Assessment: Analysis of Crisis Impacts and Needs in Eastern Ukraine,* Vol. 1: *Synthesis Report* (Washington, DC: World Bank, 2015), *Link*.

17 Source: Our World in Data, *Link* (accessed on February 25, 2022).

18 Organisation for Economic Co-operation and Development, "The COVID-19 Crisis in Ukraine," February 25, 2022, *Link*.

harmed GDP growth throughout Ukraine at the eve of the invasion.[19]

2022 War

The invasion of Ukraine began as a full-scale land, sea, and air campaign, targeting Ukrainian military assets and cities across the country. The reaction and mobilization of Ukrainian resistance and formal military units slowed the Russian advance, eventually reversing the Russian movements along the northern and northeastern fronts toward Kyiv, Chernihiv, and Kharkiv. As of June 1, Ukrainian forces have also countered Russian advances toward Slovyansk, Kramatorsk, Izium, and Odesa. As Russian military formations have shifted focus to the east and south of Ukraine, street fighting, artillery bombardments, and long-range missile and air strikes continue, damaging urban residential areas and communications, administrative, and transportation infrastructure. Hospitals, educational and residential complexes, energy production and distribution infrastructure, public service facilities, commercial and trade assets, and cultural sites have been heavily damaged. The cities of Mariupol and Sievierodonetsk in particular have sustained comprehensive destruction.

Rapid and remote assessments of damage were conducted in April 2022 by the World Bank and the Kyiv School of Economics (KSE). The World Bank assessment was aimed to inform the Approach Paper: Relief, Recovery and Resilient Reconstruction-Supporting Ukraine's Immediate and Medium-Term Economic Needs which was prepared for the Ministerial Roundtable for Support to Ukraine at the IMF-World Bank 2022 Spring Meetings.[20] This assessment used a cut off for damage of March 31, 2022, and found US$59.3 billion in direct damage, with US$18.8 billion in damage to residential buildings, US$12.9 billion to non-residential buildings and US$27.6 billion in damage to infrastructure. Using a cutoff date of April 11, 2022, the KSE identified direct damage from the war of US$80.4 billion.[21]

As of late May 2022, a 960 km line of military combat extended just west of Kherson, north of Melitopol and Mariupol, northeast of the Donbas cities of Luhanska and Donetska oblasts, continuing northwest near Izyum to the Russian border north of Kharkiv. Russian ships in the Black Sea continued to conduct a naval blockade of Ukraine, halting commerce at Ukrainian ports. Cruise missiles and other standoff weapons from these vessels have also struck Ukrainian targets. In areas temporarily under Russian control, such as Kherson, Ukrainian government personnel have been replaced with pro-Russian officials.[22] On May 30, 2022, it was agreed that the Rapid Damage and Needs Assessment would be conducted to assess the damage, loss and reconstruction and recovery needs considering the war impacts up until June 1, 2022. Further assessments of the war impacts could be conducted at later dates depending on the trajectory of the war.

War Intensity Since June 1, 2022

Since June 1, 2022, the impacts of the war in Ukraine have continued to escalate. The following maps depict the war intensity. Figure 5 shows the monthly combat intensity from March through end of May 2022, and the combat intensity in the month of June 2022. Figure 6 shows the difference between the combat and artillery use in the March–May period and June. Since June 1, and the cutoff date for this RDNA, the conflict has intensified in east and south-east of Ukraine, with significant additional damage anticipated in the oblasts of Luhanska, Donetska and Khersonska and Zaporizka.

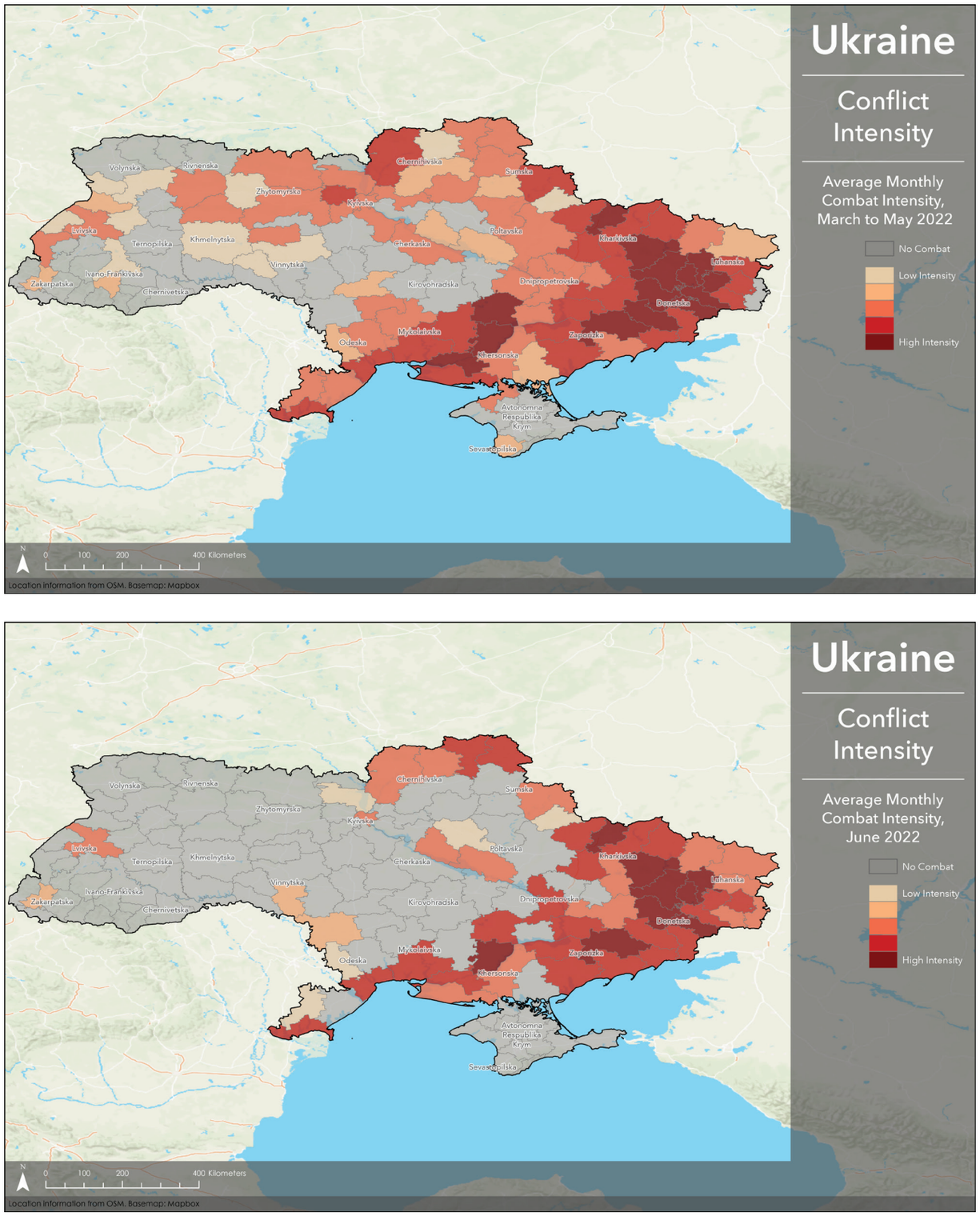
19 World Bank, *The Economics of Winning Hearts and Minds: Programming Recovery in Eastern Ukraine* (Washington, DC: World Bank, 2021), p. 13.

20 World Bank. 2022. Relief, Recovery and Resilient Reconstruction: Supporting Ukraine's Immediate and Medium-Term Economic Needs, *Link*.

21 Kyiv School of Economics, *Link*

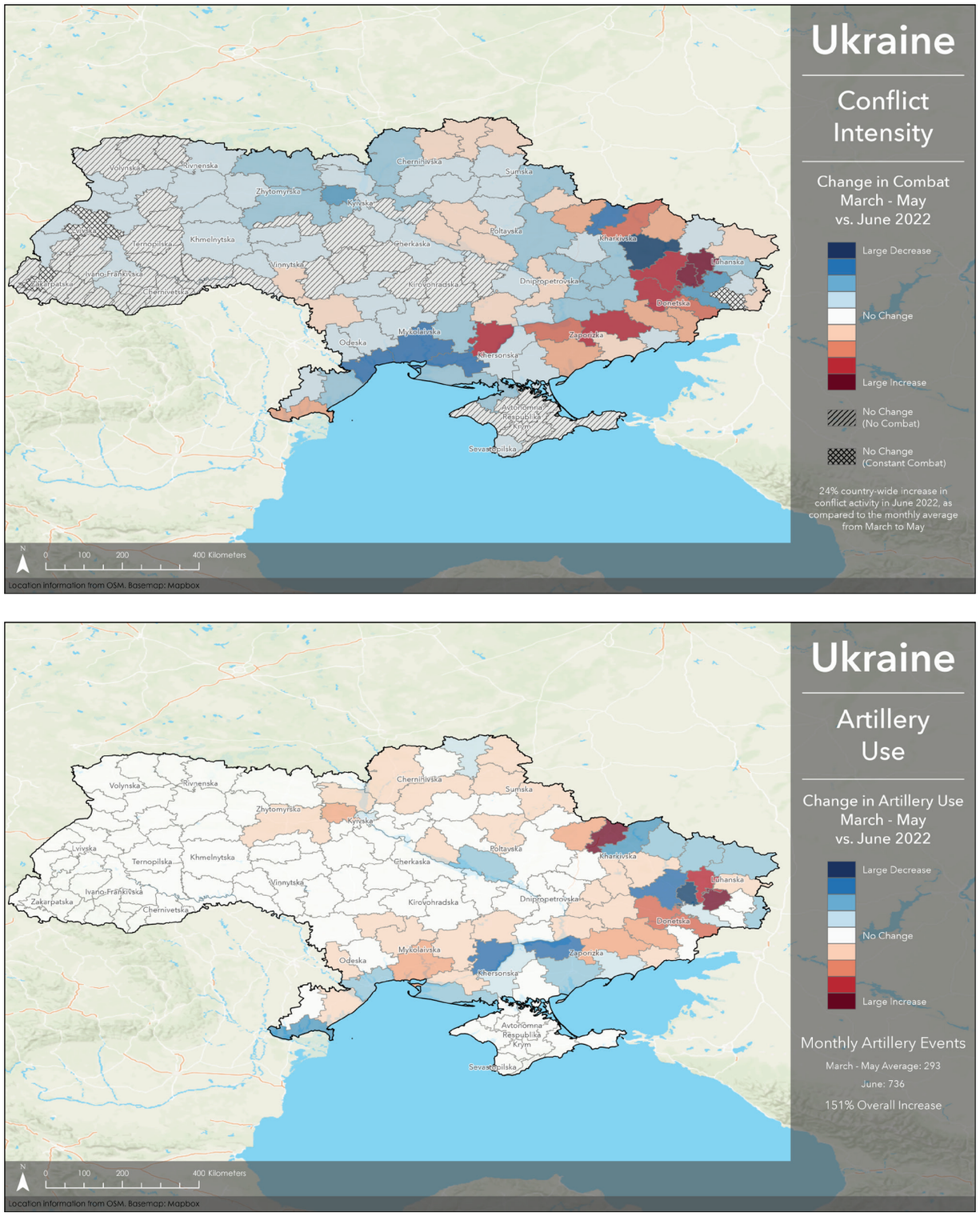
22 "Kherson: occupiers have appointed their own "head of the regional state administration" and "mayor" Ukrayinska Pravda, April 26, 2022, *Link*.

Figure 5. Combat intensity March–May 2022 (top) and month of June 2022 (bottom)



Source: Remote data assessment for the RDNA.

Figure 6. Comparison of March–May period and June in combat (top) and artillery use (bottom)



Source: Remote data assessment for the RDNA.

Government and International Response

Government Response

Since the launch of the invasion of Ukraine, the Government of Ukraine has taken the lead in coordinating the humanitarian support to the war-affected regions and population. Several important simplifications to the legislation were introduced to facilitate a rapid response to humanitarian needs during the period of martial law. These include (i) provision of the separate procedure for passage of donors' humanitarian aid through the customs border of Ukraine;[23] and (ii) procedure and mechanism for providing humanitarian and other aid to the civilian population (funds received in national or foreign currency as charitable donations, humanitarian aid, grants, or gifts are deposited to the current account of the Ministry of Social Policy opened for this purpose at the National Bank of Ukraine).[24] The Ministry for Reintegration of the Temporarily Occupied Territories (MRTOT) on a weekly basis collects and consolidates the needs of the Regional Military Administrations for the provision of humanitarian aid, in particular household items, sanitary and hygienic products, and food and medicines. In parallel, MRTOT is in charge of coordinating transportation and delivery of humanitarian aid from various charity organizations and HelpUkraine.Center to the regions.[25]

Efficient online humanitarian aid platforms have been established to provide services, coordination, and support to Ukraine. At the initiative of state authorities and volunteers, the volunteer association SpivDiia[26] has been developed as an official platform uniting volunteer and state initiatives for humanitarian aid, guaranteeing the safety of both providers and recipients of assistance. This platform is coordinated with the support of the Office of the President of Ukraine together with the MRTOT, Ministry for Communities and Territories Development of Ukraine (Minregion), Ministry of Health, and Ministry of Youth and Sports. The Humanitarian Aid Portal[27] for those seeking to help Ukraine was developed jointly by the Office of the President of Ukraine and the Cabinet of Ministers of Ukraine. This platform provides an interactive map of the humanitarian assistance; accepts online monetary contributions; explains how to send humanitarian cargo and how to transfer funds to support the army or help injured civilians; and lists foreign and Ukrainian humanitarian hubs. In addition, a national portal for temporarily evacuated persons looking for temporary housing[28] was developed by the Office of the President of Ukraine.

To support the rapidly growing population of internally displaced persons (IDPs), a large-scale IDP program under the President of Ukraine[29] has been launched to coordinate support provided to IDPs.[30] The program includes four main types of support as determined by the relevant Cabinet of Ministers resolutions to support both IDPs and host communities: (i) monthly cash transfers to IDPs to cover living expenses, including housing and utility services;[31] (ii) compensation to employers for labor costs related to the employment of IDPs;[32]

23 Cabinet of Ministers Resolution No. 174, "Some Issues of the Passage of Humanitarian Aid through the Customs Border of Ukraine under Martial Law," March 1, 2022, *Link*.

24 Cabinet of Ministers Resolution No. 220, "Procedure of Provision of Humanitarian and Other Aid to the Civilian Population under Martial Law Conditions in Ukraine," March 1, 2022, *Link*.

25 HelpUkraine.Center is the largest logistics hub for humanitarian aid in Eastern Europe, created at the initiative of Ukrainian businesses (including TIS, Nova Poshta, Rozetka, Ocean.me, and others); see *Link*.

26 SpivDiia is an initiative of volunteers and state authorities that guarantees the safety of both providers and recipients of assistance; see *Link*.

27 Humanitarian Aid Portal; see *Link*.

28 The national portal for temporarily evacuated persons looking for temporary housing is at *Link*.

29 Information about the program is at the government portal source, *Link*.

30 Fourteen war-affected regions determined by the Cabinet of Ministers are supported: Chernihivska, Sumska, Kharkivska, Khersonska, Mykolaivska, Zaporizka, Donetska, Luhanska, Kyivska, Zhytomyrska, Odeska, Volynska, and Dnipropetrovska oblasts and Kyiv City.

31 Cabinet of Ministers Resolution No. 332, "Some Issues of Payment of Housing Assistance to Internally Displaced Persons," March 20, 2022, *Link*.

32 Cabinet of Ministers Resolution No. 331, "About the Statement of the Order for Providing the Employer with Compensation for Labor Costs for the Employment of Internally Displaced Persons as a Result of Hostilities During Martial Law in Ukraine," March 20, 2022, *Link*.

(iii) reimbursement of host communities[33] for the housing and utility costs paid by the community-owned facilities (premises) used to temporarily house IDPs; and (iv) reimbursement of owners of private housing stock related to free temporary accommodation of IDPs.[34]

International Response

Various international institutions have mobilized support for Ukraine and neighboring countries affected by the war through emergency support mechanisms. The World Bank Group has earmarked a US$4 billion support package for Ukraine, including fast-disbursing budget support to help the Ukrainian government continue providing essential services.[35] In addition to this, the World Bank Group set up a Multi-Donor Trust Fund (MDTF) to provide a rapid, targeted, and secure mechanism for channeling grant resources from donors to Ukraine; the Multi-Donor Trust Fund currently has some US$0.3 billion in contributions. Under the Public Expenditures for Administrative Capacity Endurance in Ukraine project, the World Bank has approved US$1.49 billion in additional financing. The World Bank Group is also providing support to neighboring countries affected by the invasion, including support to refugee populations, as well as support to the private sector through trade finance. The International Monetary Fund (IMF) has allotted US$1.4 billion under the Rapid Financing Instrument (RFI), which provides rapid support for urgent balance of payments needs so immediate needs, such as measures to alleviate the economic impact of the war, can be met. Existing IMF financial programs with Ukraine are also continuing, where appropriate, including the disbursement of US$2.7 billion from the Special Drawing Rights (SDR) allocation in August 2021. The IMF also provides policy support in the design and implementation of effective crisis management measures and provides support to neighboring countries, including Moldova.

European financial institutions have also mobilized support for Ukraine. The European Bank for Reconstruction and Development (EBRD) has established the US$2.2 billion (€2 billion) War on Ukraine–EBRD Resilience Package, which is aimed at supporting resilience and livelihoods in Ukraine and affected countries.[36] The European Investment Bank (EIB) has supplied US$2.2 billion (€2 billion), which, in collaboration with the European Commission, includes US$0.7 billion (€668 million) for immediate liquidity assistance to Ukrainian authorities. Specifically, EIB has committed US$2.1 billion (€1.9 billion) in support to small and medium companies, as well as US$3.9 billion (€3.6 billion) in public sector support. In addition, the EIB is accelerating commitment for infrastructure projects through the investment of US$1.4 billion (€1.3 billion). Under its Ukraine Solidarity Package, the EIB has prepared a US$14.3 billion (€4 billion) package to support EU member states hosting refugees as a result of the invasion in Ukraine and to develop critical social infrastructure. Lastly, the Council of Europe Development Bank (CEB) has made emergency grants to neighboring countries to support immediate needs of refugees, including transportation and orientation.

In 2022, through the Union Civil Protection Mechanism (UCPM), the EU has provided Ukraine with over US$716 million (€700 million) in humanitarian aid and in-kind assistance (including 40,500 tons of different types of aid and 653 medical evacuations), and has delivered this aid through logistic hubs established in Slovakia, Romania, and Poland.[37] The European Union has made US$355 million (€348 million) available in humanitarian aid programs to support civilians affected by the war (€335 million for Ukraine and €13 million for Moldova).[38] The EU has also mobilized €4.1 billion in support for Ukraine's overall economic and financial resilience, keeping the Ukrainian government functional and able to

33 Cabinet of Ministers Resolution No. 261, "About the Statement of the Order and Conditions of Granting of Compensation to the Central Executive Bodies and Local Budgets for Payment of the Utility Services Provided During Placement in the Conditions of Martial Law of Temporarily Displaced Persons," March 11, 2022, *Link*.

34 Cabinet of Ministers Resolution No. 333, "Reimbursement of Expenses for Temporary Accommodation of Internally Displaced Persons Who Have Moved During Martial Law and Do Not Receive Monthly Targeted Assistance to Internally Displaced Persons to Cover Living Expenses, Including Housing and Communal Services," March 19, 2022, *Link*.

35 See World Bank, "World Bank Group Response to Global Impacts of the War in Ukraine: A Proposed Roadmap," April 12, 2022, *Link.*

36 Within Ukraine, the resilience and livelihoods framework will focus: (i) payment deferrals, debt forbearance, and restructuring; (ii) trade finance, including for fuel imports; (iii) emergency liquidity finance, in coordination with partners; and (iv) emergency reform support, to support the Ukrainian authorities with immediate legislative and regulatory interventions.

37 European Commission, "ECHO Daily Map of 17 June 2022," Directorate General for Civil Protection and Humanitarian Aid Operations, *Link*; European Commission, "Factsheet–The European Union and Ukraine," June 18, 2022, *Link.*

38 European Commission, "Ukraine," Directorate General for Civil Protection and Humanitarian Aid Operations. *Link*.

cover basic expenditures. Between March and May 2022, US$1.2 billion in macro-financial assistance has been disbursed in budgetary support to Ukraine. The EU is also providing additional grant support of US$120 million to help state and resilience building.[39]

Following Ukraine's activation of the UCPM and communication with the Emergency Response and Coordination Center (ERCC), all 27 EU member states, as well as three participating states (Norway, Turkey, and North Macedonia) responded with support for Ukraine. Moreover, many nongovernmental organizations, embassies, companies, and individuals from Ukraine and abroad have sent donations. Numerous countries expressed solidarity with Ukraine. The United Nations International Children's Emergency Fund (UNICEF), the United Nations High Commissioner for Refugees (UNHCR), the Organization for Security and Co-operation in Europe (OSCE), and the World Meteorological Organization (WMO), as well as many others, have expressed solidarity and readiness to provide assistance.

In addition, several countries are providing humanitarian support through national programs. As of May 12, the United States had provided US$688 million in humanitarian assistance for shelter, food, and health supplies to help Ukrainians affected by the war. An additional US$16 billion was committed for budgetary support for the Ukrainian government, economic assistance for small businesses, agricultural sector support, efforts to document human rights violations, and support to mitigate the effects of displacement in the region.[40] The United Kingdom has committed US$3.5 billion, and Germany announced US$1 billion in macro-economic support and humanitarian assistance for Ukraine in May.[41]

Ukraine's Recovery Plan

In April, the Government of Ukraine established the National Council for the Recovery of Ukraine from Consequences of War, which is co-chaired by the Council of the Prime Minister and the Office of the President. Working groups have been formed for economic recovery and development, agriculture, public infrastructure, private enterprise recovery, restoration of public services, housing, transport, communications, and social service delivery, among other sectors. In addition to the collection of data on damage and needs associated with the war, the National Council is charged with developing proposals for priority reforms and developing the postwar recovery and development plan. The current assessment is being conducted in collaboration with the National Council.

On July 4, 2022, the Ukraine Recovery Conference (URC2022) held its fifth conference in Lugano, Switzerland, and adopted the Lugano Declaration and the Lugano Principles (Box 2). The meeting was attended by various governmental representatives, advocacy groups, academic institutions, representatives from the private sector, and international organizations, which later endorsed the Lugano Declaration. The Ukraine Recovery Conference was structured under five recovery pillars: smart recovery architecture, infrastructure recovery, social recovery, environmental recovery, and energy security. The Lugano Declaration highlights the importance of having Ukraine drive the recovery and development plan; the recovery process should be linked to and mutually support the broader reform agenda, while also being an inclusive multi-stakeholder process that includes the private sector and civil society organizations.[42]

39 European Commission, "EU Assistance to Ukraine," *Link* (accessed June 22, 2022).
40 Center for Strategic and International Studies (CSIS), "Funding Review," May 23, 2022, *Link*.
41 Devex, "Funding Tracker: Who's Sending Aid to Ukraine?," June 2022, *Link* (accessed June 22, 2022).
42 URC2022, "Lugano Declaration," July 4–5, 2022, *Link*.

Box 2. Lugano Declaration and Principles

The seven Lugano principles are presented in full below:

1. Partnership. The recovery process is led and driven by Ukraine and conducted in partnership with its international partners. The recovery effort has to be based on a sound and ongoing needs assessment process, aligned priorities, joint planning for results, accountability for financial flows, and effective coordination.

2. Reform focus. The recovery process has to contribute to accelerating, deepening, broadening and achieving Ukraine's reform efforts and resilience in line with Ukraine's European path.

3. Transparency, accountability and rule of law. The recovery process has to be transparent and accountable to the people of Ukraine. The rule of law must be systematically strengthened and corruption eradicated. All funding for recovery needs to be fair and transparent.

4. Democratic participation. The recovery process has to be a whole-of-society effort, rooted in democratic participation by the population, including those displaced or returning from abroad, local self-governance and effective decentralization.

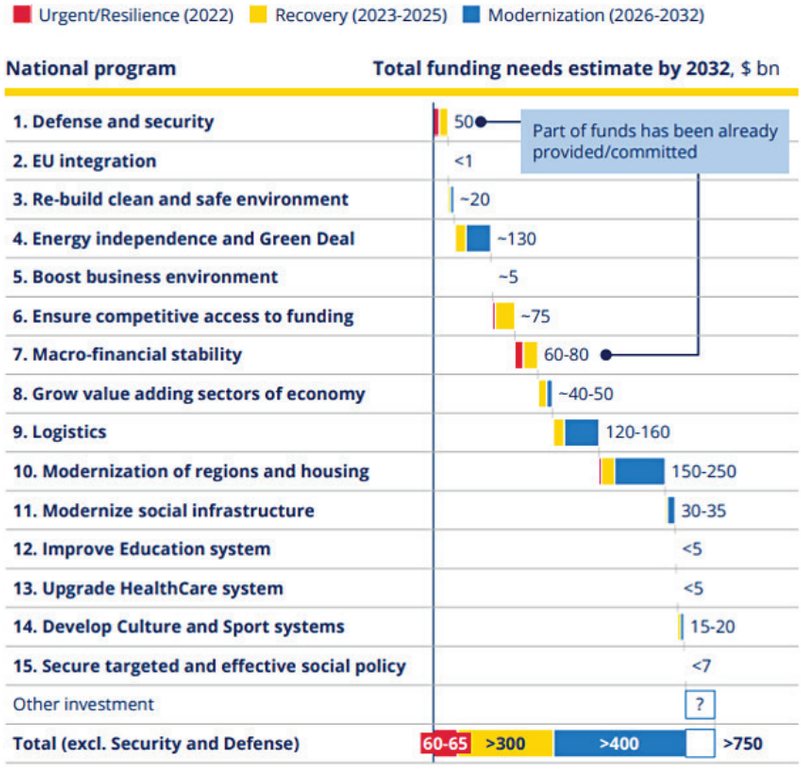
5. Multi-stakeholder engagement. The recovery process has to facilitate collaboration between national and international actors, including from the private sector, civil society, academia and local government.

6. Gender equality and inclusion. The recovery process has to be inclusive and ensure gender equality and respect for human rights, including economic, social and cultural rights. Recovery needs to benefit all, and no part of society should be left behind. Disparities need to be reduced.

7. Sustainability. The recovery process has to rebuild Ukraine in a sustainable manner aligned with the 2030 Agenda for sustainable development and the Paris Agreement, integrating social, economic and environmental dimensions including green transition.

Source: URC2022, "Lugano Declaration," July 4–5, 2022, *Link*.

Figure 7. Ukraine Recovery Plan



Source: URC2022, "Recovery Plan," 2022, *Link.*

At the conference, Ukraine presented a US$750 billion Recovery Plan.[43] Under the Ukraine recovery vision, US$150–250 billion is envisaged for restoration and modernization of housing and infrastructure (more details are in Figure 7). The Ukrainian government presented a three-stage recovery plan: Stage 1 is a recovery plan blueprint;[44] Stage 2 is a recovery plan drill-down and roadmap;[45] and Stage 3 is implementation.[46] The Recovery Plan has set targets for 2032: to accelerate sustainable economic growth (with a plan for 7 percent annual GDP growth and an increase in investments); to reach the top-25 economies in the Economic Complexity Index and the World Bank Human Capital Index; and to achieve a 65 percent reduction in CO2 emissions from 1990. The key guiding principles of the Recovery Plan are to start now and ramp up gradually; grow prosperity in an equitable way; integrate into the EU; build back better (for the future); and enable private investment and entrepreneurship. The plan will be implemented in a region-focused and parameter-based approach. To bolster Ukraine's Recovery Plan and support the achievement of short-, medium-, and long-term targets, 15 national programs have been developed; see Figure 7.[47]

43 URC2022, "Recovery Plan," 2022, *Link*.

44 Stage 1 includes defining top-down development targets; collecting development projects and initiatives via inclusive process; prioritization of projects and initiatives; identifying "catalyst" projects; and consolidation of the priority initiatives into a holistic recovery plan blueprint.

45 Stage 2 includes specification and elaboration of the plan with the local stakeholders and international partners; setup of the recovery governance structure to support implementation; synchronization of the plan with the government program; preparation of a detailed implementation roadmap with clear deadlines and responsibilities; and launch of immediate-priority projects.

46 Stage 3 includes launch of the plan implementation; regular monitoring of results; and program adjustments as needed.

47 See Government of Ukraine, "Plan for the Recovery of Ukraine (ПЛАН ВІДНОВЛЕННЯ УКРАЇНИ)," 2022, *Link.*

RDNA Objectives and Methodology

Objectives, Limitations, and Coverage of the Assessment

The World Bank, the Government of Ukraine, and the European Commission, with the support of partners, conducted jointly a Rapid Damage and Needs Assessment (RDNA) to provide a comprehensive inventory of damage, losses, and needs resulting from the ongoing war; the goal is to inform reconstruction and recovery planning. The RDNA is in line with the globally recognized Damage and Loss Assessment (DaLA) methodology, which is a credible and robust methodology to systematically and comprehensively assess damage, losses, and reconstruction needs. The RDNA looks at social, infrastructure, and productive sectors as well as cross-cutting sectors and issues (such as land decontamination, environment, social issues, governance, and debris management). The RDNA assesses the impact between February 24 and June 1, 2022.

Given the ongoing nature of the war, the damage, losses, and needs presented in this RDNA are absolute minimums, with the numbers expected to increase significantly for each month that the war continues. Depending on how the war evolves, the World Bank stands ready with the Government of Ukraine and the European Commission to repeat the analysis at national level or in specific sectoral or geographic areas. In parallel to the RDNA process, the Government of Ukraine is preparing the approach and systems for the collection of asset-level damage information for these further assessments—an effort very complementary to this RDNA. The government, European Commission, and World Bank will agree on the timing for future updates to the RDNA, at national, subnational, or sectoral level, depending on the progression of the war over coming weeks and months.

Methodology, Approach, Scope, and Timelines

The Ukraine RDNA provides a broad-brush estimate of the effect of the ongoing war on both infrastructure and service delivery.

The RDNA follows a globally established and recognized DaLA methodology jointly developed by the European Union, the World Bank Group, and the United Nations, which has been applied globally in post-disaster and conflict contexts to inform recovery and reconstruction planning.[48] This transparent and standard assessment methodology contributes to coordinated and coherent national and international efforts. In the case of Ukraine, the RDNA approach explicitly includes opportunities to build back better and smarter guided by principles of inclusion, resilience, and sustainability.

The RDNA uses the following key definitions, which are described in greater detail in Table 4. *Damage* is defined as direct costs of destroyed or damaged physical assets; it is valued in monetary terms with costs estimated based on replacing or repairing physical assets and infrastructure, considering the replacement price prevailing before the war. *Losses* are defined as changes in economic flows resulting from the war; losses are valued in monetary terms. Together damage and loss constitute the "impacts" of the war. Needs do not equal the sum of damage and loss. *Needs* costing draws on the monetary value of damage and losses as well as needs associated with the resumption of prewar normality through activities including repair and restoration. However, needs also include a premium linked to building back better principles (such as improved energy efficiency, modernization efforts, and sustainability standards), with each sector using appropriate standards and costing assumptions. Needs also consider issues such as global inflation, surge pricing due to volume of construction, higher insurance, and so forth. Needs are expressed in monetary value according to market price prevailing as of June 1, 2022.

48 Global Facility for Disaster Reduction and Recovery (GFDRR), "Damage, Loss and Needs Assessment–Tools and Methodology, 2022, *Link.*

Table 4. Key RDNA terms

Baseline: General and sector-specific prewar data and information to compare with postwar (cutoff) conditions (presented in "physical numbers" e.g., number of houses, hospitals, schools etc.). Also, where possible, includes gender disaggregated data —e.g., with number of teachers, students etc.
Damage: Total or partial destruction of physical assets existing in the affected area. Damage incurred as a result of the war and is measured in physical units (e.g., square meters of housing, kilometers of roads, etc.). In addition to infrastructure/ buildings, the assets/contents from within those buildings and infrastructures, such as furnishings and equipment, farm machinery and tools etc., should be quantified.
Damage Replacement Cost: Monetary value, expressed as the replacement costs according to the market prices prevailing just before the start of the war.
Losses: Temporary changes in the economic flows arising from the war. Losses occur from the time of the invasion until economic recovery and reconstruction have been achieved, often lasting over many years. In the case of this RDNA, an 18-month period is assumed. Typical losses include the temporary decline in output and higher production costs in the productive sectors of agriculture, livestock, fishery, industry, trade and tourism; lower revenues and higher cost of operation in services (education, health, electricity, water supply and sanitation, transport, and communications), as well as the expenditures to meet humanitarian assistance needs. Debris removal and mine clearance is covered here. Losses are expressed in current monetary values.
Reconstruction and Recovery Needs: Reconstruction and recovery needs refer to the actions and financing required to restore Ukraine to prewar levels, including reconstruction of damaged assets, restoration of services as well as actions to support residents in affected areas, catalyze the economy, build livelihoods, strengthen governance and decision-making, and to build resilience to disasters and climate change.
Needs Costing: Needs consider damage, losses as well as other needs associated with the resumption of prewar normality. Monetary value, expressed as the repair, restoration and replacement costs of damaged assets according to the market price prevailing just after the war—or in this case, replacement costs as of June 2022. For the calculation of reconstruction costs, postwar price increases as well as improvements associated with modernization, energy efficiency and other concepts are of build back better are considered. Reconstruction costs should also consider surge pricing and higher costs of doing business. Costs also include losses such as debris removal, land decontamination etc. Monetary needs also consider the costs for the resumption of production, ensuring service delivery, additional costs to service providers to restore basic services; and the provision of equitable and affordable services to vulnerable groups and affected population.
Immediate measures for basic service provision: Costs related to meeting immediate (temporary) recovery needs of the affected population, including immediate repair and restoration of urgent public services such as electricity, heating, water, etc. This costing falls under losses.
Restoration and access to goods and services: Restoration and access to goods and services that fulfill the basic needs of individuals, families, and communities, such as access to markets, employment, health care, food, schools, religious and cultural centers, etc. These costs fall under needs.
Reconstruction and Rehabilitation of physical assets and infrastructure: Includes demolition and clearance of debris (this costing is part of losses, but it is also reflected in needs). Then the design, civil work and supervision required to rebuild or rehabilitate assets and infrastructure for full functionality (reflected in needs)
Building back better: Relates to measures that the government decides should be integrated into rehabilitation and reconstruction of damaged assets, including improved functionality, energy efficiency, universal access, disaster and climate resilience, and critical modernization measures, including right-sizing and right-siting of infrastructure and services. This costing is added in the needs calculation, and each sector uses appropriate standards and costing assumptions such as additional cost to improve standards (for example, energy efficiency), surge pricing, inflation, higher insurance/security costs, and what the current status is.
Intangible costs: Costs that accrue to assets/sectors without an obvious market price which are difficult to depict in monetary terms such as environmental losses, health and psychological impacts, heritage losses etc.

Source: Assessment team drawing on DaLA guidance.

Some specific assumptions are made for the purpose of this RDNA:

- The RDNA does not provide asset-level information and is not intended for legal or compensatory claims.

- Given the ongoing nature of the war, the damage and loss numbers as well as reconstruction and recovery financing needs will have continued to accrue since June 1 and will continue to grow as long as the war continues. The nature of data collection within a rapid assessment is challenging in certain areas, and at times limited, due to escalations of conflict and a continued deterioration of the humanitarian situation in zones where clashes are prolonged; amidst growing conflict deterioration, the report recognizes that some regions have sustained extensive damage after June 1, 2022.

- Since losses are typically measured until "normality" is restored, an additional 18 months is included in the calculation for losses along with three months between the start of the war and the RDNA cutoff date of June 1, 2022.

- Reconstruction needs are based on damage and losses and consider issues such as increased costs for labor and goods given global inflationary pressures, surge costs associated with volume of reconstruction, additional security costs, and inclusion of build back better principles. Reconstruction and recovery costs are considered for two periods, (i) immediate or short-term, i.e., 18-36 months, and (ii) medium to long-term, up to 10 years. The timeline was defined in line with the context of the ongoing war and high degree of uncertainty, as well as the Government of Ukraine's Recovery Plan timelines (2022–2032).

The RDNA process involves the collection and analysis of data from government, local authorities, the KSE, as well as satellite imagery, social media analytics, anonymized cellphone data, and surveys conducted for the following purposes:

- Quantify and validate ***physical damage*** to infrastructure, buildings, etc. These data are presented overall, by sector, by ownership (public/private), and by oblast.

- Quantify ***losses*** such as disrupted services and economic impacts, clearance and management of debris, mines, and munitions, support to IDPs, etc. These data are presented overall, by sector, and where appropriate by geographic distribution.

- Identify and quantify corresponding ***recovery and reconstruction needs*** overall, by sector, and by oblast, based on the damage and losses. These needs are further broken down into short-term/immediate and medium- to long-term.

- Develop ***guiding principles and sequencing for a green, resilient, inclusive, and sustainable recovery and reconstruction*** that covers public and private infrastructure, service provision, and livelihoods across different sectors. The sequencing should highlight specific immediate and short-term socioeconomic recovery needs and a roadmap for medium- to long-term reconstruction.

Temporal scope: Damage and losses were calculated according to actual or estimated pre-February 2022 baseline of physical assets. Damage data were assessed from February 24, 2022, to June 1, 2022.

Geographic scope: The geographic scope includes all areas under government control on February 1, 2022. Results are presented by oblast and by sector, and on aggregate level overall.[49] There have been limitations in terms of obtaining data within territories temporarily not under government control and within areas where conflict remained intense or intensified throughout June and July.

Sectoral scope: The RDNA covers 20 affected sectors, as follows:

- Social: housing; education; health; social protection; and culture and tourism

- Infrastructure: energy and mining; transport; water supply and sanitation; telecommunications and digital; and municipal services (public buildings/community infrastructure)

49 The Ukraine RDNA covers Vinnytska, Volynska, Dnipropetrovska, Donetska, Zhytomyrska, Zakarpatska, Zaporizka, Ivano-Frankivska, Kyivska, Kirovohradska, Luhanska, Lvivska, Mykolaivska, Odeska, Poltavska, Rivnenska, Sumska, Ternopilska, Kharkivska, Khersonska, Khmelnytska, Cherkaska, Chernivetska, and Chernihivska, as well as the cities of Kyiv, Vinnytsia, Lviv, Odessa, Kharkiv, Irpin, Bucha, and Mariupol.

- **Productive**: agriculture (crops and livestock); irrigation and water resources; commerce and industry; and financial and banking.

- **Cross-cutting**: environment and forestry; justice and public administration; emergency response, civil protection, and early warning systems; land decontamination; social impacts; and macroeconomic impacts at the aggregate level.

Costing: Damage, losses, and needs are presented in US dollars. The hryvnia to US dollar exchange rate of US$1 = UAH 27.28 from December 31, 2021,[50] is used throughout the report.

Coordination: Activities were undertaken with UK Foreign Office, US government, relevant UN agencies, academia, civil society organizations, and the private sector to draw on the most recent information available, to validate data, to ensure a common understanding of activities, and to harmonize assessments and reconstruction efforts. At a subnational level and upon request, the World Bank is providing technical assistance and advice to municipalities on using the DaLA approach to assess damage, loss, and reconstruction needs.

Remote Data

Given the ongoing nature of the conflict and the lack of access to territories temporarily not under government control, this assessment relies primarily on remote-based information that is validated through ground-based information. Remote data sources include 50 cm resolution satellite imagery, (social) media analytics, and publicly available information. The remotely sourced data have been triangulated and validated whenever possible against ground-based information obtained from the Government of Ukraine, local agencies, the UN, and other international partners.

50 This date was selected as it was prior to the significant impact on economic variables associated with the buildup to the invasion.

MACROECONOMIC AND SOCIAL IMPACTS

Borodyanka. Photo by Julia Burlachenko for the World Bank.

MACROECONOMIC IMPACTS

Summary

The war in Ukraine has had very substantial economic, social, and poverty consequences. The war has significantly disrupted economic activities via several channels: damage to productive assets and infrastructure, logistic problems, labor force losses, ruined supply-demand chains, uncertainty, and elevated risks. Thus, estimated gross domestic product (GDP) losses in 2022 go much beyond physical asset losses, while the medium-term economic recovery will be affected by human capital reduction and the sheer size of reconstruction needs. Over 6.8 million Ukrainian residents have left the country, a large majority of them women and children and an estimated 6.6 million people are internally displaced. Ukraine's GDP shrank by 15.1 percent year over year (YoY) in Q1 (or 19.3 percent quarter over quarter (QoQ) seasonally adjusted), driven by a 45 percent GDP contraction in March YoY. After Kyivska oblast was reclaimed, economic activity in April showed the first signs of improvement, even though it remains much below the prewar level. The duration of the war continues to be uncertain, but assuming that June's status quo continues until the end of the year, the GDP contraction in 2022 is estimated to be around 35 percent YoY. If the situation further deteriorates, the decline in economic activities could reach up to 45 percent in 2022. Poverty, based on the upper-middle-income poverty line of US$5.5 per person per day, is projected to increase tenfold from a low base, with the share of the population below the poverty line increasing from 2 percent in 2021 to 21 percent in 2022. The pace of the economy's recovery in the medium term will depend on the duration of the war and availability of financial resources to support postwar reconstruction and development.

Background

Responding to the unprecedented shocks of 2014–2015, Ukraine undertook decisive reforms to stabilize the economy, reduce large imbalances, and cushion the impact of the shocks on the population. In 2014, Ukraine's economy was hit by the conflict in the east of the country, Crimea crisis, and a weak external environment, including lower global commodity prices. The economy contracted by a cumulative 16 percent and the currency depreciated by 70 percent, while the fiscal deficit, including Naftogaz, reached over 10 percent of GDP in 2014. To address the economic and social challenges, Ukraine implemented a wide range the structural reforms, including (i) moving to a flexible exchange rate; (ii) undertaking significant fiscal consolidation; (iii) reforming energy tariffs to reduce a key quasi-fiscal deficit and strengthening the social safety net to cushion the impact on the poor; (iv) stabilizing the banking sector by putting in place a framework to resolve and recapitalize weak banks and strengthen supervision; (v) taking steps to streamline the business environment; and (vi) establishing key anticorruption institutions and requiring asset disclosures for public officials. These reforms helped to stabilize confidence after two years of sharp economic contraction. While economic growth picked up in 2018–2019, weak investment and low productivity continued to undermine strong and sustainable economic expansion. Real GDP grew by 3.4 percent in 2018 and 3.2 percent in 2019, up from 2.5 percent in 2016–2017. The level of fixed investment averaged around 19 percent of GDP in 2016–2019 and was not sufficient to sustain economic growth. Investment was limited by (i) low foreign direct investment (FDI) of about 3.6 percent of GDP on average for 2016–2019; (ii) remaining weaknesses in the financial sector (with limited progress made in resolving nonperforming loans (NPLs)); and (iii) market distortions from the lack of a functioning agricultural land market, an anticompetitive environment, and large numbers of SOEs.

The improved macro-fiscal and financial policy fundamentals established after the 2014–2015 crisis helped Ukraine weather the COVID-19 crisis better than expected. Following a 3.8 percent contraction in 2020 (versus 7.8 percent initially projected), the economy grew by 3.4 percent in 2021 as COVID restrictions eased and a bumper harvest lifted growth in the last quarter of 2021. Fiscal revenues performed better than anticipated, with a trade and income tax revenue boost in both 2020 and 2021. The fiscal deficit reached 6 percent of GDP in 2020 (versus a pre-pandemic projection of 2.1 percent)

and remained elevated at 4 percent in 2021 due to the added fiscal burden from fixed household gas tariffs (amidst steep increases in international gas prices). However, 2020 experienced a slight increase in social vulnerability as 23.2 percent people were recorded to live below the national poverty line (up from 23 percent in 2019).[51] Overall, however, the government's COVID-19 response measures helped limit the economic impact on citizens, particularly those below the poverty line.

To support the economic recovery and address a lack of capital investment, Ukraine deepened reforms in 2020–2021 in the following areas: (i) de-monopolization and anticorruption institutions; (ii) strengthening of land and credit markets; and (iii) financial sector supervision improvements. First, to promote competition and attract investment, Ukraine unbundled the gas sector that has a footprint of the state-owned monopoly and clarified the legislative framework for private investment in infrastructure. Second, to improve accountability and promote a level playing field, Ukraine addressed gaps in the nascent anticorruption architecture. Judicial reform, which was long overdue and critical for anchoring confidence in the rule of law, was initiated, with the adoption of two laws reforming judicial management bodies and laying the ground for comprehensive judicial reforms. Legislation adopted in October 2021 significantly strengthened the governance and independence of the National Anticorruption Bureau of Ukraine (NABU). Third, the historic land reform was adopted to unlock investment in the agricultural sector. Fourth, amendments to the banking law were passed to improve corporate governance in banks, strengthen capital structure, and introduce capital buffers for banks; these amendments brought the law into compliance with EU directives. All banks must now undergo related party diagnostics, must be continuously monitored for related lending, and are subject to annual asset quality reviews, with large banks subject to annual stress tests. Regulatory capital adequacy ratios remained high during the COVID shock, while a high share of legacy nonperforming loans—mostly held by state-owned banks—had significantly declined.

Ukraine's recovery began to be materially disrupted by a severe escalation in geopolitical tensions toward the end of 2021. Beginning in mid-November 2021, a sustained escalation in geopolitical tensions led to a substantial reassessment of risk, with economic stress being propagated to the broader economy and public finances through confidence, trade, and financing channels. Sovereign bond yields rose sharply to nearly 30 percent during mid-November and end-February, comparable to periods in which countries face considerable crisis risks. Such high external funding costs have effectively eroded market access for Ukraine. Raising financing on the domestic market has also become difficult. Between mid-November and February 18, 2022, nonresident investors pulled out nearly US$650 million from domestic bond markets. Although the central bank had spent some US$2.3 billion in foreign exchange reserves to stem currency depreciation pressures between mid-November and mid-February, the hryvnia still lost about 8.6 percent of its value relative to the US dollar. With the declaration of a state of emergency, the central bank has imposed restrictions on currency and banking transactions.

Assessment of the Impact of the War

The invasion of Ukraine on February 24, 2022 has had very substantial economic consequences. The war significantly disrupted economic activities via several channels: damage to productive assets and infrastructure, ruined supply-demand chains, logistic problems, labor force losses, uncertainty, and elevated risks. Thus, estimated GDP loses in 2022 go much beyond physical asset losses, while the medium-term recovery is limited by large, fixed investment needs and human capital reduction.

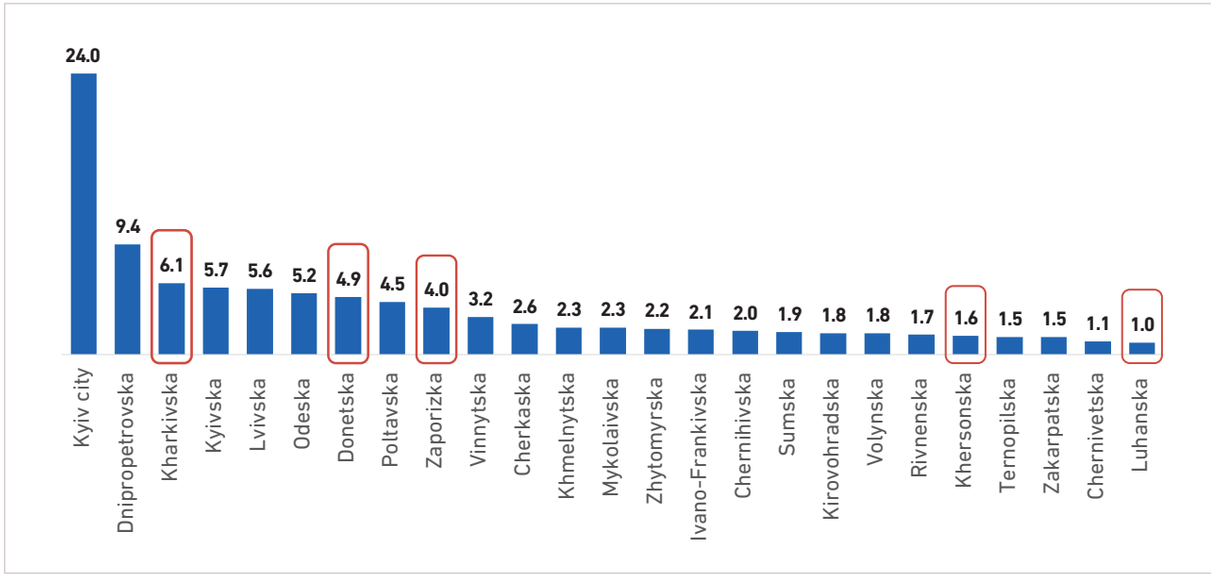
Next to loss of life and human suffering, the war has crippled Ukraine's economy with large adverse social and poverty impacts. Over 6.8 million Ukrainian residents have left the country,[52] a large majority of them women and children. An estimated 6.6 million people are internally displaced and 17.7 million people are left in need of humanitarian assistance.[53] Food and essential services are severely constrained in the areas affected by the fighting, and a third of displaced households report no income. At the same time, inflation increased from 10 percent

51 Measured by the actual subsistence minimum. This amounted to Hrv 3,661 per adult per month in 2019, which translates to US$14.5 per day in 2011 purchasing power parity (PPP). In 2015, one in two people lived below the poverty line.

52 This number was 6,865,625 as of August 26, 2022. United Nations High Commissioner for Refugees; see Operational Data Portal: Ukraine Refugee Situation. *Link*.

53 International Organization for Migration (IOM) "*Regional Ukraine Response: Situational Report–22 August 2022*," *Link*; OCHA Ukraine, "*Situation Report*," August 17, 2022.

Figure 8. Ukraine's GDP by oblast in 2020 as share of total (%)



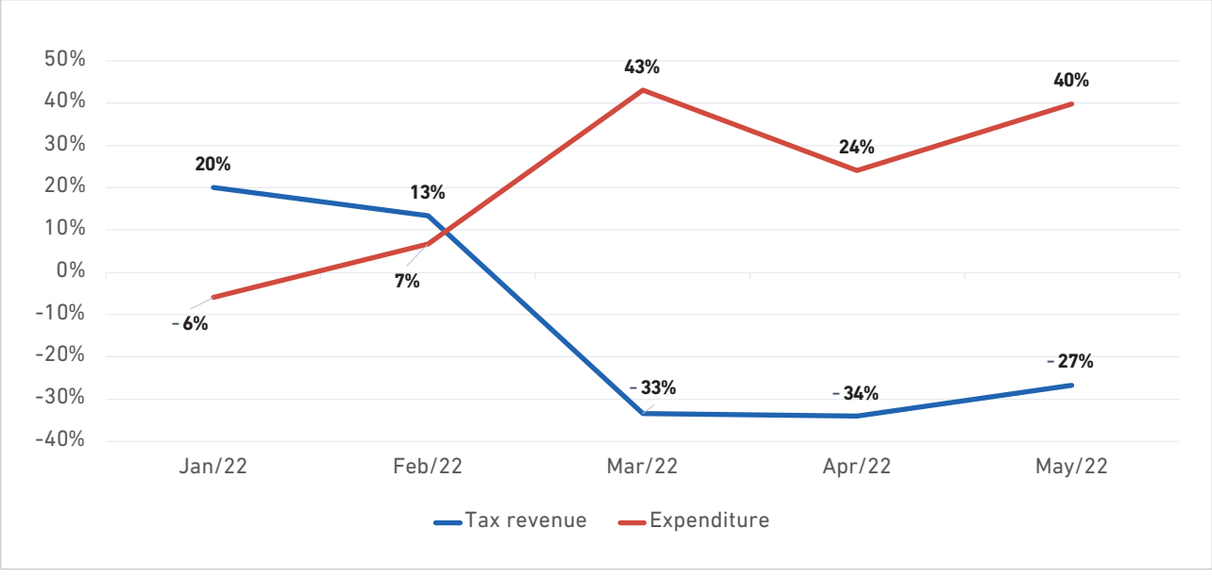
Source: Ukraine Statistic Service.

YoY in January 2022 to 21.5 percent in June, while food and fuel prices surged even higher—by 28.3 and 90.9 percent YoY respectively. The latest World Bank estimates suggest that poverty, based on the upper-middle-income poverty line of US$5.5 per person per day, is projected to increase tenfold from a low base, with the share of the population below the poverty line increasing from 2 percent in 2021 to 21 percent in 2022. Poverty rates in regions most affected by the war are expected to increase much more.

Even though the war is entering its sixth month and its duration is hard to predict, the active combat is currently localized, allowing economic activity in other parts of the country to gradually recover. In March, hostilities engulfed 10 oblasts and the city of Kyiv, which together accounted for more than 55 percent of GDP in the past. Ukraine's GDP shrank by 15.1 percent YoY in Q1 (or 19.3 percent QoQ seasonally adjusted). The estimated GDP contraction in March alone was around 45 percent YoY. The reclamation of Kyivska and Chernihivska oblasts in early April and localization of the active combat in the eastern and southern regions helped economic activities to recover gradually. As of end-June, Luhanska and Khersonska were the only oblasts that were almost fully not under government control (together they comprise around 2.5 percent of GDP), while parts of Donetska, Zaporizka, and Kharkivska oblasts were experiencing active fighting (total contribution of these oblasts in GDP is around 15 percent) (Figure 8). Importantly in Zaporizka and Kharkivska regions, the capital cities and centers of economic activity were not taken.

As a result, since April economic activity has shown signs of improvement, even though it remains much below the prewar level. Although most high-frequency economic data are not available, corporate surveys conducted by the National Bank of Ukraine make it possible to follow business activities in key sectors. According to these surveys, the number of enterprises that have completely stopped operations fell by almost half to 17 percent in April compared to March. In particular, the increase in economic activity in April–June was reported by companies involved in wholesale and retail trade, transport, food production, engineering (due to production of special equipment for defense), pharmaceutical production, and construction. The recovery is also evidenced by the increase in electricity production, though to a large extent this could be a substitution effect due to shortages of and high prices for other types of energy, as well as the expansion of export opportunities. At the same time, the recovery is uneven and shows signs of stagnating at a low level: around 60 percent of companies work below the prewar capacity utilization level; almost 23 percent work at a capacity that is more than twice lower compared to their prewar activity. Problems with logistics and the destruction of capacities are holding

Figure 9. Real growth of tax revenue and fiscal expenditure, percent YoY



Source: World Bank staff calculations based on Ministry of Finance data.

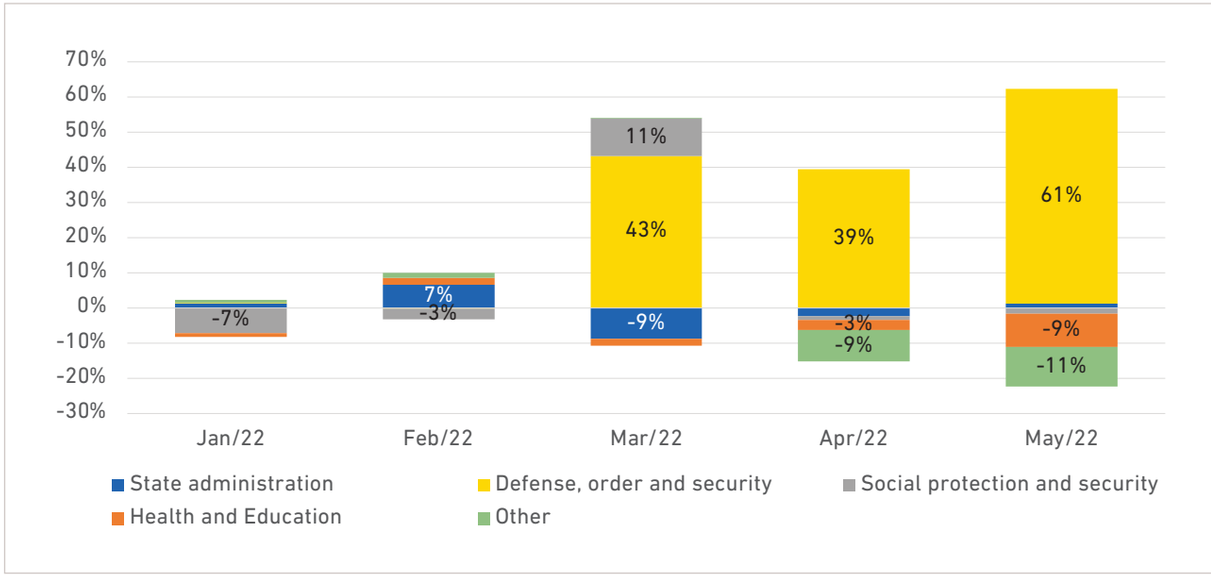
back the recovery in many sectors. The duration of the war is now uncertain, but assuming June's status quo would continue until the end of the year, GDP contraction in 2022 is estimated to be around 35 percent YoY. If the situation deteriorates further, the decline in economic activity could reach up to 45 percent. The pace of medium-term economic recovery will depend on the duration of the war and availability of financial resources to support postwar reconstruction and development.

With the war continuing, Ukraine is facing three key macro-critical challenges: (i) high fiscal financing needs and inability to mobilize domestic revenues; (ii) increasing reliance on monetary financing and deteriorating asset quality of the financial sector; and (iii) a weaker external position.

Since the beginning of the war, tax revenue collection has deteriorated significantly due to undermined economic activities, tax administration and collection bottlenecks in war-effected areas, and tax policy changes. All these factors took place simultaneously and thus it is not possible to differentiate their individual contribution to overall decline in fiscal revenue. In early March 2022, the government introduced changes to customs and tax policy and tax administration during martial law. Some customs clearance procedures were amended to provide deferral on import duty payments for food and medical goods. Starting in April 2022, the government extended a simplified tax regime to a wide range of businesses, significantly reduced the value added tax rate for import of fuel for motor vehicles, and fully exempted it from excise taxes. As a result, the nominal decline in tax revenues of the consolidated budget reached 24 percent YoY in March and April and 14 percent in May. In real terms the annual reduction in tax revenues exceeds 30 percent per month since the beginning of the war (Figure 9). Even if the war was to end relatively soon, revenues are expected to remain depressed for a considerable period.

Although nonmilitary public spending has been reduced to the basics, public expenditure increased sharply to ensure delivery of key public services during wartime. Since the war started, the government made efforts to cut non-essential current expenditures (by 78 percent YoY) and capital spending (by 61 percent YoY). Nevertheless, total public spending surged by 57 percent YoY in March–May due to higher expenditure on wages and salaries (109 percent YoY) including for emergency medical personnel and first responders, transfers and social protection needs (44 percent YoY), and procurement of goods and services (79 percent YoY), including for the restoration of public services such as electricity, water, and gas. On the functional side, growth of expenditures for defense and security by 4.5 times, and growth of social protection and social security by 30 percent YoY (amounting to about US$3.5 billion

Figure 10. Contributions to expenditure growth (%)



Source: World Bank staff calculations based on Ministry of Finance data.

Note: Other includes economic activity, environmental protection, housing and communal services, physical development.

a month), contributed the most to total increase (Figure 10). These expenditures are helping, in the first instance, to prevent even deeper humanitarian and social impacts on top of those already inflicted by the war, and in the second, to prevent an erosion of institutional capital and capacity that will be the bedrock of any future recovery and reconstruction efforts. In Ukraine, a quarter of the population receives old-age pensions, which are a key safety net. In addition, there are 171,000 public employees at the central, oblast, and rayon levels who are drawing a salary (and thus sustaining local services as well as family members who have lost jobs or become displaced) and doing the vital work of keeping essential government services running, including medical and health services, coordinating at the level of the central government, and even ensuring the safety of nuclear power plants.

Despite the cuts in nonpriority areas, the necessity to maintain critical public services amid sharply declining revenues has opened a large nonmilitary fiscal need of over US$15 billion in the second half of 2022. From July 1, import duties were reinstated at the prewar level, which is expected to support fiscal revenues going forward. At the same time, given the prolonged war and respective economic challenges, revenues are expected to remain depressed for a considerable period. Nonmilitary financing needs (deficit and debt repayments) amounted US$11 billion equivalent in Q2 (around US$3.7 billion per month). The government is making an effort to roll over domestic debt and is already negotiated a two-year deferral on external debt amortization with external commercial and official creditors. Taking into account lower debt payments in the second half of 2022, yet growing needs for gas purchases for the upcoming hitting season, non-military financing needs are estimated at US$15.4 billion (around US$2.6 billion per month). These estimates do not include military expenditure and current recovery needs. Total fiscal financing needs may reach US$28.8 billion in the second half of 2022 (around US$4.8 billion per month).

However, to help Ukraine meet its current nonmilitary financing gap, further significant support from international financial institutions (IFIs) and bilateral lenders is needed. In the absence of significant flow of funds from partners, Ukraine will have to further squeeze its now bare-bones social expenditures and avail itself of domestic financing and monetization of the deficit from the National Bank. The National Bank has monetized over US$7.7 billion in fiscal needs as of end June since the beginning of the war. Either of the two options (expenditure cut or deficit monetization) will deeply impact the poor: they could push the share of the population living below US$5.5

a day to nearly 60 percent in 2023, up from 2 percent in 2021. Such a steep deterioration in poverty will take years to reverse.

The war resulted in immediate balance of payments pressures via several channels. First, due to the blockade of the Black Sea ports, Ukraine almost fully lost its ability to export grain and other agricultural commodities: since the beginning of the war export of goods collapsed almost by half (in both month over month (MoM) and YoY terms). To offset the effect of export losses in early March, the government announced import restrictions for all types of goods, with the exception of critical imports defined by the government. The withdrawal of import restrictions in July may lead to significant broadening of the current account deficit in the second half of 2022, as imports had already started to recover in May–June. Second, huge outflows of refugees have created capital account pressures due to the withdrawal of foreign exchange funds from Ukrainian accounts to finance refugees' spending abroad. Since the beginning of the war, the National Bank of Ukraine has spent around US$12 billion for the currency interventions, including US$4 billion in June alone. This eroded international reserves, which declined to US$22.8 billion at the end of June from a prewar level of US$29 billion.

Ukraine's financial sector suffers from losses of collateral, assets, and revenues. The banking sector had already reported US$253 million in losses in the first four months of 2022, mainly caused by increased provisioning for expected losses from the war. Due to the ongoing active military combat in a significant part of the country, bank losses are expected to be significant. According to the central bank, 86 percent of the branches were operational as of July. The share of closed branches highly correlates with the advances of troops/areas of fighting. Branches in Western and Central Ukraine are almost fully operational, while in the southeast the situation remains dire. Another important vulnerability relates to possible negative feedback loops between Ukraine's fiscal accounts and the banking system. Government's increasing reliance on the banking system for budgetary financing will further narrow the availability of liquidity for productive lending to the economy after the war, while the risk of investing in government securities is becoming more pronounced due to the volatility of government securities' value.

SOCIAL INCLUSION AND VULNERABLE GROUPS

Summary

This chapter focuses on assessing social impacts on vulnerable groups, including those who have been forcibly displaced, women and children, persons with disabilities, and LGBTI (lesbian, gay, bisexual, transgender, and intersex) individuals. **The war forced over one-third of Ukrainians to flee their homes, and despite an increasing number of returnees since early May, many Ukrainians remain displaced**. According to the International Organization for Migration (IOM) General Population Survey, over 7.13 million people were displaced within Ukraine as of May 23, 2022, compared to over 8 million individuals as of May 3, 2022.[54] **According to the State Statistics Service of Ukraine, 2.7 million persons with disabilities were registered in Ukraine as of January 1, 2020.** Some of residential facilities for persons with disabilities have been damaged or abandoned due to fighting, and others are inaccessible due to military activity or loss of government control in some areas. This has resulted in overcrowding and insufficient services in accessible facilities. **The war is expected to exacerbate gender disparities, accompanied by increased incidence of sexual and gender-based violence (SGBV) and risk of human trafficking, particularly for women, adolescent girls, and children**.[55] With education and health services disrupted by the war, sexual and reproductive health outcomes such as the maternal mortality rate and adolescent pregnancy rate are expected to worsen for displaced persons and the rest of the population. **Challenges related to discrimination, exclusion, and violence based on sexual orientation, gender identity, gender expression, and sex characteristics are exacerbated in environments affected by fragility, conflict, and violence**.[56]

ASSESSMENT OF IMPACTS

Displacement

Since the onset of the invasion, one-third of Ukrainians have been forced to flee their homes to locations either within Ukraine or outside it. However, it is challenging to accurately estimate the scale of displacement within the country because only some of the displaced persons reported their arrival to local authorities, mainly to get help with accommodation or humanitarian aid.[57] Similarly, for personal reasons or because they do not need assistance from the government, a sizable share of Ukrainians who have moved within the country have not officially registered as IDPs in accordance with the Law of Ukraine on Ensuring the Rights and Freedoms of IDPs.[58] Therefore, information in the Unified Information Database for IDPs (UIDB) maintained by the Ministry of Social Policy of Ukraine underestimates the true number of IDPs in Ukraine.

At the end of 2021, 1,476,148 IDPs (1,211,165 households) from areas temporarily not under government control in Donetska and Luhanska oblasts, the Autonomous Republic of Crimea, and Sevastopol were in the registry of IDPs.[59] A month after the initial invasion, there were 1,537,923 IDPs in total, but only 63,306 of them were displaced after February 24, 2022; and 61,699 individuals were registered for the first time since February 24, 2022 (Figure 11). In other words, the overwhelming majority of registered IDPs were those displaced by the conflict since 2014. However, with an increase in the intensity of fighting in the east and south of Ukraine on the one hand, and revised rules for

54 IOM, "Internal Displacement Report – General Population Survey Round 5 (17 May 2022–23 May 2022)," *Link*.

55 This was the case in 2014. See World Bank, European Union, and United Nations, *Ukraine Recovery and Peacebuilding Assessment: Analysis of Crisis Impacts and Needs in Eastern Ukraine*, Vol. I: *Synthesis Report*, World Bank, 2015, *Link*.

56 World Bank, "Sexual Orientation and Gender Identity in Contexts Affected by Fragility, Conflict, and Violence," 2020, *Link.*

57 Cedos – NGO Centre for Society Research, 2022, *Link*.

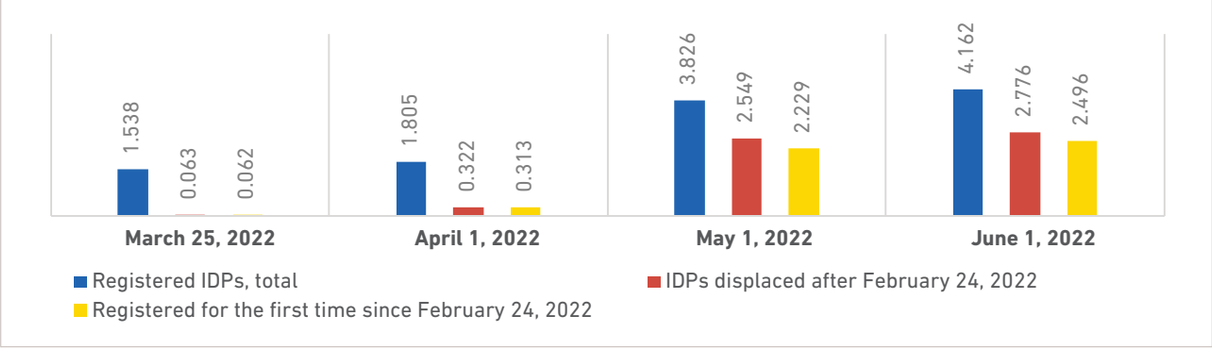
58 Ministry of Social Policy of Ukraine,"Ministry of Social Policy: More than 130,000 People Registered as IDPs after the Imposition of Martial Law," March 30, 2022, *Link.*

59 According to the Ministry of Social Policy of Ukraine.

registration of IDPs on the other hand, the number of newly registered IDPs has substantially increased: from 312,591 people on April 1, to 2,228,861 people on May 1 and then to 2,495,747 people on June 1, 2022. As of June 1, 2022, the total number of registered IDPs, including those displaced since 2014, amounted to 4,162,327 persons (Figure 11).

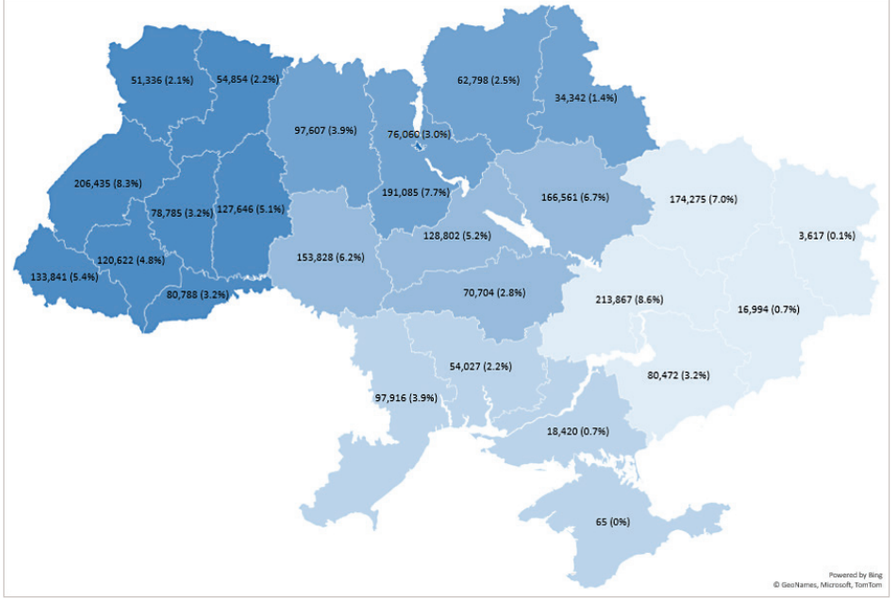
As of June 1, 2022, the oblast with the most newly registered IDPs (since February 24, 2022), is **Dnipropetrovska oblast (8.6 percent),** followed by Lvivska oblast (8.3 percent), Kyivska oblast (7.7 percent), and Kharkivska oblast (7 percent) (Figure 12). The share of newly registered IDPs in the total number of IDPs within the same oblast varies from a low of 1.3 percent in Luhanska oblast and 3.4 percent in Donetska oblast to a high of 87.8 percent in Ternopilska oblast.

Figure 11. Number of registered IDPs in Ukraine (million), March 25–June 1, 2022



Source: Ministry of Social Policy of Ukraine, "Dynamics of Key Indicators That Characterize the State of Registration, Re-registration and Record Keeping of Internally Displaced Persons for the Period of Martial Law."

Figure 12. IDPs registered for the first time since February 24, 2022, by oblast of destination/ registration as of June 1, 2022



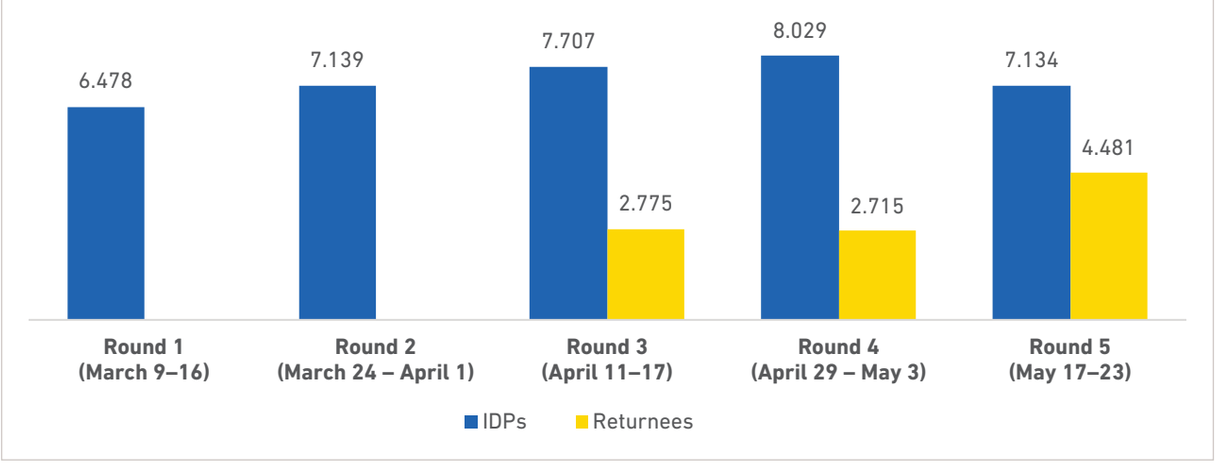
Source: Ministry of Social Policy of Ukraine, "Report on the State of registration, Re-registration and Record Keeping of internally Displaced Persons for the Period of Martial Law (Resolution of the CMU dated October 10, 2014 No. 509), as of 1 June 2022." *Note:* The figure shows the absolute number of persons in each oblast and the oblast's share of the total number in Ukraine. Since April 19, Ukrainian citizens are also allowed to record their change of residence through the digital application Diia.

According to an alternative source of information about the number of IDPs and their characteristics—e.g., the IOM General Population Survey in Ukraine conducted regularly since March 2022—over 7 million people were classified as internally displaced by the war as of May 23, 2022, compared to about 8 million individuals on May 3, 2022 (Figure 13).

As of May 23, 2022 (Round 5 of the IOM survey), over half of all IDPs had moved from territories located in the East macroregion. The estimated number of IDPs from this macroregion is 3,913,000, or 29 percent of the region's resident population before the war. For comparison, IDPs who left Kyiv city at the early stage of the war (in mid-March 2022) made up over 65 percent of the before-war resident population, but their number and share substantially decreased by May 17–23, 2022, due to mass return flows.

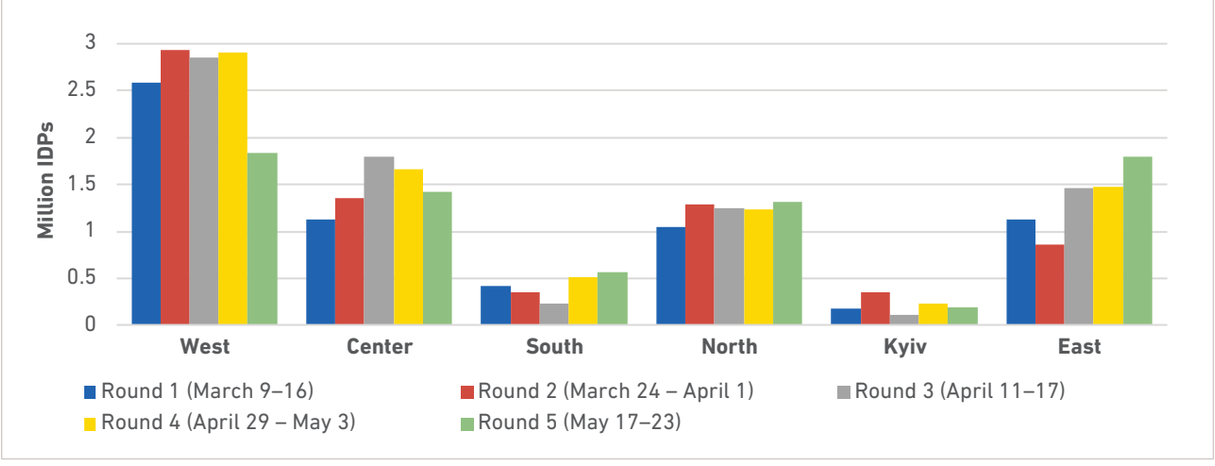
As regards the host regions for IDPs, the West macroregion was the main destination for IDPs in rounds 1–5 of the IOM General Population Survey (Figure 14). The number of IDPs hosted in the East macroregion (predominantly in Dnipropetrovska and Kharkivska oblasts) increased in April–May, and this macroregion became the second largest destination for IDPs as of May 23, 2022 (Round 5), hosting 1,794,000 people.

Figure 13. IOM estimates of IDPs and returnees in Ukraine (million), March–May 2022



Source: IOM General Population Survey.

Figure 14. IOM estimates of IDPs by host macroregion in Ukraine (million), March–May 2022



Source: IOM General Population Survey.

Displacement outside Ukraine. **There are two major sources of information about the number of people who moved from Ukraine to other countries because of the war.** First is the UNHCR (the United Nations High Commissioner for Refugees), which together with the State Border Guard Service of Ukraine reports about cross-border movements from and to Ukraine.[60] The second source is UNHCR statistics on the number of individual refugees from Ukraine recorded across Europe and refugees from Ukraine registered for temporary protection or similar national protection schemes in Europe. However, these statistics have been provided only since early June 2022 (Flash #15)[61] and do not cover Ukrainian refugees in non-European countries.

According to the UNHCR, there were 4,712,784 individual refugees from Ukraine recorded across Europe as of June 3, 2022. About 3 million refugees from Ukraine have registered for temporary protection or similar national protection schemes in Europe. The major countries of destination for individual refugees are Poland, Germany, and the Czech Republic. Over 1.3 million individual refugees are also recorded in Russia, but this does not take into account potential forcible displacement, further movements, or returns.

There are also refugees from Ukraine in the countries outside Europe. For example, over 32,000 Ukrainian refugees are in Canada.[62] The UK government had issued 142,500 Ukrainian visas out of 161,500 applications received, and 86,600 visa holders had arrived in the UK as of June 28, 2022.[63] Although it is difficult to answer how many Ukrainian refugees are already in the United States, "a substantial number of them already need support."[64] Japan has accepted more than 1,300 people fleeing the conflict and provided social services to help them assimilate."[65]

To summarize, about 6 million Ukrainians have left the country and are still residing in other countries. This is equivalent to 14–15 percent of the resident population of Ukraine as of January 1, 2022. As some of these refugees are likely to become long-term emigrants, the population decline observed in Ukraine before 2022 will deepen further. According to one study, under the low (relatively optimistic) scenario, in which only 15 percent of refugees and their family members remain abroad once the war ends, the working-age population (15–70 years) might experience a strong one-off extra cut of around 400,000 people.[66] A substantial decrease in labor supply due to both displacement of working-age population and civilian casualties since February 24, 2022, will hamper the postwar recovery of Ukraine.

Large-scale displacement of population may also bring about a huge loss in human capital, especially if displaced people of working age cannot find a proper job that uses their qualifications and skills. In addition, disruptions in the learning process among displaced children—as well as those who stayed in the areas with active fighting—can have large negative effects on learning outcomes, transformed later into a loss of human capital and lower earnings of young workers. Some research shows that the combination of extended pandemic-related closures and the war has led to learning losses in Ukraine of over one year.[67] As a result, the estimates of Harmonized Learning Outcomes for Ukraine could fall from 481 to about 451 points, putting Ukraine below the lowest-performing countries in Europe, such as Moldova and Armenia. Human capital losses are estimated to be in the order of US$90 billion, or almost as much as the estimated losses in physical capital by the end of May 2022.[68]

Composition of IDPs compared to nondisplaced population. According to the IOM General Population

60 This set of statistics has several drawbacks, as it reflects the number of movements rather than individuals, and not all of the movements from Ukraine are related to the war, e.g., some are movements of people who made use of Law No. 2142-IX (which exempted foreign transport imported into the country during martial law from the payment of import duties, value-added tax, and excise duty before July 1, 2022). Besides, movements back to Ukraine may include return of male migrants in order to join the Armed Forces as well as the return of other categories of population for a short period of time.

61 UNHCR, "Ukraine Situation Flash Update #15," June 3, 2022, *Link*.

62 A. MacIsaac, "Immigration Minister Says Ukrainian Refugees Could Remain in Canada for 'at Least a few Years,'" CTV News Atlantic, June 20, 2022, *Link.*

63 BBC, "How Many Ukrainian Refugees Are There and Where Have They Gone?," July 5, 2022, *Link.*

64 E. Davis Jr., "What to Know about Ukrainian Refugees in the U.S.," U.S. News, May 25, 2022, *Link.*

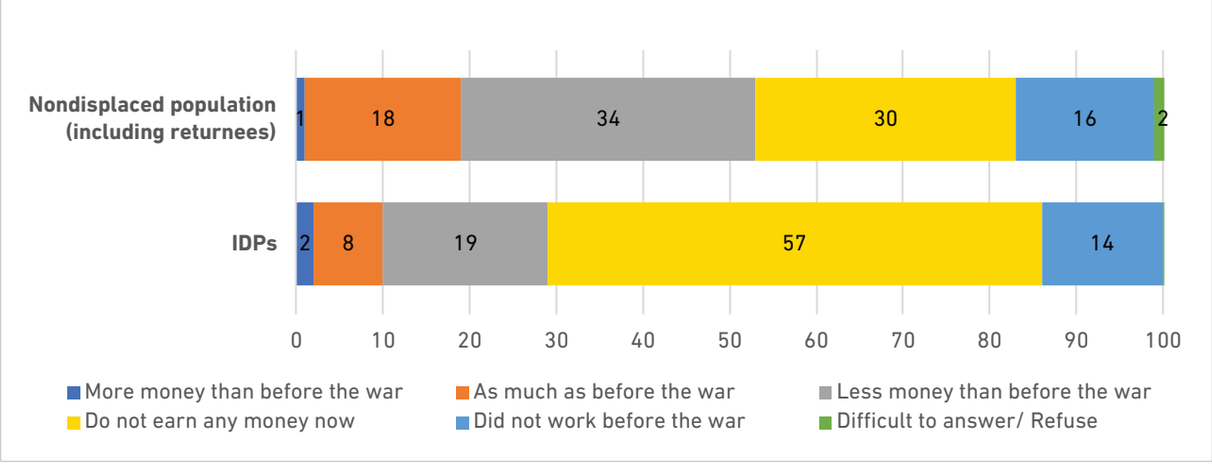
65 M. Y. H. Lee and J. M. Inuma, "Japan Has Always Been Refugee-Averse. Then Ukraine Happened," *Washington Post*, June 21, 2022, *Link.*

66 O. Blinov and S. Djankov, "Ukraine's Deepening Population Challenge," VoxEU.org, June 28, 2022, *Link.*

67 N. Angrist, S. Djankov, P. Goldberg, H. Patrinos, "The Loss of Human Capital in Ukraine," VoxEU.org, April 27, 2022, *Link.*

68 O. Blinov and S. Djankov, "Ukraine's Recovery Challenge," VoxEU.org, May 31, 2022, *Link.*

Figure 15. IDPs vs. nondisplaced population by personal ability to earn income (%), May 17–23, 2022



Source: IOM General Population Survey, Round 5. *Note:* Answers shown are to the question "How has your personal ability to earn income changed since start of the war?"

study,[69] **IDPs have a higher share of women and younger age cohorts**. This is revealed by comparison of key demographic characteristics of IDPs ages 18 years and above with individuals who stayed in their habitual residence or returned to it. In addition, substantially more households with IDPs reported having at least one child ages 1–5 or 5–17 years, and at least one chronically ill member. IDPs are also more likely to be directly affected by current violence and (among those who were already IDPs from 2014–2015) more likely to be forced to leave their homes for the second time. Hence, the ongoing war has exacerbated existing vulnerabilities.

The comparison of household income prior to the war among IDPs and nondisplaced population shows that IDPs originated from relatively better-off households compared to those who stayed. However, household income has declined significantly since February 2022, and 18 percent of IDPs reported no household income at all during the fifth round of the IOM General Population Survey in May 2022. For comparison, only 9 percent of nondisplaced population reported having no household income after February 2022. The IOM report adds that among interviewed IDPs, 13 percent lived in single female–headed households (e.g., households with only females and children under 18 years), and more than 70 percent of them had either no household income at all or income less than UAH 5,000.[70] This income is less than the sum of the statutory subsistence minimum for one work-able person (UAH 2,481 in January–June 2022) and for one child between 6 and 18 years (UAH 2,618 in January–June 2022). These figures show that such internally displaced female-headed households with children are particularly vulnerable to poverty and need additional support from the government and donors.

One of the possible reasons for substantial household income decline is that nearly 57 percent of adult IDPs were not able to earn any income since the start of the war (Figure 15). This is in sharp contrast with nondisplaced adults, over half of whom were still able to earn some money, even if somewhat less than before the war. Most likely, earning opportunities of IDPs have declined due to job loss (64 percent of IDPs who were employed before the war lost jobs due to the war) and unsuccessful attempts to find some work in the location of displacement (9 percent of jobseekers among IDPs had managed to find a new job as of May 23, 2022).[71]

These data suggest that finding a job in the location of destination is a pressing need for work-able IDPs. However, jobseekers among IDPs rarely use

69 IOM, "Internal Displacement Report – General Population Survey Round 5 (17 May 2022–23 May 2022)," *Link.*
70 Ibid.
71 Ibid.

the Public Employment Service of Ukraine to find a suitable job, to apply for the unemployment benefit, or to participate in active labor market policies (ALMPs).[72] Although the number of registered IDPs with the official unemployment status has substantially increased in January–May 2022 compared to the same period in 2021, it is small in absolute terms: 22,075 registered unemployed IDPs during January–May 2022 and 16,237 unemployed IDPs as of May 31, 2022.

Returns and return intentions. The IOM survey–based estimates show that the number of returnees (including IDPs returning from other locations within Ukraine, as well as IDPs self-reporting returns from abroad) substantially increased in May 2022 (see Figure 13 above). As of May 23, 2022, 4.481 million people had returned to the place of their habitual residence in Ukraine after a period of forced displacement since February 24, 2022. The North macroregion is the absolute leader in terms of the number of returnees, accounting for 38 percent of all returnees by May 17–23, 2022. This can be linked to improvement in individual perceptions of safety in this macroregion.

However, it is difficult to determine with certainty whether the observed return movements are permanent or temporary, as 12 percent of returnees in the IOM General Population Survey intend to leave their habitual places of residence in the future and 12 percent consider leaving their homes once again if the situation deteriorates.[73] Similarly, many interviews with people crossing back to Ukraine from Poland, Slovakia, Hungary, Romania, and Moldova, conducted between April 3 and May 25, mention the temporary nature of the visit: temporary visit to home (14 percent), temporary visit to see family (7 percent), temporary visit to get supplies (5 percent), and visit to support family members to evacuate (3 percent). Answering the question about the intended duration of stay, only 48 percent of respondents reported making a permanent return, whereas 35 percent did not know the answer, and 16 percent reported the intention to stay in Ukraine for up to one month.[74]

Among current IDPs surveyed by the IOM during May 17–23, 2022, about 23 percent reported their intention to return home within the next two weeks. The majority of them were from Kyiv city and the West and North macroregions. Some IDPs stated that their potential return would depend on further situation development.

According to the available studies of Ukrainian refugees abroad, their return intentions and determining factors of return are the following:

At least half of refugees from Ukraine are interested in returning to their places of origin if possible because of home sickness, high living costs abroad, problems with renting a long-term apartment, and language barriers—making it hard to find a suitable job that would correspond to the level of education and qualifications in Ukraine and to integrate children at school and child care. [75]

With a longer duration of displacement, more Ukrainians want to settle in their current location at least for the medium term, as documented by a larger number of Ukrainians accessing permanent types of housing and applying documents for temporary protection or asylum.[76]

The attitudes of locals toward the newly arrived Ukrainian refugees can also influence decisions about whether to stay abroad or return to Ukraine. Currently, there is strong support among local populations for Ukrainian refugees.[77] However, if governments of host countries do not properly manage the flows of refugees and address their needs, these positive attitudes can change and push refugees back to Ukraine or to other countries.

72 More on the disadvantages of IDPs in host labor markets and their barriers to registration in Public Employment Service of Ukraine in L. Filipchuk and O. Syrbu, "Forced Migration and War in Ukraine (March 24–June 10, 2022)," June 27, 2022, *Link.*

73 IOM, "Internal Displacement Report — General Population Survey Round 5 (17 May 2022–23 May 2022)," *Link.*

74 UNHCR-REACH, "Situation Overview: Movement of Ukrainians Back into Ukraine from Poland, Slovakia, Hungary, Romania and Moldova, Update as of 25 May 2022," *Link.*

75 P. Długosz, L. Kryvachuk, and D. Izdebska-Długosz, *War Refugees from Ukraine: Their Lives in Poland and Plans for the Future,* Wydawnictwo Academicon, Lublin (in Polish, Uchodźcy wojenni z Ukrainy – życie w Polsce i plany na przyszłość); J. Isański, M. A. Michalski, M. Nowak, V. Sereda, and H. Vakhitova, "Social Reception and Inclusion of Refugees from Ukraine," UKREF Research report 1, 2022.

76 IMPACT, "Six Weeks after Leaving Ukraine: Challenges, Intentions and Movement Trajectories of Ukrainians in Displacement," Brief, 2022, *Link.*

77 European University Institute, "Current Attitudes towards Ukrainian Refugees," webinar, July 4, 2022, *Link.*

Duszczyk and Kaczmarczyk (2022) predict that in the most optimistic scenario, with a quick and lasting peace, "the number of Ukrainian citizens staying in Poland would stabilize at around 1.75 million, of which 1–1.25 million would be 'prewar' immigrants (mainly males) and 0.5–0.75 million war refugees transforming into 'postwar' immigrants (mainly females, children and the elderly, to a large extent family members of those staying in Poland before the war)."[78]

Persons with Disabilities

As of January 1, 2020, 2.7 million persons with disabilities were registered in Ukraine.[79] Of these, 163,886 were children, of whom 42.7 percent were girls. Of 136,300 persons who registered their disability for the first time in 2019, 44 percent were women.[80] A survey conducted in Eastern Ukraine in 2020 reveals that 41 percent of older persons reported at least one severe disability, but only 4.8 percent had their disability status officially recognized.[81] The actual number is surely far higher, due not only to ongoing military activity, but also to limitations in how people with disabilities are counted; the government counts only persons who are registered as having a disability, and a number of barriers exist to registering, including medical examinations and evaluation by a socio-medical commission.

As of July 2020, there were 282 residential care facilities under the Ministry of Social Policy of Ukraine.[82] Some of these facilities have been damaged or abandoned due to fighting, and others are inaccessible due to military activity or because the areas are not under control of the government. This has resulted in overcrowding and insufficient services in accessible facilities. As of October 2021, it was estimated that about 4 percent of IDPs in Ukraine are persons with disabilities who encounter difficulties accessing support services.[83] While there is insufficient data to update this estimation, the numbers have clearly risen due to the ongoing war, shortage of facilities, reduced access to equipment and supplies, and the displacement of skilled professionals who support persons with disabilities. As of May 23, 2022, 26 percent of IDP respondents indicated that at least one member of the family currently had a disability.[84]

Civil society organizations working with persons with disabilities in Ukraine are instrumental in sourcing the data on the war's impact on persons with disabilities. These organizations range from self-established organizations of persons with disabilities (OPD) to organizations of parents of children with disabilities and the OPDs' national unions. Examples include the National Assembly of Persons with Disabilities (NAPD), a national cross-disability umbrella organization uniting 126 national and regional organizations from all over the country, and the Coalition for Persons with Intellectual Disabilities, which aims to protect the rights of people with intellectual disabilities and their families based on equal rights and opportunities, deinstitutionalization, social inclusion, and adaptation to community life.

Persons with intellectual disabilities are among the most marginalized population in Ukraine. The vast majority of people with intellectual disabilities are offered institutionalization if the family can no longer provide relevant care. In 2021, the queue for psychoneurological boarding schools (institutions for people with intellectual and psychosocial disabilities) had a total of about 4,000 people. **As a result of the 2014 conflict as many as 30,000 children and adults were left in dire circumstances in institutions in the East—many of which had run out of food, fuel, and medication and were completely dependent on volunteers due to the conflict.**[85] In many residential institutions for persons with disabilities, most of the staff has fled, leaving residents to fend for themselves. The evacuation process has also discriminated against persons with disabilities who have been left

78 M. Duszczyk and P. Kaczmarczyk, "War and Migration: The Recent Influx from Ukraine into Poland and Possible Scenarios for the Future," April 2022, *Link.*

79 Acording to the State Statistics Service of Ukraine.

80 United Nations Ukraine, "Ukraine Common Country Analysis," 2021, *Link.* Severe was defined as "a lot of difficulties/ cannot do at all" and "disability" as "functional difficulty."

81 Ibid.

82 UNHCR and UN Human Rights Monitoring Mission in Ukraine, "Briefing Note: Impact of the COVID-19 Pandemic on Persons with Disabilities in Ukraine," 2020, *Link*.

83 United Nations Ukraine, "Ukraine Common Country Analysis," 2021, *Link*.

84 IOM, "Internal Displacement Report – General Population Survey Round 5 (17 May 2022–23 May 2022)," *Link*.

85 Disability Rights International (DRI), "No Way Home: The Exploitation and Abuse of Children in Ukraine's Orphanages," 2015, *Link.*

behind in dangerous conditions, according to the Human Rights Ombudsman Office of Ukraine. Many institutions where persons are being transferred are severely overcrowded and ill-equipped. The residents with disabilities in the institutions in the eastern part of Ukraine were evacuated to similar institutions in the western regions of the country, but the receiving institutions lacked resources, space, and caregivers to accommodate the additional residents.

Before the war, Ukraine had the highest number of children in institutional care in Europe—more than 90,000 children living in residential care institutions, including orphanages, boarding schools, and other care facilities.[86] Nearly half of them were children with disabilities. Since the war began, tens of thousands of children from boarding schools have been returned to families, many of them hastily and without the care and protection they require. Thousands more have remained in institutions or have been relocated inside Ukraine or evacuated to neighboring countries. Moving children with disabilities safely has proved difficult, and in some cases impossible; some children with disabilities have been let behind as caregivers and staff of the institutions attend to their own family needs and safety. According to the nongovernmental organization Inclusion Europe,[87] Ukrainians with intellectual disabilities have experienced specific negative effects caused by the war: loss of social, rehabilitation, educational, and medical services; lack of psychological assistance and psychiatric care; unsuitable premises for their temporary residence; limited or no access to bomb shelters; and anxiety due to a lack of understanding of the prospect of returning home; inability for people with autism to be in overcrowded bomb shelters; and the difficulty—often the impossibility—of evacuation from combat zones due to exacerbated behavioral disorders.

A study from April 2022 finds that among Ukrainian children with disabilities, those who need the most support are living in subpar conditions, are overlooked by major international relief agencies, and are receiving little support from abroad.[88] Telemedicine and other forms of digitalized public services became more common among the general public in Ukraine due to the COVID-19 pandemic and helped them to stay connected with information sources and remote service providers during the war. However, the low digital literacy among persons with disabilities, and the inaccessibility of digital devices, prevent persons with disabilities from accessing vital information and warnings related to threats caused by the war.[89] For persons with physical disabilities, bombing shelters may be inaccessible.[90] Closure of sheltered job sites due to the war has caused more financial and social problems for persons with disabilities. With the status of IDP on top of the disability stigma, the persons with disabilities are perceived as "unstable/temporary" employees in their relocated places and may have trouble finding jobs.[91]

Women and Children

The size of Ukraine's population totaled 41.4 million persons, including 22.2 million women (53.7 percent) and 19.2 million men (46.3 percent), as of January 1, 2021.[92] Analysis of the sex and age composition of the population indicates that men have greater numbers in younger age groups. As of early 2021, men accounted for 51.5 percent (3.8 million) and women 48.5 percent (3.6 million) of persons under 18 years. The sex ratio is almost equal among the population ages 35–39 years; women dominate in older age groups of the population. Due to differences in life expectancy at birth, the numerical dominance of women is significantly greater in the elderly population: there are 162 women per 100 men in the population ages 60–79 years, compared to 265 women per 100 men in the population group ages 80 years and older.[93]

Although Ukraine has made progress in reducing gender disparities in human endowments, economic opportunities, and public and private

86 UNICEF, "Ukraine War Response: Children with Disabilities," 2022, *Link.*
87 Inclusion Europe, "100 Days: Ukrainians with Intellectual Disabilities and Their Families Surviving the War," 2022, *Link.*
88 DRI, "New Report: Left Behind in the War: Dangers Facing Children with Disabilities in Ukraine's Orphanages," 2022, *Link.*
89 Interviewee representing Ukrainian OPD, June 2022.
90 Ibid.
91 Ibid.
92 State Statistics Service of Ukraine. Data exclude the Autonomous Republic of Crimea and the city of Sevastopol.
93 State Statistics Service of Ukraine with the support of UN Women in Ukraine, "Monitoring Report: Indicators for the Monitoring of Gender Equality in Ukraine," 2021, *Link*.

sector leadership over the past two decades,[94] some reversal of these disparities has been observed since the start of the COVID-19 pandemic in early 2020.[95] The war is expected to exacerbate this reversal and to increase the incidence of SGBV[96] and risk of human trafficking, particularly for women, adolescent girls, and children.[97] With education and health services further disrupted by the war—for displaced persons as well as the rest of the population—sexual and reproductive health outcomes such as the maternal mortality rate and adolescent pregnancy rate are expected to worsen.[98]

To provide more granularity on the unequal impact of the war in Ukraine on men and women, the assessment analyzed survey data on a sample of IDPs collected for the RDNA. The survey includes detailed information on living standards, access to services, and economic and financial conditions for 301 (60 percent of whom are women) displaced individuals residing in Vinnytsia, Kyiv, and Lviv.

Comparing the employment status before and after the war shows a sharp drop in the number of individuals who are employed. This is especially true for women, whose share of employment fell from 64 percent to 42 percent. Conditionally on having a job before the war, 55 percent of displaced men are still employed after June 2022, while the share is only 39 percent for women. Women also report that they are searching for a job after the displacement less frequently than men.

Consistent with the lower probability of being employed, women tend to rely less frequently on income from wages and self-employment activities, drawing more often from savings accounts than men. In addition, 86 percent of women versus 79 percent of men received additional financial assistance from government, international organizations, and families and friends. Nevertheless, 67 percent of women (compared to 57 percent of men) state that they lack enough money to afford basic needs (e.g., food and clothes). These financial constraints are reflected in the share of women who are not satisfied with the availability of basic needs, pharmaceutical goods and medical treatments. Women are also more concerned than men with the accessibility to education services for children of preschool and school age, and psychological help for children and adults.

Levels of access to comprehensive high-quality services for victims of SGBV, including domestic violence, are low, especially in rural areas. There is a lack of general and specialized support services, limited human resources (in particular a lack of social workers, psychologists, and specialized knowledge and skills professionals), and evident psychological burnout and displacement impact. To respond to these issues and build a network of specialized support services for victims of domestic violence and SGBV, UAH 274.2 million has been allocated from the 2021 state budget for a subvention to local budgets, allowing 124 communities to establish 30 shelters, 38-day care centers, and 58 counseling services and to purchase 41 vehicles for mobile social and psychological teams assisting victims of domestic violence and SGBV. The level of social services in 16 existing shelters has also been improved. As of May 6, 2022, 805 specialized support services for victims of domestic violence and SGBV had been established in Ukraine (including some in 2021 at the expense of the state subvention), of which 649 perform their functions (43 shelters, 36-day care centers providing social and psychological assistance, 87 specialized

94 Through 2019, Ukraine had achieved near gender parity in enrollment rates at all levels of education. The rate of female labor force participation was 47 percent and male labor force participation was 63 percent among the population ages 15 years and above (Source: World Bank Gender Data Portal, from International Labour Organization, ILOSTAT database, *Link*; accessed on June 15, 2021). In 2017, 65 percent of men ages 15+ and 61.3 percent of same-age women reported having an account at a bank or other type of financial institution, or had personally used a mobile money service in the 12 months prior to the survey (Source: *Link*).

95 Care, "Rapid Gender Analysis Ukraine," March 2022, *Link*.

96 Most recent available nationally representative data prior to the COVID-19 pandemic crisis (the most recent Demographic and Health Survey was as long ago as 2007) estimate that 13 percent of ever-married women ages 15–49 in Ukraine have experienced some type of physical or sexual violence perpetrated by their current or most recent husband/partner; 24 percent of same-age, ever-married women have experienced some type of emotional, physical, and/or sexual violence committed by their current or most recent husband/partner. Ukraine Demographic and Health Survey 2007, *Link*.

97 This was the case with the conflict in Eastern Ukraine in 2014. See World Bank, Delegation of the European Union to Ukraine, and United Nations-Ukraine, "Ukraine Recovery and Peacebuilding Assessment: Analysis of Crisis Impacts and Needs in Eastern Ukraine, Volume I: Synthesis Report," 2015, *Link*.

98 In Ukraine in 2019, 22 of every 1,000 girls ages 15–19 gave birth (Source: United Nations Population Division, World Population Prospects, accessed at *Link*). Between 2000 and 2017, the maternal mortality ratio improved from 342 to 211 deaths per 100,000 live births (Source: WHO, UNICEF, UNFPA, World Bank Group, and the United Nations Population Division, *Trends in Maternal Mortality: 2000 to 2017*. Geneva, World Health Organization, 2019, accessed at l*ink)*.

services providing primary social and psychological counseling, and 483 mobile social and psychological assistance teams). As a result of the war, 19 percent of specialized support services for victims of domestic violence and SGBV do not perform their functions. Of these services, 44 percent are in the territories temporarily not under government control, 28 percent have suspended their activities, 21 percent had not started work before martial law was imposed, 5 percent perform other functions, and 2 percent cannot use their premises due to damage from shelling.[99]

Lesbian, Gay, Bisexual, Transgender, and Intersex (LGBTI) People

Ukraine's interest in stronger ties with the European Union has resulted in some recent efforts to promote the recognition of the human rights of sexual and gender minorities. While the Human Rights Strategy (2021–2023) has only a few references to the rights of LGBTI people, the associated Action Plan contains several concrete steps (e.g., designation of crimes based on sexual orientation and gender identity as hate crimes). Despite these efforts Ukraine ranks only 39th out of 49 European countries in ILGA (International Lesbian, Gay, Bisexual, Trans and Intersex Association)-Europe's annual benchmarking tool, which assesses countries on their legal and policy practices for LGBTI people.[100]

Discrimination, exclusion, and violence based on sexual orientation, gender identity, gender expression, and sex characteristics constituted a widespread problem in Ukraine even before the war.[101] These challenges, however, are significantly exacerbated in environments affected by fragility, conflict, and violence.[102] The collapse of institutions and safe spaces—and the breakdown of already-weak community and family bonds—will continue to exacerbate the vulnerabilities of sexual and gender minorities in Ukraine, who encounter additional barriers to accessing justice, basic services, and employment opportunities and have unique protection needs in situations of forced displacement.[103]

Since the beginning of the war, there have been reports of attacks against LGBTI rights activists, human rights defenders, and shelters in Ukraine.[104] Sexual and gender minorities in Ukraine have also been experiencing heightened levels of fear and anxiety about the exposure to violence and trauma, related in part to relocation and sheltering. In cases where LGBTI people had to move in with relatives or share a small space with family members as a result of the war, tensions and conflict may have increased due to family members' lack of understanding or acceptance. In parallel, sexual and gender minorities may face barriers in securing safe housing options, while transgender people may experience challenges in accessing shelters and services based on their self-identified gender if their documents do not match.[105] Limited medical supplies can also have a detrimental impact on people who are in need of HIV medication or hormone therapy treatments.[106] LGBTI rights organizations and human rights defenders are warning that, since the beginning of the invasion, transgender people have not had access to hormones because of pharmacy closures and lack of medicines across the country.[107] Despite the efforts of LGBTI rights organizations to facilitate access to hormone therapy through assistance from neighboring countries, the process can be complex, expensive, and unpredictable.[108]

Recovery Needs and Recommendations

Internally displaced people. **According to the IOM General Population Survey, cash (financial support) remains the most frequently mentioned need of IDPs.** Furthermore, the share of IDPs who reported having this need increased from 49 percent in

99 Ministry of Social Policy of Ukraine.
100 ILGA-Europe's Annual Review of the Human Rights Situation of Lesbian, Gay, Bisexual,Trans and Intersex People in Europe and Central Asia. *Link.*
101 Ibid.
102 World Bank, "Sexual Orientation and Gender Identity in Contexts Affected by Fragility, Conflict, and Violence," 2020, *Link.*
103 ILGA-Europe, *Link.*
104 Protection Cluster Ukraine, "Protection of LGBTIQ+ People in the Context of the Response in Ukraine," May 2022, *Link.*
105 Ibid.
106 Ibid.
107 *The Guardian*, "'I will Not Be Held Prisoner': The Trans Women Turned Back at Ukraine's Borders," March 2022, *Link.*
108 Protection Cluster Ukraine, "Protection of LGBTIQ+ People in the Context of the Response in Ukraine," *Link.*

Round 1 (March 9–16) to 77 percent in Round 5 (May 17–23, 2022).[109] Transportation, clothes and other nonfood items, medicines and health services, lack of access to money access (e.g.,no money in ATMs), and food are other important needs mentioned by at least 25 percent of IDPs surveyed during May 17–23, 2022. Accommodation is one of the pressing needs mentioned by 15 percent of IDPs responding to the IOM General Population Survey. If IDPs decide to return to homes that have been damaged by the war (29 percent among IDPs and about 10 percent among returnees reported some damage to their homes), they need support in accessing building/reconstruction materials to repair current shelters.[110] In addition to the support needed for temporary accommodation and livelihoods, many IDPs will also need support in reemployment or reestablishing business activity.

Social cohesion and inclusion aspects should be considered within the recovery/integration strategy. The large inflows of IDPs to popular areas of destination are likely to lead to overcrowding, strained state resources, and increasing prices for rented housing, services, and transport. This, in turn, may cause decline in social cohesion in host communities. The IOM states, however, that the attitudes of host communities toward IDPs have not changed significantly between Rounds 2, 4, and 6 of the General Population Survey, with positive attitudes prevailing in all macroregions of Ukraine. Yet 9 percent of all surveyed IDPs and 14 percent of IDPs residing in the West macroregion reported cases of discrimination on the basis of originating from another area, mainly in interactions with the local population and in access to humanitarian assistance, public transport, and schools.[111]

Persons with Disabilities. **Displacement influx and increase of persons in need of medical rehabilitation and prosthetics caused by the ongoing war has resulted in the shortage of rehabilitation, medical, and other special service providers and facilities.** Filling this gap requires allocation of additional resources to attract more specialists and maintain the provision of services; it also requires upgrading human skills and technologies, as needed health checkups for persons with disabilities are not always available. Special attention must be focused on identifying and responding to the immediate safety and health needs of children, in particular those the Ukrainian government deems to have the most "severe disabilities." The postwar interventions to restore municipalities should prioritize community integration of people with disabilities over institutionalization upon their return from the place of evacuation/relocation. While military activities are ongoing in the country, steps should be taken for resolving overcrowding issues and ensuring proper staffing of the special care institutions where disabled persons have been relocated. Families that have a child or adult family member with disabilities are in a more vulnerable situation regarding loss of day care services and personal care providers due to the war. The risk is that family members assuming care for their disabled relative may lose their paid jobs. These families should be considered for more or additional welfare payments. Disability and family-run organizations in Ukraine exist and are very effective. Humanitarian aid planning and delivery workers should be in constant coordination and consult with such organizations and the OPDs in order to prevent the inadvertent distribution of potentially harmful aid to persons with disabilities. For instance, food supplies for persons with diabetes or other health problems should be carefully planned. Long-term support and training are needed for these organizations to ensure that they are sustainable, that reforms are responsive to the needs of persons with disabilities, and that an independent perspective is available to hold government authorities accountable if they fail to enforce the rights of children and adults with disabilities.[112]

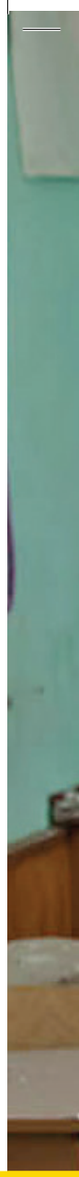
Women and Children. **As with the conflict that erupted in Eastern Ukraine in 2014, the war in Ukraine has different impacts on women, men, and children.**[113] Gender-based differences will need to be considered and integrated throughout the response and recovery strategy's design and implementation; responses will need to be tailored to effectively meet the needs of each group and address the risks they face. With many adult men separated from their families to fight in the war, a disproportionate share of women are the caretakers of children and elderly relatives (particularly among IDPs). "Although social reintegration of female IDPs and children is broadly

109 IOM, "Internal Displacement Report – General Population Survey Round 5 (17 May 2022–23 May 2022)," *Link*.
110 Ibid.
111 IOM, "Ukraine Internal Displacement Report – General Population Survey, Round 6, 23 June 2022," *Link.*
112 DRI, "New Report: Left Behind in the War: Dangers Facing Children with Disabilities in Ukraine's Orphanages," 2022, *Link.*
113 World Bank, European Union, and United Nations, "Ukraine Recovery and Peacebuilding Assessment: Analysis of Crisis Impacts and Needs in Eastern Ukraine, Volume I: Synthesis Report," 2015, *Link*.

supported, male IDPs can face acute stigma and prejudice in host communities, drastically limiting their livelihood options and social reintegration potential and reducing their likelihood of registering as IDPs. An additional gender dimension relates to men who account for the vast majority of volunteer security and protection forces and the social and economic strains their families experience as a result."[114] An approach that mainstreams and is sensitive to gender requires attention to gender-differentiated needs across the full range of entry points for support: access to services and justice (including for SGBV and for forced recruitment of boys and men into armed groups), livelihoods, social resilience, and peacebuilding—e.g., gender-sensitive disarmament, demobilization and reintegration, psychosocial recovery, and training of women and men to become peacebuilders. It is recommended that institutional arrangements are similarly gender-sensitive and support "gender-inclusive participation of war-affected populations in decision making around recovery activities, gender-disaggregated recovery data collection, and gender-responsive institutional capacity for recovery at national, oblast, and local levels, including gender advisors within institutional structures."[115]

Lesbian, Gay, Bisexual, Transgender, and Intersex (LGBTI) People. The UNHCR Ukraine Protection Cluster, in partnership with ILGA-Europe, has developed a set of recommendations for humanitarian actors and service providers working with people affected by the war in Ukraine, so they can better understand and address the risks faced by LGBTI people staying or fleeing the country. Measures will need to be taken to ensure inclusive programming, advocacy, and responses to address the various vulnerabilities and risks faced by LGBTI individuals. Recommendations include collecting data on specific protection needs, risks, and barriers to ensure that specific vulnerability factors and risks are considered in further risk prevention and mitigation cycles; mapping and engaging LGBTI support organizations; establishing specific reception and registration arrangements for safe identification and support; ensuring that specialized LGBTI shelters and centers are linked to the humanitarian system; addressing barriers to safe and equal access for LGBTI persons to social services and program; and raising awareness about and advocating for equitable and nondiscriminatory provision of services to LGBTI individuals by humanitarian actors, civil society organizations, government, and law enforcement agencies. Because transgender IDPs may face additional difficulties accessing services due to discrepancies between their appearance and identity documents, humanitarian actors should include this issue in their trainings for state service providers, and advocate for the reissuing of documents for transgender IDPs.

114 Ibid, p. 46.
115 Ibid, p. 47.



DAMAGE, LOSSES, AND NEEDS:
SECTOR ASSESSMENTS

SOCIAL SECTORS

Kharviv. Photo by Ipsos for the World Bank.

HOUSING

Summary

The total damage to the housing sector as of June 1, 2022, is estimated at US$39.2 billion. Around 817,000 residential units were impacted by the war, 38 percent of them destroyed beyond repair. This number includes apartment units, single family houses, and dormitories. Apartment buildings have been the most affected, a finding that highlights the significant impacts of the war on the urban housing stock and indicates that housing urban areas carry the bulk of the damage burden. The extent of housing damage is spread unevenly across the oblasts, with the Donetska, Luhanska, Kharkivska, and Kyivska oblasts accounting for over 82 percent of total damage to housing stock in the country. **Losses in the housing sector are estimated at US$13.2 billion,** which reflects the cost of demolition and debris removal, loss of household goods, temporary rental and shelter provision by owners, and adjusted losses in rental incomes. The loss estimation does not reflect bank losses and mortgage defaults.

The recovery and reconstruction needs amount to US$69 billion. Addressing housing recovery needs in postwar Ukraine will require an integrated green, resilient, and inclusive approach, with a focus on returning families to their homes and restoring livelihoods and services. There is an urgent need to provide temporary rental for displaced households, undertake winterization, repair partially damaged residential buildings, and establish a housing reconstruction and recovery strategy and implementation mechanism. Particularly, providing repair and rental subsidies before cold, wet weather begins will mitigate further displacement and fragility risks. While the situation is fluid, measures for ensuring safety and adequate housing for households remain necessary to address the primary need of internally displaced persons (IDPs), returnees, and host communities for safe housing options. There is also a need to establish a framework for housing reconstruction and recovery in the medium term. These actions can begin even during the war and will allow for appropriate sequencing of key actions and planning of budgets accordingly.

Background

Ukraine had a total of around 18 million housing units prior to the war. Residential units are located in both multifamily apartment buildings, in single-family houses, and in dormitories, with considerable variation across urban and rural areas. Apartment buildings are predominant in urban areas and cater to almost 67 percent of the urban population. In big cities, this share increases to 79 percent. Single-family houses, which include individual homes, dachas, garden houses, and country houses, are largely located in rural areas. In cities, single-family housing is limited to individual houses and garden houses and can be found in areas zoned specifically for individual and blocked houses.

Multifamily apartment buildings in Ukraine were mostly constructed during the Soviet era and are severely aging; less than 12 percent of Ukraine's housing stock was constructed after 1991. While relatively newer apartment buildings can be found in larger cities like Kyiv, Lviv, Ivano-Frankvisk, and Dnipro, a significant share of the multifamily apartment buildings—also known as Soviet generic housing (SGH)—remains old and in need of urgent upgrades and repairs. The aging building stock in Ukraine has also been contributing to high energy consumption, as older buildings do not incorporate energy-efficient structures and codes. While some city governments do have strategies for the management and upgrading of the building stock, with Khrushchovka (SGH buildings up to 5 floors constructed between 1957-71) a priority, progress on this front has been slow due to the lack of financial and technical capacity at the local level.

Almost 94 percent of the housing in Ukraine is privately owned, and only 3.5 percent of households live in private rental housing. In Ukraine, 93.7 percent of the housing stock was private as of 2013, a reflection of the privatization of housing stock that took place in the 1990s. As of 2013, only 3.4 percent of households lived in rental housing. According to housing experts and local consultations, however, this official number does not capture the real picture

Table 5. Damage inventory by asset type as of June 1, 2022

Asset type	Baseline		Partially damaged		Completely destroyed		Total damaged assets		
	Units	Share (%)	Units	Share (%)	Units	Share (%)	Units	Share (%)	Cost (million US$)
Apartment units	8,695,561	46.8	425,639	84.5	266,571	85.4	692,210	84.6	34,569.4
Single-family house	8,977,862	48.3	78,822	13.8	41,323	13.2	110,635	13.6	4,558.7
Dormitories	910,592	4.9	8,960	1.7	4,352	1.4	13,312	1.6	76.3
Total	**18,584,015**	**100%**	**503,911**	**100%**	**312,246**	**100%**	**816,157**	**100%**	**39,204.4**

Source: Assessment team.

of the rental market. The rental process in Ukraine is often informal, and households are seen to rent out rooms in apartments as opposed to entire apartment units. According to estimates, the housing rental market accounts for almost 13 percent of the total residential stock.

Damage and Loss Assessment

The war is estimated to have caused approximately US$39.2 billion in damage to the housing sector, adversely affecting about 2 million residents of the country.[116] Of around 18 million housing units assessed, 1 percent were deemed completely destroyed, 3 percent partially damaged, and 96 percent undamaged (see Table 5). The war has disproportionately affected urban areas, where over 80 percent of the total damaged housing units are concentrated. As shown in Table 6, the extent of housing damage is spread unevenly across the oblasts. Donetska, Luhanska, Kyivska, and Kharkivska sustained the most damage, respectively concentrating 28.92 percent, 20.07 percent, 18.13 percent and 15.07 percent of the total damaged housing units.

Housing damage varies across the three housing asset classes identified in the RDNA (apartment units, single-family houses, and dormitories). Apartment units, particularly old Soviet-era apartments, have experienced the bulk of the damage (84 percent), indicating that the conflict has mainly impacted dense urban areas. In turn, 13 percent of single-family houses (both rural and urban) and 3 percent of dormitories were affected by the conflict.

Losses in the housing sector are estimated to total US$13.3 billion, as shown in Table 7. Losses reflect the cost of demolition and debris removal, loss of household goods, temporary rental and shelter provision by owners, and adjusted losses in rental incomes. The loss estimation does not reflect bank losses and mortgage defaults. It is likely that the losses in the sector are higher than estimated, particularly for rental income losses. Because the rental market is mostly informal, it is not possible to collect precise data at this stage.[117]

116 This estimate assumes an average 2.58-person household. This is based on an estimate by the State Statistics Service of Ukraine in 2012.

117 An assessment is proposed to be carried out by the Ministry for Communities and Territories Development together with the Ministry of Social Policy.

Table 6. Damage by oblast as of June 1, 2022

Oblast	Damage to housing units						Damage (US$ million)
	Total (number)	Total (share %)	Urban		Rural		
			Number	Share%	Number	Share %	
Cherkaska	346	**0.04**	179	52%	167	48	16.6
Chernihivska	52,936	**6.49**	34660	65%	18,275	35	2,542.6
Chernivetska	0	**0.00**	0	0%	0	0	-
Dnipropetrovska	4162	**0.51**	3497	84%	665	16	199.9
Donetska	23,6039	**28.92**	214476	91%	21,563	9	11,337.5
Ivano-Frankivska	0	**0.00**	0	0%	0	0	-
Kharkivska	122,992	**15.07**	99844	81%	23,148	19	5,907.6
Khersonska	4207	**0.52**	2584	61%	1623	39	202.1
Khmelnytska	0	**0.00**	0	0%	0	0	-
Kirovohradska	0	**0.00**	0	0%	0	0	-
m. Kyiv	11,992	**1.47**	11992	100%	0	0	575.9
Kyivska	147,945	**18.13**	91820	62%	56,125	38	7,106.2
Luhanska	163,805	**20.07**	142613	87%	21,191	13	7,867.9
Lvivska	828	**0.10**	505	61%	322	39	39.7
Mykolaivska	35,815	**4.39**	24563	69%	11,252	31	1,720.3
Odeska	2190	**0.27**	1471	67%	719	33	105.2
Poltavska	594	**0.07**	372	63%	223	37	28.5
Rivnenska	374	**0.05**	178	48%	196	52	17.9
Sumska	11,787	**1.44**	8181	69%	3,606	31	566.2
Ternopilska	200	**0.02**	91	46%	109	54	9.6
Vinnytska	346	**0.04**	179	52%	167	48	16.6
Volynska	2	**0.00**	1	52%	1	48	0.9
Zakarpatska	625	**0.08**	232	37%	393	63	30
Zaporizka	11,382	**1.39**	8811	77%	2,571	23	546.7
Zhytomyrska	7,704	**0.94**	4568	59%	3,136	41	370
Total	**816,204.40**	**100.00**	**650,797.81**	**80%**	**165,406.59**	**20%**	**39,204.4**

Source: Assessment team.

Note: Housing units include single-family houses, apartment buildings, and dormitories.

Table 7. Losses inventory by category (US$ million) as of June 1, 2022

Loss category	Loss amount (US$ million)
Cost of demolition and rubble removal	3,157.3
Replacement of household goods	4,722.4
Net loss of rental income by landlords	242.8
Temporary rental of housing by owners	5,152.1
Total	**13,274.8**

Source: Assessment team.

Reconstruction and Recovery Needs, including Build Back Better

The total needs for the housing sector are US$ 69 billion, with US$33.1 billion needed in the immediate to short-term (Table 8). This amount would allow for the design and implementation of more detailed assessments of the housing stock affected by the fighting, assist owners of lightly damaged residential units to conduct repairs, and establish support systems to facilitate longer-term repair and reconstruction.

There is an urgent need to provide temporary rental housing for displaced households, undertake winterization, repair partially damaged residential buildings, and establish a housing reconstruction and recovery strategy and implementation mechanism (Table 9). Particularly, providing repair and rental subsidies before cold, wet weather begins will mitigate further displacement and fragility risks. While the situation is fluid, measures for ensuring safety and adequate housing for households remain necessary to address the primary needs of IDPs, returnees, and host communities for safe housing options. There is also a need to establish a framework for housing reconstruction and recovery in the medium term. These actions can begin even during the war and will allow for appropriate sequencing of key actions and planning of budgets accordingly. A number of actions taken now and in the immediate/short term can safeguard households, kick-start recovery, and provide a base for longer-term recovery. For example: (i) ensure households' safety and adequate shelter through repairs, provision of rental support for IDPs and returnees, and establishment of safety nets (cash transfers, urban services, etc.); (ii) elaborate a strategic framework for green, resilient, and inclusive recovery and reconstruction for the housing sector at the central, oblast, and district levels, setting the stage for longer-term recovery and reform of the sector; and (iii) ensure support to households/beneficiaries through trainings, capacity building, and adequate technical assistance.

Repair, reconstruction, and stabilization are critical to ensure swift return and kick-start recovery:

- **Repair support for partially damaged housing units**. As of June 1, it is estimated that 68 percent of the affected housing units have been partially damaged and are unlikely to require full demolition and reconstruction. Prioritizing repair of these units, especially in oblasts and districts where conflict prevalence is lower, will rapidly increase the number of housing units available in the market to the benefit of potential returnees and IDPs (either for homeowners or for rental). Modalities of financing partial repairs include providing cash or material grants for simple repairs (along with technical assistance and inspections) directly to homeowners or undertaking larger municipal-level rehabilitation and retrofitting projects for superblock repairs.

- **Reconstruction of fully destroyed housing units**. Fully destroyed residential buildings account for 32 percent of the damaged residential buildings in Ukraine as of June 1, 2022, and their complete reconstruction will be slower, as these will require full demolition, full redesign, and construction. While necessary, this is a slower process that can take up to five years for full reconstruction of the destroyed housing stock. Having a phased approach and realistic targets while prioritizing areas and households with the most needs is important. The first months will need to be dedicated to demolition, site clearance, design, and preparing engineering documents and foundation layouts.

- **Rental subsidies.** Rental subsidies aim to provide access to sustainable rental housing options for vulnerable households affected by the war in order to minimize risk of displacement and unsafe

Table 8. Recovery and reconstruction needs (US$ million) as of June 1, 2022

Needs category	Immediate/short term	Medium- to long-term	Total
Infrastructure	32,631.3	31,414.5	64,045.8
Service delivery	438.7	4,496.2	4,935.0
Total	**33,070.0**	**35,910.7**	**68,980.7**

Source: Assessment team.

shelter (in partially damaged buildings). Subsidies can help prolong hosting arrangements and keep the displaced in regular housing while repairs of damaged residential buildings are underway. These rental subsidies can be in the form of cash support to allow renting directly in the market and support to allow host communities and families to absorb displaced families and individuals. They can also be structured to incentivize landlord-financed reconstruction against rental income streams when appropriate.

- **Decontamination, demolition, and debris removal.** Decontaminating, demolishing, and removing debris from destroyed and damaged buildings are critical to begin safeguarding the population and to ensure quick and safe commencement of repairs and reconstruction, and thus return of households to their places of residence. This work will likely be undertaken by municipal governments that deliver solid waste management services; hence works to reinforce waste collection and disposal capacity (e.g., anti-hazard gear, collection trucks, a parcel addition to existing landfill) may also be a part of the scope of this work.

- **Repair and rebuilding of key municipal services to accompany the housing unit repair, as well as key service reinforcement for IDP- and returnee-hosting municipalities**. In parallel to enabling vulnerable households to access safe housing units through the combination of household-targeted rental subsidies, housing repair, and housing reconstruction, it is critical that basic communal infrastructures and services (e.g., water, electricity, district heating connection, and solid waste collection) are fully restored. Municipal governments will need assistance to undertake the necessary works to restore reliable basic municipal service access for the repaired and/or reconstructed housing units while also ensuring adherence to urban plans. In addition, the municipal governments that are experiencing increased service delivery burden—due either to the influx of IDPs or the expected large-scale return of refugees—will need support to invest in either basic municipal service expansion or repair to respond to the extra service needs. As both interventions relate to the network of services, they will benefit IDPs, returnees, and their hosting communities all together.

- **Winterization.** This includes full building-shell winterization to ensure that windows and doors are in place and that cracked walls, openings, and pipes are repaired to reduce risk of degradation due to winter freezes. Winterized habitable structures, even damaged ones, can be used for temporary housing. Winterization is also important for historical assets because they will deteriorate if the enclosure is not sealed. While historical and heritage housing is a small percentage of the housing stock in Ukraine, its value from a social and cultural perspective remains critical and safeguarding it will need dedicated support.

In the medium to long term, complementary activities addressing the full value chain of the housing sector should be undertaken to ensure its full recovery. The following topics can be entry points for longer-term development:

- **Facilitate remittance sending.** Develop secure arrangements within the banking sector to incentivize remittance sending for housing recovery.

- **Support materials markets.** Undertake upstream work with suppliers and distributors to ensure availability of construction material to facilitate repair, reconstruction, and retrofitting, and help to manage bottlenecks in building materials pipelines.

- **Support green reconstruction.** Provide just-in-time technical assistance and advice to enable contractors to use green materials and approaches fitting with the updated green and energy-efficient building regulation.

- **Support labor markets.** Address labor constraints in construction and engineering services.

- **Protect low-income tenants and owners.** This protection is necessary in light of the shadow economy and given the lengthy administrative processes that make tenancy and ownership unclear and difficult to access. It can be provided through specific affordable housing programs.

- **Improve access to housing finance for low-income groups.** This access can be improved by bolstering credit markets, providing resources to increase the liquidity of both traditional lenders and microlenders, and mitigating credit risks.

- **Promote private sector inclusion through public-private partnerships**.

Table 9. Prioritized and sequenced immediate and short-term needs (US$) as of June 1, 2022

Needs category	Immediate term	Short term	Total
Housing assessments	**70,270,440**	**330,495,760**	**400,766,200**
Conduct in-depth building inspections (to determine habitability)	7,558,665	17,636,885	25,195,550
Conduct engineering studies of individual residential buildings	61,211,775	306,058,875	367,270,650
Update safety, building, and energy-efficiency standards/building permitting system based on the multi-hazard assessment for the district levels	1,500,000	6,800,000	8,300,000
Organizational arrangements	**2,950,000**	**28,250,000**	**31,200,000**
Establish planning committees (per oblast in the immediate term, then per district)	1,500,000	7,500,000	9,000,000
Establish coordination body for housing at the central level	200,000	750,000	950,000
Design monitoring and reporting systems	1,000,000	1,000,000	2,000,000
Implement monitoring and reporting systems (national level)		2,000,000	2,000,000
Design support and training systems for each stakeholder group (central and local governments; homeowners; nongovernmental organizations; micro, small, and medium enterprises) for longer-term repair and reconstruction	250,000	2,000,000	2,250,000
Implement support systems by stakeholder group		15,000,000	15,000,000
Coordination and technical assistance	**1,750,000**	**5,000,000**	**6,750,000**
Prepare/validate National Housing Recovery Strategy (linked with urban recovery planning)	500,000	1,500,000	2,000,000
Design assistance schemes and delivery mechanisms	250,000	1,000,000	1,250,000
Undertake household enrollment, beneficiary selection, outreach, and case management	1,000,000	2,500,000	3,500,000
Repair, reconstruction, and stabilization	**3,124,374,488**	**29,506,934,642**	**32,631,309,131**
Provide technical assistance for immediate and short-term repairs and stabilization	3,750,000	11,250,000	15,000,000
Provide rental subsidies	318,999,032	1,116,496,613	1,435,495,645
Provide for demolition and debris removal	223,362,452	1,578,697,640	1,802,060,092
Provide repair and reconstruction subsidies	2,578,263,004	26,800,490,390	29,378,753,393
Add share for building back better (% of the total)			**15%**
Total	**3,199,344,928**	**29,870,680,402**	**33,070,025,331**

Source: Assessment team.

Limitations and Recommendations

Development of, and agreement on, a detailed urban housing recovery strategy is critical. Considering the extensive recovery needs for housing and settlements and the limited public resources, it is necessary to define a housing recovery strategy and an operational housing recovery manual that presents a set of prioritization criteria for investments. This will allow targeting the most affected population and prioritizing vulnerable communities and households, such as female-headed households. In addition, the housing recovery strategy should define a programmatic approach that can attract other funding over time. The development of the housing recovery strategy must be informed by urban recovery strategies that spatially prioritize key public investments in urban areas, so that housing and municipal service recovery are well-integrated for affected households. Without an agreed strategy, a multitude of ad hoc solutions that lack coordination may be pursued and may result in different benefits for different beneficiaries depending on the source of the solution. The scope of the strategy should be agreed and the strategy itself developed in conjunction with domestic and international stakeholders, drawing from relevant international experience but tailored for the specifics of Ukraine and its vision for sustainable development. The strategy, including further beneficiary identification, is needed to provide an inclusive, transparent, and equitable basis for supporting affected households with different tenure status (e.g., owners, tenants), and strengthening their economic outlook. Ukraine's reform agenda should be strongly aligned with the institutional and regulatory requirements outlined in the reconstruction strategy.

In order to develop differentiated approaches, housing recovery should recognize the linkages between the different typologies of housing damage and loss and the diversity of affected households in the different oblasts. Financial needs will likely exceed resources available, so it is critical to maximize access to existing resources, identify opportunities for long-term efficiencies (e.g., energy-efficient reconstruction), and ensure that government and donor funding for subsidies targets the most vulnerable. Targeting of available subsidies should be transparent and reflect objective criteria for need. This means all vulnerable affected people should be included in subsidy eligibility. Potential vulnerable groups would include owners of damaged units, including informally built and other low-income-type old Soviet-era apartment units, which were the units most affected by the fighting. The second main type of vulnerable group would be IDPs and renters, as renters comprise a large share of the shadow economy. Subsidies for these groups should be accompanied by an integrated urban recovery strategy that will allow livelihood regeneration to accompany shelter provision, and provide assistance for the poor, the elderly, and people with disabilities as well as the displaced and refugees. Other priorities could include reducing displacement of long-time residents, strengthening tenure security, or preserving historic and/or cultural assets. These priorities may vary from one city/oblast to another and would determine the design of the strategy and implementation modalities using concepts of subsidiarity and based on the strength of local competencies.

EDUCATION

Summary

As of June 1, 2022, the Ukrainian education sector has sustained US$3.4 billion in damage and US$0.5 billion in losses, with a particular impact on learners from Eastern Ukraine. A total of 1,885 education institutions have been impacted by the war, with 178 buildings destroyed and a further 1,707 partially damaged. The war has had deeply unequal impacts across Ukraine, with damage to infrastructure mainly located in the east, especially in Kharkivska, Donetska, and Luhanska oblasts. Prior to the war, there were nearly 1 million enrolled students just in these three oblasts (all levels of education). Meanwhile, losses are driven by debris removal costs, unpaid teachers' salaries, and decreases in private sector revenues, and there have been additional costs associated with the use of education institutions as temporary shelters. **Costs of recovery and reconstruction needs are over US$9.2 billion in the education sector.** Needs include the reconstruction of affected education facilities following new safety, sustainability, and quality standards. They also include the restoration of interim and long-term teaching and learning services, such as investments to ensure safe access to in-person education where possible (e.g., the addition of bomb shelters to education institutions, acquisition of temporary learning spaces, purchase of electronic devices). Recovery needs also cover measures to stave off an exodus of teachers from the profession and educational catch-up programs and psychological support that are critical to limiting learning losses. At the same time, the reconstruction and recovery of the sector must coincide with investments in reforms to increase quality and efficiency in education, which to a considerable extent had already been initiated before the war.

Background

Ukraine has an extensive network of education institutions, and enrollment is high at all levels. The Ukrainian education system is divided roughly into five levels: preschool education (International Standard Classification of Education [ISCED] level 0), secondary education which in Ukraine covers primary, lower and upper secondary education (ISCED levels 1–3), vocational education and training (VET) (ISCED levels 3–4), professional pre-higher education (ISCED levels 4–5), and higher education (ISCED levels 6 and up).[118] With a few exceptions, most institutions are publicly owned and under the Ministry of Education and Science (MoES) and/or local authorities. At the beginning of the 2021/2022 academic year, approximately 60 percent of students were enrolled in secondary education (Table 10). More than 1.1 million children were attending preschools, with 66 percent of children aged five participating in voluntary preschool education. Finally, Ukraine also shows very high enrollment rates in VET, professional pre-higher education, and especially higher education.

Table 10. Education sector as of start of 2021/2022 academic year

Level of education	Number of institutions	Number of students		Number of teachers
		Total	Female	
Preschool	14,974	1,111,358	533,457	138,772
Secondary school	13,991	4,188,403	2,059,044	434,755
VET	694	250,336	95,673	31,324
Professional pre-higher education	248	282,319	133,983	34,974
Higher education	386	1,046,669	562,998	125,360
Total	30,293	6,879,085	3,385,155	765,185

Source: State Statistics Service of Ukraine.

118 Officially, the education system contains other specialized forms of education that are not mentioned here (e.g., extracurricular education) but are included as education assets for the RDNA analysis presented later in this note.

Prior to the war, Ukraine's learning achievement performance was fairly strong, particularly given its income level; but it had not yet reached the levels of achievement observed in the European Union (EU). According to the Harmonized Learning Outcomes (HLO) data collected by the World Bank,[119] in 2018—prior to the COVID-19 pandemic and the invasion—Ukraine performed slightly below the average in Europe, but at par with its regional neighbors. This finding hides strong inequalities, however, especially between urban and rural students, and between those from lower- and higher-income households. In addition, the World Bank's Skills Towards Employment and Productivity Survey demonstrates that Ukrainian higher education does not guarantee the acquisition of basic cognitive skills.[120] The low quality of tertiary education impedes students' successful labor market integration and creates skill bottlenecks in critical sectors. To tackle these issues, the MoES launched the New Ukrainian School (NUS), which aims to improve the quality of secondary education through the phased introduction of a child-centered and competency-based curriculum focusing on soft skills.

For years, the Ukrainian education sector has been struggling to adjust to changing demographic dynamics. In line with the general population trend, the Ukrainian student population has been consistently declining over the past decades. However, education infrastructure and volume of teachers have not followed: the size of the teacher workforce and the network of institutions are disproportionate compared to the student population. In 2020, the average student-teacher ratio in Ukrainian secondary schools was 9.6 to 1 (6.4 to 1 in rural schools), compared to the Organisation for Economic Co-operation and Development (OECD) average of 13.1 to 1. This leads to large economic inefficiencies as well as to lower quality of education provision, especially in rural areas. To address these imbalances, and in parallel to ongoing decentralization reforms, the MoES initiated a formula-based funding model and network optimization process to move to a system of hub schools and reduce the number of very small secondary schools.

Damage and Loss Assessment

The war has had severe impacts on the education sector and has deeply disrupted the lives of students and teachers. Since February 24, 2022, nearly two-thirds of Ukrainian children have been displaced either internally within Ukraine or abroad. A survey conducted by the MoES and UNICEF at the local (hromada) level shows that most internally displaced students settled either in Western or Central Ukraine, with Vinnytska, Ivano-Frankivska, and Kyivska oblasts acting as major hubs for internally displaced persons (IDPs) (Figure 16).[121] According to this survey, hromadas reported receiving 164,000 IDP learners since February 24, 2022. Despite large-scale displacement, the Ukrainian education system quickly adapted. After two weeks of mandatory holidays, education progressively resumed online, relying on the tools developed during the COVID-19 pandemic to deliver education inside and outside of Ukraine. According to the MoES, around 89 percent of secondary schools resumed online classes before the summer closure—though there are no comprehensive measures of the quality of online learning during this period.

Meanwhile, for school-aged children and young people from Ukraine who fled abroad, the access to education varies considerably. As of June 20, there were at least 650,000 secondary students and 22,000 educators abroad. Although there are significant challenges in disaggregating data by age group and education level for displaced children, available data as of early June 2022 indicates that up to 1.1 million Ukrainian school-aged children and young people were abroad, with about 70 percent located in either Poland or Germany.[122] As of early June 2022, Poland reported the largest share of Ukrainian school-aged children and students (over 500,000), followed by Germany, Czech Republic, Romania, Italy, Spain, and Slovakia. However, the share of Ukrainian children and young people enrolled in local schools in their host countries varies significantly. For example, Spain and Austria report of Ukrainian children and young people that 75 percent and 63 percent respectively were enrolled in local schools, whereas these figures are 39 percent in Germany, 37 percent in Poland, and 8 percent in Romania.

119 N. Angrist, S. Djankov, P. Koujianou Goldberg, and H. Patrinos, "Measuring Human Capital Using Global Learning Data," Nature 592 (2021): 403–08.

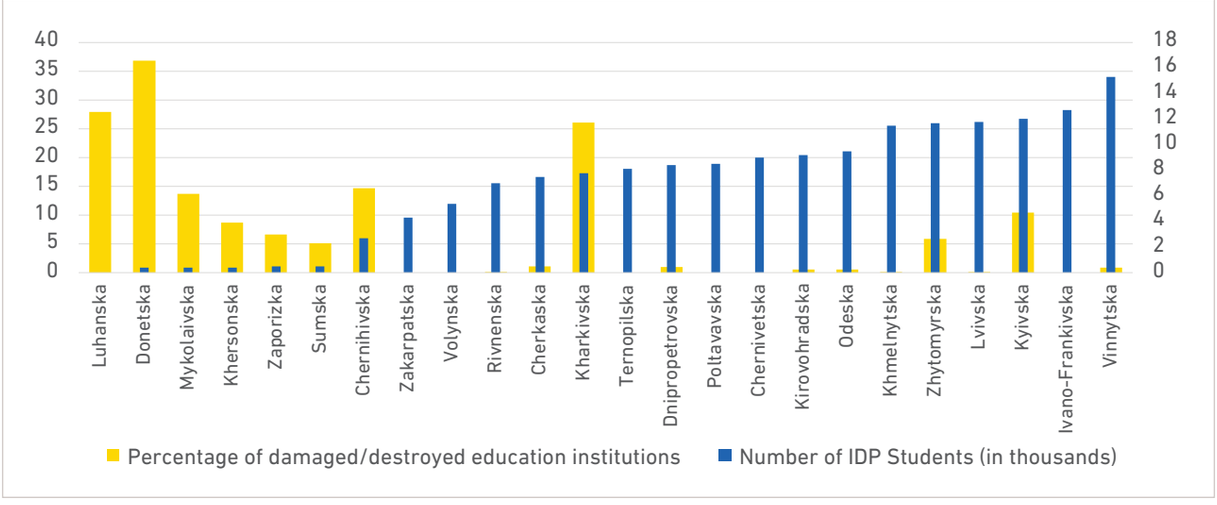
120 X. Del Carpio, O. Kupets, N. Muller, and A. Olefir, Skills for a Modern Ukraine (Washington, DC: World Bank, 2017), *Link*.

121 Ministry of Education and Science of Ukraine and UNICEF, "Final Report: Ukraine Education Needs Assessment Survey: 6 May–24 June 2022," 2022, *Link*.

122 European Commission/Eurydice (2022). Supporting refugee learners from Ukraine in schools in Europe.

The war has caused at least US$3.4 billion of damage to education institutions across Ukraine. As of June 1, 2022, at least 1,707 education institutions were partially damaged and 178 were destroyed (Table 11); these represent 5 percent of the total number of education institutions in Ukraine. Most of the affected facilities are located in Eastern Ukraine: 37 percent of all education institutions in Donetska oblast and 27 percent in Luhanska oblast are either damaged or destroyed. Vocational and higher education institutions in particular suffered high levels of destruction: 16 percent of VET institutions, 28 percent of professional pre-higher education institutions, and 11 percent of higher education institutions have been damaged since February 24. The total damage cost does not include the destruction and looting of educational material, from textbooks to electronic devices and laboratory equipment. Thus, the actual cost of damage is expected to be higher.

Figure 16. Number of IDPs and percentage of damaged education institutions by oblast as of June 1, 2022



Source: MoES, Institute for Education Analytics, and Ukraine Education Cluster.

Note: Data on the number of IDP students come from the Ukraine Education Needs Assessment Survey conducted in May-June 2022. The survey contains data from 79 percent of hromadas in Ukraine, though there were low response rates from hromadas in some oblasts heavily affected by conflict, including Luhanska, Mykolaivska, and Zaporizka, where response rates were below 50 percent.

Table 11. Damage inventory by asset type (US$ million) as of June 1, 2022

Institution category	Baseline number	Damaged infrastructure		Estimated costs of damage (US$ million)
		Totally destroyed	Partially damaged	
Preschool	14,974	41	604	$606.6
Secondary school	13,991	111	818	$1,701.8
Extracurricular education institution	1,351	3	48	$116.9
VET	694	9	99	$512.8
Professional pre-higher education institution	248	5	64	$140.6
Higher education institution	386	4	38	$201.0
Specialized education institution		5	36	$88.9
Total	**31,644**	**178**	**1,707**	**$3,368.6**

Source: State Statistics Service of Ukraine and MoES.

Table 12. Losses by category (US$ million) as of June 1, 2022

Category of losses	Estimated losses
Demolition and debris removal	$145.8
Loss of income to teachers and institutions	$285.4
Losses due to increase in operating costs	$76.7
Total	**$507.9**

Source: MoES and the World Bank team's calculation; estimates of income loss to teachers focuses on teachers at the secondary education level.

The Ukrainian education sector has sustained at least US$0.5 billion in losses. The World Bank has worked with the Government of Ukraine to ensure continuity of funding to the education sector in order to contain losses. This is particularly the case for teachers' salary payments as part of the Public Expenditures for Administrative Capacity Enhancement (PEACE) project and for students' academic and social scholarships in higher education as part of the Improving Higher Education for Results Project. Even so, losses have been incurred. Because of the occupation of some communities as well as the absence of the necessary technical means to transfer salaries from local budgets, many teachers could not be remunerated. As a result, despite their continued teaching during that period, at least 10,000 secondary school teachers were unable to receive their salaries in March and April, and 6,000 of them were unable in May, representing a total of US$13 million in salaries. These figures, however, do not cover preschool, VET, before professional pre-higher education, and higher education staff, for which data are unavailable. The war has also impacted own-source revenues in education institutions for the academic year 2021/2022, with losses expected to grow larger from September 2022 onward. Finally, with classes held online, at least 3,400 education institutions have been used for humanitarian purposes, which generates additional costs related to overuse. The MoES had also planned to print textbooks critical to the rollout of the NUS in fifth grade, but the war has created a financing gap leading to this loss. Finally, the government has incurred additional expenses related to the creation of a new university admissions exam and application system, as well as to debris removal and demining of damaged education facilities. These are summarized in Table 12.

Since the beginning of the war, the MoES has taken a leading role in the organization of online classes and the coordination of online class scheduling. It has been closely monitoring the effects of the war on education infrastructure and students, and quickly mobilized international partners around its needs. However, there has been a disconnect with local authorities; the MoES was unable to reach some of them, especially those close to the front lines. In addition, the education budget for 2022 sustained cuts of more than US$1.5 billion,[123] which are expected to have negative impacts for the recovery process.

Unpaid teachers' salaries as well as broader wage reductions could drive education staff to find employment in other sectors and threaten the foundation of the education system. Together with unpaid salaries, recent budget cuts at both central and local levels led to a decrease of 17 percent in secondary teachers' monthly wages.[124] Yet a key element of the NUS program is the planned increase of teachers' salaries—to four times the living wage by 2023—in order to boost the attractiveness of the teaching profession. Meanwhile, there is anecdotal evidence that local governments lack the necessary funds to remunerate preschool teachers, and only around 7 percent of all preschools are currently operating. The state of play is less clear for VET, professional pre-higher and higher education teachers. However, even if salaries are fully paid now, the situation could dramatically change by the next academic year if enrollments and tuition collection decrease. These pressures on salaries could potentially lead educators to resign from teaching, threatening the sustainability of the Ukrainian education system.

123 Estimates from the Kyiv School of Economics.

124 Education Ombudsman of Ukraine, "Education Ombudsman Appeals to All Levels of Government to Eliminate Rights Violations Related to Salary Payment for Employees of Educational Establishments" [Освітній омбудсмен звертається до органів влади усіх рівнів – усунути порушення прав щодо виплати заробітної плати працівникам закладів освіти], June 20, 2022, *Link*.

The most significant losses in the sphere of education relate to learning outcomes. Recent studies demonstrate that, although necessary, online learning is less effective than in-person classes because of reduced participation and lower quality of instruction.[125] According to a survey conducted by Premise[126] in May and June 2022, 43 percent surveyed parents, caregivers and teachers report that of Ukrainian students attend online classes regularly (four to five times a week), but another 34 percent of survey respondents report that students do not join at all. In addition, while secondary schools and tertiary institutions have access to various online schooling resources, there is significantly less online content available for VET students and preschoolers, for whom the quality of education depends on live interaction and practice. These findings suggest that Ukrainian students at all levels are losing significant amounts of instructional time, which is likely to lead to severe learning losses. In addition, because of the lack of electronic devices and adequate parental support, it is expected that online education will be more detrimental for vulnerable students.

The negative impact of school closures is amplified by the deterioration of students' mental health since the start of the invasion. Recurrent and extended periods of stress ensuing from the war and displacement are especially harmful to children. In a survey of parents conducted by Gradus Research,[127] 75 percent of respondents reported that their children had symptoms of psychological trauma, and 16 percent declared that their children showed signs of impaired memory, shorter attention span, and decreased ability to learn. Beyond having pervasive impacts on children's mental health, trauma has negative effects on school performance and future financial outcomes.[128] If not addressed inside and outside school settings, widespread deterioration of mental well-being among students will have far-reaching consequences.

The combination of destroyed education infrastructure, lost instructional time, and deteriorating mental health could negatively impact Ukraine's human capital. While difficult to estimate at this stage, the deterioration of Ukraine's human capital could be extremely costly. The combination of the COVID-19 pandemic and the war equates to more than a year of school closures, which could lead to a decrease of Ukraine's HLO from 481 to 451 points. Thus, even though Ukraine used to perform relatively well, it could fall below the lowest-performing countries in Europe.[129] This decline would also have severe long-term impacts on future earnings, with a loss of more than 10 percent a year per student and with the most vulnerable bearing the largest losses.

Reconstruction and Recovery Needs, including Build Back Better

Reconstruction and recovery needs for the education sector are estimated at US$9.3 billion over the next 10 years. Reconstruction needs are unequally distributed across the country, with eastern oblasts experiencing the largest share of damage. Meanwhile, service delivery restoration needs are more equally spread across the country, reflecting patterns of displacement as well as general system preparedness. In terms of timeline, it is estimated that 30 percent of needs will be addressed within the immediate/short term, with the remaining 70 percent to be progressively addressed over the next 10 years (Table 13). However, in practice the timing of responses will vary significantly depending on the type of need.

The reconstruction of damaged education institutions is expected to cost US$6 billion, with most expenses allocated to secondary schools. The reconstruction must follow the latest safety, sustainability, and quality standards defined by the government. This means that all affected institutions will be equipped with a bomb shelter but also rehabilitated with improved educational equipment, following the New Education Space guidelines, which were developed to support the implementation of the NUS. Modern education material, especially for science, technology, engineering, and mathematics (STEM) is also needed to help improve educational outcomes, especially in areas that suffered significant damage. Finally, in line with the ongoing government efforts before the invasion, energy efficiency must be prioritized during reconstruction.

125 See, for example, R. Donnelly and H. Patrinos, "Learning Loss During COVID-19: An Early Systematic Review," Covid Economics 77, no. 30 (2021): 145–53.

126 Premise, "Ukraine & Romania: Children Psychosocial Health and Education," Situation Report, June 14, 2022.

127 Gradus Research, "Changes in Children's Lives During the War: Analytical Report," April 2022, *Link*.

128 C. L Harter and J. F. R. Harter, "The Link between Adverse Childhood Experiences and Financial Security in Adulthood," Journal of Family and Economic Issues 9 (2021): 1–11.

129 H. Patrinos, "Learning Losses in Ukraine Can Amount to Over One Year (News and Research 290)," May 2, 2022, *Link*.

Table 13. Reconstruction and recovery needs (US$ million) as of June 1, 2022

Category	Component	Immediate/short term	Medium- to long-term	Total
Reconstruction needs	Preschool	279.1	651.3	930.4
	Secondary school	918.9	2,144.1	3,063.0
	Extracurricular education institution	53.7	125.4	179.1
	VET	275.3	642.5	917.8
	Professional pre-higher education institution	85.9	200.5	286.4
	Higher education institution	122.6	286.1	408.8
	Specialized education institution	48.0	112.0	160.0
Service delivery restoration needs	Ensuring safe access to education for all	767.3	1,790.3	2,557.9
	Tackling learning losses	180.4	420.9	601.2
	Providing quality education at all levels	43.5	101.4	144.9
Total		**2,774.8**	**6,474.5**	**9,249.5**

Source: MoES and the World Bank team's calculation.

The reconstruction of damaged assets will need to follow demographic trends. While future patterns of internal migration and returns to Ukraine are difficult to anticipate, it is expected that a non-negligeable number of Ukrainian households will remain abroad and that many more will resettle in a part of the country different from the one they left. For instance, preliminary evidence suggests a significant reduction in the number of students in newly recovered areas such as Bucha.[130] The education network must adjust to this new reality; depending on changes in student population, not all damaged assets will be reconstructed. Conversely, new institutions will be built in areas hosting large numbers of IDPs. These trends warrant careful consideration during the reconstruction process in order to ensure alignment with previous network optimization efforts.

The first service delivery restoration needs concern safe access to education and are close to US$2.6 billion. A major challenge for the MoES is the resumption of in-person instruction amid the war. While it is understood that not all education institutions will be able to reopen in September 2022, in-person classes remain the first step to mitigate learning losses and ensure high enrollment levels. Accordingly, the MoES has announced that only education institutions in safer regions and equipped with bomb shelters can reopen. At this stage, at least 8,500 institutions are expected to need a bomb shelter. Since school buses have been mobilized by the Ukrainian army, investments in school transportation are required in parallel to enable students to reach schools with bomb shelters. Local authorities and civil society are expected to take a leading role in these efforts, following the decentralization principles.

Investments in provisional measures are also crucial while existing education institutions cannot reopen. These include the construction of at least 8,000 prefabricated education facilities—especially in areas that suffered heavy destruction and those hosting high numbers of IDPs. At the same time, the provision of electronic devices is necessary to ensure access to online education for all, particularly vulnerable students. Local authorities are best

130 Remote assessment conducted for Bucha City as part of the RDNA.

placed to lead these activities. Finally, to limit long-term emigration and facilitate the reintegration of Ukrainian students abroad, the government plans to invest in Ukrainian education hubs in neighboring countries.

A second need is for the Ukrainian education system to invest at least US$0.6 billion to address the growing learning losses and mental health deterioration. To offset learning losses accumulated since March 2020 and ensure that minimal achievement levels are met, the government needs to develop large-scale academic catch-up programs. Evidence shows that online, by-phone, or in-person tutoring can bring positive results while being cost-effective.[131] This tutoring would be coupled with local initiatives, such as community-based and out-of-school youth programs. At the same time, the MoES must develop adequate tools to conduct systemic assessments of student achievement to help identify the greatest pockets of learning losses.

Academic catch-up programs can be combined with a comprehensive mental health response. To safeguard students' long-term capacity to learn, children and teachers must receive adequate individual or group psychological support, especially those living in newly recovered areas or where fighting is still ongoing. The provision of large-scale socio-emotional support requires the education system as a whole to adapt—for example, through curriculum adaptation as well as adequate teacher training to manage children emerging from traumatic experiences. Recent interventions as well as evidence from other countries also show the positive impact of academic catch-up programs on psychosocial well-being and emotional resilience.[132] This ambitious agenda could be achieved in parallel with and potentially integrated into the progressive rollout of the NUS.

Finally, going forward, reforms related to education quality must remain a priority; needs are estimated at US$0.1 billion. During the reconstruction process, it will be essential for Ukraine to have a skilled workforce with both hard and soft skills. That is why reforms initiated before the war will remain crucial, especially those related to education quality. Ukraine will need to invest in the continued rollout of the NUS by publishing textbooks and further introducing the new curriculum, which should stimulate critical thinking and problem-solving skills among children. Moreover, the modernization of Ukraine's education management information system will help monitor trends and patterns during the reconstruction of the education sector. Investments in data collection will enable the MoES to keep track of needs and progress, while also helping with the overall allocation of support across the system.

Investments in STEM education and VET are required to avoid skill bottlenecks during the short- and long-term reconstruction. Investments in STEM education as well as VET—both in the short term and for lifelong-learning purposes—are required to provide Ukraine's postwar economy with a skilled workforce. The MoES expects the demand for selected professions such as electrician and construction worker (traditionally acquired through VET) or engineer and IT specialist (obtained in higher education) to increase significantly for the reconstruction of Ukraine. Therefore, modernized STEM education and VET programs based on dual education (combining both traditional vocational education and work-based learning) are fundamental to a resilient reconstruction process. At the same time, providing good-quality career guidance in secondary schools will help ensure better alignment between education and the needs of the labor market for the short- and long-term reconstruction.

While the reconstruction and recovery are expected to be guided by the MoES, significant responsibilities and resources should be allocated to local authorities. Given its central role in education policy, the MoES is likely to lead the reconstruction and recovery strategy. To support its tasks, the MoES can rely on a network of independent institutions, namely the State Service for Education Quality, the Institute of Education Analytics, the Ukrainian Center for Education Quality Assessment, and the National Agency for Quality Assurance in Higher Education. At the same time, the reconstruction and recovery process should go hand in hand with the ongoing decentralization reforms in education and thus grant local authorities their autonomy.

International partners are also expected to be heavily involved in the reconstruction and recovery process. The government announced at the Ukraine Recovery Conference that various countries have committed to rebuild different regions (e.g., Germany–Chernihiv,

131 See, for example, M. Carlana and E. La Ferrara, "Apart but Connected: Online Tutoring and Student Outcomes During the COVID-19 Pandemic," IZA Discussion Paper 14094, IZA Institute of Labor Economics, Bonn, 2021, *Link*.

132 Initial evidence from a pilot project led by Teach for Ukraine in April-June 2022 suggests the positive impact of online academic catch-up programs on socio-emotional skills and well-being among Ukrainian students.

Canada–Sumy),[133] with a high possibility that they will employ their national solutions to ensure safe and green reconstruction. Hence further consultation between the relevant countries and the government may be requested to inform the implementers of losses, damage, and needs. At the same time, the war has accelerated Ukraine's membership in the EU, providing a "candidate" status to the country. This should support greater integration of European principles, approaches, and practices in rebuilding and reforming the education sector.

Guiding principles for recovery:

- While extremely challenging, the organization of in-person classes (at least in safer regions with limited damage to infrastructure) should be prioritized by MoES and local authorities in coordination with the launch of academic catch-up programs. This step will be essential to limit learning losses, especially among vulnerable students.

- Return to both in-person and online classes in September will need to be coupled with extensive psychosocial support to limit the prevalence of trauma among students and teachers.

- Ukraine will need to mobilize its human capital to support its recovery. Investments in high-quality and labor market–oriented vocational and higher education will be key, especially in trades and fields relevant to the reconstruction and rebuilding process. Putting in place short-term training and lifelong learning will help ensure a flexible education, adaptable to the recovery needs.

- Rebuilding hub schools and organizing school buses should receive a priority, as these are essential to limiting emigration and safeguarding human capital in hromadas.

- The reconstruction of damaged and destroyed assets will need careful planning to ensure alignment with the needs of new temporary and permanent demographic shifts and long-standing need for network optimization.

- The reforms initiated before the war are an opportunity for the MoES to improve the quality and the efficiency of the education system. These initiatives will need to be pursued even during the war to foster resilience and inclusiveness in the reconstruction and recovery process.

Limitations and Recommendations

To conduct the analysis of damage and losses, the World Bank team relied on data systematically gathered by the MoES. The MoES regularly gathers data on damage and losses and on students' and teachers' situations. The World Bank also benefited from insights obtained from a survey conducted at hromada level by the MoES and UNICEF, as well as other surveys conducted by private research companies and analyses produced by developmental partners. However, it is important to note that needs at the local level are not well accounted for by the MoES, since communication has sometimes been severed during the war. This is especially relevant since many educational activities are coordinated by local authorities.

Based on priorities identified by the MoES, the World Bank team took a broad approach to needs in the education sector, leading to high estimates. The MoES presented a list of needs to international partners with estimated costs,[134] which was used as a baseline for this analysis. The list was adapted and adjusted as needed, depending on the latest information available. At the same time, the team included additional recovery needs, such as psychological support for teachers and students, academic catch-up programs, the construction of prefabricated education facilities, and the addition of bomb shelters to education institutions. These additional needs are among the costliest, especially for the shelters, currently estimated at US$1.85 billion for an estimated 60 percent of undamaged education institutions.

The main limitation of the assessment concerns the damage and losses estimates, which are likely underestimates. Data on losses and damage were obtained from the MoES and KSE. However, available data and analysis lacks information regarding the cost of damaged and destroyed school materials and equipment. The team anticipates these costs to be high, especially for the destruction of STEM equipment. Second, regarding losses, the World Bank did not have access to detailed data on unpaid teachers' salaries across all levels of education;

133 Focus, "Представили електронну карту відновлення зруйнованих областей України" [Electronic Map for recovery of destroyed regions of Ukraine was presented], July 5, 2022, *Link*.

134 Ministry of Education and Science of Ukraine, "MoES Project Proposals," 2022, *Link*.

the available information covers only secondary teachers. More information in this area would help clarify educators' situation during the war and the pressures they continue to face.

To obtain a more accurate picture of costs for the education sector beyond those mentioned above, future assessments would need to include the following:

- A specific analysis of unpaid tuition fees in extensive cooperation with local authorities is needed to consider losses sustained by preschools and professional pre-higher and higher education institutions. This will be especially relevant at the start of the next academic year in order to assess drops in enrollment as well.

- In-depth assessments of learning losses are important to understand the impact of school closures, considering mental health deterioration, and the related future income losses. Critically, these assessments will support the identification of particularly vulnerable students.

- Estimated impact on human capital needs to be a key element of future assessments. With more data, analysis could consider elements such as learning assessments, calculations of lost instruction time, analysis of enrollment/dropout rates, or transition to tertiary education or the labor market.

- The reconstruction needs depend on "build back better" premiums calculated based on the costs of damage, but better estimates could be produced with more detailed plans for modernization of different types of education facilities.

- To ensure better utilization of resources and assist local communities to the extent possible, future assessments must be properly integrated into a strategy for optimizing the education institution network. As the war is expected to have a strong impact on the education network, a careful study of changes in the student and teacher population across Ukraine will be key to the reconstruction process and to network optimization.

HEALTH

Summary

The damage to the health sector is estimated at US$1.4 billion. This represents the monetary estimate of the cost of destroyed and damaged health infrastructure included in the inventory of damage compiled by the Ministry of Health (MoH). The actual level of damage is likely higher, given incomplete reports about damaged facilities located in territories temporarily not under government control and about private sector facilities. **The estimated losses of US$6.4 billion** include the removal of debris and demolition of the destroyed facilities, loss of income of private providers, losses from the financing of facilities that were not been fully operational during the war, and the additional losses of the population's health. **The needs of the health sector are estimated to be US$15.1 billion to cover the accumulated infrastructure damage and losses to the health sector, as well as scale-up of critical health services for the population of Ukraine**. This amount includes the cost of building new infrastructure using a building back better approach and the immediate recovery of facilities that are partially damaged. It also includes a significant expansion of rehabilitation and mental health services in Ukraine, which will need to be scaled up to address the impacts of the war. The estimate of needs does not include the full cost of recovery for the health care sector. Of the presented needs, **US$1.2 billion is urgently needed in the immediate/short term.**

Background

The health sector in Ukraine went through major financing and service delivery reforms in the last five years. The flagship health financing reform initiated in 2017 defined the scope of publicly guaranteed services within the state-financed Program of Medical Guarantees (PMG) and created new relationships between the National Health Service of Ukraine (NHSU) as the strategic purchaser of health services and the public and private providers. The government financed health care by allocating approximately 13 percent of total government expenditures to health, or 3.7 percent of projected GDP in 2022, mostly through the NHSU to finance health services. In addition, out-of-pocket expenditures made up about 50 percent of total health expenditures, most of which went to purchasing medicines and paying informally for health care.

Health services in Ukraine are provided by a large network of public and private providers, including nearly 1,900 public general and mono-profile[135] hospitals, 189 specialized polyclinics,[136] more than 22,300 pharmacies, and nearly 7,000 primary care providers. In addition, over 19,000 private providers hold valid medical licenses to provide different types of health services; of these, approximately 51 percent are providers of dental care and 6 percent providers of primary care. As of May 12, 2022, 930 of the 19,000 private providers are contracted by the NHSU to deliver primary health care (PHC) as private practices. Although the major share of the infrastructure in the sector is outdated and obsolete, significant investments were made in past years to upgrade primary and specialized care facilities within the program of rural family medicine and the "Big Construction" initiative aimed at upgrading the country's infrastructure.

Within the PMG, according to the NHSU data, in 2021 32.5 million people (or 79 percent of Ukraine's population of 41.3 million) were receiving services through enrollment with primary care providers, including over 2 million people participating in the Affordable Medicines Program and over 14 million people who received e-referrals for care at the specialized level. In addition, 4,099,200 patients were treated in hospitals, including 581,725 COVID-19 cases, according to NHSU data. Over 7,421,316 visits to patients were performed by pre-hospital emergency medical services; of these, 6,149,530 (or 83 percent) resulted in hospitalizations.

135 Inpatient facilities that primarily receive and treat patients with a specific health condition (e.g., tuberculosis or psychiatric hospitals).

136 Outpatient specialized facilities.

Damage and Loss Assessment

Shortly after the rapid escalation of the war in Ukraine in 2022, the MoH initiated the collection of information about damage to health facilities. Data about damage were provided by owners of facilities based on self-assessment. At the time of this RDNA, the MoH data were more complete than other data sources. The full list of damage provided by the MoH as of June 1, 2022, was used for the analysis of health infrastructure damage. The damage reported to the MoH were selectively verified and confirmed by visits to the facilities in Kyivska oblast.

Overall, as of June 1, a total of 581 health care facilities were reported as damaged or destroyed, including 557 facilities in the public sector. Most of the reported damage is for primary health care centers (264 facilities), followed by general and mono-profile hospitals (155 facilities). The level of damage was constructed considering the reported level of the damage and expert estimates of the total area of facilities experiencing damage. For the monetary estimate of the damage, the unit cost of a square meter by type of facility was applied as provided by the MinRegion, adjusted for the estimated loss of equipment and other medical materials depending on the scale of damage. Table 14 provides an estimate of the damage by type of damaged and destroyed health facility.

Table 14. Damage inventory by asset type (US$ million)) as of June 1, 2022

Type	Destroyed facility (level of damage 40–100%)			Damaged facility (level of damage < 40%)			Damage estimate (US$ million)			Share (%)
	Total	Public	Private	Total	Public	Private	Total	Public	Private	
General hospital	30	30	0	56	56	0	446.8	446.8	0.0	32.2%
Mono-profile hospital	27	27	0	42	42	0	352.9	352.9	0.0	25.4%
Primary health center	100	100	0	164	164	0	219.6	219.6	0.0	15.8%
Emergency health center	7	7	0	14	14	0	71.4	71.4	0.0	5.2%
Outpatient clinic	3	3	0	21	21	0	57.0	57.0	0.0	4.1%
Dental clinic	10	10	0	9	9	0	23.4	23.4	0.0	1.7%
Rehabilitation facility	3	3	0	8	8	0	25.0	25.0	0.0	1.8%
Blood center	2	2	0	3	3	0	6.9	6.9	0.0	0.5%
Autopsy / forensics	0	0	0	5	5	0	32.7	32.7	0.0	2.4%
Supply chain / warehouse	2	2	0	4	4	0	29.3	29.3	0.0	2.1%
Education facility (medical)	1	1	0	8	8	0	35.4	35.4	0.0	2.6%
Orphanage	1	1	0	3	3	0	34.1	34.1	0.0	2.5%
Service / policy institution	11	11	0	23	23	0	20.6	20.6	0.0	1.5%
Subtotal	**197**	**197**	**0**	**360**	**360**	**0**	**1,355.2**	**1,355.2**	**0.0**	**97.7%**
Individual entrepreneurs	0	0	0	1	0	1	5.7	0	6	0.4%
Other private	19	0	19	4	0	4	25.8	0	26	1.9%
Subtotal	**19**	**0**	**19**	**5**	**0**	**5**	**31**	**0**	**31**	**2.3%**
Total	**216**	**197**	**19**	**365**	**360**	**5**	**1,386.7**	**1,355.2**	**31.5**	**100.0%**

Source: MoH.

Damage was recorded for approximately 5.6 percent of total health facilities in the public sector. Some regions had more damage to publicly owned health infrastructure than others; the most affected regions were Donetska, Kharkivska, and Mykolaivska. The presentation of the damage by oblast is provided in Table 15 (see also Table 16). Damage to private facilities is reported as less significant: only 0.5 percent of the total reported area in privately owned facilities experienced any kind of damage. These estimates are likely incomplete, MoH focused its data collection on publicly owned facilities. A possible proxy to better estimate damage to private facilities is to review reported damage to pharmacies, which are predominantly privately owned. The available data suggest that at least 437 pharmacies are fully damaged, meaning that 2.1 percent of all pharmacies are nonoperational because of war-related destruction.

The proposed estimate of the damage to health infrastructure at US$1.4 billion is conservative and not complete. It likely underestimates damage in territories that are temporarily not controlled by the Government of Ukraine (territories of Luhanska, Donetska, Khersonska, and Zaporizka oblasts). Some additional assets were not accounted for, such as damaged ambulances (60 vehicles were damaged as of July 10, 2022).

Table 15. Damage inventory by oblast and type of provider (number and share) as of June 1, 2022

Oblast	Share of facilities (%)			Share of damaged area (%)			Number of facilities		
	Total	Public	Private	Total	Public	Private	Total	Public	Private
Cherkaska	0.5%	0.7%	0.0%	0.3%	0.4%	0.0%	1	1	0
Chernihivska	13.6%	15.2%	0.0%	15.4%	16.4%	0.0%	47	47	0
Chernivetska	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0	0	0
Dnipropetrovska	0.6%	1.2%	0.0%	0.0%	0.0%	0.0%	5	5	0
Donetska	20.3%	26.6%	9.1%	23.9%	27.6%	6.1%	137	115	22
Ivano-Frankivska	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0	0	0
Kharkivska	11.1%	17.5%	0.0%	12.8%	16.1%	0.0%	109	109	0
Khersonska	12.8%	17.0%	0.0%	1.6%	1.9%	0.0%	51	51	0
Khmelnytska	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0	0	0
Kirovohradska	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0	0	0
Kyivska	11.1%	16.3%	0.9%	3.1%	4.0%	0.5%	75	73	2
Kyiv (city)	1.4%	9.2%	0.0%	1.6%	3.9%	0.0%	24	24	0
Luhanska	4.4%	5.3%	0.0%	7.9%	8.6%	0.0%	20	20	0
Lvivska	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0	0	0
Mykolaivska	14.7%	19.7%	0.0%	9.4%	12.0%	0.0%	42	42	0
Odeska	0.1%	0.2%	0.0%	0.0%	0.0%	0.0%	1	1	0
Poltavska	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0	0	0
Rivnenska	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0	0	0
Sumska	2.7%	3.0%	0.0%	0.3%	0.3%	0.0%	13	13	0
Ternopilska	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0	0	0
Vinnytska	0.9%	1.1%	0.0%	0.6%	0.7%	0.0%	5	5	0
Volynska	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0	0	0
Zakarpatska	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0	0	0
Zaporizka	5.2%	8.2%	0.0%	4.4%	5.2%	0.0%	27	27	0
Zhytomyrska	6.3%	8.0%	0.0%	7.5%	8.7%	0.0%	24	24	0
Average/ Total	**3.9%**	**5.6%**	**0.5%**	**3.2%**	**3.7%**	**0.3%**	**581**	**557**	**24**

Source: MoH. Data for the affected area and baseline constructed using the records of the registry of licensed facilities.

Table 16. Damage inventory by oblast and type of provider (m^2 and US$ million) as of June 1, 2022

Oblast	Affected area (m2)			Cost (US$ million)		
	Total	Public	Private	Total	Public	Private
Cherkaska	868	868	0	0.1	0.1	0.0
Chernihivska	72,061	72,061	0	89.4	89.4	0.0
Chernivetska	0	0	0	0.0	0.0	0.0
Dnipropetrovska	333	333	0	5.8	5.8	0.0
Donetska	273,397	261,557	11,840	452.9	423.3	29.6
Ivano-Frankivska	0	0	0	0.0	0.0	0.0
Kharkivska	178,766	178,766	0	231.0	231.0	0.0
Khersonska	9,456	9,456	0	119.3	119.3	0.0
Khmelnytska	0	0	0	0.0	0.0	0.0
Kirovohradska	0	0	0	0.0	0.0	0.0
Kyivska	21,875	21,061	814	108.8	106.9	1.9
Kyiv (city)	32,435	32,435	0	133.3	133.3	0.0
Luhanska	66,236	66,236	0	94.0	94.0	0.0
Lvivska	0	0	0	0.0	0.0	0.0
Mykolaivska	25,108	25,108	0	76.1	76.1	0.0
Odeska	384	384	0	0.6	0.6	0.0
Poltavska	0	0	0	0.0	0.0	0.0
Rivnenska	0	0	0	0.0	0.0	0.0
Sumska	2,334	2,334	0	4.6	4.6	0.0
Ternopilska	0	0	0	0.0	0.0	0.0
Vinnytska	3,427	3,427	0	13.5	13.5	0.0
Volynska	0	0	0	0.0	0.0	0.0
Zakarpatska	0	0	0	0.0	0.0	0.0
Zaporizka	46,369	46,369	0	22.6	22.6	0.0
Zhytomyrska	36,503	36,503	0	34.7	34.7	0.0
Average/ Total	**769,552**	**756,899**	**12,654**	**1,386.7**	**1,355.2**	**31.5**

Source: MoH. Data for the affected area and baseline constructed using the records of the registry of licensed facilities.

The total conservative estimate of losses using the available data is US$6.4 billion, as presented in Table 17. It includes estimates related to the necessary demolition and debris removal at the affected health infrastructure. Under the standard approach for this RDNA, estimates for completely destroyed assets assign 14.1 percent of the full cost for demolition and 1.875 percent of the full cost for debris removal; estimates for partially damaged facilities assign 1.25 percent of the cost for debris removal. Using this approach, the total cost of loss associated with this type of damage comes to US$281.4 million (see Table 3 for the summary of estimated losses).

Losses for private providers of health services (including pharmacies) were estimated by comparing economic activity and incomes in the months preceding the escalation of the war in February 2022 to those in the following months. The highest losses in this category are estimated for the city of Kyiv (44 percent), followed by Donetska (13 percent), Luhanska (7 percent), Kyivska (7 percent), and Odeska (6 percent) oblasts.

A significant amount of losses is associated with the deteriorated health of people and constrained access to services. Losses are quantified as

Table 17. Losses by category (US$ million) as of June 1, 2022

Category	Estimate	Loss estimates (US$ million)	Share (%)
Demolition cost and debris removal	Estimated using standardized approach for the present RDNA	281.4	4.4
Private providers' loss of income	Estimated by comparing economic activity and incomes in the months before and after the war	1,472.1	23.0
Additional health expenditures	Estimated as 10% of the Program of Medical Guarantees	549.8	8.6
Health losses	Quantified as additional DALY lost for each specified class of diseases, including 5% additional DALY lost from communicable diseases, 3% from neonatal and nutritional deficiencies, 3% from maternal disorders, 4% from new NCDs and forgone care, 10% from mental health disorders, and 5% from self-harm and interpersonal violence	4,089.6	64.0
Total		**6,392.9**	**100**

Source: KSE for private provider losses estimate. Other estimates by the assessment team. *Note*: A joint with the World Health Organization model was used for the estimate of the cost of additional health expenditures.

additional disability-adjusted life years (DALYs) lost for the Ukrainian population by disease class (compared to baseline annual estimates of DALYs for Ukraine).[137] Losses related to infectious diseases are associated with the missed immunizations of children and adults, lack of access to clean water and hygiene, crowded settlements of internally displaced persons (IDPs), etc. Increased neonatal and childhood mortality is associated with additional neonatal disorders in view of increased premature deliveries, some in suboptimal conditions, and increased wartime nutritional deficiencies of infants and children. Similarly, missed antenatal care, perinatal care, and care for labor-related complications are quantified as additional maternal mortality losses. The largest group of losses is potentially associated with missed episodes of care (screening, diagnostic, and follow-up, as well as missed treatment for acute conditions) for people with noncommunicable diseases (NCDs) and additional diseases occurring in this group as a consequence of war and suboptimal living conditions.

A very conservative assumption of additional mental health burden and interpersonal violence burden was made to estimate immediate losses in health outcomes. An increase of 10 percent in DALYs was included for mental health and an additional 5 percent for interpersonal violence. Available literature suggests that the potential losses related to mental health are higher than 10 percent additional DALYs, as reported for other countries.[138]

In accordance with the RDNA methodology, direct losses from injuries and accidents for civilians and the military were not quantified.

A share of expenditures under the PMG is quantified as additional losses. The estimates are based on the modeling of the payments to providers under the PMG that had to continue despite the massive displacement of people inside Ukraine and abroad. Approximately US$549.8 million is estimated as paid within the PMG to health providers to sustain their activities and salaries, even if the provision of services is disrupted. The cost is calculated using actual expenditures for the past months and projected financing to providers using planned allocations, compared to the output-based modeling of these expenditures using actual and projected outputs.

137 DALYs are taken from the Global Burden of Disease database of the Institute of Health Metrics and Evaluation (*https://www.healthdata.org/*), using the most recent (2019) estimated DALY for Ukraine. One DALY lost is taken as 1 GDP per capita, using International Monetary Fund (IMF) projection for GDP for Ukraine for 2022 (prewar projection).

138 See, for example, R. S. Murthy and R. Lakshminarayana, "Mental Health Consequences of War: A Brief Review of Research Finding," World Psychiatry 5, no. 1 (February 2006):25–30, *Link*.

However, the cost of setting up additional capacities (e.g., in the west of Ukraine to cover additional needs for IDPs) was not included in the PMG payments, as the majority of providers continued delivery of additional services within already allocated PMG financing.

Reconstruction and Recovery Needs, including Build Back Better

Costs for reconstruction and recovery are estimated based on the projected needs for the health sector. They include estimates of the necessary investments to rebuild missing or damaged infrastructure, build new infrastructure to address new or significantly increased health needs, and upgrade the existing facilities. They also include the additional resources that will be necessary within the PMG to address forgone care needs and additional needs related to mental health and rehabilitation of direct and indirect victims of war. The total estimate of needs comes to approximately US$15.1 billion; estimates are presented in Table 18.

Estimates of the infrastructure recovery and upgrade costs are for replacing destroyed and damaged primary and specialized care facilities. Replacement of hospitals is most expensive as a lot of existing hospital infrastructure is dilapidated, and investments will be necessary to modernize hospital services in Ukraine. Of the fully destroyed hospitals, 80 percent are planned to be rebuilt as general profile (cluster) hospitals with an average capacity of 350 beds and 31,500 m2 in size; the estimated cost is US$67 million for the construction and equipping of one such modern hospital. Another 20 percent of hospitals are planned to be built as specialized general profile hospitals, with specialization (such as burn centers, for example) defined by need. The cost of a turnkey hospital with a center of excellence in defined specialization is estimated at US$133.7 million for a 600-bed hospital that is 60,000 m2 in size. Such hospitals do not necessarily need to be built in the same plots where the destroyed hospitals are located, as each general profile hospital will have sufficient capacity to cover the needs of 250,000 people in hospital care, and the specialist hospital will have the capacity to serve 750,000 to 1 million people. For partially damaged hospitals, 40 percent of the current MoH estimate for the cost of construction of 1 m2 was applied to calculate the necessary cost of reconstruction.

Investments in PHC are estimated using the build back better approach and providing for new functionalities to replace some of the hospital capacity. Replacement costs for damaged and destroyed PHCs are calculated assuming that the construction of one fully equipped PHC facility with additional capacities to cover the needs of approximately 8,000 people (PHC+) will cost US$1.25 million. Reconstruction of an existing PHC facility as a PHC+ facility will cost US$0.6 million. For a small PHC, the construction cost is US$0.18 million, and the reconstruction cost is US$0.09 million.

New investment needs associated with the impacts of the war include investments in mental health and rehabilitation centers. A total of 18 new rehabilitation centers and 59 repurposed facilities will be necessary to serve the needs of the population. The construction and reconstruction costs of these facilities are estimated for the 20-year horizon, and only half is included in the 10-year projection of needs. Similarly, investments in the construction or repurposing of 26 new or fully reconstructed mental health clinics and 544 mental health centers are estimated for the 20-year horizon; only half the cost is included in the 10-year projection of needs.

Additional estimates of the needs cover service delivery restoration need. Because of the war-related disruptions, the provision of basic care was discontinued for many people in Ukraine, and a major effort will be needed to reconnect patients with health care providers to ensure they catch up on the missed preventive or curative care. Additional investment in PHC will be needed to support this process, and financing of PHC in the PMG is expected to scale in the next 10 years, from the current 0.62 percent of GDP to 0.86 percent of GDP, to cover these additional needs. Resources needed to provide additional mental health and rehabilitation services are also estimated as increased allocations in the PMG; these resources which will need to increase by 0.3 percentage points of GDP for each PMG package covering rehabilitation and mental health services. Because financing of health services is already hospital-centered, additional costs of hospital care are not included.

An ongoing investment within the World Bank–financed project Additional Financing to Serving People, Improving Health, which provided US$35 million for additional equipment for emergency departments, was included in the estimate of the need.

Table 18. Recovery and reconstruction needs (US$ million) as of June 1, 2022

Category	Component	Estimate	Immediate/ short term	Medium- to long-term	Total
Reconstruction needs (construction and equipment)					
Investments in secondary care—new	Secondary care network—new facilities	For 54 destroyed hospitals, 80% are rebuilt as new general cluster hospitals, 20% rebuilt as specialized multi-profile hospitals	154	7,556	7,710
Investments in secondary care—reconstructed	Secondary care network—reconstructed facilities	For 88 hospitals with damage of less than 40%, renovation cost of MoH was applied to their affected area (40% of total cost)	132	0	132
Investments in primary care, PHC+/smaller PHC	Primary care network	For 26 destroyed PHC facilities, 40% are built as PHC+, 60% as smaller PHC; for 63 damaged PHC facilities, 40% are reconstructed as PHC+, 60% reconstructed as smaller PHC	29	87	116
Investments in rehabilitation centers	Rehabilitation centers	18 new rehabilitation centers and 59 existing facilities are fully reconstructed over a period of 20 years	23	734	757
Investments in mental health centers	Mental health	26 new or fully reconstructed psychiatric hospitals serve as mental health institutions; 544 mental health centers built/ equipped (as part of PHC/PHC+), and people trained over a period of 20 years	35	1,143	1,179
Education needs	Mental health and rehabilitation	10,000 people are trained	17	96	113
Service delivery restoration needs					
Additional primary health care services	Primary health care—addressing forgone care	Additional costs of the PMG are estimated to cover additional needs of people at the PHC level; PHC financed as 0.86% of GDP	595	3,373	3,969
Additional mental health needs	Mental health—war-related needs	Additional costs of the PMG are estimated to cover additional mental health needs of people; financed as 0.12% of GDP	83	470	553
Additional rehabilitation services	Medical rehabilitation—war-related needs	Additional costs of the PMG are estimated to cover additional rehabilitation services; financed as 0.11% of GDP	78	444	522
Immediate support to the health system					
Financing of emergency care equipment	Procured within World Bank project	Requested equipment procured to strengthen the delivery of emergency care in hospitals during the war	35	0	35
Total			**1,182**	**13,905**	**15,086**

Source: Assessment team.

Limitations and Recommendations

Several limitations are linked to data source limitations. To construct the baseline, the analysis relied on the state registry of medical licenses (issued to health facilities). Although the registry provides the most comprehensive data, it does not contain information on the area of licensed facilities, has incomplete data on types of medical activity, and has gaps for other essential data. Approximations are thus required in the calculations.

For the estimate of the damage in the health sector, the data set provided by MoH was used. It includes information based on self-reported forms submitted by facility owners and local health authorities. Some submissions lack data on facilities' area and bed capacity, which translates into several limitations in assigning a monetary value to the recorded damage. Another important shortcoming of this data set is that it underreports damage to facilities located in the parts of the country temporarily not under government control and to private sector health facilities.

The estimate of losses tries to include estimates of losses of health in the Ukrainian population. Such losses were calculated only for 2022 by estimating additional losses of health by key classes of diseases that are most obviously affected by the impacts of the war. However, such losses will very likely translate into increased morbidity and mortality in the coming years as well.

Since the methodology of the RDNA stipulates that only those needs directly related to the reconstruction of damaged assets and to losses be estimated, the estimated recovery needs do not fully cover the need for reconstructing service delivery in the health sector. The investment required to address health needs more efficiently and through better-quality service delivery is much higher than indicated here.

In addition, it is expected that the financing of the PMG in the short term will significantly depend on external funding. However, because of the existing uncertainties, such estimates are not included in the estimate of the need.

Future assessments should include the damage inflicted on the health infrastructure since the cutoff date of the present RDNA.

SOCIAL PROTECTION AND LIVELIHOODS

Summary

Damage to the social protection infrastructure (such as residential care units, social centers, and social services providers) is estimated at US$164.4 million. Overall, 56 stand-alone buildings were damaged or destroyed. Damage to shared building space used for social protection purposes, such as offices in administrative buildings of the local governments, is included in other parts of the RDNA. **The losses in the social protection and livelihoods are substantial, amounting to US$50.6 billion.**[139] They relate to (i) loss of jobs and household income from wages, (ii) resulting higher poverty and related increased expenditures under existing means-tested social programs, (iii) additional needs for programs such as survivor's benefits or programs related to disability, and finally (iv) lower affordability of basic needs, including energy and food, which will require a significant expenditure increase in a number of social programs linked to the subsistence minimum, ranging from pensions to the mentioned means-tested programs. **The estimated social protection and livelihoods sector needs amount to US$20.6 billion**. Most of this relates to efforts to restore permanently lost jobs. Bringing the lost workforce back would require additional efforts and costs (through mobility grants, settling-in grants, or wage subsidies for employers.

Background

Ukraine has a well-developed social protection system. About 72 percent of the population directly or indirectly benefits from at least one social program. Prior to the war Ukraine also spent a substantially higher share of gross domestic product (GDP) on social protection than other countries in the region (Figure 17).

While a significant share of social protection expenditures is due to pension expenditures (9.5 percent of GDP in 2021), a sizable portion comes from social assistance programs. In social assistance, an important role is played by means-tested programs, such as the Housing Utility Subsidy (HUS) and Guaranteed Minimum Income (GMI); expenditures for these depend on the income level of the beneficiaries and thus can fluctuate quite significantly (Figure 18). This is important for the context of the assessment, as prior to February 2022 Ukraine was projected to have a poverty level below 2 percent as measured by the upper-middle-income poverty line (US$5.5 per day in 2011 purchasing power parity). However, depending on the materialized drop in the private consumption and different response scenarios (austerity, deficit monetization, etc.), poverty could increase dramatically, with some scenarios envisaging its growth up to 58 percent.[140] This would result in radical changes to the composition of the social assistance, which are discussed later in this chapter.

In addition, the social protection sector also has an extensive infrastructure that aims to provide social services and administrative services to the beneficiaries of various social programs. It includes almost 2,200 social welfare units, about 1,200 social services delivery units, and almost 1,900 centers for administrative service delivery and offices of the Pension Fund, Social Insurance Fund, and Public Employment Service.

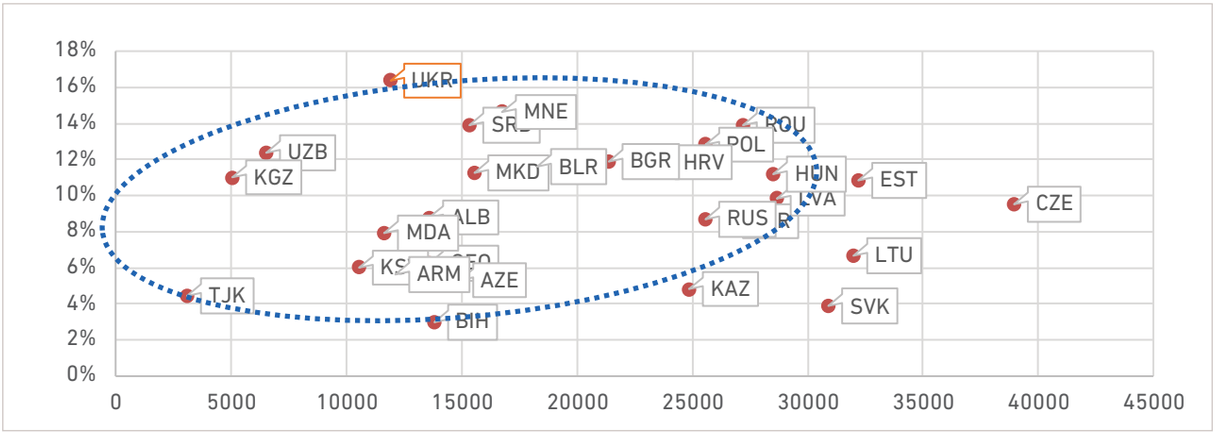
Damage and Loss Assessment

Total damage and losses for the social protection and livelihoods sector in Ukraine are estimated to reach US$50.6 billion, almost entirely through losses. Damage in the social protection area mostly consists of destroyed or partially destroyed infrastructure, such as residential care units, sanatoriums, or social centers. Overall, 56 such

139 For the calculation of the total losses, household income loss valued at US$46.05 billion is not included to avoid potential double-counting in relation to other sectors.

140 World Bank, "Relief, Recovery, and Resilient Reconstruction: Supporting Ukraine's Immediate and Medium-Term Economic Needs," World Bank Group, 2022, Link.

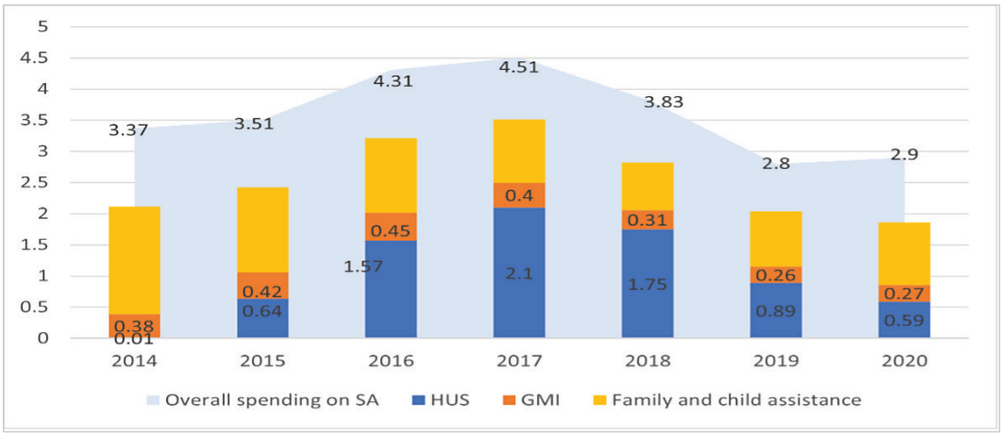
Figure 17. Social protection expenditure share in GDP (%, y axis) compared to GDP per capita (US$, x axis) (PPP 2011)



Source: World Bank Social Protection Expenditure and Evaluation Database (SPeeD) database.

Note: PPP = purchasing power parity.

Figure 18. Composition of social assistance expenditures as percentage of GDP (y axis)



Source: World Bank staff calculations.

Note: SA = social assistance.

structures were damaged or destroyed, with damage totaling US$164 million (Table 19).[141]

Indiscriminate shelling is causing damage to social infrastructure in war-affected areas (especially in Donetska, Luhanska, Kharkivska, and Mykolaivska oblasts). In the areas of Kyivska, Sumska, and Chernihivska brought back under government control, the fighting affects infrastructure through damage, disrepair, or lack of maintenance. Thus, some social welfare units that administer benefits, along with some social care facilities, are closed or have reduced their services. Despite the lower levels of damage to critical social infrastructure in the central and western oblasts of the country, the unprecedented displacement crisis has put a burden on local welfare units, which face significantly increased workloads.

141 Damage to the social infrastructure includes stand-alone buildings. Damage to the shared building space, such as offices in administrative buildings of the local governments (e.g. divisions of the Pension Fund of Ukraine), is included in other parts of RDNA. Data on damage to the buildings in territories temporarily not under government control, areas where there is ongoing military actions, and nearby areas were not available as of the time of the RDNA's preparation.

Table 19. Damage inventory by asset type (number, US$ million) as of June 1, 2022

Category	Number of damaged or destroyed facilities	Total value (US$ million)	Share of total (%)
Residential institutions for the elderly, persons with disabilities, and children	25	57	34.8
Sanatoriums, children camps	12	54	32.9
Social centers	19	53	32.3
Total	**56**	**164**	**100.0**

Source: Assessment team.

Attacks against civilian infrastructure have suspended the operations of the service delivery centers of the Pension Fund in war-affected areas, leaving pensioners with limited access to services. Of 470 local Pension Fund service centers, 64 have suffered extensive damage, as have 19 of 158 local units of the Social Insurance Fund.

Social care facilities in host communities are receiving growing numbers of internally displaced elderly, families with children, and persons with disability, and their capacities are stretched to the limit to ensure the delivery of social services and to address the complex needs of the vulnerable. According to the Ministry of Social Policy, 10 out of 62 long-term social care facilities for the elderly and persons with disabilities were damaged (see Box 3). Fourteen incidents of damage to the rehabilitation facilities were reported (9 percent of 154 facilities subordinated to the Ministry of Social Policy), and six incidents affecting social service delivery centers. Even one such incident could have a serious impact on vulnerable populations, leaving them with limited or no access to social services. Before the war (in 2020), the social service system delivered services to more than 1.3 million beneficiaries yearly.

The losses in the social protection and livelihoods sector are massive and stem from loss of jobs and household income from wages, higher poverty, related increased expenditures under existing means-tested social programs, and additional needs for programs such as survivor's benefits or programs related to disability. Losses also stem from the lower affordability of basic needs, including energy and food, which will require a significant expenditure increase for a number of social programs linked to the subsistence minimum, ranging from pensions to means-tested programs. The losses add up to US$50.6 billion, the largest share of which comes from the permanent loss of jobs and labor force (Table 20).

The International Labour Organization estimates that about 4.8 million jobs were lost, equal to 30 percent of prewar employment in Ukraine.[142] There are even higher estimates of the lost employment: a national poll conducted at the end of April showed that 39 percent of those who were employed before the war still do not have a job.[143]

The resulting increase in poverty will also significantly increase expenditure under existing means-tested social programs, such as HUS and GMI. According to the national statistics, the wage income comprised 60 percent of total disposable income. The projected household losses from the income shock and higher cost of living are estimated at around 27 percent of the household budget. In addition, the government has implemented a blanket energy subsidy by freezing energy tariffs. The average salary in Ukraine before the war (as of January 2022) amounted to US$534 (UAH 14,577).[144] The amount of losses is assessed for 18 months.

Some losses result from the service disruptions that go beyond the damage to the infrastructure. For example, some of the pensioners who have been internally displaced or temporarily left the country may have lost access to their benefits. In particular, this loss may have affected those who received benefits through the mail (Ukrposhta) and those who lost access to the Ukrainian banking system while fleeing the country.

142 International Labour Organization, "The Impact of the Ukraine Crisis on the World of Work: Initial Assessments," ILO Brief, 2022, *Link*.

143 Rating Group, "The Ninth Nationwide Poll: Socio-Economic Problems During the War (April 26, 2022)," April 28, 2022, *Link*.

144 *Link*. The exchange rate of US$1 = Hrv 27.282502 is used hereafter.

Box 3. Damage to the social care institutions for the most vulnerable

- On March 11, in Kreminna (Luhanska oblast), tanks destroyed a residential institution for the elderly. The action killed 56 persons; the 15 survivors were forcibly deported to the Russian Federation.[a]
- On March 11, the Oskil residential institution for the elderly and adults with mental disorders (Kharkivska oblast) was subjected to a barrage of heavy artillery and then destroyed by an airstrike. Hundreds of residents were evacuated to a shelter.[b]
- On March 5, forces took control of a residential institution for people with mental disabilities in the town of Borodianka (Kyivska oblast). They took 670 persons—patients and staff—hostage. The building, used as a firing point, was heavily damaged, and the area surrounding the facility was mined. The convoy of vehicles that eventually evacuated patients and staff came under fire.[c]
- In Chernihivska oblast, 30 children ages 3–18 and their caregiver fled the center for social and psychological rehabilitation, which was destroyed after 20 days of shelling and missile strikes.[d]
- During March-April, fighting partially damaged the Kyiv and Bucha (Kyivska oblast) geriatric social care facilities; in Atynsk (Sumska oblast) and Pushcha-Vodytsia (Kyivska oblast), residential institutions for persons with mental disorders suffered damage to roofing, facades, windows, doors, utility networks, and equipment. A few months later, on July 17, Atynsk institution was destroyed by artillery and mortar fire.

a. Serhiy Hayday, Head of Luhansk Oblast Administration, *Link*.
b. TSN, 1+1 Media Group, *Link*.
c. Radio Svoboda, *Link*; Bihus.Info, *Link*.
d. Ukrinform, *Link*.

Table 20. Losses by category (US$ million) as of June 1, 2022

Category	Total value (US$ million)	Share of total (%)
Loss of household income	46,051	91.0
Additional expenditures under means-tested programs	1,178	2.3
Blanket energy subsidy (tariff freeze)	[as considered by the energy sector]	-
Additional expenditures under programs directly linked to the war, such as support for IDPs	3,334	6.6
Cost of debris removal and demolition	16	0.1
Total	**50,579**	**100.0**

Source: Assessment team.

So far, the government has been leveraging digital means—such as the Diia platform with 17 million users—to provide uprooted people with additional support, including one-off benefits (UAH 6,500, or US$222) for loss of business and livelihood to self-employed and insured workers. However, providing social service benefits, as well as benefits to vulnerable populations who are unable to use digital technology, is increasingly challenging.

The government estimated losses related to support for internally displaced persons (IDPs) at UAH 50.5 billion through the end of the calendar year, meaning that for 18 months of the estimated loss period, the expenditures will reach UAH 91 billion (US$3.3 billion).

Table 21. Recovery and reconstruction needs (US$ million) as of June 1, 2022

Category	Total value (US$ million)	Share of total (%)
Restoration of permanently lost jobs	14,432	70.0
Means-tested benefits	4,107	19.9
Benefits to IDPs	259	1.3
Rebuilding of social infrastructure	386	1.9
Restoration of social services	900	4.4
Military social assistance and other long-term benefits related to the war	533	2.6
Total	20,617	100.0

Source: Assessment team.

Note: Needs for means-tested benefits, benefits to IDPs, social services, and military social assistance only include estimates for immediate/short-term due to a number of additional factors influencing them over the medium-/long-term, such as, changes in incomes and cost of basic needs, including food and energy, over the same period.

There are also significant new expenditures directly linked to the war, such as additional benefits for those who acquired a disability as a result of the war, or for families that lost a breadwinner due to war, especially in combat.

Reconstruction and Recovery Needs, including Build Back Better

Recovery of the jobs and social protection sector requires concerted actions over different time frames. Permanently lost jobs will not be restored together with the reconstruction efforts, as they were lost because businesses ceased to exist and because there was a direct loss of the workforce. By some estimates, 2.5–3 million people who fled Ukraine to the EU may not return regardless of how the war situation develops,[145] while according to the Ukrainian government, about 1.2 million people,[146] including 211,000 children,[147] have been forcibly deported to Russia and may not be able to come back. The RDNA assessment estimates that about 14 percent of all jobs may be lost permanently. Restoring these jobs would require additional efforts and costs (through mobility grants, settling-in grants, or wage subsidies for employers). The estimated needs in the social protection and livelihoods sector amount to US$20.6 billion over 10 years (Table 21).

In the immediate to short term, there is a need to finance the social expenditures that will protect vulnerable groups from the additional long-term implications such as using negative coping strategies. This includes the support to low-income families through the GMI-type program that aims to provide such families with the income to cover basic needs, and through housing and utilities subsidies that aim to prevent energy poverty, especially during the heating season in harsh winters. Costs associated with these and other social programs (such as benefits to IDPs or cost of restoring the social services, but excluding energy subsidies, which will become part of the social expenditures after the freeze of tariffs is lifted) are expected to reach **US$8.1 billion**. Additional expenditures for means-tested programs are expected to continue beyond this period but were not assessed as they also depend on the change of incomes and cost of basic needs, such as food and energy over the medium/long term, which are subject to high uncertainty.

Across the recovery period, there is a need to expand programs that will stimulate employment and prepare for long-term recovery. The cost of reestablishing a single job can range from US$20,000[148] to US$60,000; there also seems to be a link between the cost to create a job and the average annual salary in the economy[149] (in the

145 Washington Post, "Millions of Ukrainian Refugees May Stay In E.U., Top Official Says," June 6, 2022, *Link.*
146 Reuters, "Ukraine Accuses Russia of Forcibly Deporting over 210,000 Children," May 13, 2022, *Link*.
147 Government of Ukraine, Office of Ombudsman News, May 13, 2022, *Link*.
148 David Robalino, "How Much Does It Cost to Create a Job?," World Bank Blog, February 15, 2018, *Link*.
149 Economist's View, "How Much Does It Cost to Create a Job?," November 24, 2008, *Link*.

Box 4. Digital platform Diia: "Country in a Smartphone"

The Diia platform, launched by the Ministry of Digital Transformation in 2020, includes a website and mobile application. The Diia mobile app allows citizens to store and access digital national IDs, taxpayer identification documents, driving licenses, biometric international passports, vaccination certificates, and other documents on their phones. The Diia currently uses the available information from the state registries and databases. All data are transmitted and stored in encrypted form; for the critical data Diia uses distributed data storage with blockchain technology. The Diia connects users to services using their BankIDs.

Box 5. Needs that may materialize in the social protection sector

One need that may materialize in the social protection sector but is not included in the RDNA estimates is cash compensation for destroyed housing. While the RDNA assessment assumes such compensation will be provided through rebuilt housing, the draft law envisages the possibility of cash compensation. As occurred in other postwar contexts, cash compensation could be linked to the welfare status of a family, including through additional cash grants to qualifying families. Implementing cash compensation options not only affects the timeline of the needs (due to the rapid nature of disbursement) and the volume of the needs (since the cash component may include additional grants) but also adds components that would effectively be a social protection measure as a cash transfer to the vulnerable families.

Ukrainian context this is US$6,408). The number of jobs that will not be restored together with the reconstruction effort is estimated at 2.25 million jobs, and their restoration will require additional expenditures. Such expenditures may include wage subsidies, mobility grants, lump-sum grants to stimulate self-employment, and other measures. Due to the massive losses in employment, even the most modest estimate of the job restoration cost results in needs of **around US$14.4 billion,** which will probably be spread over the reconstruction period (up to 10 years). In addition, the public employment services are even more critical now and will need to adapt and strengthen skills matching and labor force activation capacities as a key input for aiding recovery and reconstruction.

In this recovery phase, utilization of new technologies, including cloud-based and online solutions, should be expanded to strengthen the adaptability of the overall system. Ukraine has already appreciably invested in digital solutions such as the Diya platform (Box 4), which has 17 million users and provides IDPs with additional support.

In addition, social infrastructure needs to be rebuilt quickly, but this recovery effort should be aligned with investment, policy, and behavioral changes. Although the war has caused massive damage to social protection infrastructure, the ongoing crisis has highlighted the necessity and opportunities for improving the resilience of social infrastructure and developing systems that can respond to shocks and crises. For example, while the government has clearly recognized the importance of community-based social service development, a large share of services is still provided by the ineffective large-scale residential institutions. These care services are excessively focused on institutional care, but at the same time, the community-owned social infrastructure does not successfully address beneficiaries' needs or ensure their full inclusion and participation in the community. Investments in building back better, in further modernizing the social service system, and in rebalancing social care toward user-centered care options provided by community-based facilities can all ensure much more effective support to the population while consuming fewer fiscal resources. In addition to the social infrastructure costs, needs for social services in territorial communities are estimated at an additional **US$0.6 billion in the immediate period and additionally US$2.6 billion over the medium-to-long term.**

Some needs were not included in this assessment due to the nature of developing legislation. An example of such needs is presented in Box 5.

For the longer term, the focus should be on rehabilitation of war-affected groups, such as orphans, IDPs, and persons with disabilities. This approach is critical for reintegration of war veterans into society and could efficiently respond to the multidimensional challenges faced by these categories. It could include development of a system of benefits and pensions to veterans combined with social and labor activation services (e.g., psychological support, physical rehabilitation to improve functionality, social rehabilitation to ensure inclusion in the community, etc.).

Limitations and Recommendations

Significant shares of the losses and needs depend on the developments related to the return of refugees and to the labor market situation. Indirect evidence of such developments (e.g., polls and reports using extrapolations from other conflicts) were used to estimate the magnitude of the impact.

The cost of social programs that depend on the change on incomes and cost of basic needs are subject to high uncertainty beyond the immediate/short-term. Expenditure for means-tested programs may change significantly depending on the change of household incomes and their dynamics related to the cost of basic needs, expressed by legislatively set amount of subsistence minimum.

A number of social benefits depends on the subsistence minimum, which no longer reflects the cost of basic needs and will need to be reviewed in the reconstruction phase with potential major impact on the needs. This disconnect between the legislated subsistence minimum and the actual cost of the basic needs ("actual subsistence minimum," calculated by the Ministry of Social Policy) was already substantial before the war. In January 2022, the actual subsistence minimum was UAH 4,666,[150] while the legislated subsistence minimum during the same period was UAH 2,393.[151] During the reconstruction period, temporary measures such as blanket energy subsidies, are expected to be abolished and rising tariffs as well as cost of other basic needs be reflected in the reviewed updated subsistence minimum, but whether it would converge with the actual subsistence minimum remains unclear. Full reflection of the cost of basic needs would affect the expenditures in a major way since over 70 percent of the population is expected to have incomes below the actual subsistence minimum. As a result, means-tested programs expenditures in such scenario would raise to US$17.2 billion (US$14.8 billion additionally). In addition, other programs will be affected, such as benefits to single parent families (additional US$2.8 billion), but most notably – additional pensions expenditures because the minimum pension is linked to the subsistence minimum. Over 80 percent of pensioners receive the benefit below the actual subsistence minimum,[152] and the estimate of additional expenditures on pension benefits is US$6.6 billion.

Postwar experiences point to a major burden on the national budget related to the military and war veterans' pension expenditures. In addition to these expenditures, there are benefits to members of the military and families who lost a relative in combat, and loss-of-life compensation for civilian deaths. Estimating related costs requires careful quantification of such liabilities with proper financial plans and institutional arrangements. For the purposes of the RDNA, the needs are extrapolated from the current expenditures, taking into account rapidly increased numbers of people qualifying for such benefits.

150 Ministry of Social Policy of Ukraine, "The Actual Size of the Living Wage in 2021–2022" [in Ukrainian], *Link*.

151 Law of Ukraine, "About the State Budget of Ukraine for 2022" [in Ukrainian], *Link*.

152 Ministry of Social Policy of Ukraine, "82 Percent of Ukrainian Pensioners Receive a Pension below the Actual Subsistence Minimum – Natalia Nenyuchenko" [in Ukrainian], February 20, 2020, *Link.*

CULTURE AND TOURISM

Summary

The war is estimated to have caused US$1.1 billion in damage to the culture sector and a significant loss of US$19.3 billion, as of June 1, 2022. The sector has also sustained damage to its intangible cultural heritage and intrinsic values of spiritual, symbolic, emotional, and existential significance, as well as to the creative industries. **Over US$5.2 billion is needed for safeguarding the culture sector in Ukraine**. The value of culture is associated with authenticity, shared values, and social connections, which cannot be monetized in market value. For this reason, recovering culture does not directly translate into reconstructing the physical/tangible assets. However, restoring and rebuilding the damaged cultural properties and rehabilitating them would be an initial step to reestablish the lost/broken cultural and social fabrics and restore the utility value, the sense of belonging they inspire, and people's affiliation with them. Any recovery efforts should lay the foundation for the sustainable, green, resilient, inclusive, and smart development of Ukraine.

Background

Throughout its long and dynamic history, Ukraine's people and culture have shaped and strengthened its national identity. From the ancient Trypillia culture dating to the Neolithic period, to the ninth century state of Kyivan Rus', to the 21st-century modern democratic sovereign state, Ukraine has undergone numerous cultural transformations. In addition to its seven UNESCO World Heritage Sites[153] (six cultural and one natural), Ukraine boasts an estimated 15,470 cultural heritage assets,[154] most of which are officially cataloged on the State Register of Immovable Monuments of Ukraine as of January 2022.[155] The number of Ukraine's cultural properties likely far exceeds the official lists—the Ministry of Culture and Information Policy (MKIP) recognizes more than 60,000 buildings of cultural/historical significance, over 44,000 monumental tombs, and almost 15,000 archives and collections of cultural significance.

Ukraine has a rich intangible culture. Five Ukrainian cultural practices are on UNESCO's intangible cultural heritage list, including borscht cooking, Cossack songs of the Dnipropetrovska oblast, Petrykivka decorative painting, Kosiv painted ceramics, and Örnek design. Some 47 other intangible cultural practices are inscribed on the National List of Intangible Cultural Heritage of Ukraine,[156] demonstrating Ukraine's diverse cultural expressions, knowledge, rituals, and traditions.

Culture and heritage in Ukraine are protected under the Constitution (Article 54), the Law of Ukraine on Protection of Cultural Heritage,[157] and the authority of the MKIP, as well as a range of international conventions and agreements, such as the Convention on the Protection of Cultural Property[158] in the Event

153 *UNESCO World Heritage Convention, "Ukraine," Link.*

154 Of these assets, 1,134 are of national significance and 14,328 are of local significance. These assets are organized in eight types: historical, architectural, archaeological monuments, landscape, objects of monumental art, urban planning/city building objects, objects of landscape art, and objects of science and technology.

155 See the official website of the Ministry of Culture and Information Policy (MKIP) of Ukraine, *Link*; and the official website of the Khersonska Oblast Administration, *Link*. The actual numbers may be higher due to delayed reporting/registration at the local level.

156 MKIP, "ICPI Added to the National List of Intangible Cultural Heritage of Ukraine by Another 21 Elements," July 7, 2022, *Link*.

157 Law of Ukraine on Protection of Cultural Heritage, *Link*.

158 In accordance with the Article 1 of the 1954 Hague Convention, "cultural property" refers to "(1) movable or immovable property of great importance to the cultural heritage of every people, which includes monuments of architecture, art or history, archeological sites, groups of buildings of historical or artistic interest, works of art, manuscripts, books and other objects of artistic, historical or archeological interest, as well as scientific collections and important collections of books or archives; (2) buildings whose main and effective purpose is to preserve or exhibit movable cultural property, such as museums, large libraries, and depositories of archives; and (3) centers containing a large amount of cultural property." *Link*.

of Armed Conflicts, the Convention for the Protection of World Cultural and Natural Heritage, the European Convention on the Protection of Archaeological Heritage, and the Convention on the Protection and Promotion of the Diversity of Cultural Expressions, among others.

Building on Ukraine's rich cultural capital, the cultural and creative industries and tourism have emerged as a significant driving force of the Ukrainian economy in recent years. Ukraine defines creative industries as "types of economic activity aimed at creating added value and jobs through cultural (artistic) and/or creative expression," and 34 types of such economic activities belong to the creative industries in Ukraine, according to the Order of the Cabinet of Ministers of Ukraine No. 265r.[159] Those activities include visual arts, performing arts, publishing, audiovisual arts, IT, and folk arts and crafts, among others. According to information from the State Statistics Service of Ukraine and research conducted by the KSE in cooperation with the MKIP,[160] the creative industries in Ukraine have seen rapid growth; in 2019, turnover was estimated at over UAH 286 billion and over 351,000 people were employed. Before the war, tourism and creative industries served as an economic engine, generating continuous growth in competitiveness and productivity.

Damage and Loss Assessment

In times of armed conflicts, culture is particularly vulnerable. It is often deliberately targeted as a means of eradicating people's ties to their communities, cities, and nation and destroying people's collective and historical memories and identities[161] as well as social capital and people's livelihoods.[162]

Preliminary and conservative estimates confirm that about 260 cultural properties have been fully destroyed, including buildings and sites imbued with recognized cultural/social values[163] (museums, historic buildings, monuments, archeological sites, houses/palaces of culture, national and regional theaters, places of worship, etc.), movable cultural properties and collections, repositories of culture (archives and library collections of cultural significance, art galleries, etc.), and touristic facilities. Over 560 are reported to be partially damaged, including the historic wooden structure of All Saints Monastery of the Sviatohirska Lavra, the Chernihiv Regional History Museum, the Popov's Palace Complex, and the Kharkiv National Academic Opera and Ballet Theater. Major damage was sustained especially in Kyivska and the Eastern region, including Kharkivska, Donetska, and Luhanska; damaged religious buildings include Orthodox and Catholic churches as well as mosques and synagogues.[164] It is noted that the 1954 Hague Convention obliges countries to refrain from all acts of hostility against cultural property during armed conflict,[165] and that Resolution 2347 adopted by the UN Security Council in 2017 condemns the "unlawful destruction of cultural heritage, including the destruction of religious sites and artifacts, and the looting and smuggling of cultural property from archaeological sites, museums, libraries, archives, and other sites."[166]

The war is estimated to have caused US$1.1 billion in damage to the culture sector (Table 22). These are extremely conservative estimates, as reports of the damaged cultural properties have been partial and limited, and regular monitoring and verification on the ground remain challenging, especially for cultural properties of smaller scale, which hold cultural and historical significance to locals but are less well known to the broader communities. Furthermore, tracking the looting/trafficking of various artworks, collections, and antiquities has been a challenge.[167]

Significant losses have been registered in the sector, amounting to US$19.3 billion (Table 23). The war has caused the closing of cultural institutions and places of religious worship, including museums, archives, places of culture, churches, and monasteries. It has not only disrupted social practices but also caused significant economic losses, including

159 The Ukrainian text of the order is available at *Link*.
160 The resulting report is "Creative Industries: Impact on Development Economy of Ukraine"(in Ukrainian), *Link*.
161 UNESCO and World Bank, *Culture in City Reconstruction and Recovery* (Paris: UNESCO, 2018), *Link*.
162 *Suzanne Nossel,* "How to Help Ukraine Fight Cultural Erasure," *Foreign Policy, May 16, 2022, Link.*
163 Damage to local libraries is covered by the municipal services sector.
164 MKIP, "Ukrainian Cultural Heritage Is under Russian Fire," July 8, 2022, *Link*.
165 "Convention for the Protection of Cultural Property in the Event of Armed Conflict with Regulations for the Execution of the Convention The Hague," May 14, 1954, *Link*.
166 *United Nations Security Council,* S/RES/2347 (2017), *Link*.
167 ICOM is developing an Emergency Red List of Cultural Objects at Risk for Ukraine to combat illicit traffic in collaboration with the Ukrainian Committee and the MKIP.

Table 22. Damage by asset type (US$ million) as of June 1, 2022

Category		Total
Buildings and sites imbued with recognized cultural/social values	Historic districts	321
	Historic/heritage buildings (by period)	91.7
	National monuments	1
	Archeological areas	24.5
	Monumental tombs	0.04
	Places of worship (of any confession)	226.8
	Other assets under religious management (of any confession)	6.8
	Cultural spaces (houses/palaces of culture)	48.62
	National and regional theaters	183
Movable cultural properties and collections, Repository of culture	Museum collections	192
	Archives and library collections of cultural significance	7.84
	Art galleries	0.9
Tourism	Hotels and similar accommodation facilities	45.68
Total		**1,149.16**

Source: Assessment team.

Table 23. Losses by category (US$ million) as of June 1, 2022

Category		Total
Cost of emergency intervention, protection, documentation (cost of temporary works for protecting cultural assets and costs of demolition)		387.84
Debris treatment		535.17
Debris treatment by activity type	Buildings and sites imbued with recognized cultural/social values and movable cultural properties and collections, repository of culture demolition	327.22
	Buildings and sites imbued with recognized cultural/social values and movable cultural properties and collections, repository of culture debris removal	204.51
	Demolition for tourism destroyed assets	2.96
	Debris removal for tourism assets	0.39
	Partially damaged tourism assets: 1.25 percent for debris removal, with the understanding that there will be no cost associated with demolition	0.08
Loss of revenue	Revenues lost due to the closure or nonavailability of cultural property	438.24
	Revenues lost due to the closure of hotels and similar accommodation facilities	2,239
	Revenues lost by travel agencies/tour operators	497.27
	Revenues lost due to the disruption in the production of goods in cultural and creative industries	13,000.39
	Media revenues lost	2,230.66
Total		**19,328.56**

Source: Assessment team.

revenues lost because cultural property, hotels, and tourism facilities are closed or unavailable; revenues lost because production of goods in the creative industries has been disrupted; revenues lost in media and advertisement; and revenues lost by tour agencies and tour operators. The livelihoods of creatives and professionals are immediately affected by the war, and these are also conservative estimations, given the informal nature of many creative and tourism activities and gig work in the orange economy (e.g., performances by street artists and others, tours by self-employed guides, sale of souvenir/creative goods in open-air stalls and social media, and renting out of guesthouses/Airbnbs). Another major source of loss includes debris management of cultural property and the cost of temporary emergency intervention, protection, and documentation to avoid further damage and mitigate increased vulnerabilities. The nature of cultural property is such that maintaining, conserving, preserving, restoring, and reconstructing it are often complex undertakings and require very specialized equipment, inspections, structural assessments, and high capacity. For cultural property of historical significance, these tasks often involve appreciating and adhering to original material and traditional knowledge, guidelines, and techniques associated with its original value and cultural and architectural significance.

The sector has also sustained damage to its intangible cultural heritage and intrinsic/nonmarket values of spiritual, symbolic, emotional, and existential significance. While destruction in the intangible dimension is not always readily visible and can happen over time, the war has disrupted the Ukrainian way of life in every sense and destroyed the country's cultural and social fabric. The immense human loss and population displacements caused by the war have grave implications for the possible loss of traditional knowledge, craftmanship, performing arts, social practices, rituals, ceremonies, and languages; they also have implications for brain drain in the creative industries. The humanitarian toll and loss of culture are intertwined and inseparable because intangible cultural assets are intrinsically tied to a sense of people and place. Furthermore, the war has disrupted various cultural initiatives and programs and interrupted the overall conservation and transmission of cultural property and intangible heritage; it has also taken a toll on human capital, including the officials, specialized professional and technical staff, and security involved in the cultural and creative industries. Under the circumstances, the MKIP is actively collaborating with various local, national, and international entities—including the World Bank, UNESCO, ICCROM (International Center for the Study of Conservation and Restoration of Cultural Property), ICOMOS (International Council of Monuments and Sites), and ICOM (International Council of Museums)—to assess the damage, address the emergency needs, and plan for the recovery. In addition, professionals and volunteers are heavily engaged in tracking the damage and rescuing cultural property on the ground,[168] cloaking monuments in fire-resistant coverings and sandbags, and transporting movable artifacts.

Against the daunting challenges, increased risks and vulnerabilities in the sector remain. Given the often-fragile state of many cultural properties and the difficulty of "rebuilding" what has been disrupted, cultural property may face increased physical vulnerabilities from potential new hazards or inadequate protection and reconstruction measures that do not account for its intrinsic value. The risks of further looting and vandalism remain high as well, in addition to the loss of authenticity or falsification of its value

Reconstruction and Recovery Needs, including Build Back Better

Based on the rapid assessment, over US$5.2 billion is needed for safeguarding the culture sector in Ukraine (Table 24). The value of culture is associated with its authenticity, shared values, and social connections, which cannot be monetized in market value. For this reason, recovering culture does not directly translate into reconstructing the physical/tangible assets, and its value may be considered "irreplaceable" once lost. At the same, however, restoring and rebuilding the damaged cultural properties and rehabilitating them is an initial step to reestablish the lost/broken cultural and social fabrics and restore the cultural property's utility value, the sense of belonging it inspires, and people's affiliation with it. Thus, the reconstruction and recovery efforts need to aim at returning people and cities harmed by the war to a more sustainable and resilient state of normalcy in a broader sense—that is, proper assessment of cultural property needs should not focus merely on the rebuilding of the physical form or the appropriate levels of intervention and methods of treatment.

168 Jane Recker, "Inside the Efforts to Preserve Ukraine's Cultural Heritage," *Smithsonian Magazine,* March 30, 2022, Link.

Table 24. Recovery and reconstruction needs (US$ million) as of June 1, 2022

Category	Immediate/ short term	Medium- to long-term	Total
Implement first-aid measures and systems (shoring, propping, and protection measures)	310.3	181.0	491.3
Carry out emergency management measures, inventories, and immediate conservation to avoid loss and looting	387.8	181.0	568.8
Repair assets as feasible to restore function	456.4	1,447.9	1,913.3
Implement systems and reinforce capacities to ensure proper practices of conservation and prevent demolition of sites/ buildings of cultural significance	155.1	724.0	879.1
Support restoring the creative industry and safeguarding intangible heritage	232.7	1,086.0	1,318.7
Total	**1,551.4**	**3,619.9**	**5,171.2**

Source: Assessment team.

Given the limited resources—from qualified labor to building materials—priority should be given to the cultural property that can foster a sense of shared heritage, though priority should also be based on the extent of damage and risk magnitude. Once the basic emergency measures are taken, communities should be involved in the process as much as possible in a meaningful way, as interventions to cultural property of historical and architectural significance need to respect and preserve the integrity, history, identity, and shared value and memory of the people. It is critical to involve stakeholder groups affected both directly and indirectly, including underrepresented and marginalized groups such as women, youth, minorities, poor, and people with special needs, and it is vital that the community groups assess the value of their own culture. The process also needs to capture the different layers of values and interpretations of the cultural property and be carried out transparently, based on consensus and public dialogues.

It is recommended that the reconstruction and recovery mechanisms be developed under the overall authority of the National Recovery Council (NRC) and the MKIP in consultation with the respective departments, state agencies, and other public, private, and local institutions; selected international experts in the fields of conservation, restoration, archaeology, structural engineering, architecture, and museums; and representatives from major donor agencies, when appropriate. The ministry will also work with various cultural institutions, including museums, libraries, cultural centers, and arts educational state institutions, to identify, plan, and implement the measures. Under the authority and overall guidance of the NRC and MKIP, the responsibilities of each public and private agency involved could be delineated to operate independently in a coordinated and complementary manner.

Building back better for the culture sector encompasses various needs, from restoring, repairing, and reconstructing the damaged assets and infrastructure, to restoring service and access to cultural property, resuming cultural activities and social practices, and mitigating the new risks and vulnerabilities induced by the war. Any recovery efforts should lay the foundation for the sustainable, green, resilient, inclusive, and smart development of Ukraine. This would require strengthening institutional and professional capacities at all levels of planning and implementation.

Restoring, repairing, and reconstructing physical cultural property

The first phase is the response phase, focusing on the emergency and relief actions. In terms of physical structures, there is an urgent need to implement first aid measures and systems, such as shoring, propping, winterization, and protection interventions for stabilization. Small-scale restoration and repair efforts that are deemed desirable and feasible (and also do not require high expertise, resources, and lead time) will also be initiated, and remnants of any cultural property and collapsed structures will

be photographed and inventoried. Furthermore, immediate salvage and conservation of collections and movable cultural assets will be carried out to avoid further loss and looting. After the emergency response measures have been implemented, further assessment and research are required to support large-scale restoration and reconstruction efforts. Detailed information on each property—such as the location, historical data, architectural drawings (floor plan, landscape drawing, installation drawings, interior and exterior details, elevations, etc.), elements of cultural/historical significance, and the records of past restoration efforts—would contribute to more informed interventions.

Due to the complexities associated with "reconstructing" cultural property of historical significance, the process will require specialized labor, expertise, time, and considerable cost. Longer-term activities should be adjusted based on the priorities identified by the stakeholders and the secured funding. In the process, the structures that are not of historical and architectural significance may be upgraded and modernized, while those that are located in the historic core could be upgraded in harmony with the historic landscape, following the special ordinances, acts, or decrees concerning historical areas,[169] as well as the respective management plans and buffer zones. This is also a good opportunity to update or revise the existing regulations considering the spatial, social, and economic changes to ensure a more resilient, sustainable, inclusive, and green development path (e.g., upgrading infrastructure in line with energy efficiency and universal accessibility mechanisms and protection of biodiversity and ecosystems).

Restoring the creative industry and safeguarding intangible heritage

For the creative industry, the processes for the production, distribution, and sale of creative and cultural goods will need to be restored. As a first step, the affected creatives and industries need to be mapped along with the impacts—this includes not only the establishments needed for creative activities (e.g., structures, equipment, raw materials, etc.) but also the human capital: creatives, including artisans and master craftspeople, as well as their skills and intangible knowledge, especially those who are displaced elsewhere. For this process, the development and use of digital infrastructure is highly recommended (e.g., e-library, digitization of records through e-archive, media, online museums, etc.). The development of the National Digital Platform of the Cultural Heritage of Ukraine is underway, and it is expected that UNESCO will provide extensive support in the arena.[170]

Documenting creative practices and human capital is vital, as they are instrumental in maintaining and rebuilding the communal and national identities and promoting cultural diversity, as well as restoring social cohesion after the deliberate attack on Ukraine's culture. Recognizing the importance of tangible and intangible heritage, MKIP is already leading efforts to bring together various relevant initiatives and funds by launching the United Platform of Culture and Media.[171] The efforts will also entail promoting Ukraine's unique history, culture, and language.

Capacity building for restoration and reconstruction of physical assets, the transmission of intangible heritage, and documentation and monitoring

Such recovery efforts require highly specialized expertise and skills. Capacity-building programs (workshop and technical training) are necessary to implement and accelerate the efforts; these will involve not only the respective staff but also young, new professionals in the heritage field and local communities—who can equip them with knowledge and skills and also find employment. Various capacity-building programs are needed, including restoring, repairing, and reconstructing cultural heritage assets, conducting engineering and structural analysis for construction, providing skills training on craftsmanship, and surveying, documenting, and monitoring cultural property and intangible heritage.

Limitations and Recommendations

The rapid assessment was conducted based on the data and information shared by the MKIP, the KSE, and the State Statistics Service, supplemented by

169 For example, Article 32 of the Law on the Protection of Cultural Heritage addresses "the approval of the Procedure for determining the boundaries and regimes of the use of historical areas of settlements, restrictions on economic activity on the territory of historical areas of settlements." *Link*.

170 MKIP, "UNESCO Will Support the Digitalization of Culture in Ukraine," July 12, 2022, *Link*.

171 The platform is available at *Link*.

the research undertaken by UNESCO,[172] the World Monument Fund, and the Conflict Observatory, which is a collaborative effort of the Smithsonian Cultural Rescue Initiative and the Cultural Heritage Monitoring Lab.[173] The assessment faced several challenges, including a lack of data. Given the dangerous situation with the war still ongoing, it was difficult to accurately assess and validate the data on the ground, including the degree of damage and the operating status of different cultural facilities. The lack of baseline data also posed challenges in understanding the prewar conditions, as well as the ownership and the replacement cost of different cultural properties. Furthermore, the assessment may not have captured the damage and loss sustained by smaller-scale cultural property or by cultural practices not well known outside the communities; the same is true for the many precarious, temporary, informal, part-time, self-employed creative activities.

Based on the assessment, the following steps are suggested for further assessment and recovery:

- Prioritize cultural property that can foster a sense of shared heritage and based on the extent of damage and risk magnitude.

- Inventory and map cultural property and intangible heritage.
  - » Baseline: Property type, location, year built, size, materials, historical information, conditions, ownership; cultural/historical/architectural/social significance and attributes; architectural drawings (floor plan, landscape drawing, installation drawings, interior and exterior details, elevations, etc.); management plan, land use plan, building codes, records of past restorations/repairs/reconstruction; economic value (e.g., revenue from the entrance fee, etc., number and type of visitors, revenue from the creative industry); list of creatives; technical experts/organizations; respective ordinances, acts, decrees, and regulations
  - » Postwar: Damage to the structure, physical status (partially damaged, destroyed—e.g., over 40 percent structural damage), operating status, information on the economic value associated with the loss of the cultural property's function, disruptions in cultural and creative practices

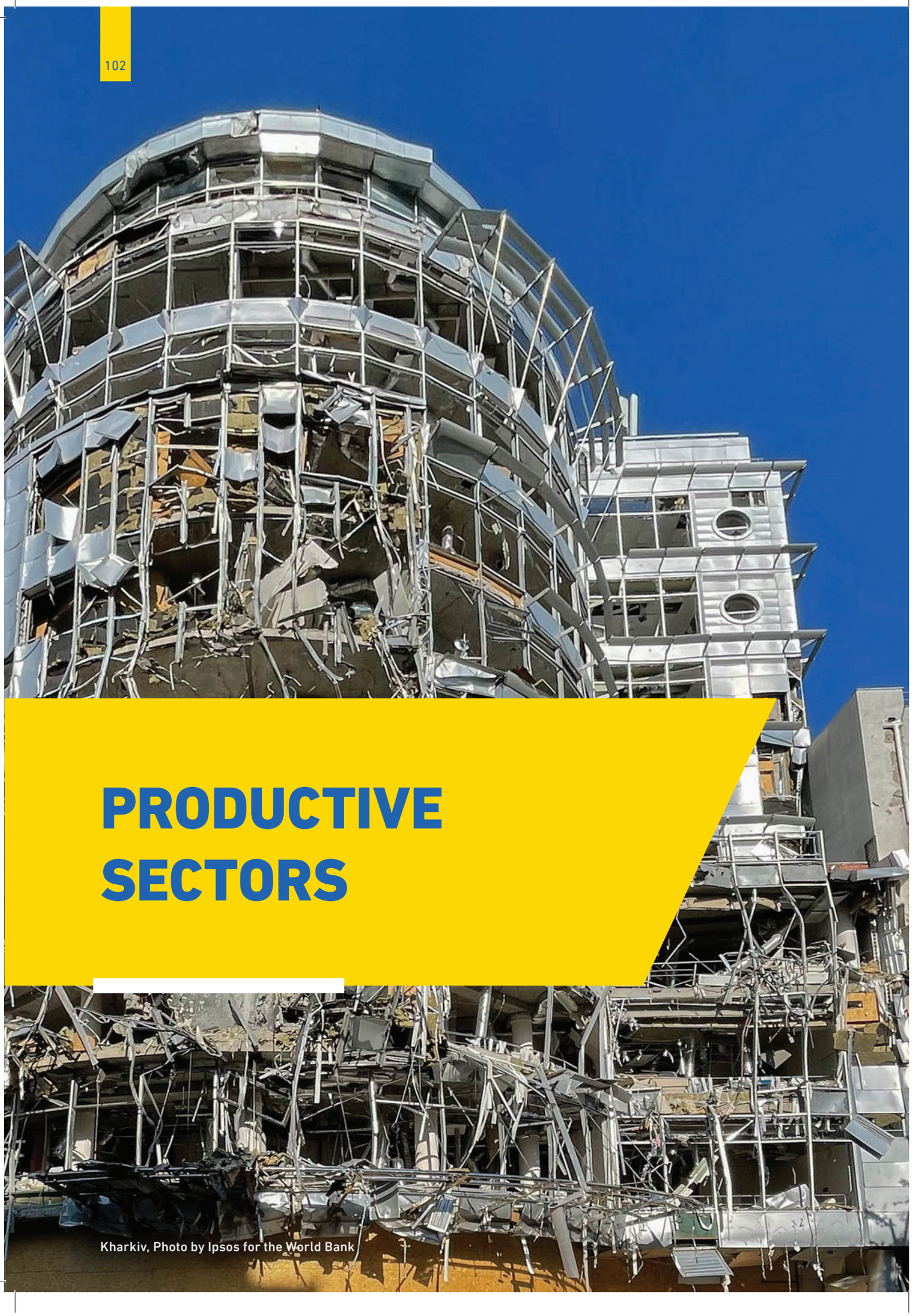
- Develop management/specialized plans, including emergency responses, where appropriate.

- Promote meaningful participation of all relevant stakeholders.
  - » Include underrepresented and marginalized groups such as women, youth, minorities, poor, and people with special needs in the planning, decision-making, and implementation process as appropriate

- Implement capacity-building programs for staff and also local institutions and communities.
  - » Restoration and reconstruction of physical assets
  - » Transmission of intangible heritage
  - » Documentation and monitoring

- Build back better.
  - » A more resilient, sustainable, inclusive, greener, and smarter development path
  - » Upgrading infrastructure in line with energy efficiency
  - » Use of smart technology (enhanced digital infrastructure)
  - » Universal accessibility mechanisms
  - » Biodiversity and ecosystems protection

172 UNESCO, "War in Ukraine," *Link*.
173 The Conflict Observatory website is at *Link.*



PRODUCTIVE SECTORS

Kharkiv, Photo by Ipsos for the World Bank

AGRICULTURE[174]

Summary

As of June 1, 2022, the war has resulted in total damage of US$2.2 billion for the agriculture sector, while the aggregate losses total US$28.3 billion. The damage include partial or full destruction of machinery and equipment, storage facilities, livestock, and perennial crops, as well as stolen inputs and outputs and agricultural land that needs recultivation.[175] The losses include production loss, including unharvested winter crops, higher farm production costs, and lower farm gate prices due to the export logistic disruptions, which are significant for Ukraine's export-oriented agriculture. **The total reconstruction and recovery needs from the public sector are estimated at US$18.7 billion.** The most pressing investments include rebuilding the damaged assets, helping agriculture bounce back by addressing liquidity and other constraints, and restoring the agricultural public institutions to effectively support recovery and reconstruction.

Background

Prior to the war, Ukraine's agriculture produced 10 percent of gross domestic product (GDP), employed 14 percent of the labor force, and generated 24 percent of total exports. Together with input supply and food processing, the agrifood system generated 20 percent of the GDP and total employment. In 2021, the grain and oilseed production reached a historical 109 million tons, and export of these products was projected to reach a record 65 million tons. That year, Ukraine was projected to provide 5 percent of the global export of wheat, 13 percent of the global export of corn, and 40 percent of the global export of seed oil.

The war came to Ukraine just before the start of the spring planting campaign, hitting it very hard. The total planting area declined by 20 percent compared to 2021, and 15 percent of agricultural capital stock was already damaged after the first three months of the war. The 2022 grain and oilseed harvests are projected to decline by 40 percent on a year-on-year basis. Along with the upward pressure on input prices, especially fertilizers and diesel, the lower agricultural production will significantly reduce farm incomes. Grain export dropped due to the blockade of the Black Sea, which supported 90 percent of the prewar agricultural export. In March 2022, the export of grain was only 0.3 million tons, compared with 5.4 million tons in January. Although the alternative routes helped increase the grain export to 1.2 million tons in April and 2.7 million tons in June 2022, this was still much below the 5–6 million tons exported monthly prewar through Black Sea ports. As a result, the domestic farm gate prices for wheat and corn declined by 30–35 percent between January and June 2022, while globally they grew by 42–60 percent. The upcoming harvest will put pressure on the grain storage infrastructure; the storage deficit is estimated at 10–15 million tons. The low volumes of agrifood exports could exacerbate global food insecurity, triggering the risk that the current crises of food access will become a crisis of food availability over the next several years.

Damage and Loss Assessment

Crop and livestock production has suffered significant damage and losses due to the war. The war damage is calculated as the monetary value of physical assets that were destroyed, stolen, or partially damaged (but still suitable for repair and recovery) due to the invasion. The assessment is indirect and based on the baseline of assets/fixed capital in the form of machinery and equipment, storage elevators, perennials, livestock, and land; it also includes the differentiation of territories by supposed severity of the damage. In the regions with little military activity and no loss of government control, the damage was assumed to be zero. In the regions of Kyivska, Sumska, Chernihivska, and

174 The agriculture sector includes crops and livestock production. It excludes irrigation and forestry, which are included in other parts of the Rapid Damage and Needs Assessment (RDNA), and it does not provide estimates for the fishery subsector due to the lack of data. Given the small size of fishery in the total agriculture sector, however, this does not significantly affect the overall sector estimates.

175 The losses from mines on agricultural land and the need for agricultural land's demining, which is likely to be large, are not included in the agriculture sector estimates. They are presented separately in the RDNA.

Table 25. Damage by asset type (US$ million) as of June 1, 2022

Category	Total value (US$ million)	Share of total (%)
Farmland requiring recultivation	40	1.8
Machinery and equipment	926	41.4
Storage facilities	272	12.2
Livestock	136	8.0
Perennial crops	89	4.0
Stolen inputs and outputs	732	32.7
Total	**2,239**	**100.0**

Source: Assessment team.

Table 26. Losses by category (US$ million) as of June 1, 2022

Category	Total value (US$ million)	Share of total (%)
Logistical disruption and lower export prices	15,428	54.6
Lower production of annual crops	11,064	39.1
Lower production of perennial crops	222	0.8
Lower livestock production	706	2.5
Higher farm production costs	859	3.0
Total	**28,280**	**100.0**

Source: Assessment team.

Mykolaivska, where government control has been restored some damage occurred. In the regions that were temporarily not under government control or suffered heavy fighting during the sowing season, e.g., the regions of Kharkivska and Zaporizka, the damage were much larger, increasing with each day of fighting. Lastly, in Khersonska, Donetska, and Luhanska regions, the damage was the largest.

The damage to machinery and equipment were the largest source of total damage (41 percent), followed by stolen inputs and outputs (33 percent), damaged storage facilities (12 percent) and livestock (8 percent), and farmland requiring recultivation (2 percent) (Table 25).

The war losses include the foregone farm income due to the lower production volume, the lower farm gate prices, and the higher additional farm production costs (e.g., fertilizers and fuel). The losses add up to US$28.3 billion. The largest loss, accounting for 54 percent of the total losses, resulted from the decrease in farm gate prices of export-oriented commodities such as wheat, barley, corn, and sunflower seeds (Table 26). Next largest are the losses from lower production of annual and perennial crops (40 percent), lower livestock production (3 percent), and higher farm production costs (3 percent).

The total cost of the war for Ukrainian agriculture is estimated to reach US$30.5 billion, with losses accounting for 93 percent of the total (Table 27). Khersonska oblast incurred more than 10 percent of the total cost. Total costs of between 5 percent and 10 percent were incurred in Chernihivska, Kyivska, Kharkivska, Donetska, Luhanska, Zaporizka, and Vinnytska oblasts. Kirovohradska, Mykolaivska, Dnipropetrovska, Khmelnytska, Odeska, Poltavska, Sumska, and Cherkaska oblasts incurred between 3 percent and 5 percent of the total costs.

Table 27. Damage and losses by oblast (US$ million) as of June 1, 2022

Oblast	Damage	Losses	Total Costs	Share of total (%)
Cherkaska	0	1,168	1,168	3.8
Chernihivska	62	1,510	1,572	5.2
Chernivetska	0	144	144	0.5
Dnipropetrovska	0	1,299	1,299	4.3
Donetska	618	2,160	2,778	9.1
Ivano-Frankivska	0	214	214	0.7
Kharkivska	216	2,544	2,760	9.0
Khersonska	401	2,744	3,145	10.3
Khmelnytska	0	1,008	1,008	3.3
Kirovohradska	0	1,345	1,345	4.4
Kyivska	87	1,532	1,619	5.3
Luhanska	581	1,491	2,072	6.8
Lvivska	0	416	416	1.4
Mykolaivska	44	1,357	1,401	4.6
Odeska	0	1,123	1,123	3.7
Poltavska	0	1,378	1,378	4.5
Rivnenska	0	363	363	1.2
Sumska	62	1,241	1,303	4.3
Ternopilska	0	668	668	2.2
Vinnytska	0	1,560	1,560	5.1
Volynska	0	314	314	1.0
Zakarpatska	0	65	65	0.2
Zaporizka	168	1,948	2,116	6.9
Zhytomyrska	0	691	691	2.3
Total	**2,239**	**28,280**	**30,519**	**100.0**

Source: Assessment team.

Reconstruction and Recovery Needs, including Build Back Better

For the agricultural sector to recover, drive the overall economic recovery, and serve as a decent income source for farmers, the following measures need to be taken in different time frames. The estimated agriculture sector needs amount to US$18.7 billion over 10 years (Table 28).

The principal recovery and reconstruction focus for the first year includes these measures:

- Reconstruction of/building back better the physical assets damaged by the war
- Provision of direct support to farmers through a combination of grants and soft-term credit lines to relaunch production activities, while also injecting liquidity into the banking system to recover past nonperforming loans (a result of the war) and stimulate new agricultural lending

Table 28. Recovery and reconstruction needs (US$ million) as of June 1, 2022

Category	Component	Immediate/Short-term	Medium- to Long-term	Total
Reconstruction Needs	Physical facilities and productive assets	422.2	227.3	649.5
	Farm equipment	602.0	324.2	926.1
	Agricultural lands	25.8	13.9	39.6
	Outputs & Inputs	476.0	256.3	732.3
Service Delivery Restoration Needs	Support for the production recovery	7,464.2	4,966.6	12,430.8
	Liquidity support to banks for agricultural financing	592.5	319.1	911.6
	Supporting Agricultural Public Institutions for Service Delivery	456.3	2,585.8	3,042.2
Total		**10,039.0**	**8,693.1**	**18,732.1**

Source: Assessment team.

- Clearing of mines and pollution of agricultural lands (estimated separately and not included in Table 28).

The needs estimated for the first year of the postwar period are US$10.04 billion, or about 54 percent of the total needs (Table 28). The priority medium-term and longer-run needs (up to and beyond five years) amount to US$8.7 billion or 46 percent of the total needs, with the emphasis on the following areas:

- Completing the reconstruction of the incurred war damage.
- Scaling up direct support to farmers and banks (through liquidity support) during several production seasons to help agricultural production rebound.
- Scaling up investment in agricultural public institutions for delivery of agricultural services (sanitary and phytosanitary measures, food safety, land monitoring and registration, soil testing for precision agriculture, agricultural research and extension services, training and retraining of farmers and staff of other agribusinesses, etc.), so institutions can better support the recovery of the agricultural sector. This would also require support for adaptation to climate change.

Limitations and Recommendations

- Baseline data was provided by the State Statistics Committee of Ukraine. The data on damage are indirect, indicative of the estimated effects of occupation and/or military activities by region. Losses are estimated using the data on production losses, including for annual and perennial crops and livestock, and output and input prices from the State Statistics Committee of Ukraine, the Ministry of Agrarian Policy and Food, and private agribusiness data providers such as APK-Inform.
- Future assessments would benefit from more accurate data on damage, including those collected by remote sensing; an updated estimate of losses in view of the upcoming 2022 harvest, which puts downward pressure on output prices and increases the likelihood of additional food stock losses; and the updated needs estimate in line with the latest Government plan on recovery and reconstruction
- Agriculture sector includes also irrigation, fisheries, and demining of agricultural land which are currently presented in other parts of the RDNA.

IRRIGATION AND WATER RESOURCES

Summary

As of June 1, 2022, damage in the irrigation, drainage, and water resource management (WRM) sector for several oblasts is estimated at US$154.4 million, including damage to dams, irrigation canals, embankments, buildings, and agency premises. This is a partial number representing damages to areas control of the Ukrainian authorities has been restored, territories that were always under government control but had damages due to bomb attacks, and areas that were flooded to protect against troop movements. **The initial aggregate losses accounted for thus far (data are still not complete) are US$75.8 million**. The losses include operational losses based on lost profit as reported by the different operational entities in the Ukrainian water system and collected by the State Agency of Water Resources (SAWR). **The total reconstruction and recovery needs in the public sector are estimated at US$7.5 billion for building back better irrigation, drainage, and flood protection assets.** The most pressing investments involve restoration of destroyed hydraulic assets and water storage structures in areas that were recently brought back under government control and areas that did not face hostilities; these investments will help the WRM sector rebound by addressing the major gap—the lack of water supply and lack of irrigation services to farmers. They will also protect communities against flood-related risks and restore the public institutions involved in irrigation and WRM so they can effectively support recovery and reconstruction.

Background

Ukraine has 41 million hectares (ha) of agricultural land, of which 33 million is under cultivation. Agriculture directly generates 10 percent of gross domestic product, 20 percent of exports, and 5 percent of employment, with significant additional impact in input supply, processing, and marketing. Irrigation covers 1 percent of all agricultural land but is especially important for certain crops (e.g., 15 percent of potatoes, almost all tomatoes and rice) and regions (e.g., 14 percent of Khersonska oblast), where it contributes to the rural economy. Drainage covers around 10 percent of agricultural land, mainly in the north and northwest, and makes a significant contribution to Ukraine's total production, including the national output of cereals and beef, by ensuring usable pastures and forage land.

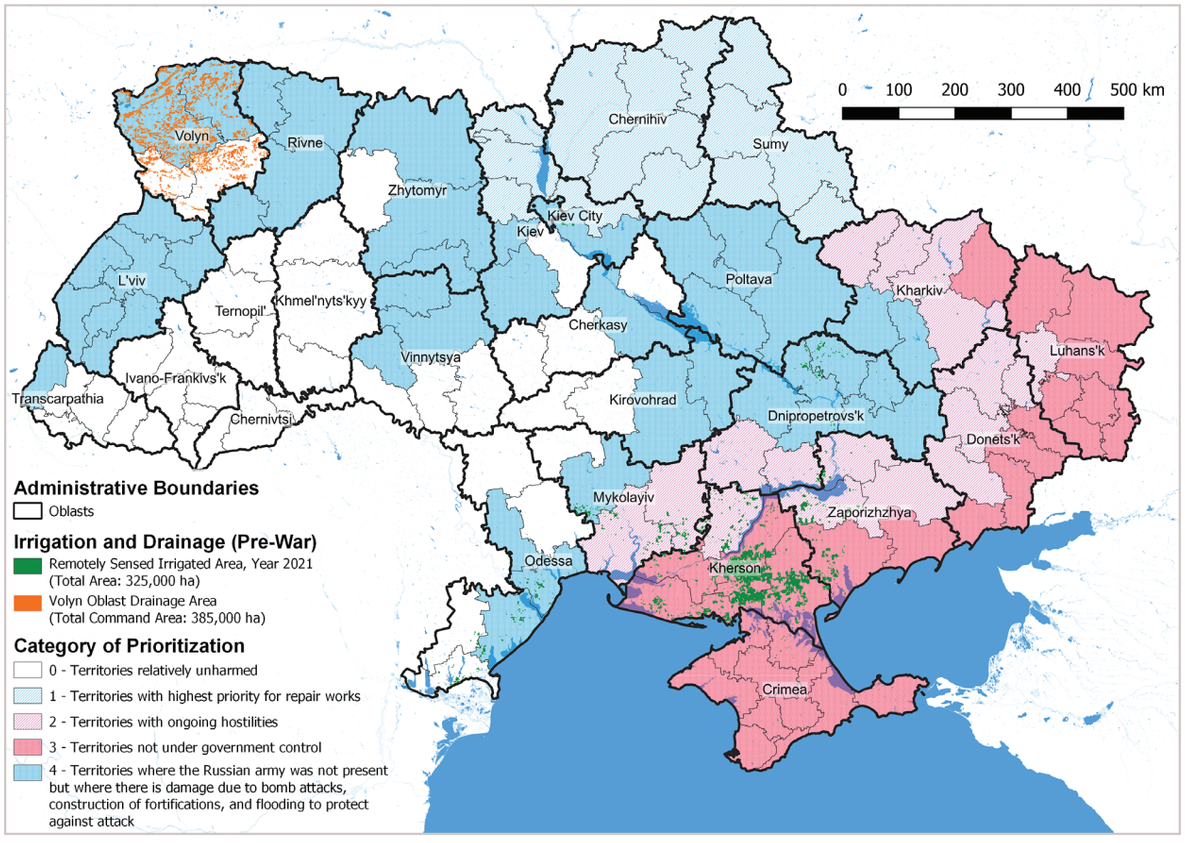
Prior to the war, Ukraine's delivery of I&D (irrigation and drainage) services faced persistent challenges, as the irrigation sector had collapsed after independence and required deep structural change to overcome the infrastructure barriers. Ukraine's I&D system was developed for state-run farms, but with the economic and political transition after the collapse of the Soviet Union, these large structures were broken up, creating an ownership and funding vacuum, and leading to widespread deterioration. These changes also had a dramatic negative impact on irrigated area in Ukraine. Out of the present 2.2 million ha of land equipped for irrigation, only around 738,000 ha (33 percent) can be irrigated without additional capital investment, and this area has shrunk even further with impacts related to the war. Prewar estimates (using remote sensing data) indicate that only 325,000 ha was irrigated in 2021, as shown in Figure 19.[176] Consequently, out of the total cultivable area that can be irrigated in Ukraine, only 25 percent is actually irrigated today, posing significant water stress risks to crop yields leading to potential negative impacts on the rural livelihoods, climate resilience, food security, and economic development potential of the country.

The low level of irrigation system utilization is the result of poorly maintained systems that are largely not operational, poor drainage conditions, and increasing energy costs—a function of the decline in state funding.[177] As a result, productivity in the sector

176 Forthcoming report by the World Bank Water Global Practice in ECA and Hydrosolutions 2022.

177 World Bank, "Ukraine Irrigation Sector Modernization," prepared by Olga Zhovtonog, Onno Schaap, and Sam H. Johnson, World Bank Mission, June 2015.

Figure 19. Map of total irrigated area by conflict zone prioritization in Ukraine (including drainage area Volynska)



Source: World Bank/Hydrosolutions 2022.see Link.

is much lower than its potential; there is a need to move the sector toward high-value export crops, but these require irrigation services that are currently not available. The Government of Ukraine, with support from the World Bank, prepared a strategy for the I&D sector in 2017[178] that emphasized the need for clear roles, clear budget responsibilities, and the financial sustainability of irrigation systems. It is in the process of implementing the strategy, even during the war. It has recently passed a law on Water User Organizations (WUOs), and ongoing reforms to national institutions are intended to establish a new structure for designing, managing, constructing, and maintaining critical irrigation, drainage, and WRM assets.

The State Agency for Water Resources is responsible for managing primary irrigation systems. It also manages the main drainage systems and flood defenses. SAWR reports to the Ministry of Environmental Protection and Natural Resources and its activities are coordinated by the Cabinet of Ministers. Reform of the I&D sector will inevitably require substantial reform of SAWR, and this is currently underway. According to recent dialogue, the government will soon establish a new agency for irrigation and fisheries within the Ministry of Agrarian Policy and Food, which will soon take over from SAWR responsibility for main systems construction and for management, operation, and maintenance.

Ukraine must manage its national water in the interests of all users and the environment and in line with the European Union (EU) Water Framework Directive, which introduces the key concepts of integrated water resource management and river basin management.[179] Within the frame of the EU Directive, Ukraine is developing its river basin management plans, which are important steps toward enhancing its WRM potential.

178 World Bank, "Irrigation and Drainage Strategy of Ukraine: Final Draft Proposal," 2017.
179 World Bank, "Irrigation and Drainage Strategy of Ukraine: Final Draft Proposal," 2017.

Table 29. Prioritization categories and corresponding oblasts

Category of prioritization	Priority oblasts
1. Territories with highest priority for repair works	Kyivska, Chernihivska, Kharkivska (southwestern part), Sumska
2. Territories with ongoing hostilities	Khersonska (northern part), Zaporizka (north and eastern parts), Kharkivska (southeastern part), Luhanska, Mykolaivska, Donetska
3. Territories not under government control	Khersonska, Zaporizka, Dnipropetrovska
4. Territories where the Russian army was not present but where there is damage due to bomb attacks, construction of fortifications, and flooding to protect against attack	Kyivska, Zhytomyrska, Rivnenska, Volynska
0. Territories relatively unharmed	Vinnytska, Zhytomyrska, Zakarpatska, Ivano-Frankivska, Kirovohradska, Lvivska, Odeska, Poltavska, Ternopilska, Khmelnytska, Chernihivska, Mykolaivska

Source: Assessment team, with support of SAWR and IWPLR.

Table 30. Damage assessment methodology for Category 2 and 3 regions

Irrigated area	Irrigated area is estimated based on satellite images from 2021, using the geographical coordinates provided by SAWR. Because an important part of the original command area is no longer functional, this is considered the most reliable approximation of irrigated areas.
Damage calculation using KSE methodology	Damage is taken as a coefficient of the irrigated area, following the method used by the Kyiv School of Economics. This method entails assuming that the volume of damages is a linear function of the length of period the region is either an active war zone (Category 2) or is occupied (Category 3). For active war zones, it is assumed that the volume of damages increases linearly with time at a rate of 0.274 percent a day. If the region is not under government control, the pace of increase in the volume of damages is half of this coefficient (0.137 percent). Both Donetska and Luhanska regions are active war zones, meaning that the volume of damages in these regions increase by 0.274 percent linearly with time. For the entire period (up to June 1, 2022) this entails a total share of damage of 27 percent. In Kharkivska, only about half of the oblast is an active war zone. Thus the pace of growing destruction is halved as well. Currently, the entire Khersonska oblast is not under government control, as is most of Zaporizka (where most of the irrigation and storage infrastructure is located). The coefficient of estimated damage for these oblasts grows with time, albeit at a halved rate, as regions temporarily not under government control are likely to have less damage than active war zones. Therefore, to take into account that regions not under government control are likely to have less damage than active war zones where fighting is happening, the coefficient for these regions is half of the damage coefficient used for war zones (0.274) and is estimated to be 0.137 percent a day (leading to a total share of damage of 13 percent up to June 1, 2022 which comes from multiplying the coefficient with the number of days in conflict (0.137*97)). Mykolaivska oblast, for which the damage coefficient is set to 5 percent, is an exception.
Degree of damage	The degree of damage is adjusted based on the data from remote assessment prepared for the RDNA related to the number of incidents.
Cost of damage	According to the KSE formula, the costs for restoration of complete destruction and partial damage is respectively US$3,000/ha and US$600/ha. This tallies with the rehabilitation costs for tertiary systems (only) calculated as part of the Irrigation and Drainage Policy (2017), set at US$2,000–2,200/ha. For this assessment, the assumption was made that one-third of all damage is totally damaged and two-thirds is partially damaged. This assumption leads to the combined number of US$1,400/ha.[a] The costs obtained by the oblast inventory and KSE method were added up for Category 2 and 3 areas.

Source: Assessment team based on information from KSE.

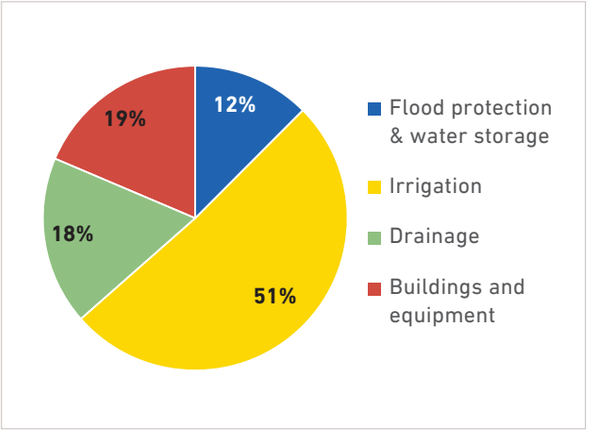
a. 1/3*$3,000 + 2/3*$600 = $1,400.

The I&D infrastructure in Ukraine has been severely affected by the war. Hostilities have targeted storage reservoirs, I&D systems, pump stations, flood embankments, and key water resource agency buildings and equipment. There are examples of targeted destruction of dams, whereas other damage has occurred due to intense fighting around the water systems, vandalization of structures during occupation, construction of barricades with material from the water systems, defensive inundations, and the placement of mines around vital infrastructure.

Damage and Loss Assessment

In consultation with the Ministry of Agrarian Policy and Food, the Ministry of Environmental Protection and Natural Resources, and the SAWR, the RDNA prioritizes oblasts in Ukraine according to four conflict zone categories (as described in Table 29). Oblasts are categorized depending on the degree of

Figure 20. Damage by asset type as share of total damage



Source: Assessment team.

Table 31. Damage by asset type (US$ million) as of June 1, 2022

Asset type	Baseline number	Completely destroyed	Partially damaged	Estimated damage (US$ million)
Flood protection & water storage				**4.72**
Dams	232	2	18	4.63
Embankments	775	0	13	0.90
Irrigation				**19.30**
Main canals (km)	10,238	0	43	5.86
Secondary canals (and water transportation pipes) (km)	164,218	0	0	
Operational pump stations	1,312	6	42	10.30
Other hydraulic constructions	18,033	6	22	3.13
Drainage network (km)	1,177	0	0	
Drainage				**6.76**
Main collectors (km)	7,639	0	0	
Lower collectors (km)	91,566	0	0	
Operational Pumping Stations (PSs)	170	0	5	0.38
Other hydraulic constructions	17,489	12	5	6.39
Buildings and equipment				**7.04**
Administrative buildings and garages	49	5	22	2.47
Repair shops and production sites	62	1	8	0.76
Other buildings, including bridges	0	3	8	0.69
Cars and other machinery	1,606	9	57	3.13
Total	**314.566**	**44**	**243**	**37.82**

Source: Assessment team & SAWR, Government of Ukraine.

Table 32. Damage by oblast (US$ million) as of June 1, 2022

Oblast	Category of prioritization	Damage using oblast inventory method	Damage using KSE method	Total infrastructure damage using hybrid method
Cherkaska	0	0	0	0
Chernihivska	0	1.47	0	1.47
Chernivetska	0	0	0	0
Dnipropetrovska	3	0.05	0	0.05
Donetska	2	5.50	45.51	51.00
Ivano-Frankivska	0	0	0	0
Kharkivska	1, 2	6.96	0.06	7.02
Khersonska	2, 3	0.07	42.93	43.00
Khmelnytska	0	0	0	0
Kirovohradska	0	0	0	0
Kyivska	1, 4	11.07	0	11.07
Luhanska	2	4.40	20.13	24.53
Lvivska	0	0	0	0
Mykolaivska	2	6.61	1.48	8.09
Odeska	0	0.02	0	0.02
Poltavska	0	0	0	0
Rivnenska	4	0.37	0	0.37
Sumska	1	0.37	0	0.37
Ternopilska	0	0	0	0
Vinnytska	0	0	0	0
Volynska	4	0.55	0	0.55
Zakarpatska	0	0	0	0
Zaporizka	3	0.01	6.42	6.44
Zhytomyrska	4	0.37	0	0.37
Total		**37.82**	**116.52**	**154.35**

Source: Assessment team and SAWR, Government of Ukraine.

exposure to the war. A fifth category (labeled "0") concerns those oblasts that are so far not affected by the war. For the areas in Category 2 (ongoing hostilities) and Category 3 (not under government control), the inventory reporting is for obvious reasons incomplete; there is no (reliable) communication with the operating agencies. For these areas, the RDNA has adopted a hybrid method that combines initial estimates with the approach of the KSE (see Table 30 for more detail).[180] The records of SAWR however only cover the public infrastructure, not of the private on-farm infrastructure which however represents an important part of the asset base. As there are no records of this, for the four oblasts in

180 The calculation on damage to infrastructure comes partly from an inventory of damage to all irrigation, drainage, and flood protection assets, carried out by SAWR for all regions on a constant basis. The period covered is from the start of the war (February 24, 2022) up to June 1, 2022. The calculation also draws on the KSE's damage methodology. The assumption made is that the longer an irrigated area is an active war zone, the more damage it experiences.

Table 33. Losses by category (US$ million) as of June 1, 2022

Category	Loss estimate (US$ million)	Share of total (%)
Loss of profit: Management Department of Dnieper Reservoirs	0.01	0.0
Loss of profit: Melitopol Technical School	0.06	0.1
Loss of profit: Regional Offices of Water Resources	2.16	2.8
Loss of profit: Reservoirs	2.63	3.5
Loss of profit: Management Departments	7.12	9.4
Loss of profit: Management Department of Main Kakhovsky Canal	17.01	22.4
Loss of profit: Basin Water Resources Departments	46.84	61.8
Total	**75.83**	**100%**

Source: Assessment team.

Table 34. Losses by oblast (US$ million) as of June 1, 2022

Oblast	Category of prioritization	Loss estimate (US$ million)	Share of total (%)
Cherkaska	n.a.	n.a.	0
Chernihivska	0, 1	0.12	0
Chernivetska	0	0	0
Dnipropetrovska	3	1.74	2
Donetska	2	0.47	1
Ivano-Frankivska	0	n.a.	0
Kharkivska	1, 2	0.54	1
Khersonska	2, 3	54.10	71
Khmelnytska	0	0.01	0
Kirovohradska	n.a.	n.a.	0
Kyivska	1, 4	2.87	4
Luhanska	2	0.15	0
Lvivska	0	n.a.	0
Mykolaivska	2	5.79	8
Odeska	0	n.a.	0
Poltavska	0	n.a.	0
Rivnenska	4	0.12	0
Sumska	1	0.30	0
Ternopilska	0	n.a.	0
Vinnytska	n.a.	n.a.	0
Volynska	4	0.10	0
Zakarpatska	0	0.16	0
Zaporizka	3	9.58	13
Zhytomyrska	4	0.04	0
Total		**75.83**	**100%**

Source: Assessment team.

Note: n.a. = not applicable.

Category 1 (territories with high priority for repairs) field investigations are planned in July 2022, as part of an agricultural survey through remote/survey means. Another cost item that is not assessed are the smaller privately developed systems. Figure 19 shows a breakdown of the categories by oblast in Ukraine. The map also illustrates that as of 2021, all of the irrigated command areas of Ukraine are currently located in areas that are in active conflict zones.

Table 30 provides a summary of the methodology used by the KSE, which is used for Category 2 and 3 regions as part of the RDNA assessment in the context of data limitations.

The results of the damage assessment according to asset type were determined according to the SAWR oblast inventory method and show total damage of US$37.8 million. Of this amount, US$4.7 million is attributed to flood protection and water storage, US$19.3 million to irrigation structures, US$6.76 million to drainage, and US$7.04 million to buildings and equipment (Table 31, see Figure 20). However, as this method largely underreports the damage inflicted to structures in the Category 2 and 3 oblasts, final damage figures for these oblasts are calculated by the hybrid method described in Table 30. The RDNA assumes that the same proportion is an indication of the distribution over asset categories. This still omits the damage to the tertiary systems that are usually operated by enterprises or individual farmers and hence do not appear in the records of the SAWR. With this caveat, Table 31 shows the damage to each main asset type as a share of total damage.

Table 35. Recovery and reconstruction needs Phase 1 and 2 by category (US$ million) as of June 1, 2022

Component	Phase 1 (Immediate/short term)	Phase 2 (Medium- to long-term)	Total
Public reconstruction needs			
Modernization of irrigation & drainage infrastructure & associated pumping stations		Reconstruction, overhaul, modernization, and new construction of irrigation and drainage systems: Securing irrigation on 756,400 ha and additional new irrigation on 353,900 ha to address damage and profit losses in Category 0 and Category 1 oblasts (when applicable)	
		1,254.94	1,254.94
Centralized water supply and group water pipes		Construction of water supply networks in settlements of Lvivska oblast, group water pipes on the territory of Odeska and Khersonska regions; reconstruction of group water pipes due to damage in the territory of Mykolaivska oblast (Category 0, 2) oblasts)	
		91.63	91.63
Hydraulic structures and protective assets of Dnipro reservoirs		Reconstruction of hydraulic protection structure around Dnipro reservoirs, protecting 197,000 ha of land, including 131 settlements (in 10 cities in 5 regions), housing 600,000 people in Category 0 and Category 3 oblasts (where applicable)	
		76.97	76.97
Irrigation system expansion		Expansion of irrigation and storage structures for restoration of services and compensation measures in case of continued occupation of the main irrigation systems in Category 2 and 3	
		1,254.73	1,254.73

Component	Phase 1 (Immediate/short term)	Phase 2 (Medium- to long-term)	Total
Service delivery restoration needs			
Modernization of water management infrastructure	Restoration of damaged hydraulic facilities and water management systems and buildings considering martial law	Ecological restoration of drainage and water management systems, considering nature-oriented solutions and economic validity of measures to address damages and profit losses, mostly in Category 1 oblasts (territories where government control is restored)	
	19,06	1,099.61	1,118,67
Restoration of damaged water monitoring system	Relocation of the Eastern Region Water Monitoring Laboratory, arrangement of laboratory premises and communications, purchase of auxiliary equipment. Accreditation of the Eastern Region Water Monitoring Laboratory, purchase of equipment	Restoration of water monitoring laboratory in Sloviansk, Donetska oblast	
	0.86	1.10	1.96
Protection and restoration of floodplains of Irpin River affected by inundation		Kozarovytsia protective dam and operational section, overhaul of Irpin pumping station covering Kyivska oblast in Category 1 and 4	
		3,742.33	3,742.33
Total	**19.92**	**7,521,31**	**7,541,24**

Source: Assessment team.

Table 32 shows the damage for each oblast. The total infrastructural damage is calculated according to the hybrid method, which takes the damage as a coefficient of the irrigated area.

The sector has suffered substantial operational losses among the different state entities. A major factor is that in many areas, payment for water services by water users (which equals 60 percent of all operational costs) is hampered. These operational losses also reflect the damage to government and management of the water systems, as the financial basis is having a serious setback. The total losses were found to be US$75.8 million. The largest share of losses was found in the Basin Water Resources Departments (61.8 percent). Losses do not yet account for the cost of making emergency repair works to damaged assets, as damage data are still being collected by the SAWR. Thus, losses figures presented are preliminary and will rise as the data on repair costs are received. See Table 33 for an overview of the losses by category.

Table 34 displays losses by oblast. Most of the losses are attributed to the Khersonska oblast, where they total US$54.1 million.

Reconstruction and Recovery Needs, including Build Back Better

Table 35 provides an overview of the needs for each category for three phases. A short description of the relation of these programs to the war recovery is given: some investments are needed to repair damaged systems, where possible under a build back better approach. Other programs are compensatory—that is, designed to maintain and improve production levels through improved drainage and expanded irrigation in the parts of the country that are under government control. The total needs for Phase 1 immediate/short-term needs were found to be US$19.92 million. The needs for Phase 2 medium/long-term needs were found to be US$7.5 billion. This includes a nationwide component for irrigation and water storage infrastructure expansion to allow for flexibility in measures, given the possibility of continued loss of

Table 36. Recovery and reconstruction needs by oblast (US$ million) as of June 1, 2022

Oblast	Immediate/short term	Medium- to long-term	Total
Cherkaska	0	12.83	12.82
Chernihivska	1.83	183.27	185.10
Chernivetska	0	0	0
Dnipropetrovska	0	326.56	326.56
Donetska	1.34	1.10	2.44
Ivano-Frankivska	0	0	0
Kharkivska	1.34	0	1.34
Khersonska	1.34	349.47	350.82
Khmelnytska	0	0	0
Kirovohradska	0	0	0
Kyiv (city)	0	0	0
Kyivska	1.83	3,938.42	3,940.25
Luhanska	1.34	0	1.34
Lvivska	0	22.91	22.91
Mykolaivska	1.34	336.64	337.99
Odeska	0	336.64	336.64
Poltavska	0	12.83	12.82
Rivnenska	1.83	183.27	185.10
Sumska	1.83	183.27	185.10
Ternopilska	0	0	0
Vinnytska	0	0	0
Volynska	1.83	183.27	185.10
Zakarpatska	0	0	0
Zaporizka	1.34	12.83	14.17
Zhytomyrska	1.83	183.27	185.10
Nationwide (no specific region)	0.86	1,254.73	1.255.59
Total	**19.92**	**7,521.31**	**7,541.24**

Source: Assessment team.

Note: The restoration needs for some of the regions are assumed under the nationwide costs to allow for some flexibility.

government control of the main irrigation systems of Ukraine, which supply 90 percent of the entire irrigated area (located in Khersonska and Zaporizka, or mostly Category 2 and 3 oblasts). Table 36 shows the breakdown of needs per oblast. Among the overall needs for recovery, an initial preliminary prioritization was done by SAWR and Institute of Water Problems and Land Reclamation (IWPLR), and this is to be further updated and refined.

Even before the war started, the I&D sector, flood protection sector, and WRM sector were in transition. Some irrigation systems were no longer viable, and irrigated areas had reduced considerably. Other systems were singled out for enhancement, modernization, or a combination of both. However, today there is a pressing need to address some urgent priorities first, as the destruction, damage, and even larger risk of loss of access to the main I&D infrastructure for the Ukrainian government has severe social and economic impact, besides jeopardizing food production across thousands of farms in Ukraine.

There is also a clear need for improved operations, both in on-farm water application methods (for instance, transition to low-pressure systems) and in retailoring of energy operations for the pumping systems: increasing energy costs are threatening the operational cost-effectiveness of the systems.

The recovery plan might consider assessing the energy needs by conducting a detailed energy audit, financing energy-efficient pumping systems and modernized pumping, and conversion to gravity-based systems.

Infrastructure modernization and reconstruction needs to be coupled with ongoing institutional reform. The Irrigation and Drainage Policy (World Bank, 2017)[181] sets a medium-term target for irrigation modernization, rehabilitation, and expansion to result in effective irrigation of 810,000 ha. The possibility for further expansion of up to 1.5 million ha of irrigated land was discussed where future analysis shows it to be practical and economic. In addition, drainage targets would be set following detailed review, considering both the 3 million ha that are currently drained and the possibility of adding another 1 million ha.

Limitations and Recommendations

In this preliminary overview, some important components of the RDNA are not yet addressed. These are summarized in Table 37.

It is critical to note that information on access to goods and services will coincide with the RDNA for agriculture and environment. The severe disruption of water infrastructure is one of the drivers of the very high losses in agriculture, which can be corroborated by matching the oblast/regional breakdowns once the complete damage and loss data are added to the template for the I&D sector.

Due to increasing climatic stress to existing rain-fed areas in Ukraine, as well as the potential loss of access to 90 percent of the most important irrigation systems (located in oblasts temporarily not under government control), Ukraine may need to consider sustainable expansion of its water storage and I&D systems in oblasts that are currently producing food under rain-fed conditions. The World Bank is conducting analysis using remote sensing and crop water modeling for present and future climate scenarios to identify possible areas for sustainable irrigation expansion, with the aim of building back better from the war impacts on the irrigation and WRM sectors in Ukraine, with early results available in September 2022.

Table 37. Summary of key sectoral limitations

Category of assessment	Details of limitations
Assessment of war effect	
Disruption of access to goods and services & costs of emergency repairs to key irrigation and WRM assets [a]	Loss of agricultural production capacity or change in cropping systems due to war, considering restoration/demining time (although this is covered by the losses section of the agriculture sector's template). Loss of secondary functions of I&D system, in wetland protection or source water. Costs incurred to conduct emergency repair works to damaged assets.
Governance and decision-making processes	Effect on service delivery due to war, availability of key staff in operation and I&D system planning, loss of expertise, undermining of financial institutional basis
Increased risks and vulnerabilities	Effect on overdue deferred investment (see Irrigation and Drainage Policy, World Bank, 2017), water quality degradation, and pollution risks.
Assessment of war impact	
Economic impact at macro and micro levels	Disruption of the economy, as part of the systems under occupation, backward and forward linkages (to relate to agricultural surveys).
Damages and losses to private on-farm irrigation systems	Absence of records on private on-farm infrastructure, which represents an important part of the asset base. As there are no records for private infrastructure, field investigations are planned in July 2022 for the four oblasts in Category 1 (government control restored) as part of the RDNA Agricultural Survey. Another cost item not assessed is the smaller privately developed systems.

Source: Assessment team.

181 World Bank, "Irrigation and Drainage Strategy of Ukraine: Final Draft Proposal," 2017.

COMMERCE AND INDUSTRY

Summary

Commerce and industry are one of the most war-affected sectors. As of June 1, 2022, approximately US$9.7 billion of damage is estimated to have been sustained in this sector. Both privately and publicly owned enterprises in conflict-affected areas have been destroyed or bankrupted. Value chains have been disrupted through the destruction of, or damage to, connective infrastructure, inability to access key inputs, and the severing of business links with firms located in affected areas. Damage to large factories accounts for most of the damaged assets, including the destruction of steel plants in Donetska that make up almost 10 percent of the total damage. Approximately 2,900 retail shops, shopping malls, and warehouses have been damaged or destroyed. **Estimated aggregate losses equal US$47.5 billion**. The losses are estimated based primarily on expected lost income from firms over the course of 21 months and the costs for demolition and debris removal. **Total reconstruction and recovery needs are estimated at US$20.8 billion.** More than 80 percent of the needs are for rebuilding and modernizing buildings, equipment, and inventory. For industry, the regions with the greatest needs for reconstruction and recovery are Donetska, with almost half of the total amount, followed by Kharkivska, Luhanska, Chernihivska, and Kyivska oblast.

Background

Industry and commerce accounted for about one-third of Ukraine's gross domestic product (GDP) in 2021 and about 7.2 million jobs in 2020.[182] Industry, as defined by this section, covers manufacturing and services not covered elsewhere in the report. This excludes manufacturing associated with transportation, military, and energy, but includes agro-industry from the processing stage. Services related to culture, tourism, finance, and creative industries, such as hotels, tour operators, and advertisers, are also excluded. Restaurant and food services are included under industry and services. Commerce covers wholesale and retail trade and warehousing. This section includes impacts on both public and private firms.

Among Ukraine's top exporting industries are metal and machinery, including electrical and computer machinery. Metal exports even exceeded grain exports in 2021. Of approximately 700,000 active enterprises in Ukraine in 2021, the vast majority are micro and small, with less than 50 employees.[183] The biggest concentration of firms (19 percent) is in Kyiv city. Based on the 2019 Labor Force Survey, wholesale and retail trade had the most employees, followed by agriculture and industry.[184]

Given Ukraine's location, human capital, and physical assets, the competitiveness of its commerce and industry had unrealized potential prior to the war. Reforms had been underway to improve the business and investment climate and specifically to allow greater competition, reform state-owned enterprises, and allow firms to move into higher-value-added segments of markets.

Institutionally, the Ministry of Economy is the main government counterpart on many key business issues, including trade, business climate, innovation, and development of small and medium enterprises (SMEs). The government has identified the importance of facilitating business continuity and operation during the conflict. To that end, it has announced or passed legislation to ease burdens on businesses and facilitate operations. Active business associations are also key actors in the institutional structure.

182 Estimates are based on data from the State Statistical Service of Ukraine.

183 Data from State Statistical Service of Ukraine. Of the 700,000 firms, almost half were not classified by size in the data, but most are likely individual entrepreneurs or small firms.

184 State Statistics Service of Ukraine. "Labor force of Ukraine 2019: Statistical Publication." 2020. *LInk*.

Table 38. Damage by size/type of firm (US$ million) as of June 1, 2022

Category	Asset type	Damage (US$ million)	Share (%)
Industry	Large and medium-size private enterprises	4,454.4	46.1
	Small private enterprises	2,223.7	23.0
	State enterprises	762.2	7.9
Commerce	Shops	1,493.4	15.5
	Warehouses	160.2	1.7
	Gas stations	157.6	1.6
	Pharmacies	31.2	0.3
	Shopping centers	381.2	3.9
Total		**9,663.9**	**100%**

Source: Data as reported to the KSE. Adjustments in calculations made by World Bank to large and medium-size private enterprises and to state enterprises to subtract damage to firms that should not be covered in this section.

The impact of the war on businesses has been significant through various channels, such as revenues, costs, availability of supplies, material damage, disrupted trade routes, and displaced customers. It is estimated that the economy has lost 30–50 percent of its productive capacity, with losses concentrated in Eastern Ukraine. Recent numbers from the National Bank of Ukraine (NBU) noted that 14 percent of businesses completely stopped operations in May, compared to 17 percent in April. However, the level of capacity utilization is still 40 percent below the prewar level. Major challenges to operating are (i) difficulties with logistics; (ii) interrupted supply of inputs and goods; (iii) displaced labor force; (iv) frozen contracts with foreign and local clients; (v) low purchasing power of local customers; (vi) damaged facilities and infrastructure; and (viii) lack of financial resources.

Damage and Loss Assessment

Total damage to the industry and commerce facilities is estimated at US$9.7 billion. Most of the damage (77 percent) was to industry, with the rest under commerce. Much of the destruction occurred to large and medium-size private enterprises (46.1 percent) (Table 38). About 80 percent of the damage estimate to those firms (US$4.5 billion) was due to the destruction of two steel plants in Donetska oblast, the Azov Steel Plant and the Ilyich Iron and Steel Works in Mariupol, which destroyed about half the country's steel production capacity.

Damage in industry totaled US$7.4 billion. When available, damage was included as reported for medium/large private firms and for state-owned enterprises. If exact damage amounts were not available, assets were defined from the latest financial reports as gross capital stock, inventory, and unfinished goods; 100 percent of the value was used if the asset was reported destroyed and 40 percent if reported partially damaged. These assets include buildings, equipment, machinery, and intermediate and final goods. For small private enterprises, not including those covered under commerce, direct reported damage was not available given the large number of such enterprises. Instead, an indirect method was used to calculate impacts on small firms, based on the percentage of damage to housing in major cities as reported by local authorities. This approach was used to estimate damage because many small firms are located in residential buildings.[185]

As noted above, firms in industries covered elsewhere, such as transportation, military equipment production, energy, and agriculture, were not included in these calculations. Medium/large industry in this assessment covers 51 medium and large firms (35 private firms and 16 state-owned enterprises). Of these, manufacturing firms were the most impacted, accounting for more than half of the damaged and destroyed firms, with metallurgy and machine-building firms accounting for 10 of the 29 damaged and destroyed firms.

185 Assets were aggregated by city from financial reports. Destroyed and damaged assets were calculated using the housing damage percentages and allocated across destroyed (60 percent) and damaged (40 percent) and aggregated across oblasts.

For commerce, damage was reported from the Retail Association of Ukraine, Ukrainian Council of Shopping Centers, and other open sources. Approximately 2,900 retail shops, shopping malls, and warehouses have been damaged or destroyed. The damage assessment was performed according to standardized interviews and online surveys of owners and top managers of retail companies, considering the area and nature of damage to the buildings and based on the cost of construction, equipment, and inventory. The surveys were administered to 295 leading network companies that represent about 1,000 brands and have 28,500 outlets with a total area of 15.4 million m^2. Calculations do not include enterprises with fewer than three outlets, merchants in street markets, warehouses of wholesale goods, and stores that suffered minor damage. Of the US$2.2 billion of damage reported by commerce businesses, over two-thirds of the damage was suffered by shops (see Table 38).

Total losses across commerce and industry equal US$47.5 billion. Losses for industry were calculated based on sales data from the latest available financial reports and increased by 10 percent to account for inflation. Losses are calculated as sales losses for 21 months, including the three-month period measured from the start of the war (February 24 to June 1) and an additional estimated 18 months for continued losses. Sales losses were also calculated for subsectors that experienced nationwide impacts, such as specific services like car rental agencies and employment services.[186] Losses also include agreed calculations for demolition and debris removal, based on the damage. Total losses for industry are about US$23.2 billion. These calculations likely overestimate sales losses for these firms, given that in many areas where there is no active conflict firms are returning to work. However, sales losses are being used as a proxy for other losses such as productivity and need for rental fees where no data were available. Also, the estimates assume that all damaged and impacted firms nationwide are not captured in the sales losses.

For commerce, losses were also estimated as sales losses as reported by the relevant business associations. Retail stores estimated an average decrease in income of 25 percent over 21 months. Total estimated losses for commerce, including debris removal, are equal to US$24.3 billion, with US$23.1 billion from shops.

As expected, commercial and industrial damage and losses are concentrated in oblasts in Eastern Ukraine. Commerce and industry in Donetska oblast suffered the most, with almost US$5 billion in damage and US$16.5 billion in losses. This is followed by Kharkivska oblast, with US$2.2 billion in damage and US$12.7 billion in losses; and then by Luhanska, with US$0.8 billion in damage and US$3.7 billion in losses (Table 39). An assessment that verified damage to commerce and industry establishments in certain cities found the following: in Mariupol in Donetska, 32 percent of 901 establishments were destroyed and 67 percent had partial damage; in Bucha in Kyivska, 13 percent of 127 establishments were destroyed and 50 percent had partial damage; in Irpin in Kyivska, 18 percent of 231 establishments were destroyed and 74 percent had partial damage; and in Kyiv city, 0.8 percent of 2,858 establishments were destroyed and 5 percent had partial damage. Most damage and losses across regions were to private industry, with state-owned enterprises accounting for 7.9 percent of the total damage and 1.4 percent of the total losses. Damage to state-owned enterprises were concentrated in Kharkivska oblast, where the destruction of two manufacturing plants totaled almost US$0.5 billion, accounting for about 63 percent of the total damage to productive state-owned enterprises.

Many firms, in addition to suffering damage to assets and loss of revenue, have experienced other costs, such as employees being displaced or killed and customer bases shrinking or disappearing. Many firms have borne the costs of relocation to safer areas in Ukraine or outside of Ukraine. Firms in commerce and industry are also intrinsically linked to other sectors. Electricity, water, and fuel supplies have been disrupted in many areas, affecting production costs. Damage and impeded access to transportation and logistics are hurting access to markets, both domestically and internationally. Some firms have dwindling financial reserves but cannot easily access needed credit. The full disruption of value chains through connective infrastructure, access to needed inputs, and decreased demand in markets will continue to affect firms as the conflict continues and likely after it ends. The uncertainty of the duration and severity of the conflict also deters planning and longer-term investments.[187]

186 This does not include creative services or industries covered elsewhere, such as cinemas and advertising.
187 Based on interviews with industry and commerce experts in Ukraine conducted in June and July 2022.

Table 39. Damage and losses by oblast (US$ million) as of June 1, 2022

Oblast	Damage	Loss
Cherkaska	-	41.1
Chernihivska	522.2	4,779.6
Chernivetska	-	9.0
Dnipropetrovska	-	251.3
Donetska	4,989.5	16,536.4
Ivano-Frankivska	-	16.8
Kharkivska	2,274.9	12,729.2
Khersonska	0.2	89.3
Khmelnytska	-	22.1
Kirovohradska	-	9.6
Kyiv (city)	43.9	2,177.6
Kyivska	458.8	2,308.4
Luhanska	758.4	3,678.6
Lvivska	-	173.2
Mykolaivska	238.2	1,291.8
Odeska	-	203.2
Poltavska	-	71.3
Rivnenska	-	10.3
Sumska	255.9	2,417.1
Ternopilska	-	11.4
Vinnytska	-	32.2
Volynska	-	2.1
Zakarpatska	-	9.2
Zaporizka	84.1	171.0
Zhytomyrska	37.9	165.8
Nationwide (no specific region)	-	264.3
Total	**9,663.9**	**47,472.1**

Source: World Bank calculations based on data provided by the KSE.

Note: - = not available or no damage reported.

Reconstruction and Recovery Needs, including Build Back Better

Total reconstruction and recovery needs for the commerce and industry sector are US$20.8 billion, estimated over 10 years. Reconstruction needs for infrastructure and assets under a build back better approach are estimated in total as US$16.9 billion, with US$5.1 billion in the immediate/short-term and US$11.8 billion in the longer term. This means that over 80 percent of the estimated needs for this sector are for rebuilding and modernizing buildings, equipment, and inventory. Recovery needs to restore service delivery and to build back better total US$3.9 billion, with US$1.5 billion in the short term and US$2.4 billion in the longer term (Table 40).[188]

Regionally, the oblast with the highest reconstruction and recovery needs is Donetska, followed by Kharkivska, Luhanska, Chernihivska, and Kyivska oblasts (Table 41). Short-term construction needs in the three Eastern oblasts of Donetska, Kharkivska, and Luhanska total US$4.2 billion, or 84 percent of the total short-term reconstruction needs. The

188 Reconstruction needs were calculated as a multiplier of damage to account for "building back better." Recovery needs were calculated as a proportion of that multiplier, allocated between the short and long term.

Table 40. Recovery and reconstruction needs by category (US$ million) as of June 1, 2022

Category	Component	Immediate/short term	Medium- to long-term	Total
Reconstruction needs	Industry	3,906.2	9,114.4	13,020.5
	Commerce	1,167.4	2,723.9	3,891.3
Service delivery restoration needs	Industry	1,171.8	1,822.9	2,994.7
	Commerce	350.2	544.8	895.0
Total		**6,595.6**	**14,205.9**	**20,801.5**

Source: World Bank calculations based on data provided by the KSE.

Table 41. Recovery and reconstruction needs by oblast (US$ million) as of June 1, 2022

Oblast	Needs category	Short-term	Medium- to long-term needs	Total
Kyiv (city)	Infrastructure	23.05	53.78	76.83
	Service delivery	6.91	10.76	17.67
Donetska	Infrastructure	2,619.49	6,112.15	8,731.64
	Service delivery	785.85	1,222.43	2,008.28
Zhytomyrska	Infrastructure	19.89	46.41	66.29
	Service delivery	5.97	9.28	15.25
Zaporizka	Infrastructure	44.13	102.97	147.10
	Service delivery	13.24	20.59	33.83
Kyivska	Infrastructure	240.87	562.03	802.90
	Service delivery	72.26	112.41	184.67
Luhanska	Infrastructure	398.15	929.02	1,327.18
	Service delivery	119.45	185.80	305.25
Mykolaivska	Infrastructure	125.06	291.82	416.88
	Service delivery	37.52	58.36	95.88
Sumska	Infrastructure	134.33	313.44	447.77
	Service delivery	40.30	62.69	102.99
Kharkivska	Infrastructure	1,194.32	2,786.75	3,981.07
	Service delivery	358.30	557.35	915.65
Khersonska	Infrastructure	0.00	0.00	0.00
	Service delivery	0.03	0.05	0.08
Chernihivska	Infrastructure	274.14	639.67	913.81
	Service delivery	82.24	127.93	210.18
Total		**6,595.51**	**14,205.69**	**20,801.20**

Source: World Bank calculations based on data provided by the KSE.

rebuilding of destroyed and damaged factories in this region accounts for the bulk of the reconstruction needs.

Principles for addressing the needs of commerce and industry are incorporated into the Government of Ukraine's plans for revitalizing the economy and building back better. They include recognition of key sectors that have contributed significantly to the economy but have been hurt by the conflict, such as metallurgy and machine-building. Agriculture is of course identified as a critical sector, with agro-industry as a key component. Priorities for reconstruction should include facilities involved in these industries, including manufacturing factories, food-processing facilities, and warehouses. Construction is also crucial since it has suffered losses during the conflict and will be critical for rebuilding. Strengthening the business climate, facilitating access to funding, rebuilding and upgrading logistics, and boosting human capital will help businesses build back better and are all identified as needs by the government. Additionally, greater integration with the European Union (EU) and unlocking of access to new markets will require businesses to adapt greener, more sustainable technologies.

Options to support businesses, as confirmed through qualitative interviews with sector experts, should include soft loans, grants or matching grants to address the liquidity needs for micro and small enterprises in the short run, financing to sustain employment, financing for production equipment/machinery, credit guarantee schemes to restore warehouses, support for exporting firms through product certification, and restoration of linkages with foreign investors. Given the huge numbers of employees in retail and wholesale trade (approximately 3.6 million in 2020), reigniting the growth of shops is a vital need. Lastly, in the medium term, government should facilitate the growth of the private sector by undertaking structural reforms that increase competition, ease business operation, and enable firms to work transparently.

Limitations and Recommendations

Revitalizing the commerce and industry sector is a priority, given that millions of employees and employers depend on this sector for their livelihoods, and given its contribution to critical needs during reconstruction, such as construction, food industry businesses, and key manufacturing. The following are priority recommendations to support commerce and industry in the short term:

- Provide financial support to firms in the form of loans, grants, and guarantees to allow viable firms to survive and reconstruct and modernize assets, and to allow new entrants to emerge. Trade finance instruments could help firms access new markets.
- Rebuild the logistics infrastructure needed for access to inputs and markets.
- Streamline business regulations to make it easier to start and restart businesses and to enter into new product lines and delivery models.
- Facilitate domestic and foreign investment to rebuild key industries.
- Ensure private sector participation in reconstruction efforts and promote linkages with SMEs in priority sectors for recovery and investment, such as construction, transport, and logistics.

In the medium to long term, efforts to build back better should continue, emphasizing green and digital technologies to build resilient businesses. Financial support to firms, including efforts to facilitate access to credit, should also continue. Addressing business, investment, and trade climate obstacles that were present before the conflict—such as trade harmonization with the EU, competition issues, and state-owned enterprise reform—should be a priority. Direct technical assistance to firms—potentially focused on sectors critical to growth like agribusiness, metallurgy, machine-building, and IT—could help them enter new markets, move into higher-value-added products, and adapt more sustainable practices. Women-owned and -managed firms could be targeted for financial and nonfinancial support.

Given that the conflict is ongoing, prioritization of needs is difficult and will continue to change. A more extensive survey of firms, with regional and cross-sector coverage, would provide a fuller picture of damage and losses. Verification is also difficult with ongoing conflict,[189] but possible in areas where the conflict has subsided.

189 Damage to larger firms was verified to the extent possible with media reports and occasionally satellite imagery.

This analysis faced several limitations. It was informed by qualitative interviews with sector experts that also helped to back up recommendations. This analysis also built on information collected from several business associations, but information on damage and losses was not regionally specific and often not sector specific. Specific limitations in the data and analysis for this section that can hopefully be addressed in subsequent analyses include the following:

- Regional data were unavailable for some oblasts that likely suffered from the conflict.
- For commerce, no regional breakdowns of the data were available. An indirect method was used to assign damage and loss proportions based on the impacts on small firms, since most commerce outlets are small firms.
- Damaged assets and values were not available for most firms, especially smaller ones. The assumptions used were based on financial reporting and led to best estimates.
- Losses were calculated based only on sales losses, although inflated to account for other losses. For large and state-owned enterprises, the sales losses likely did not cover the full scope of losses, since firms that did not suffer any physical damage likely still suffered economic losses. Ideally, data for estimating losses in productivity and other indirect costs, like rental fees, could be collected for subsequent analyses.
- Sector breakdowns of small firms were not available and could not be indirectly estimated.
- Needs calculations were based on calculated damage to the sector. Given the immense nationwide losses faced by this sector, these calculations may be underestimated.

FINANCE AND BANKING

Summary

The Ukrainian financial sector has been significantly impacted by the war. The banking system entered the war in relatively good condition and banks remain operational. However, loss of assets, collateral and revenues will severely affect banks' profitability and solvency. During March-May, the banking sector accounted for US$1.1 billion of loan loss provisions for expected war-related credit losses. It can be anticipated that the nonbank financial institution (NBFI) sector will also suffer significant losses as a result of the invasion on top of prewar vulnerabilities. Given its small size, NBFIs are not expected to have systemic impacts on the overall financial system. **From the preliminary estimates, the total damage is estimated at US$26.3 million and potential losses suffered by the banking sector are expected to be US$8.1 billion;** however, data on NBFIs is very limited. It will take many months for the true extent of damage to the financial sector to become fully apparent/quantifiable. The quantification of losses also does not recognize the inherent risks posed to the gains made over recent years by reforms to the financial sector, such as relaxation of prudential and state-owned bank (SOB) governance rules; nor does it recognize the potential delays to the implementation of further reforms as a result of the need to address postwar problems first. **Based on current conditions as of June 2022, the total cost for reconstruction and recovery needs is estimated at US$8 billion, with US$6.4 billion for the short term and US$1.6 billion for the medium term.**

Background

Ukraine's financial system is dominated by banks, with significant state ownership. Banks account for 88.6 percent of total financial system assets;[190] around 47 percent are state-owned, 31 percent are foreign, and 22 percent private banks (see Table 42). The Ukrainian banking sector lacks depth, with a private sector loan-to-GDP (gross domestic product) ratio at 28.2 percent in 2020, compared to a 57.5 percent average in the Europe and Central Asia region (excluding high-income countries). Furthermore, the nonbank sector is underdeveloped and requires further strengthening of the regulatory and supervisory framework and financial system infrastructure.

Following measures adopted in the aftermath of the 2014–2015 crisis, the Ukrainian banking system entered the war in relatively good condition; but it faces heightened operational, credit, market, profitability, solvency and liquidity risks as a result of the war. Due to stringent regulatory and supervisory measures, systemwide capital adequacy stood at 18 percent and the aggregate nonperforming loan (NPL) ratio at 30 percent at end-2021 (down 11 percentage

Table 42. Financial institutions regulated by National Bank of Ukraine (NBU), end-2021

Financial institutions	Number	Total assets (UAH billion)	Share of total (%)
Banks	71	2,054	88.6
Credit unions	278	2.3	0.1
Financial companies	935	195.2	8.4
Pawnshops	261	3	0.1
Insurance companies	155	63.6	2.7

Sources: NBU; World Bank staff calculations.

190 This figure does not include collective investment institutions and pension funds.

Table 43. Evolution of banking sector soundness

	2013	2014	2015	2016	2017	2018	2019	2020	2021
Capital adequacy ratio (%)	18.3	15.6	12.3	12.7	16.1	16.2	19.7	22.0	18.01
NPLs as share of total loans (%)	12.9	19.0	28.0	30.5	54.5	52.9	48.9	41.0	30.0
Liquid assets to total assets (%)	20.6	26.4	33.0	48.5	53.9	51.1	72.3	69.1	69.2
ROA (%)	0.3	-4.2	-5.5	-12.5	-1.8	1.6	4.7	2.8	4.5
ROE (%)	1.7	-32.0	-65.5	-122.2	-15.3	14.6	37.6	21.7	37.9
Customer deposits to total (non-interbank) loans (%)	73.3	64.5	71.2	80.5	84.6	81.8	103.1	139.0	140.3
FX-denominated loans to total loans (%)	34.7	47.7	57.9	51.4	47.5	46.5	41.2	39.1	32.0
Share of state bonds in bank assets (% of total assets)	7.0	7.9	7.0	19.4	26.1	29.9	24.5	31.7	28.6

Sources: NBU; World Bank staff calculations.

Note: ROA = return on assets; ROE = return on equity.

points compared to a year earlier). Bank profitability and liquidity were high; all 13 systemically important banks had liquidity coverage ratios (LCRs) of more than 150 percent (as of January 1, 2022), at least 50 percent above the required minimum. About a third of the loan portfolio and deposit liabilities are denominated in foreign exchange (FX), a key source of vulnerability in case of sustained currency depreciation and/or economic contraction. Another important vulnerability relates to possible negative feedback loops between Ukraine's fiscal accounts and the banking system given its large exposure to the government sector. See Table 43 for detailed information.

The payment infrastructure continued to develop while the number of branches declined. Compared with 2020, the number of point-of-sale (POS) terminals in retail and service networks grew by 13.7 percent to 426,500, of which 393,600 (92.3 percent) were contactless terminals. Overall, the number of POS terminals in retail and service networks in the last five years almost doubled, from 232,100 to 426,500. At the same time, there was a gradual annual drop in the number of banking devices (ATMs, self-service kiosks etc.). With clients switching to online transactions, banks were able to optimize their branch networks. The number of branches declined by 21 percent, from 8,271 to 6,607 branches, over the last four years.

The insurance sector, although small in size, already faced issues prior to the war. The National Bank of Ukraine (NBU)—the regulator of the insurance sector since mid-2020—started activities to strengthen the sector, but the war interrupted this work. By the end of 2021, the number of insurers was reduced by 25 percent (from 210 in 2020 to 155 in 2021). As of end-2021, the number of insurance companies that violated solvency requirements was significantly lower than in previous periods,[191] but vulnerabilities remain. Ukraine's insurance penetration (the ratio of premiums written to GDP) remains low by international standards at just 1.14 percent in 2021. Life insurance companies account for only 0.13 percent of the market as measured by net premiums.

Damage and Loss Assessment

While the electronic payment system infrastructure has remained fully operational since the start of the war, banks face a number of operational challenges. According to NBU, about 85 percent of bank branches operated as of mid-June, while online financial services are fully available to all bank clients with internet connectivity. Banks are gradually resuming operations in the recently recovered northern regions, while in the southeast the safety situation remains dire. NBU has taken measures to safeguard its operations to the extent possible. The operation of the electronic payments system has

191 As of January 1, 2022, only four insurers violated at least one of the two solvency standards (source: *Link*), versus 44 insurers as of January 1, 2021 (source: *Link*).

been transferred to a contingent location, and thus the local wholesale payment system is currently fully operational.

Liquidity remains at sufficient levels, given a relatively stable deposit base and refinancing support from the NBU. Outflows of hryvnia retail deposits were short-lived. The deposit base has grown since the start of the war due to regular wage and social payments to bank accounts and limits on deposit withdrawal, but primarily due to customer trust in banks. Overall, since the beginning of the war until mid-June, retail hryvnia deposits surged by 20 percent, while FX deposits declined by 4.9 percent. At the same time, corporate hryvnia deposits rose by 4.1 percent, while corporate FX facilities declined by 4.9 percent. Anticipating possible future withdrawals, NBU introduced an unsecured refinancing facility.[192] As of mid-June, outstanding NBU refinancing loans amounted to US$4.5 billion (UAH 132 billion), or approximately 10 percent of liabilities, which is only US$170 million (UAH 5 billion) more than on the day before the war.

Loss of business revenues and household incomes as well as collateral will significantly impact the quality of banks' loan portfolios. The size of such credit losses is very hard to estimate at this stage of the war and economic crisis. Banks offered "credit holidays" for almost all borrowers in spring and also waived fees and commissions while making full and timely interest payments on deposits. The crisis has already started to take its toll on banks. During March-May, the banking sector accounted for US$ 1.1 billion (UAH 33 billion) of loan loss provisions for expected war-related credit losses. About a third of the loan portfolio is denominated in FX, which is another source of vulnerability. At the same time, several significant anti-crisis regulatory forbearance measures have been introduced, including deferral of sanctions on banks that breach minimum regulatory requirements (except for related party lending) during martial law. Audits of banks' statements for 2021 and regular annual stress tests/asset quality reviews (AQRs) have been postponed.

Since the start of the war, four banks have been declared insolvent—two subsidiaries of Russian state-owned banks and one private bank. On February 25, 2022, NBU decided to revoke the banking license of two Ukrainian subsidiaries of Russian banks (Sberbank and Prominvestbank) and sent them into liquidation. These subsidiaries accounted for only 2 percent of the total banking sector assets, since their activities had been curtailed after 2014. A decision of the National Security Council (vetted by the president and the Parliament) was taken to expropriate the shares and a part of the assets and liabilities of these two subsidiaries. The National Investment Fund of Ukraine will become a de facto public asset management company for these assets. Megabank (a private bank accounting for 0.5 percent of total assets) was declared insolvent in June, 2022. Bank Sich (a private bank, accounting for 0.3 percent of total assets) was declared insolvent in August 2022.

The NBFI sector is also expected to be impacted significantly, although data are still very scarce. Operations of nonbank financial services providers have been seriously affected by the war. The sector has shown itself to be vulnerable to operational risk, and a large number of companies either suspended their activities or had to close. Further on, NBFIs might face the materialization of liquidity and credit risks and an eventual deterioration of their financial performance. Insurance premiums of reporting insurance companies declined sharply in the first quarter of 2022 (14 percent for life and 25 percent for non-life). The effective suspension of reinsurance services raises risks for Ukrainian insurers. In the meantime, some international companies refuse to enter into reinsurance agreements with Ukrainian insurers due to high risks. The quality of credit unions' loan portfolio is deteriorating; consumer loans dominate the portfolio, and activities of finance companies, pawnshops, and lessors have slowed since the start of the war. Only two-thirds of insurers and even fewer credit unions, finance companies, pawnshops, and lessors managed to report on their performance in the first quarter of 2022. Some of the institutions that failed to provide reports have closed their business. The condition of the sector can be assessed accurately only after reporting resumes.[193]

Based on current conditions as of June 2022 as well as available data, the total cost for damage is estimated at US$26.3 million and losses is estimated at US$8.08 billion (see Table 44 and Table 45). Damage was estimated using data on banks' fixed

192 The maximum amount of support available for banks is capped at 30 percent of prewar retail deposits.
193 NBU, "Financial Stability Report," June 2022, *Link.*

Table 44. Damage inventory by asset type (US$ million) as of June 1, 2022

Bank type	Asset	Baseline	Temporarily not under government[a]	Other territories	Total cost
National Bank of Ukraine	NBU premises	-	-	-	-
Banks	SOBs	470.5	17.4	0.8	18.1
	Private banks (foreign and domestically owned)	589.5	5.2	3.0	8.2
Total damage		**1,060.0**	**22.6**	**3.8**	**26.3**

Sources: NBU; World Bank staff calculations.

a. The territories temporarily not under government control include the Cabinet of Ministers' list of territorial communities located in the areas of current military operations, close to them, or temporarily not under government control. They do not include recently reclaimed Kyivska, Chernihivska, and Sumska oblasts.

Table 45. Loss inventory by category (US$ million) as of June 1, 2022

Bank type	Loss	Baseline	Total cost
Public (SOBs)	Loan losses (estimated as ~29% of net loans)	9,904	2,872
	Cash	1,315	8.2
	Due from banks in Russia	0	0
	Investment property	136	0.1
	Property received by the bank as a pledgee	158	0.6
Private (Foreign and domestically owned)	Loan losses (estimated as ~29% of net loans)	17,624	5,111
	Cash	1,418	9.0
	Due from banks in Russia	80	80
	Investment property	89	1.5
	Property received by the bank as a pledgee	85	1.5
Total loss			**8,084**

Sources: NBU; World Bank staff calculations.

assets as well as a recently conducted NBU bank survey on damage.[194] Credit losses were estimated at 29 percent in line with NBU's upper range estimates outlined in its 1H Financial Stability Report.

Reconstruction and Recovery Needs, including Build Back Better

Based on current conditions as of June 2022, the total cost for reconstruction and recovery needs is estimated at US$6.4 billion in the short term and US$1.6 billion in the medium term (Table 46). In aggregate, total sector needs are US$8 billion. Infrastructure needs were calculated based on a recently conducted NBU bank survey on damage and estimates for territories where banks are not currently able to conduct proper assessments of damage to their infrastructure.[195] Additional provisions for banks' credit losses were calculated by estimating overall credit losses at 29 percent in

194 Using fixed assets data as of June 1st as a baseline, an assumption was made on the amount of damages in territories temporarily not under government control. For other territories, data on damages from a bank survey conducted by NBU (as of end April) was used for the calculations.

195 Using fixed assets data as of June 1st as a baseline, an assumption was made on the amount of damages in territories temporarily not under government control. For other territories, data on damages from a bank survey conducted by NBU (as of end April) was used for the calculations.

Table 46. Recovery and reconstruction needs by category (US$ million) as of June 1, 2022

Public/private	Immediate / short term	Medium / long term	Total
Central bank infrastructure	-	-	-
SOB infrastructure	16.3	10.9	27.2
Additional provisions for SOB credit losses	2,298	574	2,872
Public total	**2,314**	**585**	**2,899**
Private bank infrastructure	7.4	4.9	12.3
Additional provisions for private banks credit losses	4,089	1,022	5,111
Private total	**4,096**	**1,027**	**5,123**
Total	**6,410**	**1,612**	**8,023**

Sources: NBU; World Bank staff calculations.

Note: - = not available. All costs shown are for restoration of service delivery.

line with NBU's upper range estimates outlined in its 1H Financial Stability Report.

Critical actions are required to safeguard the financial system, maintain confidence, and minimize fiscal costs. At the same time, a solvent, liquid, and operationally sound financial sector will be key to provide financing to the economy during and after the war. Financial sector policy reforms should focus on (i) preserving financial stability and maintaining public confidence, (ii) strengthening readiness for resolution, (iii) safeguarding institutional frameworks, and (iv) enhancing the financial sector's contribution to addressing fiscal and private sector needs. Coordinated efforts by all financial market players—financial institutions, NBFIs, the NBU, National Securities and Stock Market Commission (NSSMC), and other market regulators—along with the effective support of public authorities, in particular the Ministry of Finance, are needed to ensure financial stability during the war and in the recovery/reconstruction phase.

In the short term, authorities will need to closely monitor the situation and get an early understanding of the impact of the war on the financial sector. They will also need to plan steps to be taken in the recovery/reconstruction phase, as follows:

- **Undertake an initial assessment of the losses of financial institutions (in particular banks and insurance companies).** Financial institutions should be required to present plans on how they will recapitalize to meet prudential requirements. Using the results as a starting point, an assessment of individual institutions' viability on a forward-looking basis should be conducted.

- **Develop a financial sector restructuring strategy.** This should include modalities of governance, transparency, and financing.

- **Ensure the financial sustainability of the Deposit Guarantee Fund (DGF).** Ensure that the DGF has sufficient funds to cover insured deposits at banks with the highest likelihood of becoming insolvent.

- **Plan, adjust, and implement further time-bound policy and regulatory responses to the changing environment.** The goal is to ensure undisrupted functioning of the critical operations of the banking sector.

- **Develop a carefully calibrated plan for phasing out special measures put in place during the war.** These should be gradually replaced with standard measures or refined laws and regulations to address the current situation.

- **Reform NPL resolution mechanisms** and create markets/mechanisms for distressed assets.

- **Provide financial support to corporates** that have been affected by the war but remain viable if going through a comprehensive and orderly corporate restructuring program. Such funding would need to have a transparent and clear governance mechanism and would need to be well integrated with the restructuring proceedings.

- **Develop assistance programs for insured parties.** These will be needed by those who have suffered significant losses, and where the obligations of insurers are uncertain or force majeure clauses have been enacted.

- **Provide financial support to corporates** that have been affected by the war but remain viable if going through a comprehensive and orderly corporate restructuring program. Such funding would need to have a transparent and clear governance mechanism and would need to be well integrated with the restructuring proceedings.

- **Develop well-designed, time-bound financial support programs** that target affected borrowers and sectors using transparent rules and governance mechanisms. Policy responses will need to minimize opportunities for moral hazard and rent-seeking and adhere to sound credit risk management practices and independent governance arrangements at SOBs, while facilitating the effective allocation of new credit. A special war insurance pool should be developed and the Partial Credit Guarantee Fund for small farmers operationalized.

In the medium term, implementation of critical reforms in the financial sector should be continued in line with international standards and EU Directives, aimed at enhancing financial stability, facilitating sustainable development of the banking sector, and promoting sustainable financial system diversification and inclusion. Benefits surrounding the creation of a development finance institution should be assessed which would allow for a single institution to coordinate the utilization of reconstruction funds and assure proper controls are in place so that both the government's priorities are met as well as those of the donors.

Limitations and Recommendations

This financial sector needs assessment is based on a wide range of inputs and data from diverse sources, including NBU and surveys of financial sector institutions. The assessment also used expert opinions and secondary data where possible. However, these estimates are based on currently available information, which is largely anecdotal and unsupported by the data needed for precision. It will take many months for the true extent of damage to the financial sector to become fully apparent. The quantification of losses also does not recognize the inherent risks posed to the gains made over recent years by reforms to the financial sector, such as relaxation of prudential and SOB governance rules; nor does it recognize the potential delays to the implementation of further reforms as a result of the need to address postwar problems first.

INFRASTRUCTURE SECTORS

Irpin. Photo by Julia Burlachenko for the World Bank.

ENERGY AND EXTRACTIVES

Summary

As of June 1, 2022, the war has resulted in the total damage of around US$3 billion for the energy sector, while the aggregate estimated losses total US$11.7 billion. The value of damage includes damage in the power sector (US$1.4 billion), district heating (US$0.7 million), gas sector (US$0.5 billion), transport fuel sector (US$0.4 billion), and coal mining (US$0.1 billion). The losses include lost revenues and production decreases, higher costs, losses due to deterioration of liquidity positions, and losses due to lost access to energy services. **The total reconstruction and recovery needs in the public sector are estimated at US$10.4 billion, including US$7.3 billion for the immediate/short term and US$3.1 billion for the longer term (up to 10 years).** Given that the energy sector provides critical services, the above reconstruction and recovery investments are all considered as pressing. In addition, part of the losses can also be considered as pressing for short-term operations of the energy sector. This includes the need to close liquidity gaps in the power sector transmission system operator (TSO) (Ukrenergo) and other stakeholders in the amount of US$2.6 billion. Naftogaz needs at least US$5 billion only for purchasing gas for the next heating season.[196] For the extractives sector, in the context of limited data available, US$0.1 billion of damage, US$0.3 billion of losses, and US$0.3 billion of needs were identified in addition to the energy sector estimates. In addition to the physical damages and loses generated by the war, some key energy market and governance reforms are suffering delays due to the need to implement temporary emergency measures to ensure the provision of basic energy services to the population.

Background

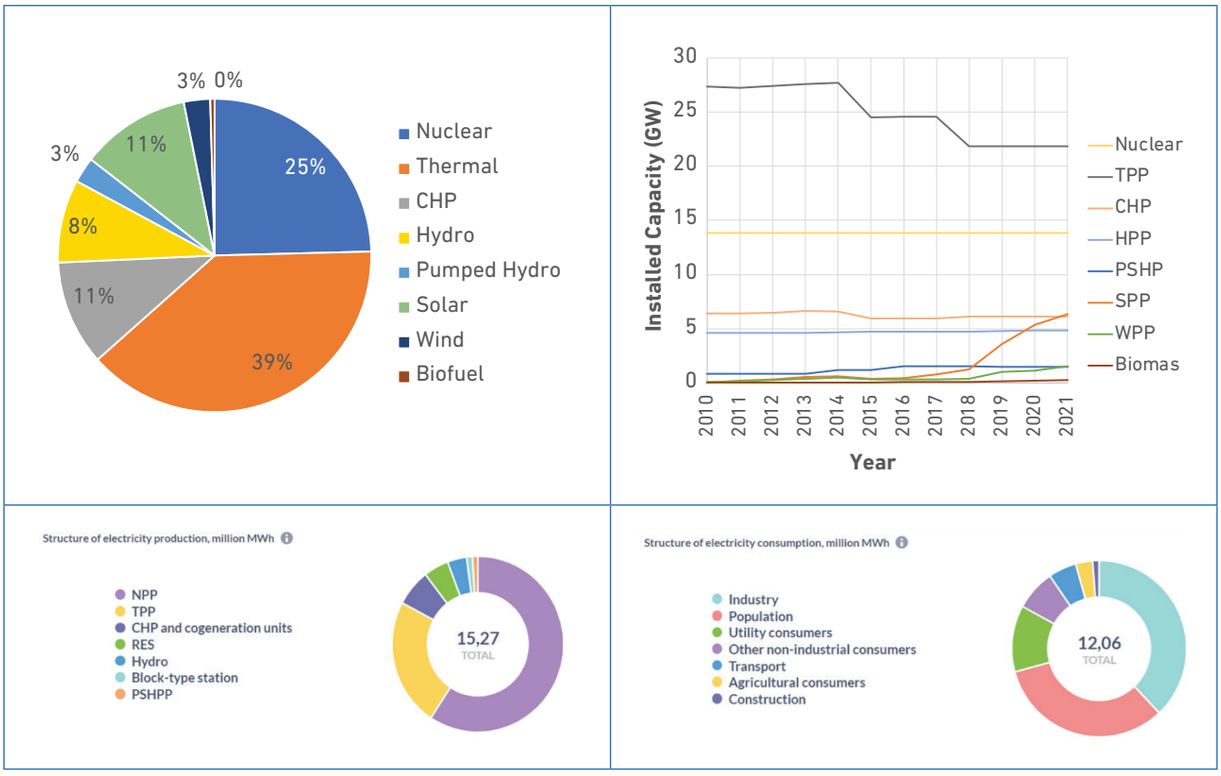
Before the onset of the war, the energy sector played a key role in Ukraine's economic growth as well as its national security, and increasingly supported the country's goal to modernize the economy. The energy supply sector represented 17 percent of gross domestic product (GDP), with gas transit fees from Russia representing about 0.3 percent of GDP.[197] Fossil fuels accounted for about 66 percent of the total primary energy supply in 2020, with the remainder covered by nuclear power (~27.5 percent) and renewables and waste-to-energy (~6.5 percent). Ukraine has traditionally relied on energy imports, which accounted for 31 percent of its natural gas, 48 percent of its coal, and 84.5 percent of its oil and oil products in 2020.[198] Ukraine was also entirely dependent on Russian imports for nuclear fuel. Prior to the war, the largest share of final energy consumption was in the residential and industrial

196 The needs for the energy sector also include the short-term need for purchasing natural gas for the upcoming heating season (around 4.8 bcm), that would generate a financial gap in Naftogaz of around US$5 billion. It is estimated that Naftogaz could need some 4.8 billion cubic meters (bcm) of additional gas to reach the estimated required level 15 bcm. Naftogaz will use its produced gas (up to 1.4 bcm), purchase from domestic producers/private stored gas (1.3 bcm), and import the remaining amount (2.1 bcm). The value of this volume can vary depending on the import price. Assuming that the domestic price for the gas from other domestic producers will be around US$1,000 and that imported gas is purchased at US$ 2,000 per 1,000 cubic meter, the total purchase costs would be US$ 5.1 billion if the import price is US$2,000, and US$7.2 billion if the import price is $3,000. Considering the selling price of the gas for Naftogaz at the level of US$190 per 1,000 cubic meters, the financial gap would be US$4.37 billion if the import price is US$2000 and US$6.47 billion if the import price is US$3,000.

197 Gas transit via the territory of Ukraine has undergone substantial changes since independence. The construction of pipelines (Blue Stream in 2003, Nord Stream 1 in 2011, and TurkStream in 2020), gas disputes between Ukraine and Russia, and the development of the liquefied natural gas (LNG) market have contributed to further reduction of gas transit through Ukraine over the last few years.

198 In 2021, Ukraine imported anthracite coal from Russia, Spain, Belarus, Germany, and Poland; petroleum products from Belarus, Russia, and Germany; and crude from Azerbaijan, Libya, the United States, Latvia, and Lithuania. Natural gas is imported from Poland, Slovakia, and Hungary, which are essentially purchases of portions of Russian gas volumes sold to European buyers through netting.

Figure 21. Installed capacity at the end of 2021 (top left), historical trend (top right), and structure of electricity generation (bottom left) and consumption (bottom right)



Source: Elaborated based on Energy Map. Link.; own elaborations.

Note: CHP = combined heat and power; HPP = hydropower plant; NPP = nuclear power plant; PSHP = pumped storage hydropower plant; RES = renewable energy source; SPP = solar power plant; TPP = thermal power plant; WPP = wind power plant.

sectors, representing 28 percent and 33 percent, respectively.[199] Before the war, Ukraine's electricity network operated in a synchronized way with the Integrated Power System (IPS)/Unified Power System of Russia (UPS), even if the country had been working since 2016 toward synchronization with the European network.

Electricity: **Of the total installed power generation capacity, estimated at 56.2 GW, about half (27.9 GW) consists of thermal power plants (TPPs) (Figure 21).** Coal-fired power plants account for 80 percent of the TPPs. Nuclear power plants account for 24.6 percent (13.8 GW) of the installed capacity, while hydropower plants, including pumped storage hydropower plants, represent 11.2 percent (6.3 GW) of the total installed capacity. Of the total electricity production of 130,753 GWh in 2020, 76,203 GWh (58 percent) was generated by nuclear power plants, while 42,852 GWh (33 percent) came from coal TPPs, 11,257 GWh (9 percent) from natural gas TPPs, and 441 GWh (0.3 percent) from oil TPPs. Nonrenewable sources accounted for over 91 percent of the total electricity production. Renewable energy (RE) resources accounted for 14,500 GWh, composed as follows: 7,487 GWh from hydropower, 2,933 GWh from solar photovoltaic (PV), 1,932 GWh from wind, 384 GWh from bioenergy, and 129 GWh from other types of RE resources. The amount of solar PV and wind production has been increasing rapidly due to the attractive feed-in tariff (FIT) program. In 2022, generation amounts are expected to reach 8,020 GWh from solar PV and 5,750 GWh from wind.

Generous FITs for renewables resulted in the addition of significant privately owned RE assets to the generation mix in the last few years, but an inadequate tariff system led to high accumulated large arrears among the RE developers in 2020 and 2021. Most of the arrears to RE developers were settled after eurobond issuance by Ukrenergo (the transmission system operator) in December 2021, but

199 Ukrainian Statistics Agency, "Ukrainian Energy Balance for 2020." Link.

the transmission tariff is not yet fully cost-reflective, and new arrears kept accumulating.[200] On August 26, 2021, the Ministry of Energy (MoE) announced the publication of the draft Law on Amendments to Certain Laws of Ukraine on Stimulating the Production of Electricity from Alternative Energy Sources on a Market Basis, which introduced a feed-in-premium support scheme for renewable projects, to replace the FITs.

Gas: **Ukraine has 36,700 km of fully automated gas pipelines to deliver Siberian gas to Germany, the Czech Republic, Slovakia, Romania, Hungary, and Poland.** While gas transit has continued after independence, the Orange Revolution in 2004 and the Revolution of Dignity in 2014 led to a reduction of transit volumes. The construction of Nord Stream 1 and 2 and other pipelines, gas disputes between Ukraine and Russia, and the development of the liquefied natural gas (LNG) market have contributed to further reduce gas transit through Ukraine in the last few years. However, before the war, transit fees still represented about 0.5 percent of GDP.

District heating: **Ukraine has a relatively well-developed but highly inefficient district heating infrastructure fueled by gas and coal that relies on heat-only boilers (60 percent) and combined heat and power plants (40 percent).** Decades of underinvestment have led to very high losses. For example, Ukraine requires an average of 250–400 kWh per m^2 per year in heating, compared with 180 kWh in Germany, 150 kWh in Scandinavia, and 60–80 kWh in buildings constructed with energy-saving technologies. Most district heating systems are inefficient and operating beyond their lifetime, and boilers are typically oversized and with limited temperature controls.[201] Most customers also lack metering and temperature controls, providing limited incentives to avoid wasting energy.

Energy efficiency (EE) in energy demand (productive) sectors: **Among countries in Europe and Central Asia, Ukraine has the fourth lowest EE score (47), according to the Regulatory Indicators for Sustainable Energy (RISE) 2020 report.**[202] Until very recently (November 2021) it was the only member of the European Energy Community without an energy efficiency law. The potential for energy saving is greatest in industry (33 percent) and the residential sector (30 percent), but there are also significant opportunities in the efficient provision of public sector services. The building stock is in dire need of renovation: energy consumption per square meter of government buildings built between 1978 and 1988 is on average more than three times consumption for class B energy-efficient buildings; if built during the same period, hospitals consume more than twice and schools more than three times the energy of class B energy-efficient buildings.

Ukraine's electricity system has maintained stable operations since the beginning of the war. Amidst the war, Ukraine reached a historical milestone in relation to its power system by starting synchronized operations with the European network (European Network of Transmission System Operators, or ENTSO-E) on March 16, 2022. Emergency synchronization was authorized by ENTSO-E upon the successful completion of isolated test modes (required as part of the synchronization protocol). This allowed Ukraine to benefit from automatic reserves that help stabilize the electricity grid. Since then, the transmission grid has maintained its stability despite local disturbances incidental to indiscriminate shelling. However, the take-over of nuclear power plants (Chernobyl and Zaporizka) and hydropower plants has created episodes of very high security risks for Ukraine and Europe.

Electricity exports: **The drop in electricity demand in Ukraine has created an attractive opportunity to generate revenues for the sector and partially compensate for sectoral deficits through electricity exports.** Exports to Europe would be particularly profitable for Ukraine given high market prices and the cheap generation available in Ukraine. Preliminary estimates indicate that around US$140 million could be generated per month. Ukraine was allowed to initiate export to ENTSO-E and currently is working to gradually increase the capacities for electricity export, which would allow increased revenues. Additional technical measures, including STATCOMS and other requirements are required by ENTSO-E to maximize exports without creating stability issues. By the end of 2022, Ukraine expects

200 Outstanding debt of Guaranteed Buyer to renewables for the electricity supplied in 2021 stands at UAH 9.6 billion.

201 According to the State Statistics Service of Ukraine, there were about 31,000 boiler houses with a total installed capacity of 111.8 GW at the end of 2014. No further assessments were performed. The experts of the Partnership for Market Readiness (PMR) project in Ukraine (2016–2021) have estimated 1,000+ boiler houses with installed heat generation capacity that would fall under the mandatory reporting of the Monitoring, Reporting and Verification (MRV) system within territories under the government's control.

202 World Bank. *Link*.

to be able to export 800 MW a day, but this would need to be authorized by ENTSO-E.[203] In addition, Energoatom is in negotiations with Poland on additional electricity export to Poland once the electricity line for this export is restored (within 1 –1.5 years). It must be noted that at the end of March, on an exceptional basis, some commercial exchanges with Poland had been already accepted on an isolated line linking the 510 MW Dobrotvir TPP (owned by DTEK company) in Western Ukraine to Zamost in Poland, with flows mutually beneficial to Ukraine, as well as to Ukrainian and Polish companies. In addition, on May 12, Ukraine started electricity exports to Moldova through a bilateral contract between Ukrhydroenergo (the state-owned hydro generator) and Moldovan Energocom (providing 30 percent of consumption in Moldova). More recently, initial electricity exports were permitted by ENTSO-E in June 2022 (initially only around 100 MW, then increased up to 250MW after July 30). Ukrenergo is working on necessary measures, as requested; the full set of grid measures can be completed only by mid-2023. However, the war has created a financial gap in the sector, which needs an injection of liquidity to continue services till revenue collections and export revenues materialize.

Institutional arrangements: The key players in Ukraine's energy sector governance and regulatory framework are the Cabinet of Ministers of Ukraine (CoM), the MoE, and the National Energy and Utilities Regulatory Commission (NEURC). CoM is the highest executive body responsible for collective decision-making. MoE forms and implements state policy within the energy sector, and it reports to the CoM as well as to the Parliament (Verkhovna Rada) and the Presidential Administration. MoE is also responsible for developing the energy strategy of Ukraine until 2035, tracking and monitoring results while submitting annual progress reports. In addition, MoE measures economic incentives, monitors and reports on energy demand and forecasts, and defines strategy and methodology for constructing facilities for energy generation. MoE is one of the main bodies responsible for the management and oversight of energy state-owned enterprises (SOEs).[204] The third player along with CoM and MoE is the National Energy and Utilities Regulatory Commission, which remains central to regulating the country's energy sector, particularly in setting tariff policies and in implementing relevant pricing formulation.

Other institutions responsible for the formation and implementation of national energy and climate policies include the Ministry of Environmental Protection and Natural Resources. This ministry is responsible for geological study and rational use of subsoil; protection of the natural environment; geological control and control in the sphere of ozone layer protection; regulation of the negative anthropogenic impact of climate change and adaption to climate change; and fulfillment of requirements under the United Nations Framework Convention on Climate Change (UNFCCC). In addition, the State Agency on Energy Efficiency and Energy Saving is a central executive authority and operates under the coordination of the MoE. It implements the state policy for efficient use of fuel and energy resources, energy saving, renewable and alternative fuels, and the RE and EE policies. The Ministry for Communities and Territories Development is responsible for creating policies and technical regulations related to EE in buildings and energy certification. The Ministry of Infrastructure is responsible for national policy, action plans, and strategies related to the development of infrastructure to encourage the use of alternative fuels and EE measures in transport. The Ministry for Development of Economy, Trade and Agriculture oversees the state-owned energy companies; provides support for the technological renewal of the agricultural production industry and the development of machinery for the agricultural complex, including energy conservation; assists the agricultural complex in implementing biofuels production projects; and supports the improvement of EE agricultural enterprises and development of raw material base for biofuels production. At the implementation level, the Energy Efficiency Fund plays an important role in supporting EE in buildings and energy-saving measures, particularly in the residential sector.

Energy reforms and governance: **Since the 1990s, Ukraine has aimed to reform its electricity sector, becoming one of the first countries in the region to begin working toward the liberalization of the market.** However, progress has been slow. The power sector was profoundly affected by the severe recession of the 1990s, which followed the dissolution of the USSR.[205] In 1996, the government proceeded to work toward the creation of a wholesale electricity market. However, it retained SOEs in the sector, set up a single-buyer model, and established regulated tariffs within the industry. In

203 Kosatka Media. *Link*.

204 MoE is responsible for approximately 130 companies, with the power to manage the corporate rights of the state, including Ukraine's hydropower plant operator UHE. CoM is also responsible for SOE governance in the sector.

205 Electricity generation fell by 38 percent between 1991 and 1999 as the economy contracted.

combination with fossil fuel subsidies for electricity generation, cross-subsidies in the electricity market, and weak payment discipline, this situation resulted in limited incentives for energy efficiency or new investments. Thus, Ukraine has continued to experience inefficiency in electricity production and distribution, with annual losses exceeding 10 percent. Moreover, this situation was complicated by the partial privatization of regional power companies before the restructuring of the sector was complete. Privatization proved problematic in the absence of any clear plans for further restructuring the power sector. The partial privatization in some segments of the industry created both opportunities to exploit market imperfections and other opportunities arising from the partially reformed nature of the sector. Some of the unbundled assets were subsequently "rebundled" into a large state-owned holding company, and the wholesale power market by the mid-2000s was so heavily regulated and so distorted by cross-subsidy mechanisms that it was defined as a quasi-market.

Despite these challenges and barriers, reform has continued. Along with launching initiatives to privatize distribution companies, Ukraine introduced market players within the industry alongside SOEs, and in February 2011 it acceded to the European Energy Community. In 2013, the Parliament adopted a law to liberalize the wholesale electricity market (WEM) and promote competition in compliance with European Union (EU) regulations. The Ukrainian electricity market operated in a state of emergency caused an economic and energy blockade outside the government's control. Nevertheless, Ukraine has continued to restructure the electricity market with the aim of achieving energy efficiency and security. In 2014, the country signed an Association Agreement with the EU, which requires increased energy efficiency and the promotion of market-oriented reforms. To meet these requirements, Ukraine has sought to pursue its efforts to comply with the EU's Third Energy Package and to integrate into the ENTSO-E. To promote competition within the sector, it introduced the Law on the Electricity Market in 2017. The law replaced the single-buyer model with more competitive elements, including the establishment of bilateral contracts, creating an ancillary services market while adopting market-based pricing. Moreover, the law sets goals to promote efficiency within the energy sector, including the energy market. The WEM, which was operated by the state-owned company Energorynok as the sole wholesale trader, finally switched to a model with a more competitive power market in mid-2019, as required by the law.

The Government of Ukraine has continued to provide state support for market players and consumers. To maintain low energy tariffs for end users, Ukraine has imposed price controls and adopted generous subsidy schemes. With the launch of the electricity market, nuclear and hydro producers of electricity sell a portion of their output at lower rates for residential consumers. Furthermore, Ukraine provides an additional layer of support for vulnerable consumers through housing subsidies based on household income and the number of individuals per household. Since government policies have resulted in supplying energy at below-cost-recovery levels, the government has also developed schemes to compensate energy producers, distributors, and suppliers for their losses by offering budget transfers to cover part of the costs of production, among other initiatives. Additionally, tax exemptions have been applied. Despite efforts, Ukraine's power sector continues to suffer from lack of transparent pricing mechanisms, and rules are set by legislation rather than independent regulation.[206] As a result, electricity market rules before the war were suboptimal, and low competition leads to market power concentration and increasing perceived risks by potential new investors in the sector.

Damage and Loss Assessment

Preliminary estimates based on information shared by the government, SOEs, and the World Bank indicate that damage to power, gas, and fuel infrastructure and coal mining is close to US$3.1 billion (including estimated damage to assets located in territories temporarily not under government control [207]). Please see Table 47 with the breakdown by subsector. The largest share of damage is in the transmission segment within the power sector, district heating infrastructure, and gas sector. The gas sector damage estimates are around US$500 million, which comprises US$330 million in

206 The large SOEs that supply 60 percent of electricity are not allowed to participate in the WEM and are obliged to provide power at low prices; these requirements increase their financial stress, particularly as higher-priced renewable power puts a squeeze on their volumes.

207 Assets located in territories temporarily not under government control are estimated to be partially damaged (50 percent). It is likely that some of the assets are completely destroyed while others are almost intact. There is limited ability to verify those damages at this point.

Table 47. Damage by category (US$ million) as of June 1, 2022

Subsector	Damage (US$ million)
Power sector	1,400[a]
District heating	700
Gas sector	500
Oil/transport fuel	400
Coal mining	110[b]
Total	**3,110**

Source: Assessment team.

Notes: **a.** The US$1,400 figure includes damage recorded by the transmission system operator Ukrenergo (US$700 million); damage to distribution companies, which have been estimated at approximately US$600 million by the KSE based on indirect calculations; and damage to some power plants, estimated at around US$100 million. World Bank estimations are in the same order of magnitude. **b.** Aggregate figure received from Ministry of Energy.

Table 48. Damage to power transmission by oblast (US$ million) as of June 1, 2022

Oblast	Damage
Chernihivska	1.50
Dnipropetrovska	7.87
Donetska	102.00
Kharkivska	24.87
Khersonska	82.29
Kyiv (city)	82.75
Kyivska	3.32
Luhanska	85.14
Mykolaivska	10.39
Odeska	0.11
Rivnenska	0.30
Sumska	6.88
Zakarpatska	0.19
Zaporizka	292.34
Zhytomyrska	0.04
Total	**699.96**

Source: Assessment team.

Note: The table includes only regions for which data were available.

Table 39. Damage to power generation by oblast (US$ million) as of June 1, 2022

Oblast	Nuclear	Solar	Wind	Total
Kharkivska	0.00	0.48	0.00	0.48
Khersonska	0.00	0.00	23.52	23.52
Kyivska	57.00	0.00	0.00	57.00
Zaporizka	0.00	8.00	0.00	8.00
Grand total	**57.00**	**8.48**	**23.52**	**89.00**

Source: Assessment team.

Note: The table includes only regions for which data were available as of June 1.

damage to gas distribution infrastructure reported by the largest operator of gas distribution networks, the Regional Gas Company, as well as almost US$150 million reported by the Gas Transmission System Operator. Damage to 28 fuel depots is estimated at around US$250 million and to fuel stations at around US$150 million.

Electricity sector. **It is estimated that US$0.9 billion in damage and losses was incurred at the largest Zaporizka nuclear power plant during its occupation.** The Okhtyrka, Chernihivska, Kremenchuk, and Azovstal combined heat and power plants were destroyed. Control over DTEK's coal power plant in the Luganska region was lost.[208] In Donetska and Luhanska regions, the combined heat and power plants in Lisichansk and Sievierodonetsk were recently destroyed, as was the Vyglegirska TPP in Svitlodarsk. Only around 50 percent of renewable energy capacity is working; 73 percent of wind energy capacity is not operating or is located in regions temporarily not under government control. The transmission sector has suffered damage in some substations, but most damage is at the distribution level. The damage to the power transmission networks across the regions is given in Table 48.

Power generation assets: As of the beginning of June, the damage to power generation assets totaled US$89 million (Table 49). Given ongoing and new damage in June, including damage to the thermal power plants in Eastern Ukraine and other power generation assets, the total damage will be much higher.

Gas transmission network: **On May 10, 2022, the gas TSO claimed that forces were interfering with a compressor station in in Novopskov, which is temporarily not under government control, and diverting gas.** This line supplied 33 percent of gas piped through Ukraine to Europe. Consequently, Ukraine's gas TSO stopped shipments through Sokhranovka, offering to reroute though another point (which Gazprom considered unfeasible). This shutdown is not expected to substantially affect gas transit but has contributed to increasing uncertainty in European gas markets. The damage to gas distribution networks continue; for example, on June 14, 2022, in the Zaporizka oblast, the medium-pressure pipes were damaged.[209] Damage to gas networks has also been occurring in Khersonska, Donetska, Luhanska, Kharkivska, and Mykolaivska oblasts. As of the end of May, overall damage is estimated to be not less than US$330 million.[210]

Table 50. Damage to gas transmission network by oblast (US$ million) as of June 1, 2022

Oblast	Gas TSO (excluding regional distribution networks)
Chernihivska	0.04
Dnipropetrovska	3.67
Donetska	23.35
Kharkivska	5.90
Khersonska	1.65
Kyivska	0.26
Luhanska	2.38
Mykolaivska	0.07
Sumska	31.78
Zaporizka	78.15
Total	**147.24**

Source: Assessment team.

Note: The table includes only regions for which data were available.

208 Ukrainian thermal power plants rely on local coal, with mining and supply at risk.
209 Kosatka, *Link*.
210 RGC, *Link*.

Table 51. Damage to district heating networks by oblast (US$ million) as of June 1, 2022

Oblast	Boiler house	Central heating points	Combined heat and power	Heating networks	Total
Chernihivska	11.51	14.50	29.44	8.03	63.47
Dnipropetrovska	0.00	0.00	0.15	0.00	0.15
Donetska	7.70	0.17	0.00	471.16	479.04
Kharkivska	30.33	8.14	3.70	5.51	47.67
Kyiv (city)	0.20	0.00	-	0.00	0.20
Kyivska	14.53	0.00	-	0.00	14.53
Luhanska	6.63	0.00	-	0.00	6.63
Lvivska	0.20	0.00	-	0.00	0.20
Mykolaivska	6.92	1.61	0.05	0.00	8.58
Odeska	0.59	0.00	-	0.00	0.59
Poltavska	0.20	0.00	16.03	0.00	16.23
Sumska	3.02	3.31	11.79	0.04	18.16
Zhytomyrska	3.12	0.00	-	0.18	3.30
Total	**84.93**	**27.73**	**61.15**	**484.92**	**658.72**

Source: Assessment team. *Note:* The table includes only regions for which data were available.

Note: The data on the damages on CHPs can be bigger (up to US$100 million) since not all damages were documented. Given that, the grand total for damages the district heating (US$658.72 million) is rounded up to US$700 million.

Gas transmission operators have also received significant damage to their systems, as described in Table 50.

Gas needs in preparation for the next heating season: **Ukraine's gas reserves were almost depleted during the last heating season.** At the beginning of August 2022, Naftogaz had around 10.2 billion cubic meters (bcm) of natural gas available in storage.[211] From this amount, only 5.5 bcm may be used for the next heating period because there is a need to keep a gas reserve for operational reasons. Current domestic gas production is around 1.5 bcm per month (about 4 percent less than the prewar level), making it possible (i) to cover the summer consumption, and (ii) to pump about 3 bcm into storage by the next heating season.[212] This means that around 5 bcm will need to be imported to reach the historical average level of gas storage by the start of the next heating season.[213] Actual needs for the next heating season could be lower in the event of a mild winter and considering lower demand and destroyed district heating infrastructure. In any event, gas purchases may need to start during the active war period to ensure adequate reserves. However, while gas prices have skyrocketed, revenue collection has dropped, and Naftogaz has requested donor support to purchase gas.

District heating network: **A large part of district heating infrastructure in war-affected areas is damaged beyond recovery and will need to be built back to modern, more efficient standards, or replaced by other sustainable heating solutions, combined with more energy-efficient reconstruction of buildings.** The estimations of the damage to the district heating network are given in Table 51.

Repairs of energy networks during the war: **In the ongoing war, energy sector companies have been playing an essential role in maintaining the provision of electricity, gas, and heating services to the population, but they are facing shortages of fuel, spare parts, and tools.** The need for emergency repairs of equipment is increasing every day, but the most urgent needs for electricity and gas networks amount to around US$100–150 million. Emergency repairs for district

211 Data on the gas stored by Naftogaz was accessed in August 2022 through this *link*.
212 BIZ, *Link*.
213 UA Energy, *Link*.

Table 52. Damage to transport fuel infrastructure by oblast (US$ million) as of June 1, 2022

Oblast	Fuel stock	Gas station	Oil depot	Total
Chernihivska	0	18.19	0.00	18.19
Donetska	0	12.63	0.00	12.63
Kharkivska	0	40.99	0.00	40.99
Kyivska	0	19.47	15.00	34.47
Luhanska	0	11.93	0.00	11.93
Lvivska	0	0.00	12.00	12.00
Mykolaivska	0	7.58	0.00	7.58
Nonspecified	0	0.00	60.60	60.60
Poltavska	0	0.00	18.00	18.00
Sumska	0	21.02	0.00	21.02
Vinnytska	0	0.00	12.00	12.00
Zakarpatska	0	0.00	14.40	14.40
Zhytomyrska	0	2.02	0.00	2.02
Nationwide	120.00	0.00	0.00	120.00
Total	**120.00**	**133.83**	**132.00**	**385.83**

Source: Assessment team. *Note:* The table includes only regions for which data were available.

heating focused on safety are estimated at around US$100 million according to the information provided by Ministry of Regions. The Energy Community Secretariat is helping coordinate donor support for electricity sector repairs. The World Bank has raised awareness about the needs of gas companies with the Ministry of Finance to secure budget for critical repairs.

Fuel for transport: **Ukraine's current fuel needs amount to approximately 100,000 tons of petroleum, 250,000 tons of diesel, and 70,000 tons of LPG (liquified petroleum gas) every month.** After the destruction of refineries and depots, the government is negotiating with the EU to provide Ukraine with "green corridors" for fuel supply through the ports of Gdansk, Gdynia, Constanța, Świnoujście, and Burgas, and to create a new protected fuel reserve. Estimated damage to transport fuel infrastructure is shown in Table 52.

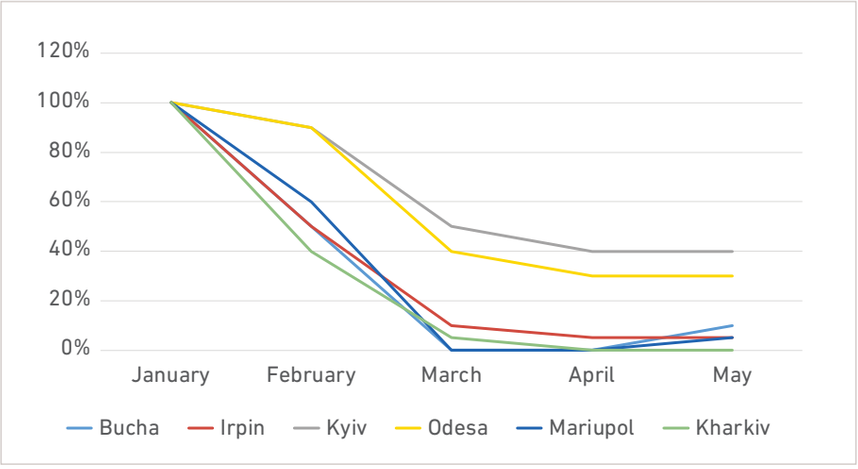
Mining. **Many important mines are in areas at risk.** Some mines have already been flooded in the Luhanska oblast; Zolote and Toshkovska were flooded and are no longer recoverable. Two other mines (Gorskaya and Karbonit) are also being gradually flooded. In the Donetska oblast, the Pivdenodonbaska G1 mine has been heavily damaged. The Surgai (Pivdenodonbaska G3) mine has been closed due to heavy shelling. A preliminary estimate of damage to coal mining operations shared by the MoE states a figure of US$111 million. Data on other mine types could not be obtained. The cost of environmental impacts resulting from damage to mining infrastructure (e.g., groundwater contamination due to interruption of water management systems) is not included in this estimate.

Losses: Effects on Production and Access to Goods and Services

In total, losses in the energy sector due to war are estimated at US$11.7 billion, without considering the increase in gas import prices.

Access to energy services: **As of June 1, energy sector companies had managed to maintain energy services for most consumers.** While damage to the core energy transmission infrastructure has been limited, there is increasing damage to the distribution infrastructure, which has left many consumers without access to electricity, gas, or fuel supply. As of July 11, 765 settlements and over 580,000 consumers have been disconnected from the electricity supply, primarily due to damage

Figure 22. VIIRS Relative Brightness Levels, January–May 2022



Source: Based on *link*.

Note: VIIRS = Visible Infrared Imaging Radiometer Suite.

in transmission and distribution networks, while immense efforts to restore power continue. Outages significantly decreased in the Kyivska oblast since mid-March (when 1 million consumers were disconnected), allowing for reconnections in that area. However, outages are increasing in the east. While in this case nightlight brightness is not a direct indicator of access to electricity services (since many citizens hide in their basements at night), in some cities it remains an indication of the loss of access to electricity. As shown in Figure 22, streetlights completely disappeared in most of Bucha and Irpin during March and April. In Kyiv, the decline was more gradual and has remained stable after the end April.

The provision of electricity services has also been threatened by recurring cyberattacks on the grid central operation center, making electricity services widely vulnerable to frequent outages; during the first 40 days of the war, there were about 200,000 cyberattacks on energy infrastructure,[214] compared with 900,000 for the whole of 2021, and cyberattacks have increased since then. On June 9, 2022, Ukrenergo reported that the number of DDos (distributed denial-of-service) attacks during three months of the war (March–May) was 10 times greater than the number of such attacks during the previous three years (2019–2021).[215]

In addition, about 244,000 consumers remain without gas supply, although recent efforts managed to reconnect a significant number of consumers.[216] The regions most impacted by gas supply disruptions are Luhanska, Donetska, Zaporizka, Chernihivska, Mykolaivska, and Kharkivska. Ukraine is also experiencing a fuel deficit after canceling supplies from Belarussian oil refinery plants and suffering attacks on local oil refinery plants (the Kremenchuk plant in Poltava was destroyed by shelling, while the Shebelynsk plant in Kharkiv was closed because of the active war in February 2022 and shelled by in June 2022).

Due to the impacts described above, the war has also considerably deteriorated the electricity sector's financial situation, jeopardizing the sustainability of energy provision throughout the country. In March and April 2022, electricity consumption decreased significantly—by 35 percent in comparison to the previous year, and the collection rate dropped by around 40 percent, on average. Electricity consumption for the first half of 2022 is expected to be 20 percent lower than in 2021, while the collection rate might be improved to 85 percent depending on the situation. Ukrenergo estimates the total financial deficit for the electricity sector could reach US$2.6 billion by the end of 2022. While all sector stakeholders would be affected, Ukrenergo and Energoatom would accumulate the highest deficits,

214 ePravda, *Link*.

215 According to Ukrenergo's announcement on its official Facebook page: *Link*.

216 According to the government update on the situation in the energy sector as of July 11, 2022: *Link*.

Table 53. Recovery and reconstruction needs per category (US$ million) as of June 1, 2022

Sector	Immediate/short term	Medium- to long-term	Total
Power	960	1,440	2,400
District heating	540	810	1,350
Gas	5,340	510	5,850
Oil	320	480	800
Total	**7,160**	**3,240**	**10,400**

Source: Assessment team, based on various data.

Note: The needs for the gas sector also include the short-term need for purchasing natural gas for the upcoming heating season, at the amount of US$5 billion. The rest of the amount includes the needs of reconstruction.

even if some of their financial obligations could be deferred. Ukrenergo in particular, as a center of the sector's financial settlements, is expected to accumulate financial debts deficits to various players, including Energoatom, Ukrhydroenergo, and RE producers. Its financial deficit is expected to increase to US$1.2 million (UAH 35.1 billion) by the end of 2022, even taking into account gradual improvements in collection and consumption as well as expected electricity export revenues.[217]

Gas sector: **The KSE has estimated the loss of revenues from gas production and gas supply as US$2 billion.** In addition, due to the war, Russian Gazprom has not fully paid transit payments to the Ukrainian gas TSO. The transit payments for the whole of 2022 come to about US$1.2 billion.

Coal mining sector: **Data on losses could be obtained for mines located in Donetska and Luhanska oblasts.** According to the MoE, coal production from state mines located in the conflict-affected areas dropped by 37 percent from a pre-invasion baseline production of about 625,000 tons/month (snapshot from January 2022). This translates into cumulative losses of US$305 million over the duration of the conflict. Assuming a linear loss scenario, every additional month of conflict will add US$75 million to the losses. Data on other types of mines could not be obtained.

Effects on living standards: **The specific impact of electricity blackouts and district heating and gas shortages is difficult to distinguish from the other impacts of the war, but it is clear that lack of heating or electricity in some impacted areas has aggravated the suffering of the population.** Disrupted electricity services can lead to lootings of commercial businesses, while the inability to use a mobile phone (whether because there is no network or because it cannot be charged) causes high levels of stress in areas under attack, which must deal with high violence levels and need emergency reporting channels.

Broader effects in the sector and sectoral reforms: **Beyond the direct war impacts, the lack of maintenance in the network infrastructure, and reduction of technical and managerial capabilities in the energy companies due to the war, increases the probability of new countrywide blackout events.** In addition, some of the electricity and gas reforms under implementation before the war, aimed to improve the financial sustainability of the sector and its governance have been put on hold due to the need to ensure affordable energy prices for the population through the temporary introduction of price caps, new public service obligations for SOEs and difficulties to implement corporate governance processes during war.

Reconstruction and Recovery Needs, including Build Back Better

Preliminary estimates based on information shared by the government, SOEs, and the World Bank indicate that reconstruction needs of power, gas, and fuel infrastructure are close to US$5.5 billion, as described in Table 53.

Electricity sector*:* It is estimated that US$1,240 million are the needs related to the power transmission network, with indicative regional

217 Electricity export to ENTSO-E is expected to gradually increase with grid stability measures implemented in Ukraine.

breakdown given in Table 54. As of the beginning of June, needs for power generation were estimated at more than US$157 million, as indicated in Table 55. Given ongoing and new damage in June, including damage to the thermal power plants in Eastern Ukraine and to other power generation assets, the total amount of these needs will be much higher.

Table 54. Recovery and reconstruction needs for power transmission by oblast (US$ million) as of June 1, 2022

Oblast	Immediate/short term	Medium- to long-term	Total
Chernihivska	1.06	1.59	2.65
Dnipropetrovska	5.58	8.36	13.94
Donetska	72.29	108.44	180.73
Kharkivska	17.62	26.44	44.06
Khersonska	58.32	87.48	145.80
Kyiv (city)	58.65	87.98	146.63
Kyivska	2.35	3.53	5.88
Luhanska	60.34	90.52	150.86
Mykolaivska	7.36	11.05	18.41
Odeska	0.08	0.12	0.19
Rivnenska	0.21	0.32	0.53
Sumska	4.87	7.31	12.18
Zakarpatska	0.13	0.20	0.33
Zaporizka	207.19	310.79	517.98
Zhytomyrska	0.03	0.04	0.07
Total	**496.10**	**744.14**	**1,240.24**

Source: Assessment team. *Note:* The table includes only regions for which data were available.

Table 55. Recovery and reconstruction needs for the power generation sector by oblast and technology (US$ million) as of June 1, 2022

Oblast	Nuclear	Solar	Wind	Immediate/short term	Medium- to long-term	Total
Kharkivska	0.00	0.85	0.00	0.34	0.51	0.85
Khersonska	0.00	0.00	41.68	16.67	25.01	41.68
Kyivska	101.00	0.00	0.00	40.40	60.60	101.00
Zaporizka	0.00	14.18	0.00	5.67	8.51	14.18
Total	**101.00**	**15.03**	**41.68**	**63.08**	**94.62**	**157.70**

Note: The table includes only regions for which data were available.

Gas: Minimal needs of the gas transmission network are estimated at US$260.89 million (Table 56); however, it is expected that the final value of the needs will be much higher due to new damage as well as higher costs.

District heating network: A large part of district heating infrastructure has been destroyed in Eastern Ukraine, where the share of urban population is the highest. As of June 1, the total needs were estimated to be about US$1.4 billion (Table 57). Given that further destruction in Eastern Ukraine is likely, this figure will be bigger.

Table 56. Recovery and reconstruction needs for gas transmission system operators per oblast (US$ million) as of June 1, 2022

Oblast	Immediate/short term	Medium- to long-term	Total
Chernihivska	0.03	0.04	0.07
Dnipropetrovska	2.60	3.90	6.50
Donetska	16.55	24.82	41.37
Kharkivska	4.18	6.27	10.46
Khersonska	1.17	1.75	2.92
Kyivska	0.18	0.27	0.46
Luhanska	1.69	2.53	4.22
Mykolaivska	0.05	0.08	0.13
Sumska	22.52	33.79	56.31
Zaporizka	55.39	83.08	138.46
Total	**104.35**	**156.53**	**260.89**

Source: Assessment team.

Note: The table includes only regions for which data were available. The needs do not include regional gas distribution networks.

Table 57. Recovery and reconstruction needs in district heating sector by oblast and type of asset (US$ million) as of June 1, 2022

Oblast	Boiler house	Central heating points	Combined heat and power	Heating networks	Immediate/short term	Medium- to long-term	Total
Chernihivska	23.41	29.49	59.88	16.34	49.66	79.46	129.12
Dnipropetrovska	-	-	0.30	-	0.12	0.19	0.30
Donetska	15.67	0.34	0.00	958.43	374.79	599.66	974.45
Kharkivska	61.69	16.56	7.53	11.20	37.30	59.67	96.97
Kyiv (city)	0.40	-	-	-	0.15	0.24	0.40
Kyivska	29.55	-	-	-	11.37	18.19	29.55
Luhanska	13.49	-	-	-	5.19	8.30	13.49
Lvivska	0.40	-	-	-	0.15	0.24	0.40
Mykolaivska	14.08	3.28	0.09	-	6.71	10.74	17.45
Odeska	1.19	-	-	-	0.46	0.73	1.19
Poltavska	0.40	-	32.61	-	12.69	20.31	33.00
Sumska	6.15	6.73	23.98	0.08	14.21	22.73	36.93
Zhytomyrska	6.35	-	-	0.36	2.58	4.13	6.71
Grand total	**172.76**	**56.40**	**124.39**	**986.42**	**515.37**	**824.60**	**1,339.97**

Source: Assessment team.

Note: The table includes only regions for which data were available. In the text, the total is rounded up to US$1,350 million.

Table 58. Recovery and reconstruction needs in the transport fuel sector by oblast (US$ million) as of June 1, 2022

Oblast	Fuel stock	Gas station	Oil depot	Immediate/short term	Medium- to long-term	Total
Chernihivska	0	37.01	0	14.80	22.20	37.01
Donetska	0	25.70	0	10.28	15.42	25.70
Kharkivska	0	83.38	0	33.35	50.03	83.38
Kyivska	0	39.60	30.51	15.84	23.76	70.11
Luhanska	0	24.26	0	9.70	14.56	24.26
Lvivska	0	0	24.41	9.76	14.65	24.41
Mykolaivska	0	15.42	0	6.17	9.25	15.42
Nonspecified	0	0	123.27	61.51	92.27	123.27
Poltavska	0	0.00	36.62	14.65	21.97	36.62
Sumska	0	42.76	0	17.10	25.66	42.76
Vinnytska	0	0	24.41	9.76	14.65	24.41
Zakarpatska	0	0	29.29	11.72	17.58	29.29
Zhytomyrska	0	4.11	0	1.65	2.47	4.11
Nationwide	244.10	0	0	97.64	146.46	244.10
Total	**244.10**	**272.23**	**268.51**	**313.94**	**470.91**	**784.85**

Source: Assessment team.

Note: The table includes only regions for which data were available.

Transport fuel sector: In this sector, the needs were estimated at US$784 million, as shown in Table 58.

Coal mining sector: **Based on the estimated damage of US$110 million, the reconstruction needs will probably be at least US$275 million.** This figure is based on the assumption that the damaged coal infrastructure is generally aged and not up to modern standards. Without having specific details on what features and components of the coal sector have been damaged, it is probably safe to assume that quality improvement and modernization to global standards would cost at least twice the value of the damage, equaling another US$110 million. There is an additional factor to consider: many of the domestic production facilities for mining equipment, facilities for servicing and repair, and contractors for mining-related works (shaft sinking, underground construction) will have suffered damage and have gone out of business or been plundered/dismantled. There is an expectation that a large share of reconstruction works, goods, and services will be foreign-supplied, increasing the cost by another 50–100 percent (a "constrained market premium"). In summary, the investment needs for reconstruction are composed of US$110 million (damage), US$110 million (quality upgrades), plus US$55 million (market premium).

Guiding principles during reconstruction

Resilient Reconstruction Phase the Government should prioritize measures in line European security and climate priorities, while promoting fast economic recovery.

Diversifying gas supply and integration with European gas markets, including:

- **Completing the gas sector reform and accelerating gas market integration with Europe.** Proper governance and transparency should be high priorities to ensure a resilient reconstruction. The independence and proper governance of the GTSO and gas regulator are prerequisite for integration with European gas markets.

- **Optimizing gas (including biogas) production and supply infrastructure** (including to facilitate imports of LNG) given the substantial reduction in gas transit from Russia to Europe.

- **Optimizing power sector investments based on an indicative least cost expansion plan that maximize energy security, meet climate commitments, and build to modern standards.** Hydro, variable renewables, and storage could help achieve higher energy security.

- **Accelerating green hydrogen deployment.** For Ukraine, the development of hydrogen opportunities offers a wide set of benefits: (i) new diversified exports; (ii) an opportunity to replace natural gas transit revenue streams; (iii) an opportunity to leverage existing infrastructure; and (iv) the potential of hydrogen to support Ukrainian decarbonization efforts.

Boosting energy efficiency during reconstruction and electrifying energy demand when possible:

- **Operationalizing the EE law approved in October 2021.** Secondary legislation should be enacted to operationalize the EE law, including create enabling operating framework for Energy Service Companies (ESCOs) and defining subsector strategies and targets. The role of regulators and power sector players can be very important for energy efficiency programs.

Implementing large scale programs for efficient reconstructions of residential and public buildings, with focus on municipal and residential. Energy-efficient buildings are not only necessary for decarbonization – they also provide higher thermal comfort, better health, and lower energy costs (IEA, 2019). Technologies that use fossil fuels (e.g., gas furnace) should be replaced with technologies that use electricity (e.g., heat pump) in existing buildings.

- **Replacing district heating infrastructure,** damaged beyond recovery, in accordance with modern sustainable heating standards more adapted to the needs of citizens as part of the building back better effort. The use of heating pumps in multifamily buildings could be scale-up in regions with relatively mild winters. Other sustainable heating options could replace gas in the mid-long term in areas where heating pumps would be inefficient.

- **Green reconstruction of industrial sector.** Measures aimed to reduce and electrify energy consumption could help greening surviving industries.

- **Accelerating the alignment with European fuel quality in transport sector.** In the short term, although politically sensitive, an effective taxation scheme has to be introduced that favors the uptake of small, efficient cars over inefficient cars. Moving forward, European fuel economy standards for light- and heavy-duty vehicles are set to increase significantly in the next decade, which suggests that the EU policy framework will continue to provide a sound foundation for Ukraine to gradually increase demand restraint and EE in the transport sector.

- **Rebuilding public transportation with efficient systems stimulating behavioral shift towards public transport can help reduce energy demand.**

- **In the mid to long term, promoting adoption of electric vehicles (EVs) in private and public transport**.

Consolidating integration with EU energy markets and boosting operational efficiency of the sector:

- **Improving governance and regulation of electricity markets in** alignment and integration with European markets

- **Rebuilding obsolete and damaged energy sector** using modern and efficient technologies.

- **Reducing physical and regulatory barriers for energy imports from the EU electricity market**, and increased supervision would help increase competition and sectoral governance in Ukraine. The integration of electricity markets offers mutual benefits for Ukraine and EU countries.

- **Mitigating Cybersecurity risks ensuring full transposition of European directives.**

- **Accelerating scale-up of renewables:** Decarbonizing electricity generation will require: (i) a significant expansion of solar and wind power; (ii) Confirming the potential of off-shore wind and the preparation the regulatory framework to enable its deployment in the long term, and potential application for green hydrogen generation;(iii) Supporting energy storage (battery and pumped hydro) development is needed to enable the integration of higher shares of variable RE. (iv) Promoting distributed REs to reduce consumption. Distributed RE can contribute to providing decentralized clean energy supply and reduce the demand to the grid; and (v) Rethinking the value chain of nuclear power and the need for future investments

Phasing out coal and promoting climate smart mining, including:

- **Rethinking Coal transition strategy.** The drivers for phasing out coal remain relevant in a post-war scenario. Moreover, so far three coal mines and two coal power plants have been damaged, likely beyond repair.

- **Promoting Climate-smart mining**. Ukraine is well-positioned to supply the minerals and metals needed for low-carbon technologies, including wind, solar, and batteries.

Limitations and Recommendations

The assessment considers a range of assumptions in addition to the general RDNA assumptions of geographic scope and timeline:

- Damage and needs include both damage in territories fully or partially controlled by Ukraine, and damage in territories temporarily not under government control. Damage in territories temporarily not under government control is estimated based on information available to the government and other sources on actual damage to facilities. Assets in territories temporarily not under government control are not considered as definitely lost unless there is certainty that they have been completely destroyed.

- The damage to power generation is based on information from several sources, which sometimes highlight damage and needs based on their own interests. Some assets have been damaged and repaired multiple times. Given the restrictions on data sharing imposed by the government, it was not possible to obtain direct detailed information on damage to distribution networks. In the future, it will be necessary to assess on the ground the actual extent of damage, and a power sector model will be needed to refine the needs estimates.

- The calculation of the transmission damage is based on estimates from Ukrenergo that included a combination of two types of estimates: (i) preliminary estimates, which are applicable until the end of hostilities and are based on available information from technical personnel (witnesses) on the condition of the asset, the degree of its damage, and the possibility of recovery; and (ii) actual estimates, which are based on the results of actual inspection, technical inspection, and full inventory in areas controlled by Ukraine where inspections are feasible. Ukrenergo has operational data on damage to the network and conducts inspections and repairs of damaged assets. Thus, there are six categories of assets for Ukrenergo: (i) damaged, physically inspected, and reported (detailed damage assessment); (ii) damaged and repaired; (iii) damaged and not repaired; (iv) probably damaged according to the operational data of the network system (or data on shelling for nonproductive assets), but not inspected; (v) located in areas that are partially controlled by the armed forced of Ukraine; and (vi) located in territories temporarily not under government control.

- Damage to assets in areas temporarily not under government control has been reestimated assuming partial damage instead of 100 percent damage (assumed by Ukrenergo). This should be better quantified at a later stage.

- The preliminary calculation of the energy sector investment needs uses generalized coefficients of replacement costs based on data on investment and repair programs and purchases of recent years from World Bank projects in the region. In case of repeated damage to the same asset, the cost of preliminary repairs is used.

- For simplicity at this stage, needs are calculated using a multiplier of 1.75 over damage. Needs include demolition and cleaning works for partially and total damaged assets and are calculated using the multipliers agreed with the government: for **destroyed assets,** 14.1 percent of the full cost of fully destroyed assets should be added for demolition and 1.875 percent for the removal of debris; and for **partially damaged assets,** 1.25 percent should be added for debris removal, with the understanding that there will be no cost associated with demolition.

- Short-term needs include US$5 billion required by Naftogaz to purchase gas in the short term and liquidity needs in the electricity sector since both are considered increased by the war.

The main shortcoming of the analysis is that it is based on limited information in some subsectors and regions:

- Power sector damages in areas controlled by Ukraine are considered accurate. Power sector damages in areas totally not under government control are estimated as 50 percent, but this could

be overestimated. In areas partially controlled by Ukraine, the accuracy of estimates varies.

- Damage in electricity distribution is estimated based on calculation by the KSE given that no available data were found.
- Damage in the power sector is estimated as replacement cost (with similar quality of equipment).
- Needs in the power sector are estimated as replacement cost (with similar quality of equipment).
- Damage in the gas transmission sector is estimated as the value on the books provided by the gas TSO.
- Damage in the gas distribution sector is estimated as US$330 million, based on public statements of the private corporation that operated regional distribution networks till May 2022.
- Damage in the district heating sector was provided by the government and compared with previous estimations in some cities. Further verification would be needed for greater precision.

The following studies/analysis would help in the future to provide a more detailed understanding of the sector:

- **Georeferenced database of the power grid assets and power system facilities.** This database should include high-voltage transmission lines, the location of main substations in those lines, transformers, and the location of power generation facilities, as well as supply to related transportation infrastructure (roads allowing access to electric system infrastructure), connected main productive uses (large industry), water pumping stations, airports and seaports, and large urban centers.
- **Analysis of night lights.** This could help verify damage to assets and access to electricity in some areas of main cities.
- **Assessment of current operational status of key electricity generation infrastructure.** For this, the rapid assessment may be able to use remote temperature sensing to identify plants in operation, among other techniques. The key infrastructure includes (i) hydroelectric generation plants, in particular those reporting structural damage and leakages; (ii) thermal generation plants, prioritizing thermal power plants larger than 300 MW, located in key network nodes and close to highly populated areas; (iii) high-voltage transmission lines; (iv) high-voltage substations associated with key power plants and transmission grid nodes; and (v) natural gas pipelines supplying thermal power plants.
- **Assessment of current operational status of the distribution supply service.** This analysis should provide information on interruptions, number of hours of supply, scheduled and unscheduled load shedding, etc., for the main large urban areas, with particular focus on service delivery in hospitals, schools, key transport infrastructure (airport and seaports), and residential areas.
- **Satellite imaging of key assets for validation purposes, to estimate damage more accurately.**

TRANSPORT

Summary

Damage (US$29.9 billion), losses (US$26.1 billion), and needs (US$73.8 billion) in Ukraine's transport sector are large and indicative of the strategic value that combatants have placed on transport networks. Overall damages include: (i) 8,699 km of motorways, highways, and other national roads; (ii) 7,619 km of oblast and village roads; (iii) 3 million m^2 of bridges on national roads; (iv) 428,470 m^2 of bridges on local roads; (v) 1,119 km of railway lines; (vi) 93 railway stations; (vii) 63,072 m^2 of railway bridges; (viii)) 392,843 private vehicles; (ix) 9,473 km of communal roads; (x) 16 airports; and (x) 850 units of urban public transport rolling stock. Losses include consideration for (i) loss of Black Sea transport; (ii) disruptions to road and rail transport services due to damaged infrastructure; (iii) losses associated with closure of Ukraine's airspace; and (iv) the cost of rail transport service provided free of charge for refugee evacuation as well as import of humanitarian supplies. Envisaged short-, medium-, and long-term needs reflect the enabling role that transport will play across sectors as well as the need to facilitate European Union (EU) integration. **Transport sector reconstruction is estimated to require approximately US$73.8 billion, with US$8.9 billion in the immediate/short-term, along with an additional US$64.9 billion in the medium to long-term**. The estimates are approximate and are subject to assumptions about the configuration and scope of Ukraine's transport networks after reconstruction. The nature and level of demands on that network may affect the economic viability of building back to a given set of standards. The highest-priority needs for reconstruction are (i) restoration of basic network functionality (road, rail, and air) for both humanitarian aid flows and support to broader reconstruction efforts across sectors, as these will rely on transport access; (ii) enhancement of westward road and rail linkages to the EU to facilitate economic integration with Europe's single market and provide resilience to any potential future disruptions of Black Sea access; and (iii) transformation of legacy networks toward EU standards for safety, service quality, and interoperability as a complement to Ukraine's stated policy objective of EU accession, which will require alignment with the EU acquis.

Background

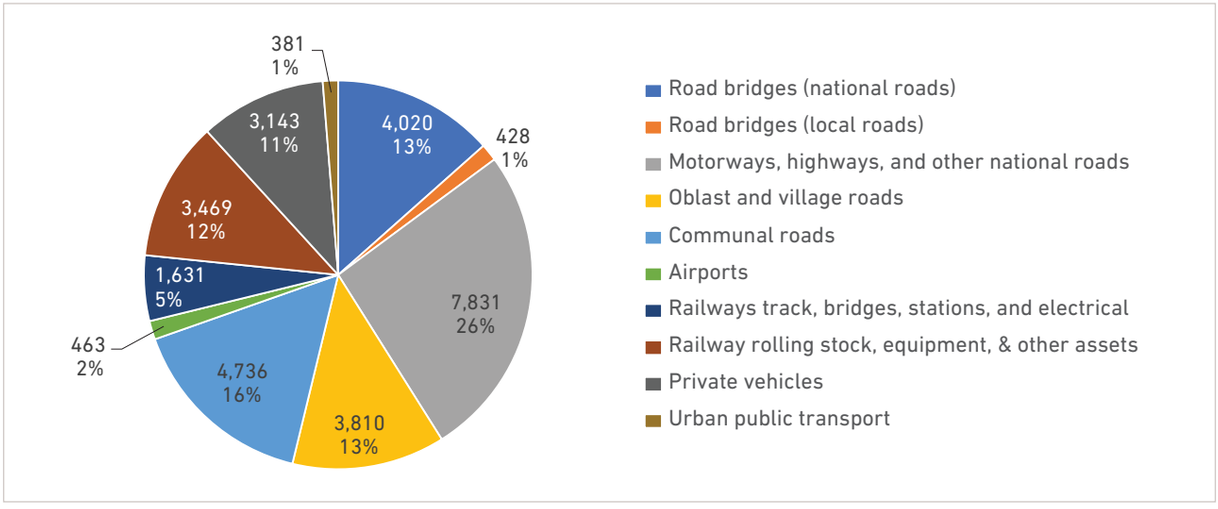
The transport network is extensive across every subsector by virtue of Ukraine's scale, geographical position, and population distribution. Ukrainian transport networks include 46,600 km of government-controlled highways, approximately 200,000 km of local roads, 19,800 km of railways (of which 9,300 km are electrified), 25 civil airports, 27 river ports, and 15 seaports. Prior to the war, approximately 70 percent of Ukraine's population lived in urban areas. This is a relatively high urbanization rate when compared to other European countries such as Poland (60 percent), Romania (54 percent), and Moldova (42.7 percent). Ukraine had five cities near or above 1 million people, four cities between 500,000 and 1 million people, and at least 15 cities between 250,000 and 500,000 people. Urban transport systems in major cities include metro, public buses, trolleybuses, trams, and privately owned small and medium-size buses locally called "marshrutka."

The Ministry of Infrastructure is the lead oversight and policy institution for Ukraine's transport sector, and the ministry's subsidiary institutions, and the ministry's subsidiary institutions, along with municipal governments, are the primary implementing bodies. Authorities and state-owned enterprises under the Ministry of Infrastructure implement service provision, investment, and asset management for the national road network, national railways network, aviation, maritime, and inland waterways subsectors. In the case of urban transport, municipal governments (and their municipal enterprises or departments) deliver services, implement investments, and manage assets, while the Ministry of Infrastructure retains the lead role in policy formulation. The most notable funding flows in the transport sector prior to the war occurred in the road sector through a national road fund. In 2022 alone, the national road fund was expected to support more than US$2.5 billion in maintenance and investment spending on roads.

Damage and Loss Assessment

The war has directly affected up to 26 percent of the area of Ukraine within nine oblasts. Muddy terrain throughout the winter and spring of 2022 has focused

Figure 23. Damage by asset category (US$ million)



Source: Assessment team based on Ministry of Infrastructure data.

heavy armor movements and fighting along critical road and rail axes. Airport infrastructure has been a primary target for aerial attacks since initial fighting occurred, and airspace closure has shut down the entire civilian air travel industry for Ukraine. Bridges have been destroyed either deliberately to deny access or as collateral damage. Urban settlements have been deliberately targeted with associated damage to urban transport networks that are nodes of civilian activity. More recently, the protracted nature of fighting and intensive use of artillery has required extensive logistics and supply efforts, with associated increase in targeting of transport nodes in eastern oblasts. In addition, the loss of Black Sea access has increased the strategic significance of westward road and railway linkages via the European Union, and these linkages have also attracted strikes aimed at disrupting supply lines.

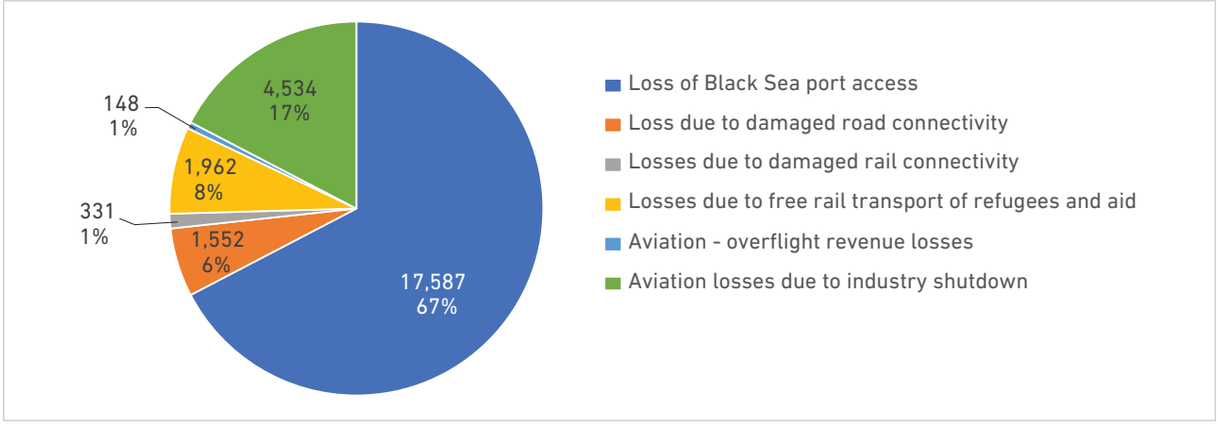
Overall transport sector damages are estimated at US$29.9 billion. The largest concentrations of damages are (i) local oblast, village and communal roads combined (29 percent); (ii) motorways, highways, and other national roads (26 percent); (iii) road bridges on national roads (15 percent); and (iv) railways rolling stock, equipment, and other assets (12 percent). The extensive damages estimated for Ukraine's road and bridge network reflect both damages due to combat and estimated damage due to overloading of roads and bridges with armored vehicles and supply convoys. Experience from past conflicts (e.g., Iraq, former Yugoslavia) has shown that movements of heavy armor along road networks degrade road structure as well as pavement surfaces, which subsequently requires full rehabilitation. The Russian Federation has heavily relied on railway transport for logistical support of its invasion forces. Ukraine has relied heavily on its railway network for military operations as well as for evacuation of civilians, import of humanitarian aid, and export of goods that would normally have transited via the Black Sea. A particularly noteworthy element of transport infrastructure damage has been road and railway bridges (3.5 million m^2 and 63,000 m^2 damaged respectively). The extent of damage to bridge assets aligns with the critical role that bridges play in enabling maneuvers, supply, evacuation, and export/import as well as their inherent vulnerability as readily identifiable critical points that can sever access. Damages by asset category are shown in Figure 23. Table 59 provides damage inventory by asset type; and Table 60 provides damage by oblast.

While transport networks have suffered extensively, institutional capacity in the transport sector has proven remarkably robust. Ukraine's national road authority (Ukravtodor) and its national railway company (Ukrzaliznytsia or "UZ") have continued to undertake emergency repairs, deliver services, and inventory damaged assets in reclaimed territory. The data used to assess transport damage were sourced primarily from these entities. The institutional capacity of municipal entities involved in urban public transport has fared considerably worse in areas that suffered heavy fighting, likely due to less redundancy in staffing and potential simultaneous damage to both home and work locations for employees. Considering this, it is likely that urban transport damage (currently US$381 million) reflects underreporting.

Losses in the transport sector are estimated at US$26.1 billion and are dominated by the effects of losing Black Sea access (US$17.6 billion or 67 percent). Prior to Russia's war on Ukraine, ports along the Black Sea and Azov Sea handled approximately 135–150 million tonnes of cargo per year. This included approximately 70 percent of all exports and specifically about 95 percent of all grain exports from Ukraine. In lieu of Black Sea access, Ukraine's shippers are reliant on longer road and rail routes to ports on Danube River, and the Baltic, Adriatic, Atlantic, or Romanian/Bulgarian Black Sea coast. The additional distance required to reach alternative ports is approximately 1,200–1,500 km, which adds direct transport cost to shipping via alternative routes. Actual losses are likely to exceed estimates due to factors such as inventory carrying costs, additional chance of spoilage or loss during transit, and greater complexity in coordinating the logistics chain to more distant ports.

The full shutdown of Ukraine's airspace has created extensive loss to the aviation sector (US$4.5 billion or 17 percent of all losses). Aviation has historically contributed approximately 1.1 percent to Ukraine's gross domestic product through employment, aviation supply chains, and indirect impacts on tourism, according to the International Air Transport

Figure 24. Losses by category (US$ million)



Source: Assessment team based on MOI data.

Table 59. Damage inventory by asset types (units as indicated) as of June 1, 2022

Asset type	Baseline		Partially Damaged		Completely destroyed		Total damaged assets	
	Public	Private	Public	Private	Public	Private	Public	Private
Road bridges (national roads) [m^2]	17,936,293	n.a.	n.a.	n.a.	3,035,177	n.a.	**3,035,177**	n.a.
Road bridges (local roads) [m^2]	10,686,760	n.a.	n.a.	n.a.	984,347	n.a.	**984,347**	n.a.
Motorways, highways, and other national roads [km]	46,600	n.a.	n.a.	n.a.	8,699	n.a.	**8,699**	n.a.
Oblast roads, village roads, and other local roads [km]	200,000	n.a.	n.a.	n.a.	18,422	n.a.	**18,422**	n.a.
Residential roads (cities and towns) [km]	n.a.	n.a.	n.a.	n.a.	9,473	n.a.	**9,473**	n.a.
Airports [each]	25	n.a.	9	n.a.	14	n.a.	**14**	n.a.
Railways track [km]	19,800	n.a.	n.a.	n.a.	1,119	n.a.	**1,119**	n.a.
Private Cars [each]		10,811,850	n.a.	n.a.	n.a.	392,843	n.a.	**392,843**
Urban public transport [# rolling stock units]	80,909	n.a.	n.a.	n.a.	850	n.a.	**850**	n.a.

Source: Assessment team. Note: no information on partially damaged. *Note:* n.a. = not applicable.

Association (IATA). Closure of Ukrainian airspace to civilian traffic has created a complete loss in this subsector. A secondary source of loss related to aviation is the loss of overflight revenues (US$149 million) from long-haul flights transiting between Europe and Asia via a common route for circumnavigation. It is important to note that the RDNA considered only the impact of lost overflight revenue on Ukraine without considering the losses endured by international airlines no longer able to transit Ukrainian (and potentially Russian) airspace due to the war. For an "average" Europe-Asia connection, the additional distance required can result in losses between US$20,000 and $50,000 per flight due to additional fuel and other aircraft operating costs. Losses by category are shown in Figure 24. Losses by oblast are in Table 60.

Disruptions to road and rail networks have created important losses due to increased road user costs, forgone rail revenues, and free transport services provided for evacuation/import of humanitarian aid. Road-related disruptions (6 percent of losses) reflect assumptions on the need for detour routes and higher vehicle operating costs on damaged roads due to degraded conditions. Estimated losses for the railway sector across different categories are estimated at US$2.3 billion (9 percent). These reflect (i) estimates of forgone gross profits due to network disruptions (1 percent); and (ii) losses from free transport of humanitarian supplies and refugees (8 percent). While these losses appear small relative to the scale of losses attributable to severed Black Sea access, it should be noted that their combined total exceeds US$3.8 billion.

Reconstruction and Recovery Needs, including Build Back Better

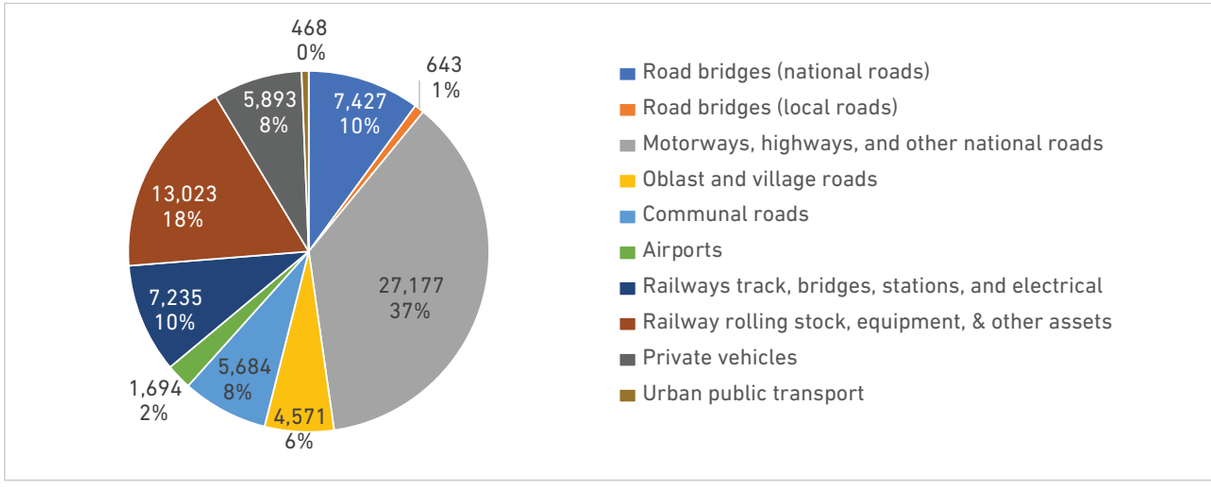
Total transport sector needs are estimated to be US$73.8 billion. The largest category of need includes

Table 60. Damage and losses by oblast (US$ million) as of June 1, 2022

Oblast	Total damage		Total losses	
	Public	Private	Public	Private
Cherkaska	59.2	0.0	531.4	107.2
Chernihivska	1,891.3	119.4	538.3	138.0
Chernivetska	0.0	0.0	204.4	41.2
Dnipropetrovska	190.4	0.0	2,003.7	404.6
Donetska	5,186.4	1,016.0	1,159.3	255.9
Ivano-Frankivska	5.0	0.0	449.6	90.7
Kharkivska	3,447.3	266.7	1,432.0	326.4
Khersonska	3,122.3	35.5	457.6	122.0
Khmelnytska	12.5	0.0	429.2	86.6
Kyivska	1,507.6	506.6	6,089.3	1,247.3
Kirovohradska	40.0	0.0	367.9	74.2
Luhanska	4,552.7	989.3	303.2	83.6
Lvivska	4.7	0.0	1,103.6	222.7
Mykolaivska	1,002.4	0.0	570.1	137.8
Odeska	154.6	0.0	1,022.7	206.6
Poltavska	0.0	0.0	960.5	193.9
Rivnenska	2.0	0.0	347.4	70.1
Sumska	1,414.0	101.1	492.5	123.0
Ternopilska	0.0	0.0	286.1	57.7
Vinnytska	55.5	0.0	674.4	136.1
Volynska	1.4	0.0	388.3	78.4
Zakarpatska	0.0	0.0	306.6	61.9
Zaporizka	3,946.1	108.2	967.9	234.1
Zhytomyrska	174.3	0.0	437.3	90.1
Total	**26,769.6**	**3,142.7**	**21,523.1**	**4,590.4**

Source: Assessment team.

Figure 25. Recovery and reconstruction needs by asset type (US$ million)



Source: Assessment team based on Ministry of Infrastructure data.

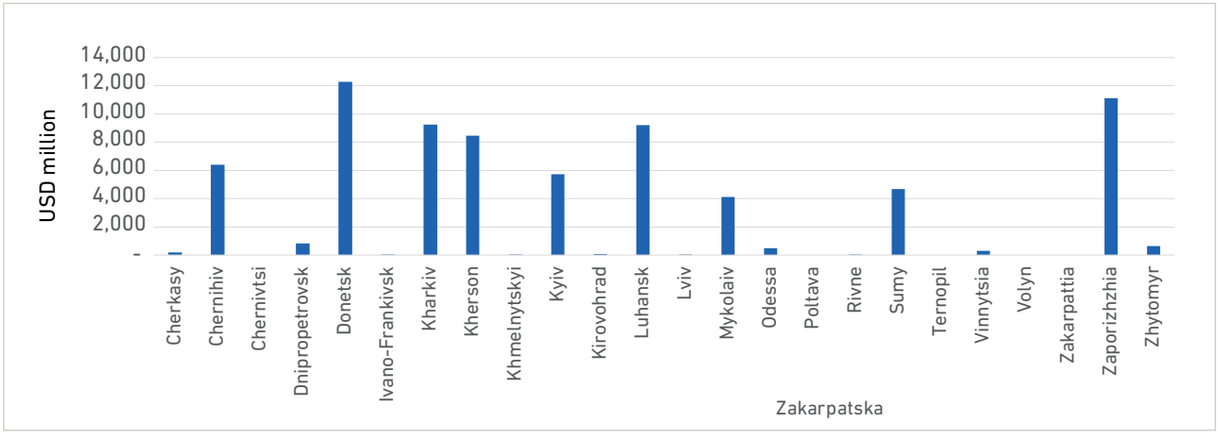
(i) motorways, highways, and other national roads (37 percent); (ii) railway rolling stock, equipment, and other assets (18 percent); (iii) road bridges on both national and local roads (11 percent combined); and (iv) railway track, bridges, and electrical equipment (10 percent). The large portion of needs for road- and railways-related investments reflects both the level of damages in these subsectors as well as the large cost differentials between legacy Ukrainian standards and the standards that Ukraine would eventually target during reconstruction as an EU candidate country. In the case of national roads, this specifically means reconstruction to modern standards of road safety and service quality that characterize recently constructed motorways and highways in the European Union. Similarly, for railways Ukraine's needs were assumed to include implementation of the European Railway Traffic Management System (ERTMS) and compliance with Technical Standards for Interoperability (TSI). Unit costs from neighboring EU states informed the calculation of needs accordingly. The need to rebuild to European Union standards explain the majority of differences in scale between damage and needs (approximately 2.5 times). Needs by asset type are shown in Figure 25.

Needs are highest in the eastern and southern oblasts that have seen protracted ground fighting, intensive artillery use, and deliberate destruction of transport networks to deny access. Specifically, Donetska, Luhanska, Khersonska, Kharkivska, Mykolaivska, and Zaporizka oblasts (which still have active fighting) together account for approximately 74 percent of transport reconstruction needs. Kyivska oblast (including the city of Kyiv), Sumska oblast, and Chernihivska oblast, which have been fully recaptured by the Government of Ukraine, contain approximately 23 percent of transport sector needs. The balance of needs (about 3 percent) reflects damage in oblasts that have been subject to aerial bombardment (e.g., missile attack) targeting airports, rail nodes, road bridges, and locations within urban population centers that also represent nodes in urban transport networks. Needs by oblast are shown in Figure 26; see also Figure 27.

The Ministry of Infrastructure is expected to lead reconstruction efforts in the transport sector and to structure implementation arrangements within its network of subsidiary institutions. There are four priority areas where the Ministry of Infrastructure is expected to focus attention in preparing reconstruction:

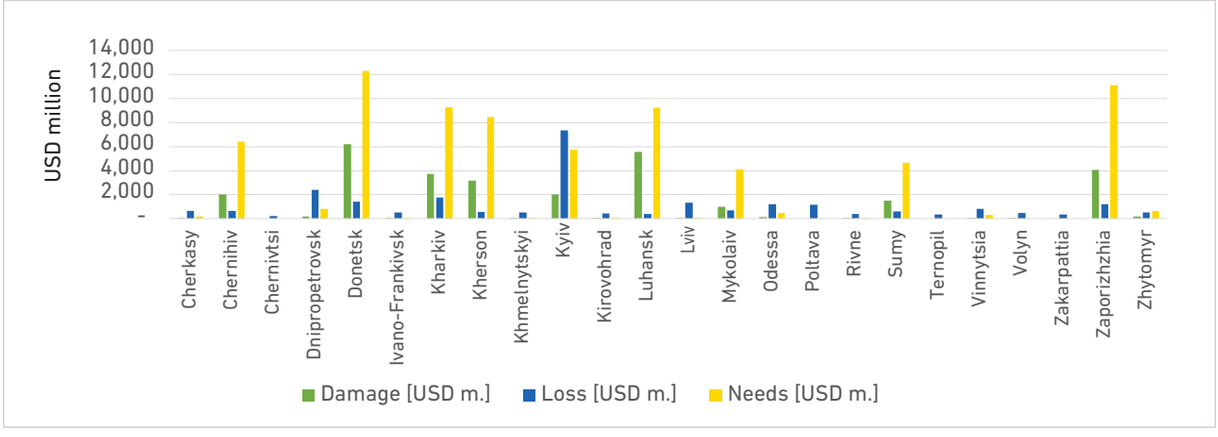
1. **Project identification, prioritization, sequencing, and commercial strategy:** There is a need to identify and frame reconstruction project packages and to sequence them over time. This process should reflect transformation strategies to "build back better" in specific subsectors, the relative priority of needs, a logical sequencing of interdependent works, and commercial considerations for bundling contracts according to the scale and scope that the market for engineering and contractor services can meet. The commercial strategy for delivering works at the scale envisaged for Ukraine's reconstruction would likely require an increase in the number of international construction firms that are active in Ukraine in parallel with efforts to grow smaller domestic firms into internationally competitive firms.

Figure 26. Recovery and reconstruction needs by oblast (US$ million)



Source: Assessment team based on Ministry of Infrastructure data.

Figure 27. Damage, losses, and needs by oblast (US$ million)



Source: Assessment team based on Ministry of Infrastructure data.

2. **Implementation structures for individual subsectors:** The Ministry of Infrastructure's implementing bodies would potentially need to establish specialized implementation units (or multiple units) to manage projects in specific subsectors. Given the likelihood of international support, these units should be capable of preparing/managing projects to the requirements of bilateral or multilateral development institutions with respect to technical, fiduciary, and environmental/social requirements. Ukraine has experience of mobilizing such a unit under the national roads company, which was known as Ukradorinvest (UDI) and previously implemented projects financed by the World Bank, European Bank for Reconstruction and Development, and European Investment Bank. A key advantage of UDI was its ability to pay market-competitive salaries (above the standard civil service) and to recruit international-caliber staff. Replicating this model for railways, aviation, maritime, and urban transport subsectors could offer the way forward for structing implementation arrangements across the transport sector.

3. **Mobilizing technical project preparation:** The reconstruction projects needed in the transport sector are technically complex and engineering intensive. Some will require environmental assessments and/or land acquisition processes along with public consultation processes. Alignment with European Union peers will also require Ukraine to apply standards that differ from or modify those previously used. While it may be possible to temporarily apply foreign standards (e.g., Polish motorway standards), Ukraine's own domestic standards will eventually need amendments to align with the EU acquis.

Project preparation tasks would reasonably be expected to cost between 2 percent and 10 percent of total civil works investment. Initiating these tasks immediately and beginning technical preparations for "no regret" investments that are highly likely to fall into highest-priority categories is essential to rapid mobilization and Ukraine's ability to absorb reconstruction funding in the transport sector.

4. **Financial strategy and the roles of international funds, sovereign funding, and user charging in specific subsectors:** The scale of investment needed for Ukraine's reconstruction is beyond the budgetary capacity of the Ministry of Infrastructure and its subsidiary institutions in virtually all subsectors. International assistance in the form of grants, loans, and/or guarantees from external sources is expected to augment what fiscal capacity Ukraine may have during reconstruction. Beyond these sources, there will also be a role for user charging to support investment and long-term sustainability of transport services. Each specific subsector will accordingly need a financial strategy and indicative expenditure envelope that reflects credible funding sources and their role in supporting direct expenditures or underpinning different forms of financing to structure payment over time (sovereign, nonsovereign, commercial, etc.). Prior to the war, Ukraine's national road sector had secured international financing and commercial finance using user charges that flowed into the national road fund (along with sovereign guarantees). However, Ukraine had yet to mobilize analogous mechanisms in other subsectors and had yet to fully implement financial planning for the road fund itself. In addition, the national government's financial role in urban public transport services was never defined systemically. Providing financial strategies for transport subsectors during reconstruction is both necessary in the immediate term and likely to prove complementary for post-reconstruction efforts to ensure financial sustainability of critical transport services.

Envisaged short-, medium-, and long-term needs reflect the enabling role that transport will play across sectors as well as the need to facilitate EU integration. Transport sector reconstruction is estimated to require approximately US$8.9 billion in the immediate/short term along with an additional US$64.9 billion in the medium- to long-term (Table 61). The highest-priority needs for reconstruction are (i) restoration of basic network functionality (road, rail, and air) for both humanitarian aid flows and support to broader reconstruction efforts across sectors, as these will rely on transport access; (ii) enhancement of westward road and rail linkages to the European Union to facilitate economic integration with Europe's single market and to provide resilience to any potential future disruptions of Black Sea access; and (iii) transformation of legacy networks toward EU standards for safety, service quality, and interoperability as a complement to Ukraine's stated policy objective of EU accession, which will require alignment with the EU acquis.

Limitations and Recommendations

The RDNA considers assets including roads, railways, aviation, ports, and urban public transport as part of the assessment. Specific limitations in the approach used to assess damage, losses, and needs include the following:

Table 61. Recovery and reconstruction needs by category (US$ million) as of June 1, 2022

Category	Short term	Medium to long term	Total needs
Road bridges (national roads)	891	6,536	7,427
Road bridges (local roads)	77	566	643
Motorways, highways, and other national roads	3,261	23,916	27,177
Oblast roads, village roads, and other local roads	549	4,023	4,571
Residential roads (cities and towns)	682	5,002	5,684
Airports	203	1,490	1,694
Railways track, bridges, stations, and electrical	868	6,366	7,235
Railway rolling stock, equipment, & other assets	1,563	11,460	13,023
Private cars	707	5,186	5,893
Urban public transport	56	412	468
Total	**8,858**	**64,957**	**73,815**

Source: Assessment team.

- **Data sets and completeness:** Damage to road, rail, aviation, and urban transport assets reflected data provided through Ukraine's Ministry of Infrastructure. The accuracy of these data varies by oblast according to the security situation—that is, according to whether Ministry of Infrastructure staff or the ministry's implementing subsidiaries can access sites and validate (at least approximately) locations and actual levels of damage. Where precise data on damaged assets are unavailable due to ongoing fighting, RDNA analysis has relied on area-based calculations using GIS tools and/or the Ministry of Infrastructure's indicative estimates for the extent of damage.

- **Indirect losses:** With the exception of aviation, losses calculations do not currently consider indirect losses. This limitation may be most relevant in the case of lost Black Sea access, where specific industry clusters near port agglomerations were likely predicated on transport via the Black Sea and would not otherwise be competitive without such access. Disruptions to specific road or rail linkages may have similar effects on industries with ridged mode requirements, where switching to alternative forms of transport may not be possible. The effect of these limitations is likely an underestimate in the scale of losses suffered due to transport sector disruptions, though some of these effects would likely be captured in analysis by other sectors.

- **Cost estimates:** Cost estimates for reconstruction needs reflect the use of unit costs or approximations for specific assets (e.g. airport terminals). This approach is approximate and actual costs would vary by location within Ukraine due to different geographical factors as well as market factors that may affect pricing of works. Unit costs also reflect assumptions regarding the nature of works required for reconstruction, which may be inaccurate, particularly where technical solutions would be different from those assumed (e.g., a different route or mode alternative developed to meet a transport need).

- **Assumptions regarding extent of damage:** The assessment of damages has not included detailed engineering work or testing that would eventually be necessary to definitively assess levels of damage and determine appropriate mitigation strategies. Such assessments would clarify whether assets assumed to be fully damaged require may only require repairs or whether full replacement/rehabilitation is needed.

- **Continuation of lost Black Sea access and airspace closure:** Loss calculations assume that Ukraine's Black Sea access will remain impeded and that Ukraine's airspace will remain closed throughout the "recovery" (loss) time considered under the RDNA assessment (3+18 months). This may prove overly pessimistic and depends on the development of the war and international diplomacy efforts to re-open the Black Sea.

The foremost recommendations to address the above are as follows: (i) once security conditions allow, intensify field-level investigations and engineering work needed to identify and classify damage; and (ii) in parallel with improved damages data following field validation, expand consideration for indirect losses, which will require additional complexity in the calculation methodologies used for assessment.

The estimates for the substantial investment needs are approximate and are subject to assumptions about the configuration and scope of Ukraine's transport networks after reconstruction. In addition, the nature and level of demands on that network may affect the economic viability of building back to a given set of standards. Postwar Ukraine's eastern and northern borders with Russia and Belarus are particularly relevant in this regard. For example, if borders remain closed or impeded, motorways may be downgraded to national roads and railway lines may be simplified (e.g., through track closures, single tracking, or simplified signaling), either because they lack economic viability or because the government has made a policy decision to prioritize resources for westward linkages. In a hypothetical case where 50 percent of damaged motorways would be downgraded to national roads ("H" category), total transport sector needs would decrease by approximately US$2.1 billion. It is also possible that Ukraine may choose to build back to standards lower than the EU standards due to fiscal or other constraint. In a hypothetical scenario where reconstruction costs are 20 percent lower than the currently assumed cost of investment in both local and national roads/bridges and rail infrastructure, transport sector needs would decrease by US$13.2 billion overall (US$9.1 billion less for roads and US$4.1 billion less for rail). Conversely, increases in needs are also possible if the amount of investment required to achieve higher standards is greater than assumed. At this stage in Ukraine's recovery, it is important to note the inherent uncertainty around the configuration of transport networks and the impact this has on estimated needs.

TELECOMMUNICATIONS AND DIGITAL

Summary

The damage in the telecommunications and digital sector has reached US$0.7 billion. This includes US$0.6 billion for telecom operators (fixed and mobile), US$0.08 billion for postal service companies, and US$0.04 billion for Ukraine's broadcasting provider. Donetska, Kharkivska, Khersonska, and Zaporizka oblasts account for 67 percent of the damage to telecom operators. The damage to postal services is similarly concentrated: Donetska and Kharkivska oblasts account for 68 percent of damage to postal infrastructure (post offices, depots, sorting centers, etc.). In broadcasting, there are 49 damaged and nonoperational TV towers as of June 1, 2022, 11 of them in Luhanska oblast and 12 in Zaporizka. **Losses of economic value added in the sector amount to US$0.6 billion for the period between the war's start and June 1, 2022. The needs for reconstruction and recovery are estimated at US$3.3 billion over the medium term within 10 years**. Among the immediate recovery investments is restoring the broadband coverage in territories that have been brought back under government control. Internet coverage and postal service access are of strategic importance, given the need for connectivity among the local population.

Background

Ukraine's telecom and digital sector plays an outsized role in enabling Ukraine's service sector, particularly the IT industry and the start-up scene. Widespread access to mobile and fixed broadband was one of the key drivers of the country's economic growth prewar.

Wireless communications were widespread in Ukraine. As of December 2019, the wireless penetration was 131 percent per capita, which was the second highest performance among the Eastern Partnership (EaP) countries, comparable to that of Poland (127 percent) and Bulgaria (134 percent).[218] In terms of coverage, 36 million Ukrainians (out of a population of 41.9 million) had mobile coverage prewar, according to Ukrcensus data. The mobile telecommunications market was competitive, and mobile internet generally affordable to an average Ukrainian. The wireless market in Ukraine displayed levels of competition similar to comparable European markets: the Herfindahl-Hirschman Index (HHI) of 0.38 (Ukraine has three major operators controlling 97 percent of the market) was comparable to that of Poland (0.2), Bulgaria (0.33), and Romania (0.28). On the cost of mobile cellular tariffs, the World Economic Forum (WEF) ranked Ukraine 48th out of 139 economies in 2016.[219] A 2019 survey by Factum Group, a consultancy, found that 64 percent of Ukrainians used internet (fixed or mobile) at least once a month.[220]

Fixed broadband penetration was 32 percent as of 2019, according to TeleGeography; this is below the European Union average of 55 percent. One of the developmental challenges was that 12 percent of the population lacked broadband access in 2020 (mostly in rural and less densely populated areas), according to the World Bank and Ookla estimates. Of those using fixed broadband, only 53 percent did so via modern fiber-optic connections. The Ookla 2020 Speedtest Global Index ranked Ukraine 59th out of 176 countries on internet speed. Ukraine's average fleet broadband speed was 50.51 Mbps (megabits per second), comparable to that of Bulgaria (53.98 Mbps), but below the global average of 76.64 Mbps. The fixed broadband market in Ukraine was highly competitive (HHI of 0.12), and the prices generally affordable (a 100 Mbps connection would cost around 1–2 percent of average household income in 2020).

Ukraine's postal service was instrumental to the growth of e-commerce in Ukraine; in 2021 it handled 450 million parcels (domestically and

218 The figures on prewar internet access in Ukraine are from the World Bank: *Link*.
219 Source: *Link*.
220 See Factum Group (2019): *Link*.

across borders), reflecting growth of 15–20 percent per year.[221] The two dominant players in the market were Nova Poshta (65 percent market share) and Ukrposhta (25 percent market share). Domestic parcels accounted for 90 percent of the market, and of this share 75 percent was driven by domestic Ukrainian e-commerce.

Damage and Loss Assessment

As of June 1, 2022, the estimated accumulated damage to Ukrainian fixed broadband providers are US$0.3 billion; for mobile providers they are US$0.2 billion. The detailed breakdown of damage and losses by oblast is provided in Table 62 and Table 63. These damage account for the value of damaged and destroyed internet lines due to military actions in the territories temporarily not under government control, as well as damaged infrastructure in those territories that were brought back under government control before June 1, 2022. Overall, 1,767,269 fixed lines have been damaged or destroyed, limiting access to broadband internet and telecommunication services for the local population. The damage has been concentrated in the country's Eastern regions: Kharkivska oblast accounts for 22 percent of telecom damage, Zaporizka for 18 percent, Donetska for 17 percent, Khersonska for 10 percent, Luhanska for 7 percent, and Chernihivska for 6 percent. The extent of damage in the territories temporarily not under government control can only be estimated. The true damage in parts of the country not controlled by the Ukrainian government cannot be quantified until those territories have been brought back under government control. The frontline cities of Kharkiv, Sumy, Chernihiv, Dnipro, and Zaporizhzhia are likely to sustain extended damage to infrastructure as the missile strikes on residential areas continue. The damage to broadband infrastructure adversely affects information access, and also limit the capacity of governmental institutions to reach the local population. Because the Ukrainian e-government app Diia is used by many Ukrainians to access humanitarian payments and other government services, the absence of broadband connectivity may severely impair governance and social welfare.

As of June 1, 2022, the accumulated losses of Ukrainian fixed broadband providers are at least US$0.05 billion; for mobile providers they are US$0.1 billion. These losses are a lower-bound estimate of economic value added (profits) lost due to the invasion. They reflect lost profits to internet service providers (ISPs) during the first three months of war, and the service restoration period of 18 months. Estimates suggest that 22 percent of ISPs' income has been lost due to subscriber loss and unpaid service provision. Mobile operators have been hit even harder in the short run (the first three months), as unpaid service provision and subscriber loss in territories temporarily not under government control had already materialized in March and continued through May. ISPs' costs also increased due to debris removal, unplanned repair works, staff relocation expenses, and more. The loss estimate is conservative, as it considers only the profit margin part (17 percent, the average for European ISPs) of the 22 percent revenue lost. The increased operating costs, repair works, demining, and other extra operating costs have not been quantified at this stage.

As of June 1, 2022, the damage to the two largest postal service providers is US$0.07 billion (private assets of Nova Poshta) and US$0.07 billion (public assets of Ukrposhta). The damaged assets include postal depots, service centers, sorting centers, and post offices. Nova Poshta provided a detailed settlement-level breakdown of damage by oblast, while Ukrposhta provided overall countrywide figures. This assessment the same proportional estimates as for Nova Poshta to obtain oblast- level damage of Ukrposhta. For Nova Poshta, a confirmed 18 postal depots and 51 postal service centers have been damaged or destroyed (see Table 62). The damage has been highest in Donetska (34 percent), Kharkivska (34 percent), Mykolaivska (10 percent), and Chernihivska (7 percent) oblasts. These damage to postal service providers has adversely affected supply chains across the country, limiting access to consumer goods, medicine, and food. Some frontline settlements rely entirely on humanitarian support for everyday food and consumer staples.

Losses to the post sector as of June 1, 2022, are US$0.4 billion (comprising private sector losses of Nova Poshta and public sector losses of Ukrposhta). Postal service providers' losses are due to lost postal parcels, employee relocation, and other war-related operational expenses.

The accumulated damage to Ukrainian broadcasters, as of June 1, 2022, are US$0.04 billion. The damage stem from the destruction of 49 TV broadcasting towers over a three-month period.

221 Forbes: *Link*.

The economic consequences of the war-related damage to the telecom and digital sector include effects on economic growth and employment in the service sector (the main beneficiary of stable and reliable broadband coverage), e-commerce (the main beneficiary of the efficient postal network), and IT and the start-up scene (both of which require internet connectivity as the very precondition for existence). Jobs and productivity growth are likely to suffer as a result of service disruptions in the telecom and digital sector.

The social impacts of the war-related damage to the telecom and digital sector include effects on inequality, educational attainment, and gender equality. Inequality is likely to increase, as the least protected parts of the population are more likely to stay behind in areas with destroyed infrastructure (broadband, etc.), and to suffer from adverse effects of having no internet access and hence no access to government services provided via internet. The adverse educational effects for students forced to study online are also more likely to be felt by those who remain in territories temporarily not under government control or in areas of active fighting. The effects of destroyed digital infrastructure are second order compared to the direct impacts of the war on livelihoods, but lack of information access, postal logistics, and internet are nevertheless non-negligible. Finally, any opportunities that previously existed for women due to easy internet access (e.g., social protection, online work) are also less likely to materialize for those remaining in territories with damaged or destroyed digital assets.

Table 62. Damage inventory by asset type (number of facilities) as of June 1, 2022

Oblast	Baseline (internet lines)	Total damaged internet lines	Total damaged postal depots	Total damaged postal service centers	Total damaged TV stations
	Private	Private	Private	Private	Public
Cherkaska	205,339	0	0	0	0
Chernihivska	193,318	136,343	0	3	2
Chernivetska	117,612	0	0	0	0
Dnipropetrovska	717,441	15,440	0	0	0
Donetska	364,867	364,867	7	9	3
Ivano-Frankivska	238,751	0	0	0	0
Kharkivska	467,649	459,173	3	31	4
Khersonska	236,721	236,721	0	1	8
Khmelnytska	268,325	0	0	0	0
Kirovohradska	159,477	0	0	0	0
Kyiv (city)	0	0	0	0	0
Kyivska	1,520,962	79,287	1	1	3
Luhanska	120,916	120,916	3	3	11
Lvivska	573,502	0	0	0	0
Mykolaivska	232,136	176,100	0	1	4
Odeska	619,566	0	0	0	0
Poltavska	287,983	0	0	0	0
Rivnenska	209,474	0	0	0	0
Sumska	236,440	176,794	0	0	2
Ternopilska	198,246	0	0	0	0
Vinnytska	293,093	0	0	0	0
Volynska	210,039	0	0	0	0
Zakarpatska	151,936	0	0	0	0

Oblast	Baseline (internet lines)	Total damaged internet lines	Total damaged postal depots	Total damaged postal service centers	Total damaged TV stations
	Private	Private	Private	Private	Public
Zaporizka	428,472	900	4	2	12
Zhytomyrska	228,116	728	0	0	0
Total	**8,280,381**	**1,767,269**	**18**	**51**	**49**

Source: Assessment team.

Note: For the telecom sector, all fixed broadband lines are private assets; for the post sector, only information on private assets is available; for the broadcasting sector, there are only public assets (TV broadcasting towers).

Table 63. Damage and losses by oblast (US$ million) as of June 1, 2022

Oblast	Total damage		Total losses	
	Public	Private	Public	Private
Cherkaska	0.000	0.000	0.000	0.000
Chernihivska	2.035	40.410	16.810	12.299
Chernivetska	0.000	0.000	0.000	0.000
Dnipropetrovska	0.000	4.160	0.000	1.301
Donetska	3.853	121.845	75.741	31.684
Ivano-Frankivska	0.000	0.000	0.000	0.000
Kharkivska	4.770	150.492	77.803	42.876
Khersonska	7.153	56.887	4.820	16.713
Khmelnytska	0.000	0.000	0.000	0.000
Kirovohradska	0.000	0.000	0.000	0.000
Kyiv (city)	0.000	0.000	0.000	205.575
Kyivska	2.924	29.337	17.042	9.241
Luhanska	9.941	42.642	13.314	14.205
Lvivska	0.000	0.000	0.000	0.000
Mykolaivska	3.904	49.407	23.094	12.185
Odeska	0.000	0.000	0.000	0.000
Poltavska	0.000	0.000	0.000	0.000
Rivnenska	0.000	0.000	0.000	0.000
Sumska	1.778	41.706	0.538	11.693
Ternopilska	0.000	0.000	0.000	0.000
Vinnytska	0.000	0.000	0.000	0.000
Volynska	0.000	0.000	0.000	0.000
Zakarpatska	0.000	0.000	0.000	0.000
Zaporizka	10.731	101.082	7.320	29.047
Zhytomyrska	0.000	0.285	0.000	0.109
Total	**47.089**	**638.254**	**236.481**	**386.927**

Source: Assessment team.

Note: Damage and losses in this table are for telecom, post, and broadcasting subsectors. Public damage and losses pertain to broadcasting and Ukrposhta (the public postal services provider); private damage and losses pertain to mobile operators, fixed broadband providers, and Nova Poshta (the private postal services provider).

Table 64. Recovery and reconstruction needs by category (US$ million) as of June 1, 2022

Category		Immediate/short term	Medium- to long-term	Total
Reconstruction Needs	Fixed operators	478.2	-	478.2
	Mobile operators	314.5		314.5
	Post	100.9	33.0	133.9
	Broadcasting	-	406.5	406.5
Service Delivery Restoration Needs	Fixed operators	50.0	-	50.0
	Mobile operators	121.4	-	121.4
	Post	215.5	1,488.6	1,704.2
	Broadcasting	-	87.9	87.9
Total		**1,280.5**	**2,016.0**	**3,296.5**

Source: Assessment team.

Reconstruction and Recovery Needs, including Build Back Better

The priority short-term recovery needs amount to US$1.3 billion; of this amount, US$0.9 billion is for infrastructure recovery and restoration of broadband, private postal service, and mobile coverage where damage was incurred, while US$0.4 billion is for service delivery needs, including higher service costs for the duration of the recovery period (one to two years) (Table 64). These estimates incorporate the build back better premium of 40 percent above the damage estimates (see Table 65). The immediate-term solution of providing Starlink terminals can ameliorate the adverse effects of the military actions on internet access but restoring broadband in the war-affected areas is still a priority action for the one- to two-year horizon. Because internet connectivity for educational institutions, hospitals, and government institutions cannot be sustained through Starlink terminals alone, restoring broadband connectivity is critical for the effective functioning of the public sector (education, health care, government services), and also for the return of the private sector (especially service-oriented firms), which will drive the recovery in war-affected regions.

Restoring postal service provision by the private provider Nova Poshta, which accounted for 65 percent market share of postal deliveries prewar, is also critical in the short term. Anecdotally, Nova Poshta already operates postal delivery services to the front lines, which should make the service recovery speedier. The recommendation to prioritize private providers (in both telecom and post) for the short-term recovery is driven by the economic argument that profit-maximizing entities are more efficient at allocating resources than public entities. This recommendation should ensure that the broadband and postal services are restored fast, at scale, and with the build back better principle in mind.

Prioritizing the broadband recovery is also in line with the National Broadband Development Plan of Ukraine and the country's Digital Agenda. The fast, affordable, and inclusive connectivity will enable faster growth in sectors like e-commerce and IT services, which are critical for the country's economic growth as Ukraine rebuilds.

The priority long-term recovery needs amount to US$2 billion; of this amount, US$0.4 billion is for infrastructure recovery and restoration of broadcasting infrastructure and the public postal service where damage was incurred, while US$1.6 billion is for service delivery needs, including higher service costs for the duration of the recovery period.

Table 65. Reconstruction and recovery needs by oblast (US$ million) as of June 1, 2022

Oblast	Short term (up to 18 months)		Long term (18 months–10 years)		Total needs (10 years)
	Private		Public		
	Infrastructure	Service delivery	Infrastructure	Service delivery	
Cherkaska	0.000	0.000	0.000	0.000	0.000
Chernihivska	56.575	12.299	18.996	112.064	199.9
Chernivetska	0.000	0.000	0.000	0.000	0.000
Dnipropetrovska	5.823	1.301	0.000	0.000	7.1
Donetska	170.583	31.684	35.960	504.941	743.2
Ivano-Frankivska	0.000	0.000	0.000	0.000	0.000
Kharkivska	210.689	42.876	44.520	518.683	816.8
Khersonska	79.642	16.713	66.762	32.132	195.2
Khmelnytska	0.000	0.000	0.000	0.000	0.000
Kirovohradska	0.000	0.000	0.000	0.000	0.000
Kyiv (city)	0.000	205.575	0.000	0.000	205.6
Kyivska	41.072	9.241	27.287	113.610	191.2
Luhanska	59.699	14.205	92.785	88.760	255.4
Lvivska	0.000	0.000	0.000	0.000	0.000
Mykolaivska	69.170	12.185	36.437	153.960	271.8
Odeska	0.000	0.000	0.000	0.000	0.000
Poltavska	0.000	0.000	0.000	0.000	0.000
Rivnenska	0.000	0.000	0.000	0.000	0.000
Sumska	58.388	11.693	16.592	3.587	90.3
Ternopilska	0.000	0.000	0.000	0.000	0.000
Vinnytska	0.000	0.000	0.000	0.000	0.000
Volynska	0.000	0.000	0.000	0.000	0.000
Zakarpatska	0.000	0.000	0.000	0.000	0.000
Zaporizka	141.515	29.047	100.156	48.803	319.5
Zhytomyrska	0.399	0.109	0.000	0.000	0.5
Total		**1,280.482**		**2,016.035**	**3,296.5**

Note: The recovery needs in this table are for telecom, post, and broadcasting subsectors. Public damage and losses pertain to broadcasting and Ukrposhta (the public postal services provider); private damage and losses pertain to mobile operators, fixed broadband providers, and Nova Poshta (the private postal services provider).

Limitations and Recommendations

The key data used for these estimations are from the Government of Ukraine (sourced from post providers, public broadcasters, and internet service providers) and from the KSE. The telecom providers (fixed broadband ISPs) provided the damage data by settlement, and the mobile providers supplied overall estimated damage. Where data are not available by oblast (e.g., for mobile operators), the assessment team extrapolates the extent of damage by calculating the proportional damage per oblast from the available fixed broadband data. The damage data provided by ISPs assume that the book value of equipment damaged is approximately the same as its market value. This assumption is conservative, as it likely underestimates rather than overestimates the extent of damage.

The assessment team cross-checked the assumptions of the KSE with those of the World Bank team and detailed any differences in assumptions (for losses and needs calculations) where differences exist. The qualitative information on damage in Kyiv was verified vis-à-vis remote-data analysis. Verification of data faced several key limitations: (i) there is an absence of multiple data providers for the same data points (except for Kyiv, for which data are available from remote analytics conducted as part of the RDNA; (ii) ongoing military actions and loss of government control over some territories prevent accurate information collection; (iii) the service restoration period of 18 months is a simplifying assumption, and may underestimate the true extent of reconstruction needs, if the military actions continue beyond the one-year horizon; and (iv) the debris removal estimates for the telecom sector service recovery were not explicitly quantified.

WATER SUPPLY AND SANITATION

Summary

The estimated damage for the water supply and sanitation (WSS) sector stand at US$1.3 billion. Given various challenges in data collection (especially for territories not under government control), this is a conservative figure; however, it provides a fair assessment of the magnitude of WSS infrastructure damage. **Losses have been estimated at approximately US$6.8 billion, noting similar challenges in accessing data.** The main part of the losses (over 50 percent) stems from lost revenues from WSS services provision. **The total reconstruction and recovery needs for the sector are estimated at around US$5.4 billion**. The building back better approach was limited to the reconstruction of the damaged/destroyed WSS assets and not geared toward achieving compliance with the WSS Sustainable Development Goals (SDGs). However, there is room to further optimize existing WSS systems and facilities (developed before the war) to meet increased standards and sustainability and climate change requirements.

Background

Before the war, the Ministry of Communities and Territories Development of Ukraine (Minregion) estimated the access to centralized piped water supply in the country at 70 percent, and access to centralized wastewater collection and treatment services at around 50 percent.[222] For a country like Ukraine that seeks to align the WSS sector requirements with the European Union (EU) Water Directives requirements, this level of WSS services is relatively low; approximately 10 million people lack access to safely managed water services and 20 million people lack access to centralized wastewater collection and treatment services. There are significant inequalities between urban and rural areas in piped water access (80 percent in urban areas versus 34 percent in rural areas), flush toilet access (86 percent versus 26 percent), and sewer connections (75 percent versus just 8 percent).

The WSS sector governance framework is highly fragmented, with administrative and legislative shortcomings that limit coordination and efficiency between national and local administration efforts. At the national level, Minregion is the institution in charge of developing countrywide WSS policies to ensure improvement and sustainability of WSS services; however, municipalities are in charge of WSS service provision (through their own WSS utilities) at local level, and there is no specific mechanism to pass down policy targets and obligations. A national economic regulator is in charge of approving prices for WSS services for utilities serving more than 100,000 people, but in recent years it has been isolated in its efforts to improve the sector performance.

In the early 2000s, the country was developing a National Water Supply and Sanitation Strategic Plan, which was not approved or implemented. The strategic plan estimated investment needs at about US$4.3–6.5 billion (€4–6 billion) to bring the water and sanitation systems in Ukraine to operational safety, and at US$23.8–28.1 billion (€22–26 billion) to achieve international WSS service standards. Since then, there has been no detailed national assessment or WSS master-planning exercise to update the figures. However, the fact that WSS utilities have suffered from underinvestment for more than three decades—a situation that persists today, with only 8 percent of WSS sector expenditures dedicated to investments—would suggest that the needs just before the war were even more substantial than those estimated for the strategic plan.

Damage and Loss Assessment

The destruction of the hydroelectric power center of the Oskil reservoir in the Kharkivska oblast occurred early in the war. Around 355.5 million m^3 of water

222 According to Governmnet of Ukraine. National report on the quality of drinking water and the state of drinking water supply in Ukraine for 2020. 2021. *Link*.

Table 66. Damage inventory by asset types (number) as of June 1, 2022

Asset type	Partially damaged	Completely destroyed	Total damaged assets
Water treatment facilities (no.)	8	2	10
Sewage treatment plants (no.)	10	4	14
Water pumping stations (no.)	20	18	38
Sewage pumping stations (km)	32	19	41
Water supply networks (km)	0	816,314	816,314
Sewer networks (km)	0	241,665	241,665
Wells (no.)	11	13	24
Laboratories (no.)	3	2	5
Clean water tanks (no.)	4	12	16
Water towers (no.)	8	24	32

Source: Minregion data.

Note: All WSS assets listed are public assets.

were released, which negatively affected municipal enterprises that provide water supply services in Luhanska and Donetska regions; as a result, significant portions of the population in these regions have limited or no access to water supply. Based on information from UNICEF, due to the war, about 6 million Ukrainians were encountering problems with access to drinking water in May 2022. UNICEF data reveal that around 13.6 million Ukrainians suffer from a lack of water for sanitary and hygienic needs, a situation that can cause infectious diseases to develop and spread throughout the country.

Active military operations and/or cases of missile strikes (in particular, air strikes and bombardment with a multiple launch rocket system) have affected access to drinking water in many cities and towns. Among the most affected have been Druzhkivka, Donetsk, Kostiantynivka, Berdiansk, Mariupol, Mykolaiv, Popasna, Prymorsk, Izium, Rubizhne, Sumy, Lysychansk, Trostianets, Sievierodonetsk, Kharkiv, and Chernihiv. Based on information received from Minregion, as of June 1, the most affected infrastructures were water supply networks (31 percent), wastewater collection networks (28 percent), wastewater treatment plants (18 percent), and drinking water treatment facilities (10 percent). Most networks are usually located under roads, which have been heavily damaged during the war, while treatment facilities are above ground and easy to target. A breakdown of asset type and damage is presented in Table 66. The information presented is not exhaustive, given that data from the territories not under government control is very difficult to obtain and might notreflect the actual situation on the ground.

Table 67 provides information on the assessment of WSS damage and losses by oblast; due to the limited data availability, most of the WSS sector losses have been estimated at national level. As of June 1, 2022, the estimated damage in the WSS sector stand at US$1.3 billion. Given that this exercise is a rapid assessment and given the challenges in data collection (especially in the territories not under government control), this figure is not precise and could underestimate damage; but it provides a fair assessment of the magnitude of damage to the WSS infrastructure. With most of the WSS infrastructure underground, it is difficult to do a good assessment while fighting is ongoing, but the team relied on data collected by Minregion, reports of issues related to access to WSS services, surveys on access to WSS services, and limited terrain work and observation (including satellite images) of visible damage to drinking and wastewater treatment plants, pumping stations, etc.

The WSS sector loss estimations are based on assumptions and limited information from vodokanals (WSS utilities) and oblasts. The sector losses are calculated at around US$6.8 billion. The main losses—53 percent of total losses—are from the lost revenues from WSS services provision and the significant drop in the collection rate. The second big loss category is additional costs for WSS services provision due to increased energy costs; energy is the second biggest cost component for Ukrainian vodokanals after salaries (30 percent). The rest of the economic losses are associated with increased fuel consumption, increased prices, and required demolition and debris management. Most of these losses have been estimated at national level and cannot be broken down based on reported damage

Table 67. Damage and losses by oblast (US$ million) as of June 1, 2022

Oblast	Total damage	Total losses
Cherkaska	-	-
Chernihivska	304.3	45.5
Chernivetska	-	-
Dnipropetrovska	-	-
Donetska	133.2	5.8
Ivano-Frankivska	-	-
Kharkivska	73.3	6.4
Khersonska	-	-
Khmelnytska	-	-
Kirovohradska	-	-
Kyiv (city)	-	-
Kyivska	146.7	16.7
Luhanska	499.8	79.7
Lvivska	8.4	1.3
Mykolaivska	41.3	2.1
Odeska	30.0	4.8
Poltavska	-	-
Rivnenska	-	-
Sumska	15.2	0.4
Ternopilska	-	-
Vinnytska	-	-
Volynska	-	-
Zakarpatska	-	-
Zaporizka	51.4	7.9
Zhytomyrska	0.0	0.0
Nationwide (no specific region)	-	6,600.0
Total	**1,303.6**	**6,770.6**

Source: Minregion data. *Note:* - = not available.

Note: All WSS assets listed are public assets.

since the losses are not always related to damage but rather reflect how many people are served at oblast level, etc.

In terms of impacts on populations, millions of Ukrainians are experiencing interrupted, limited, or no access to safe water and sanitation services because of the war. Local WSS utilities are doing their best to address the problems, but with decreasing revenues (due to consumers' nonpayment for delivered services) and increasing costs, they lack equipment and resources, and the temporary solutions put in place might not hold for more than a few months. Presently, the utilities are relying on international support and donations for small emergency investments. The major challenge for the WSS sector is to continue to provide WSS services; this is currently possible in the most affected oblasts because the central government is stepping in and paying directly for salaries and other critical operational costs. If the national budget cannot cover the accumulating losses in the sector, these vital and critical services could stop, leading to disastrous social impacts.

Reconstruction and Recovery Needs, including Build Back Better

Needs in the WSS sector build on the damage and loss assessments and are estimated at around US$5.4 billion. Partially damaged and destroyed WSS infrastructure needs rebuilding in a prioritized manner. It is proposed that the reconstruction of critical WSS assets at oblast level should come first, along with support for utilities' operational costs to ensure provision of WSS services. The required investments are split into immediate to short term and medium to long term (up to year 10); see Table 68.

The needs assessment considers a limited building back better approach to the reconstruction of the damaged/destroyed WSS assets and does not seek to achieve the WSS SDGs. However, there is room for further optimization of systems and facilities, which were developed in the past for a different reality and projections. Reconstruction of the WSS sector in Ukraine needs to take into account the broader water challenges in the country (such as water resources availability, climate change effects and resulting droughts and floods) and ensure that the new WSS services are properly sized and easy to operate and maintain (like nature-based wastewater solutions) to ensure sustainability of services.

Table 68. Recovery and reconstruction needs by oblast (US$ million) as of June 1, 2022

Oblast	Immediate/short term	Medium- to long-term	Total
Cherkaska	-	-	-
Chernihivska	114.1	456.3	570.4
Chernivetska	-	-	-
Dnipropetrovska	-	-	-
Donetska	47.1	188.4	235.5
Ivano-Frankivska	-	-	-
Kharkivska	26.6	106.3	132.9
Khersonska	-	-	-
Khmelnytska	-	-	-
Kirovohradska	-	-	-
Kyiv (city)	-	-	-
Kyivska	54.0	215.8	269.8
Luhanska	188.4	753.6	942.0
Lvivska	3.2	12.7	15.8
Mykolaivska	14.6	58.6	73.2
Odeska	11.3	45.2	56.6
Poltavska	-	-	-
Rivnenska	-	-	-
Sumska	5.3	21.2	26.5
Ternopilska	-	-	-
Vinnytska	-	-	-
Volynska	-	-	-
Zakarpatska	-	-	-
Zaporizka	19.3	77.2	96.5
Zhytomyrska	0.0	0.0	0.0
Nationwide (no specific region)	3,000.0	-	3,000.0
Total	**3,483.9**	**1,935.4**	**5,419.3**

Source: Assessment team.

Note: - = not available. *Note:* All WSS assets listed are public assets.

Table 69. Recovery and reconstruction needs by category (US$ million) as of June 1, 2022

Category	Component	Immediate/short term	Medium- to long-term	Total
Reconstruction needs	Water treatment facilities	39.0	156.0	195.0
	Sewage treatment plants	72.0	288.0	360.0
	Water pumping stations	13.7	54.6	68.3
	Sewage pumping stations	28.6	114.5	143.1
	Water supply networks	122.4	489.8	612.2
	Sewer networks	108.7	435.0	543.7
	Wells	0.6	2.4	3.0
	Laboratories	0.3	1.2	1.4
	Clean water tanks	4.1	16.3	20.4
	Water towers	1.6	6.5	8.2
Service delivery restoration needs	Demolition and debris management	34.1	136.5	170.6
	Facility operational costs	58.7	234.6	293.3
	Energy/fuel costs support	3,000.0	0	3,000.0
Total		**3,483.9**	**1,935.4**	**5,419.3**

Source: Assessment team.

Note: All WSS assets listed are public assets.

Table 69 presents a breakdown of types of WSS assets to be reconstructed. To ensure WSS services provision in the immediate/short term, there is an urgent need to continue supporting (subsidizing) the additional energy and fuel costs until WSS utilities recover their prewar revenue levels. The energy/fuel cost support is based on calculations at national level and phases out this additional cost (or subsidy, which is currently covered mostly by the state budget) in the immediate/short term. This approach takes into consideration that WSS sector revenues equal costs, that the national average for electricity/fuel costs out of total operating costs is around 30 percent or more, and that utilities financed by the World Bank Second Urban Infrastructure Project (UIP2) have reported a 40 percent increase in monthly electricity/fuel costs since the beginning of the war.

Limitations and Recommendations

The WSS sector requires reform to develop and improve WSS service delivery so that it meets EU requirements. The difficulty in obtaining data for the RDNA demonstrates that Minregion is facing significant challenges as a policy maker for the sector; there is no national information system or database on WSS assets, their condition, services quality, etc. The ongoing decentralization in Ukraine should not mean that all WSS responsibilities are transferred to local level, but rather that a mechanism is devised to ensure that national policies trickle down and are implemented at local level.

In 2021, the World Bank developed a WSS sector Policy Note,[223] which recommended reform efforts to tackle three key sector issues simultaneously: (i) improving governance to increase access, transparency, and accountability; (ii) enhancing regulation to improve performance and service quality; and (iii) reforming the funding approach to ensure cost recovery and sustainability, as well as to diversify funding options. These WSS reform efforts should be combined with the building back better approach to WSS infrastructure and services in order to deliver significant improvements and results and ensure assets and services sustainability.

223 World Bank, "Ukraine Water Supply and Sanitation Policy Note," World Bank, Washington, DC, 2021, *Link*.

MUNICIPAL SERVICES

Summary

As of June 1, 2022, the estimated damage for the municipal services sector amounts to US$2.3 billion, while the aggregate losses total US$4.3 billion. The damage includes partial or full destruction of key municipal assets (for which data were available) as well as damage to goods and equipment. The estimated losses focus on revenue losses, debris removal, and increased operational costs. Over 90 percent of the total losses valued stem from incurred and projected revenue losses of local governments; this finding indicates that local governments will continue to face financial burdens and highlights the potential instability of service delivery maintenance in the second half of 2022. **The total reconstruction and recovery needs are estimated at US$5.71 billion.** This includes costs for building back better and inflation. The most pressing needs in the short term relate to the upkeep and increase of service delivery, rapidly scaling up of investments in the waste management sector, and the formulation of citywide reconstruction and recovery strategies and action plans. Key guiding principles for recovery and reconstruction include the explicit prioritization and sequencing of investments based on technical assessments, and the facilitation of an enabling institutional and legal environment for the efficient implementation of plans.

Background

Communal infrastructure and services in Ukraine have been impacted by decades of underinvestment, poor maintenance, and low coverage. Prior to the war, service provision of utilities and infrastructure across all regions was irregular and had low coverage rates. According to the Ministry of Communities and Territories Development of Ukraine (Minregion), coverage of household waste management services is only an estimated 79 percent,[224] repairs for local roads are commonly delayed,[225] and only around 50 percent of public green spaces are actively maintained.[226] Out of the total length of street and road network in Ukraine (per Minregion, the total exceeded 270,950km as of end of 2021), only 60 percent of the road network is estimated to be serviced by streetlights, and the coverage and quality of sidewalks in cities remains wanting. With most public buildings and communal infrastructure dating from the Soviet era, and with minimal upgrades to infrastructure over time, municipal assets have remained highly energy inefficient and do not reflect demographic trends and associated needs. For example, despite the aging population, accessibility of public spaces, including sidewalks, remains limited. The high urbanization rate of 70 percent means that cities especially face a continuous strain on their infrastructure and have struggled to keep up with the increasing demand for essential utility services and urban amenities and land. This point is well illustrated by the burial sector: only around 12 percent of all cemeteries are in cities, and Minregion states that 500 additional cemeteries are needed in urban areas.[227]

The household waste management sector is especially in need of urgent investment and reforms. About 500 million tons of waste is generated annually, of which household waste accounts for more than 10 million tons. Nearly all household waste (93 percent) is disposed in landfills or in ad hoc dumping grounds; 6 percent is

224 Ministry of Development of Communities and Territories of Ukraine, "State of the field of household waste management in Ukraine for 2021," *Link.*

225 Ministry of Development of Communities and Territories of Ukraine, "Analysis of the state of the road and bridge industry in 2021," *Link.*

226 Ministry of Development of Communities and Territories of Ukraine, "State of the field of the green economy for 2021," *Link.*

227 Ministry of Development of Communities and Territories of Ukraine, "State of the burial industry in Ukraine in 2020," *Link.*

processed, and 1 percent is burned for energy.[228] The waste sector accounts for a significant 4 percent of national greenhouse gas emissions.[229] Ukraine has 6,000 landfills across the country covering a total area of 9,000 ha, but 99 percent of the operational landfills do not comply with European Union (EU) standards, and 15 percent do not meet national environmental safety requirements. Moreover, due to inadequate waste management infrastructure and networks across settlements, annually around 26,000 unauthorized dump sites are reported. The predominance of unregulated and uncertified disposal sites has major implications for health, ecosystems, and safety. Waste collection is carried out by either private entities or utility companies that provide services at relatively low tariffs are therefore unable to incorporate upgrades to equipment and technologies unless the costs are recouped from service users or from local budgets.

Local governments in Ukraine, although responsible for delivering a wide range of services and infrastructure, face numerous capacity constraints. Local governments deliver "hard" municipal services (like local roads, solid waste management, utilities, public facilities, and urban amenities) along with social services (e.g., education, health), while also fulfilling their civil and environmental protection duties. Overall regulatory functions are at the local level in Ukraine and directly impact the quality of life of citizens, local economic development, and sustainability. However, the weak financial position of some local governments, exacerbated by inconsistent cash flows, has impeded the delivery of critical local functions. Continuing underinvestment in communal infrastructure and services has resulted in rapid deterioration of assets and steadily worsening service delivery. In addition, there are gaps between the legal mandate of municipalities and the requisite technical and resource capacities and institutional arrangements for delivering municipal services; these gaps have severely limited the influence and performance of local governments, especially in small communities (*hromadas*).

Efficient land management and spatial planning have been severely impacted by the uncertainty of local administrative boundaries, and sustainable urban development planning and practices are also yet to be adopted. The decentralization reform that began in 2014 resulted in 2020 in the amalgamation of over 11,509 old (pre-reform) hromadas into around 1,470 hromadas (except the territory of Crimea).[230] The creation of the territories was proposed at the national level during 2014-2019 was voluntary. Among 11,509 rural and urban communities, only around a third of urban municipalities have had their boundaries recorded and agreed upon. None of the village communities had recorded and agreed boundaries. The ambiguous status of boundaries has several implications for planning, land management, and sustainable development. Without boundaries, any urban or spatial plan or cadaster information is not considered legally binding and can be challenged. Land registries and cadaster information is incomplete, and spatial planning, zoning, and so on cannot be undertaken efficiently at the local level without knowledge of city boundaries. The result is inefficiencies in subsequent capital planning, infrastructure and service delivery, land management, etc. In addition, despite Ukraine's high urbanization rate, it has yet to formulate a national urban development strategy that provides guidance to the local levels for planning and developing urban areas in line with sustainability and climate goals. Prior to the war, local and regional urban master plans remained considerably outdated in terms of reflecting current population needs and built-up area changes.

Damage and Loss Assessment

Damage to communal infrastructure and breakdown of municipal service delivery are among the most pronounced implications of wars, and they span a wide range of communal facilities and service functions concentrated in a specific place. For the purpose of the RDNA, the municipal infrastructure and services sectoral assessment covers mainly five categories of assets: household waste management, public infrastructure and facilities, local administrative buildings, sports facilities, and local mobility assets.[231] Within each asset category, asset types included do not cover the exhaustive set

228 Ministry of Development of Communities and Territories of Ukraine, " State of the field of household waste management in Ukraine for 2021" *Link.*

229 Ministry of Environmental Protection and Natural Resources of Ukraine, "Ukraine's Greenhouse Gas Inventory 1990–2019," 2021.

230 As part of decentralization and the entry into force of the Law "On Voluntary Unification of Territorial Communities," as of 2019, 892 amalgamated territorial communities (the «ATCs») were already established. Those ATCs were composed of about 4500 former local councils. Available at *Link*.

231 All other utilities and housing are covered by infrastructure and housing sectoral assessments respectively.

Table 70. Damage inventory by asset type (US$ million) as of June 1, 2022

Category	Asset type	Damage estimate (US$ million)	Share (%)
Solid waste management	Containers for household waste collection	10.22	4.1%
	Trucks for garbage collection	32.63	
	Container site	0.23	
	Sorting line	4.50	
	Landfill	42.67	
	Biogas plant	5.11	
Public spaces and public facilities	Public squares	15.75	28.5%
	Urban parks, gardens, and outdoor green and recreational areas	94.51	
	Cemeteries	80.18	
	Crematoriums	0.00	
	Libraries	49.19	
	Recreation centers	424.36	
Administrative buildings	Local government administrative buildings and offices	552.22	24.0%
	Local government administrative service centers and spaces	8.15	
Local mobility	Sidewalks	555.48	39.0%
	Streetlights	354.80	
Sports facilities	Stadiums	20.92	4.4%
	Swimming pools	6.98	
	Sports halls and sports schools	73.03	
	Ice rinks	2.75	
Total		**2,333.7**	**100%**

Source: Ministry of Communities and Territories Development of Ukraine data.

because of data limitations, but they do reflect the diverse range of infrastructure and services that fall under the remit of local governments.

The war is estimated to have caused at least US$2.3 billion in damage to the municipal infrastructure and services sector as of June 1, 2022. A breakdown across asset type, category, and damage is presented in Table 70. Local mobility assets (sidewalks and streetlights) had the highest share of damage at 39 percent, followed by the public spaces and facilities category, which accounted for 28.5 percent of the total damage. Within this category, parks and public squares incurred damage amounting to 5 percent of the total. Local administrative buildings and centers that house municipal service functions and operations faced US$0.6 billion in damage (24 percent), of which 75 percent was derived from completely destroyed buildings.[232]

The solid waste management sector sustained significant damage. Total damage across the sector was valued at US$95 million, which constitutes a big dent in the already strained sector. Some 5 percent of all existing collection trucks, 17 percent of all biogas plants, and 9 percent of sorting lines have been destroyed or damaged, indicating a disruption of the entire service network, especially in the Donetska and Luhanska oblasts, where 75 percent of damage in the waste sector was localized.

232 Administrative buildings do not include health and education facilities.

Table 71. Loss by category (US$ million) as of June 1, 2022

Category	Loss estimates (US$ million)	Share (%)
Costs of rubble/ debris removal	320.7	7.4
Local government estimated revenue losses	3,912.5	90.6
Increase in expenditures incurred by local governments	74.6	1.7
Loss of revenue of waste management entities	11.9	0.3
Total	**4,319.7**	**100%**

Source: Ministry of Communities and Territories Development of Ukraine data; KSE local budget analysis.

Damage is estimated to be highest in the Donetska, Kharkivska, Kyivska, Luhanska, Chernihivska, and Zaporizka oblasts. Table 72 provides the damage across all oblasts. Significant damage was also estimated in the Mykolaivska and Sumska oblasts. The accuracy and coverage of regional damage data is different across various asset types and across regions due to limitations in on-ground data collection and verification, the evolving occupation of territories, and a host of disruptions created by the ongoing war. Wherever possible and reasonable, data gaps have been addressed by leveraging informed assumptions and extrapolations, based on reports of prewar baseline information, limited satellite imagery of visible damage, data on location of conflict events, and anecdotal evidence from local experts and authorities. The estimated value of damage should not be regarded as precise but rather as indicative of the magnitude of damage.

Sectoral loss was estimated at a significant US$4.3 billion, with losses across Kyiv city, Donetska, and Kharkivska together accounting for more than 50 percent of the total. Estimated losses include demolition and debris removal (7 percent), revenue losses, and increased expenditures incurred by local governments and waste collection entities (Table 71).[233] More than 90 percent of the total loss value is registered as municipal revenue loss, highlighting the need to fiscally equip local governments so that they can continuing to deliver municipal services. Estimations of revenue losses for local governments were approximated for the months of March, April, and May and then projected over the subsequent 18 months; they included both local shares of personal income taxes (PIT)[234] and own-source revenues (OSR).[235] Revenue losses of household waste management entities (public utilities and private companies) were estimated for the period March–May and amounted to US$11 million, while the additional service delivery burden incurred by local governments during the same period accounted for US$74.6 million. The sectoral loss estimates relied on available local budget data and assumptions derived from analysis of conflict intensity, the new military budget code, and prewar baseline information on household waste collection and disposal tariffs and volumes.

Access to waste collection and disposal has severely deteriorated due to the war, and damage to local infrastructure and communal facilities has had significant impacts on the quality of life of residents. The waste sector, which was already suffering from a lack of investment and low operational capacity and coverage, has been strained even further. The increase in burden to the sector stems from two fronts: first, the increase in waste servicing demands in cities and settlements acting as IDP hubs and hosting around 17 percent of the national population; and second, the need for continued service delivery—despite major breakdowns in the delivery networks—in areas subjected to multiple battles. Many private waste collection companies have temporarily ceased operations due to significant losses to capital and revenues, and local governments do not have sufficient capacities and infrastructure to supplement this gap. Moreover, due to limitations

233 Loss estimates do not account for the increased costs related to increased costs of fuel.

234 During the period March–May, local revenues from PIT registered an increase in 20 oblasts and as such registered no loss in PIT revenues. This increase can be attributed to the substantial increase in salaries in the defense sector and a corresponding increase in military enrollment. Only six oblasts—Kyivska, Donetska, Kharkivska, Khersonska, Kyiv city, and Mykolaivska—registered losses in PIT income.

235 Municipal own-source revenue is composed of local taxes (e.g., single tax, land and property tax and fees), non-utility user fees, administrative fees, and any local capital revenue.

(and in many cases absence of) waste pickup, ad hoc open dump sites are being created for the disposal of damaged assets and household waste, which may pose significant risks to the community. Availability of a reliable household waste management system is fundamental for the safety and health of residents and IDPs in urban areas; it is also essential for debris removal in critical sites and for the commencement of reconstruction activities. Damage to local roads, sidewalks, and streetlights has constrained mobility in cities and towns, which in turn has limited the timely procurement of critical household goods and services and has also dampened employment opportunities for IDPs. Furthermore, in regions not currently witnessing fighting, the significantly reduced functionality of public facilities and spaces due to local operational capacity constraints has led to a decline in residents' quality of life and slowed the process of integrating IDPs into the community.

Table 72. Damage and losses by oblast (US$ million) as of June 1, 2022

Oblast	Damage (US$ million)	Loss (US$ million)	Damage share	Loss share
Cherkaska	10.2	14.5	0.4%	0.3%
Chernihivska	216.7	74.5	9.3%	1.7%
Chernivetska	n/a	7.1	0.0%	0.2%
Dnipropetrovska	15.4	343.0	0.7%	7.9%
Donetska	336.4	819.4	14.4%	19.0%
Ivano-Frankivska	0	11.0	0.0%	0.3%
Kharkivska	287.1	811.1	12.3%	18.8%
Khersonska	76.8	195.4	3.3%	4.5%
Khmelnytska	1.9	15.3	0.1%	0.4%
Kirovohradska	36.3	16.2	1.6%	0.4%
Kyiv (city)	34.8	656.6	1.5%	15.2%
Kyivska	215.6	203.0	9.2%	4.7%
Luhanska	213.6	221.4	9.2%	5.1%
Lvivska	3.8	35.5	0.2%	0.8%
Mykolaivska	149.7	97.4	6.4%	2.3%
Odeska	13.2	180.5	0.6%	4.2%
Poltavska	3.8	44.2	0.2%	1.0%
Rivnenska	n/a	12.6	0.0%	0.3%
Sumska	162.1	68.3	6.9%	1.6%
Ternopilska	n/a	8.8	0.0%	0.2%
Vinnytska	2.5	16.7	0.1%	0.4%
Volynska	n/a	9.1	0.0%	0.2%
Zakarpatska	8.3	9.8	0.4%	0.2%
Zaporizka	208.9	373.7	9.0%	8.7%
Zhytomyrska	64.6	31.2	2.8%	0.7%
No specific region	271.9	43.4	11.6%	1.0%
Total	**2,333.7**	**4,319.7**	**100.00%**	**100.00%**

Source: Ministry of Communities and Territories Development of Ukraine data; KSE

Note: Bolded numbers depict regions having a significant share of the damage or losses; Damage = "n/a" means there were no estimated damage based on the available data for assets included in this sectoral assessment.

Table 73. Recovery and reconstruction needs by category (US$ million) as of June 1, 2022

Category	Immediate/short term	Medium- to long-term	Total
Upkeep and increased service delivery in IDP hubs	594.54	69.75	664.29
Coordinated and efficient debris removal, treatment, and disposal and enhanced waste management capacity and infrastructure	592.58	148.14	740.72
Repair, reconstruction, and stabilization of prioritized public and service delivery infrastructure	672.10	2,688.38	3,360.48
Full-service restoration	-	945.13	945.13
Total	**1,859.21**	**3,851.41**	**5,710.63**
Total share	**33%**	**67%**	**100%**

Source: Ministry of Communities and Territories Development of Ukraine data.

Reconstruction and Recovery Needs, Including Build Back Better

When it comes to recovery and reconstruction, the role of local governments—especially cities—goes beyond just municipal assets. Local governments are critical for the implementation, coordination, and planning of measures stipulated by individual functional sectors and line ministries. This reality necessitates adopting an integrated and place-based approach at the local level and ensuring the presence of strong intergovernmental, inter-sectoral, and inter-municipal coordination mechanisms. In addition, to overcome the likely challenges of resource constraints and unstable cash flow during the recovery period, city governments will at the outset need to undertake evidence-based identification of prioritized needs and associated sequencing of recovery and reconstruction measures.

For the municipal sector to recover and in turn help facilitate local reconstruction and recovery, the estimated needs amount to US$5.7 billion. The estimated needs factor in necessary costs associated with inflation and building back better, in alignment with Ukraine's reconstruction strategy that prioritizes decarbonization as well as the EU's Green Deal.[236] The priority immediate/short-term needs are detailed in Table 73; they account for a total of US$1.8 billion and emphasize building at the local level the "Smart recovery architecture" outlined during the Ukraine Recovery Conference[237]—e.g., defining guiding principles of the recovery process and building from conducive operational, legal, financial, and institutional arrangements from the start. In the immediate term, examples of suggested actions across key components are outlined below. To translate the estimated needs to the actual implementation of recovery and reconstruction work, existing debt obligations of municipal governments will need to be assessed and the potential approach to attract further credits and grants will need to be considered.

1. **Upkeep and increase in service delivery: Maintaining current levels of service delivery citywide while increasing delivery in neighborhoods catering to large IDP populations**

    - Strengthen monitoring, reporting, and verification systems for data collection for understanding evolving location and profile of the population, identifying critical service delivery bottlenecks, recording damage, and gauging citizen needs.
    - In areas servicing large IDP populations, increase service coverage and undertake repairs of partially damaged service delivery infrastructure and critical facilities (e.g., cemeteries/ crematoriums).

236 National Recovery Council, "Ukraine's National Recovery Plan," July 2022.
237 Policy Briefs on Ukraine's Recovery," Ukraine Recovery Conference, July 4–6, Lugano, Switzerland, 2022, *Link*.

- Secure financing from external stakeholders and from the national government to ensure maintenance of services and to increase operational capacity (personnel, goods, technology, and equipment).

2. **Debris removal and waste management: Coordinated and efficient debris removal, treatment, and disposal with simultaneous enhancement to waste management capacity and infrastructure**

   - Conduct assessments in sample sites for understanding debris composition and prepare a citywide plan for debris removal, sorting, treatment, and processing that also identifies priority locations for demolition and debris removal.
   - Identify and treat ad hoc dump sites used for debris and make temporary provisions for the disposal of debris ensuring safety and environmental standards.
   - Prepare and adopt a short- to medium-term waste management plans aligned with population movements and household waste management infrastructure gaps (both at national and local level).
   - Procure necessary and critical assets, like collection trucks, to ensure timely waste collection and effective and efficient waste management in the short term.

3. **Repair, reconstruction, and stabilization of prioritized assets**

   - At the national level, incentivize agreement and finalization of local government boundaries, including rapid conflict resolution arising from boundary disputes.
   - Conduct engineering studies for individual buildings and multi-hazard assessments at the city level to determine structural integrity and risks and specific needs for reconstruction.
   - Prepare and adopt integrated immediate-to-medium-term citywide urban recovery and reconstruction action plans identifying and prioritizing needs and sequencing planned reconstruction activities.
   - Update building codes and safety and energy-efficiency standards.
   - Update local cadasters and land registries in coordination with the national-level ministry and conduct cadaster activities (systematic survey and property registration processes) in urban areas.
   - Undertake repairs of partially damaged prioritized assets.

Limitations and Recommendations

Data on the number and status of the wide range of locally maintained and owned assets should be aggregated and documented regularly at the national level; the same should be done for data on service delivery. This would allow for better monitoring of local service delivery, cross-regional comparisons for benchmarking, and identification of infrastructure needs and gaps—essential for national-level policy makers seeking to design evidence-based policies and regulations and to channel investments. For this assessment, although Minregion provided baseline data and data on unit costs and damage, the data were in most cases either incomplete or not verified, suggesting data-reporting systems for communal assets could be improved. The damage and losses are therefore to a large extent extrapolated from analyzing the severity of the war across regions and based on informed assumptions and information from multiple sources. The estimated numbers are indicative and are not to be taken as precise values.

Future data collection efforts and assessments would benefit from the segregation of infrastructure asset data across urban and rural settlements. Infrastructure and service needs, delivery approaches, and costs in urban areas widely differ from those in rural areas. More importantly, local capacities are substantially different when comparing cities with other smaller, settlements or rural areas. Categorizing data across the degree of urbanization would yield a better understanding of context-specific policy and financing requirements.

CROSS-CUTTING AREAS

Borodyanka. Photo by Julia Burlachenko for the World Bank.

ENVIRONMENT AND NATURAL RESOURCE MANAGEMENT, AND FORESTRY

Summary

The war in Ukraine has significantly harmed the environment and natural resources of the country. Multiple air pollution incidents and potentially serious contamination of ground and surface waters and soil have already been observed, and the long-term impact of war could be even more harmful—not only for the population's health and safety, but also for ecosystems and biodiversity. Most of the environmental risks are linked to the damage to industrial installations and houses (asbestos release), energy infrastructure (power plants, oil storage tankers, oil refineries, drilling platforms, and gas facilities and distribution pipelines), and ecosystems (forest fires and land mines). The main environmental risks include air pollution, water pollution, and soil pollution, with accumulation of hazardous wastes that affect the health and safety of the population as well as biodiversity. Losses and damage in monetary terms are estimated where feasible, such as for the forest sector. Due to the active war situation, measuring of key pollutants in air, water, and soil was not possible. Priority areas for cleanup and building back better are identified for a fundamental transformation of Ukraine toward a green and net-zero economy. The rebuilding process should be harmonized with the European Union (EU) environmental and climate goals.

The forestry sector has been significantly impacted by the war. As of June 1, 2022, approximately 3 percent has been lost due to forest fires and 38 percent is inaccessible due to the presence of mines. **Damage across growing stock, roads, buildings, and equipment is almost US$2.5 billion. Lost ecosystem services value—a result of mines making the forests inaccessible—is estimated at US$739 million over the 21 months from March 2022**. However, forestry has a slow recovery rate, and these losses may extend much further beyond this period. **Sectoral recovery and reconstruction needs, including building back with strengthened institutions, equipment, and nursery capacity, are estimated at US$1.2 billion**. As part of the recovery and reconstruction needs, capacity building includes a functional review of the institutions in the sector, with a focus on modernized planning and on the best afforestation and reforestation methods for climate-smart forestry. Recommended for further study is the creation of investor-ready carbon projects and the potential for mass employment in afforestation and reforestation via "green wage" schemes.

Environment and Natural Resource Management

Background

Ukraine's National Environmental Strategy–2020[238] identifies several key environmental challenges: air pollution; quality of water resources and land degradation; solid waste management; biodiversity loss; and human health problems.

Air pollution. Since 2016 there has been a partial rise in pollutant emissions as a result of growth in output in agriculture, energy, and industrial production and waste generation.[239] Thus, nearly

238 Government of Ukraine, "National Environmental Policy 2011–2022," *Link*; see also FAO Aquastat, "Country Profile: Ukraine," 2015, *Link*.

239 Ministry of Environmental Protection and Natural Resources, "Ukraine´s Informative Inventory Report," 2020 Submission under the UNECE CLRTAP, Kyiv, 2021.

all big Ukrainian cities exceed the World Health Organization standards for specific pollutants.[240] The annual average Plume Labs Air Quality Index (AQI) for the 10 biggest Ukrainian cities ranges between 31 and 36, which indicates a moderate level of air pollution.[241] The largest annual average AQI value in the 10 largest cities was recorded in Odessa (36 AQI), whereas the lowest in Kharkiv (31 AQI). In addition, Krivyi Rih was the city with the most of days with high air pollution, while Mariupol was the city with the most days with very high or excessive or extreme air pollution. Other cities that recorded days with very high air pollution include Kharkiv, Dnipro, Donetsk, Zaporizhzhia, and Mykolaiv. Due to the presence of heavy industry, the cities of Dnipro, Donetsk, Kharkiv, Kyiv, Mariupol, and Zaporizhzhia are commonly identified as air pollution hotspots for NO2 and SO2 concentrations.[242] The air pollution effect of industrial production disruption due to war has yet to be determined. At the same time, a significant amount of air pollution is associated with forest fires that are also concentrated in the war zone.

Quality of water resources: **Ukraine's total renewable water resources are estimated at 175 billion m^3 per year and were 3,980 m^3 per capita per year in 2018.**[243] While this level puts Ukraine in the "no stress" category (defined as below 1,700 m^3 per capita per year), there is disparity in distribution of the water resources between different regions. The area affected by the war is in the arid zone already affected by water shortages. Almost 70 percent of the drinking water supply relies on surface water sources, which increases the population's exposure to water pollution linked to the conflict, with significant risk to health, especially in vulnerable groups.

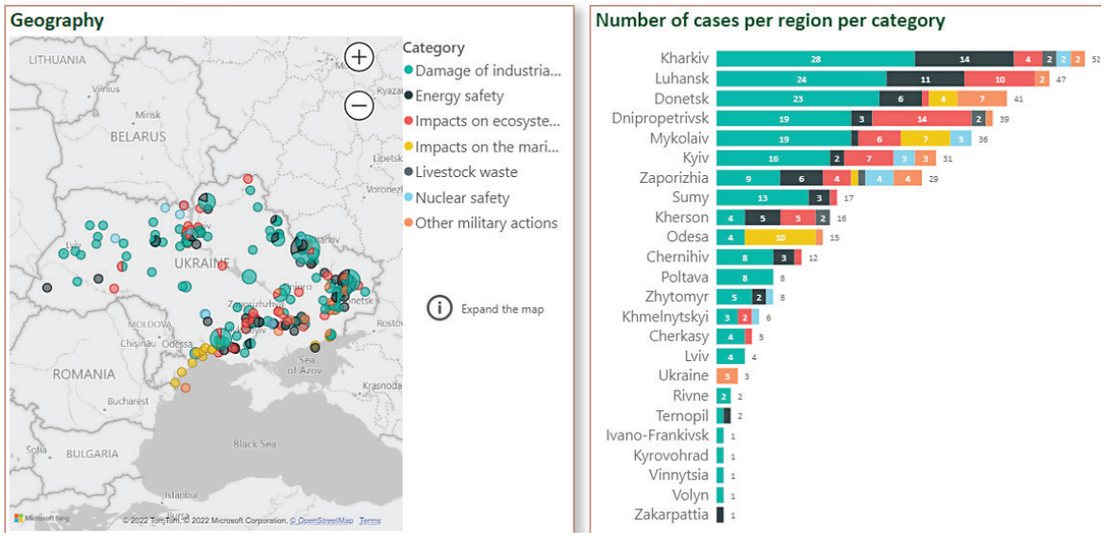
Solid waste management: **Ukraine identifies four classes of industrial waste, grouped according to hazardous properties and physical, chemical, and biological characteristics.** The first, second, and third classes—considered most harmful—represent 3 percent of the annual generation of waste, or 1 percent of waste accumulation. The fourth class is considered less harmful and, in practice, represents the total accumulation of solid waste in Ukraine. In 2020, Ukraine generated about 500,000 tons of the most harmful wastes and disposed of about 25 percent.[244] Large accumulations of such wastes increase the risks of ecological accidents from disposed heavy metals, oil products, pesticides, and other materials. The war in Ukraine is a direct and indirect cause of many accidents, and it also leaves hazardous waste that requires cleanup and reclamation of significant areas exposed to the war.

Ukraine has a total of 663 protected areas of national importance and 7,633 areas of local importance. The beech forests of Ukraine—located within the Gorgany Nature Reserve, the Roztochya Nature Reserve, the National Nature Park (NNP) Podilski Tovtry, NNP Synevyr, and NNP Zacharovany Krai—are listed as a UNESCO World Heritage site; these "Ancient and Primeval Beech Forests of the Carpathians and Other Regions of Europe" are among the oldest forest areas of Europe.[245] In 2017, the Standing Committee to the Bern Convention designated and approved a list of 271 Emerald Network sites in Ukraine, whose total area is 10 percent of the country. Ukraine's 39 Ramsar sites (wetlands of international importance) cover over 825,000 ha. Many protected areas and habitats in the east are affected by war, with many biodiversity hotspots located in the exposed area.

The Ministry of Environmental Protection and Natural Resources of Ukraine (MEPNR) is responsible for the state policy in several fields: environmental pollution control; sustainable use of water and subsoil resources; climate policy; environmental and (within the limits of the powers provided by law) radiation, biological, and genetic safety; fisheries and fishing industry, protection, use, and reproduction of aquatic biological resources; and biodiversity protection, forestry, and hunting. At the oblast level, the Departments of Ecology and Natural Resources under each oblast administration are also accountable to the MENR. These departments ensure implementation of environmental policy at the oblast level.

240 World Bank, "Ukraine Country Environmental Analysis," January 2016, *Link*.
241 Plume Labs, "Ukraine," *Link*.
242 Satellite data from Copernicus Atmosphere Monitoring Service (CAMS), *Link*; United Nations Development Programme's Accelerator Lab, *Link*.
243 World Bank, Clear Water Dashboard.
244 Ukrstat (State Statistics Service of Ukraine), *Link*.
245 "Sixth National Report of Ukraine on the Implementation of the Convention on Biological Diversity," December 2018, *Link*.

Figure 28. Environmental incidents by May 5, 2022



Source: Ecoaction, "Potential Environmental Impacts Caused by Russian Aggression In Ukraine," May 5, 2022, *Link*.

Damage and Loss Assessment

From the first days of the war, the Government of Ukraine and nongovernmental organizations (NGOs) launched several tools to document the environmental damage—for example, a dashboard, EcoZagroza, with data on the war's impact on the environment.[246] In addition, the State Environmental Inspection recorded over 250 cases of environmental incidents and over 1,200 cases of damage to the environment from the war. Special units have been collecting evidence, including photos, videos, and satellite images and, where possible, air and soil samples for laboratory tests. Work has begun to develop methodologies for calculating the monetary values of the damage to the environment. By May 5, 2022, 377 cases of environmental incidents had been reported in the media.[247] The most frequently affected regions are in the east and southeast and in Kyivska oblast. Kharkivska oblast was the one most affected by environmental incidents. Other heavily affected oblasts are Luhanska, Donetska, Dnipropetrovska, Mykolaivska, Kyivska, and Zaporizka (Figure 28).

The RDNA's assessment of the areas most exposed to environmental risks is very similar to that of the United Nations Environment Programme and partner organizations[248] that follow the conflict in the areas with nuclear power plants and facilities, energy infrastructure (including oil storage tankers, oil refineries, drilling platforms, and gas facilities and distribution pipelines), mines and industrial sites, and agro-processing facilities. There are about 360 critical facilities in the war zone, some of them already damaged. Multiple air pollution incidents and potentially serious contamination of ground and surface waters have already been observed. Environmental risks due to war in Ukraine are presented in the map (Figure 29). Among the industrial facilities that have major pollution risks are Zaporizhzhia and Chernobyl nuclear power plants, Avdiivka Coke and Chemical Plant, the Toretsk Ferroalloy Plant, metallurgical plants in Mariupol, and all ports, oil storage facilities, and coal mines. The map below (Figure 29), prepared by the ZOI Environmental Network, presents the level of risk for different industrial and infrastructural facilities in Ukraine.

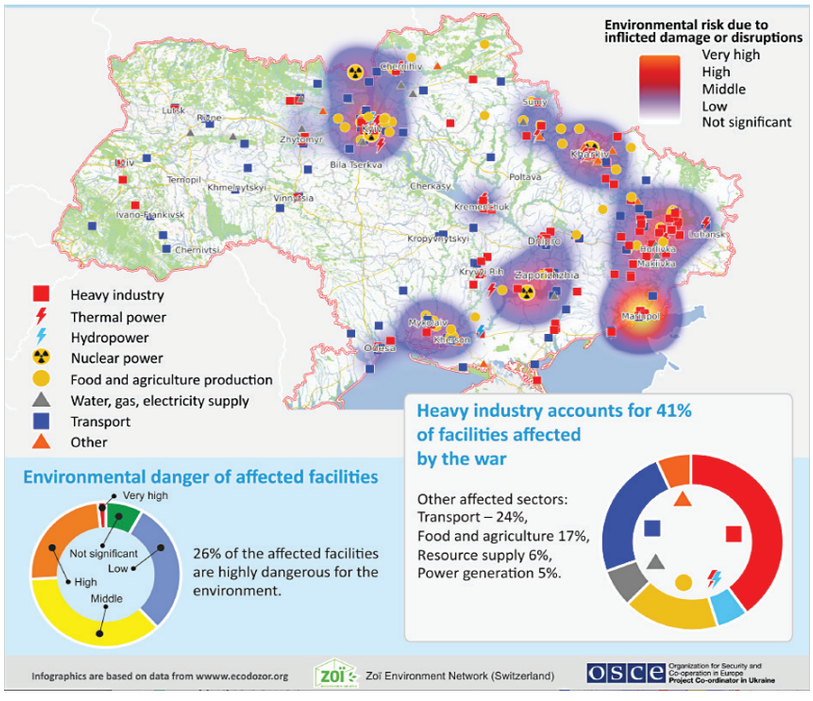
Environmental and safety hazards in the exposed areas. Nuclear and radiation safety threats are looming, since the security of Ukrainian nuclear power plants continues to be threatened. Every accident could lead to a radiation leak (see Figure 30).

246 MENR, Eco-threat, *Link*.

247 Ecoaction, "Potential Environmental Impacts Caused by Russian Aggression in Ukraine," May 5, 2022, *Link*.

248 United Nations Environment Programme, "UN Warns of toxic Environmental Legacy for Ukraine, Region," July 4, 2022, *Link*.

Figure 29. Environmental risks due to war in Ukraine Environmental risks due to war in Ukraine

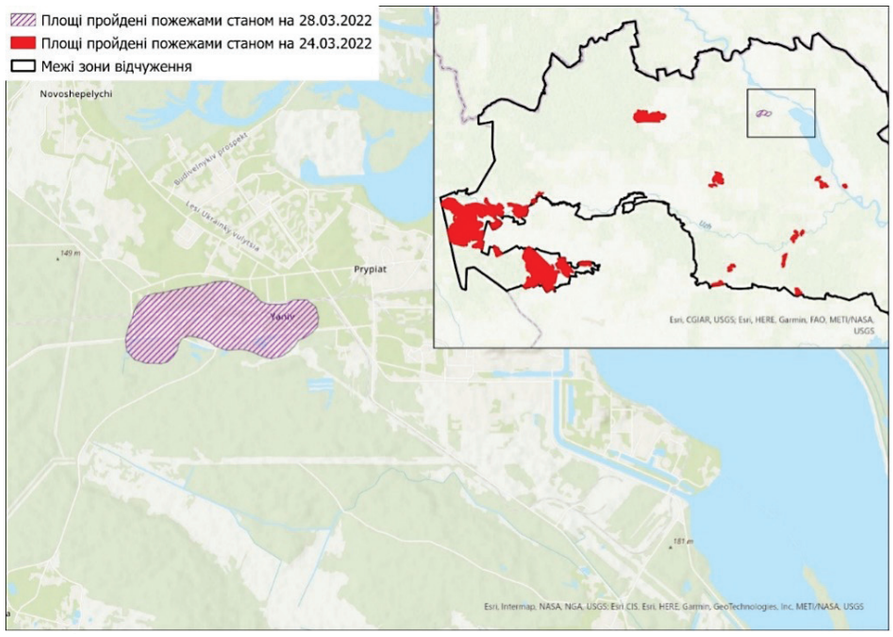


Source: ZOI Environmental Network, "Ecodozor Platform for Monitoring War-Related Environmental Damage and Risks in Ukraine," Link.

Figure 30. Nuclear power plants in Ukraine

Source Bloomberg, "Mariupol Has Fallen," May 18, 2022, *Link*.

Figure 31. Territories with forest fires in the exclusion zone as of 18:00 on March 28, 2022



Source: MNER, "Key Environmental Issues, Associated with Russian Invasion in Ukraine 24–31 March 2022," April 1, 2022, *Link*.

The Zaporizhzhia nuclear power plant continues to operate outside of government control since March 4. The Russian army uses the territory of the nuclear power plant as a military base. According to the Defense Intelligence of Ukraine, the forces are endangering the safe operation of the facility, which has almost no spare parts and consumables. According to Energoatom, several employees of the facility are displaced.

In the Chernobyl Exclusion Zone, an inventory and assessment of the amount of damage caused are underway. During his visit to the Chornobyl nuclear power plant on June 2, Ukraine's minister of environmental protection and natural resources, Ruslan Strilets, noted that according to preliminary estimates, the damage caused by troops in the Exclusion Zone amounted to UAH 2.5 billion. The forces destroyed almost 100 units of valuable analytical equipment that have no analogs in Europe. Total lost equipment is estimated at US$135 million.[249]

Forest fires in the Chernobyl Exclusion Zone are consuming forests and fallow lands that accumulated a significant amount of radionuclides after the 1986 accident.[250] During the occupation of the Exclusion Zone, fires have already been recorded in natural complexes and abandoned villages on an area of about 10,287 ha, in particular on March 28, 2022, when after two days without fires, new fires were identified that passed over an additional 176 ha of natural ecosystems (see Figure 30 and Figure 31).

Currently, only large fires are being detected by satellite imagery (VIIRS, MODIS), but there may be a significant number of smaller and low-intensity fires that are not recorded. Such fires, under favorable weather conditions and delayed detection and extinguishing, are able to spread over large areas. With the increase in temperature in summer and lack of control over the fire situation, fire risks are expected to increase.

Air pollution and public health risk: **Fires, smoke, and fumes caused by shelling, including fires in residential areas, have significant impact on air quality.** As a result of fires at oil depots, oxides of nitrogen, ammonia, sulfur dioxide, benzopyrene, carbon oxides, hydrogen cyanide vapor, formaldehyde, metals, and toxic organics and their compounds are released into the air. These substances also cause acidification of soil, wood, sod, and metal constructions such as bridges. While carbon dioxide and water vapor are not toxic and are dangerous only for climate change

249 MNER, "Briefing on the Environmental Damage Caused by the Russia's War of Aggression against Ukraine (2–8 June 2022)," June 10, 2022, *Link*.

250 MNER, "Key Environmental Issues, Associated with Russian Invasion in Ukraine 24–31 March 2022," April 1, 2022, *Link*.

(both of them are greenhouse gases), sulfur and nitrogen oxides may cause acidic rains, changing the pH of soils, causing vegetation burns, and creating respiratory problems for mammals and birds. After the fires/explosions, sulfur settles on the ground, which turns into sulfuric acid after rain. Continuous exposure to these pollutants has a cumulative effect. The pollutants significantly affect air quality and pose a threat to human health, and they can be carried by winds over long distances. Air pollution effects of industrial production disruption due to war have yet to be determined. At the same time, a significant amount of air pollution is associated with forest fires that are also concentrated in in the war zone. At this time the public health impact of air pollution associated with the war has not been assessed in Ukraine.

Damage to water infrastructure and public health risk: **Water infrastructure, including pumping stations, purification plants, and sewage facilities, has also suffered significant damage.** All cities of the Luhanska oblast in the territory controlled by Ukraine lack water supply and treatment. Water supply and sewerage facilities in the Donetska, Zaporizka, Kharkivska, and Mykolaivska regions have been significantly damaged. The greatest environmental damage is due to the destruction of treatment facilities and dams and decommissioning of service organizations involved in water supply and wastewater treatment. Water now ends up in reservoirs without treatment, especially where active hostilities have taken place. For example, after the shelling of the Vasylkiv Operational Department of Water Supply and Sewerage Treatment facilities, the forces destroyed the building of the sewage pumping station.[251] As a result of such actions, the return water enters the Dnipro River without any treatment, which could spread infectious diseases among the population consuming this water and lead to the eutrophication and algal blooms, resulting in water de-oxygenation and fish kills. In addition, the destruction of infrastructure and industrial facilities can lead to the ingress of pollutants into water bodies, resulting in significant water pollution.

As a result of damage to water supply infrastructure, an estimated 1.4 million people in Ukraine currently have no access to safe water, and a further 4.6 million people have only limited access.[252] For example, the water supply system from the Dnipro River to the city of Mykolaiv was severely damaged by shelling, cutting access to drinking water for three weeks until basic needs were met by water transported from neighboring regions. As of June 1, 2022, Ukraine had begun enhanced epidemiological surveillance of cases displaying cholera symptoms.[253] Children under the age of 15 living in countries affected by conflict are almost three times more likely to die from diarrheal diseases caused by a lack of safe water, sanitation, and hygiene, than by direct violence; the greatest risk is among children under five, who are more than 20 time more likely to die.[254] Health damage from the lack of access to clean water (additional diarrheal mortality) is estimated in the range US$138–257 million.[255] This damage is not included in the total damage due to potential double counting with the losses associated with the deteriorated health of people and constrained access to services estimated in the health sector.

Hazardous waste problem: **Highly hazardous wastes as a result of war will likely exceed the total amount of annual wastes in Ukraine.** They will pose a significant challenge for both cleanup and decontamination efforts. The cost of cleanup has to be estimated and is expected to be quite significant. The costs vary by type of waste and technology for safe disposal.[256]

Tailing storage facilities: **Multiple industrial facilities, warehouses, and factories have been damaged, some storing a range of hazardous substances.** The war in the Donetska and Luhanska oblasts in Eastern Ukraine threatens around 4,500 mining, metallurgical, and chemical enterprises. The Donbas region was polluted before and is home to "Europe's most significant man-made environmental burden." Among these industries, 80 percent have hazardous installations that pose a threat to the environment. The region hosts 200 of Ukraine's 465 tailing storage facilities (Figure 32)—large ponds storing the industrial waste and toxic substances of the region's heavy mining, chemical, and energy industries. Well over half (60 percent) of these facilities are old, some

251 Rubryka, "Water Theft: How the Russians Are Depriving Us of Water Resources," June 27, 2022, *Link*.

252 MENR, "Briefing on the Environmental Damage Caused by the Russia's War of Aggression against Ukraine (4–10 May 2022)," May 12, 2022, *Link*.

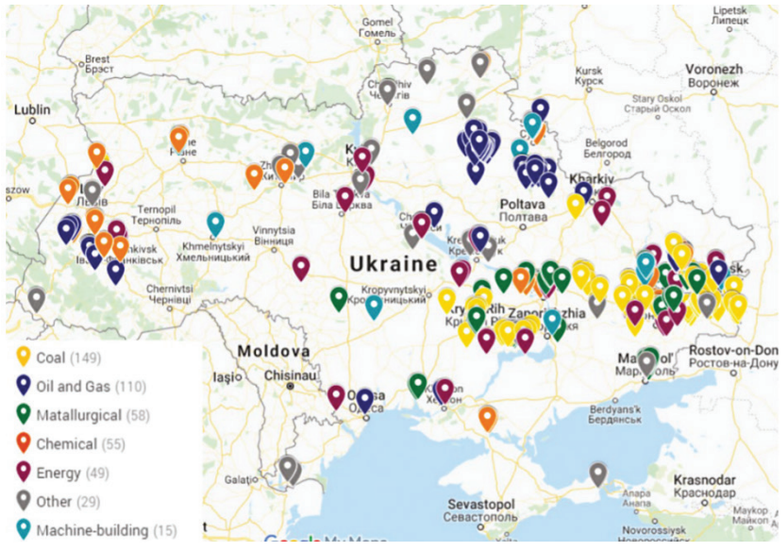
253 OECD, "Environmental Impacts of the War in Ukraine and Prospects for a Green Reconstruction," *Link*.

254 World Health Organization, "Ukraine Crisis. Public Health Situation Analysis–Refugee-Hosting Countries," 2022, *Link*.

255 Value of statistical life is estimated using the standard World Bank methodology as presented in U. Narain and C. Sall, "Methodology for Valuing the Health Impacts of Air Pollution," 2016, *Link*.

256 See Profitableventure.com, "How Much Does It Cost to Dispose Hazardous Waste Per Ton?," *Link*.

Figure 32. Tailings storage facilities in Ukraine



Source: Organisation for Security and Co-operation in Europe, "Donbas Tailings Storage Facilities," Link.

are abandoned by their owners or in disrepair, and almost three-quarters are considered potentially dangerous.[257] They store about 6 billion tons of waste from various industries, and potential failures could lead to the pollution of Ukraine's major rivers, such as the Dniester, Dnipro, and Siverskyi Donets, which flow through Russia, Moldova, and Belarus. Tailing storage facilities damaged by war have not been assessed yet.

A 2019 study by the Organization for Security and Cooperation in Europe (OSCE) showed that potential threats posed by damage to these facilities include risks of floods and explosions as well as chemical, environmental, and fire hazards. More than 40 industrial sites have already been attacked.[258] For example, the Azovstal bombing threatens cross-border global hydrogen sulfide poisoning. The destruction of the steel plant could damage a technical facility that holds back tens of thousands of tons of hydrogen sulfide solution. According to the Mariupol City Council, the leak of this liquid could completely kill the flora and fauna of the Sea of Azov[259] and allow dangerous substances into the Black and Mediterranean Seas. The situation is so critical that, according to Mariupol's mayor, Vadym Boychenko, international experts and the UN must be admitted to the site to study the state of affairs and prevent a worldwide environmental catastrophe.[260]

Asbestos: **In many urban areas, the cleanup of destroyed housing will confront hazardous materials, particularly asbestos.** The asbestos still presents in the structure of buildings that are being torn apart by bombardments can cause a series of diseases, ranging from breathing difficulties to cancers of the lungs, stomach, ovaries, and other organs. The waste problem has become critical. Each destroyed house generates about 50 m^3 of waste. A recent source in Ukraine suggests that up to 60 percent of roofs used asbestos-reinforced slate.[261] With about 240,000 houses destroyed (per the RDNA), about 5–10 tons of asbestos[262] could have been released into the air. In comparison, the collapse of the World Trade Center on September 11, 2001, released a plume containing 400 tons of

257 VoxEurope, "What Impact Will the War in Ukraine Have on the Environment?," April 20, 2022, Link.

258 Radio Free Europe/Radio Liberty, "Scorched Earth: The Catastrophic Environmental Costs of Russia's Invasion of Ukraine," June 28, 2022, Link.

259 Rubryka, "War and Environment: Russia's Ecological Crimes and How to record Them," June 2, 20222, Link.

260 Newsweek, "Leak at Bombed Mariupol Steel Plant Risks Environmental Catastrophe—Ukraine," May 18, 2022, Link.

261 UNDRR, "Rebuilding Ukraine: The Imminent Risks from Asbestos," (blog), June 7, 2022, Link.

262 MNER, "Briefing on the environmental Damage Caused by the Russia's War of Aggression against Ukraine (2–8 June 2022)," June 10, 2022, Link.

pulverized asbestos and other hazardous materials across lower Manhattan.[263] Of the half million people exposed to the toxic plume, about 4,500 died from lung and other types of cancer.

Toxic remnants of war:[264] **Pollution from the extensive use of weapons, including in populated areas, and the large volumes of military waste, including destroyed military vehicles, creates a major cleanup challenge.** Such pollution and waste materials found in war zones are called toxic remnants of war (TRW). They arise from military herbicides, emissions from military bases, debris during the conflict, military waste management such as burn pits, and munitions disposal during and after conflict. According to one expert, "TRW are also created after the fighting has ceased through abandoned military materiel, critical infrastructure usage, industrial site usage, military activity in populated locations, governance collapse (which leads to a lack of control over environmental regulation), loss of assessment capacity, and the collapse in waste management."[265] The war already has created more than 200,000 tons of hazardous waste and scrap metal.[266]

Damage to nature reserves and protected ecosystems: **As a result of the war, about 20 percent of the area of all protected areas in Ukraine is in danger.** The threatened areas include 17 Ramsar sites (wetlands of international importance) with a total area of 627,300 m^2; about 160 territories of the Emerald Network with an area of 2.5 million ha; and four biosphere reserves. This situation poses a threat to strategic goals for the conservation of biodiversity, leads to a decrease in the potential for absorption of greenhouse gases, and strengthens the desertification process. The disappearance of endemic species of plants and animals would significantly harm biodiversity at planetary scale.[267] The potential damage is greater because the conflict began near spring, when animals move in search of mates and food, and when they are rearing their young. According to the MENR, at least 900 protected areas together covering 1.2 million ha, or 30 percent of all protected areas in Ukraine, have been affected by shelling, bombing, oil pollution, and military maneuvers.[268] According to Oleksii Vasyliuk of the Ukrainian Conservation Group, an NGO, a fifth of the country's 377 Emerald network sites protected under the Bern Convention have been degraded by military action. These include many unique steppe habitats of the highest nature value as well as the dense forests growing along the Siverskyi Donets River, which provide shelter, food, and nesting sites for protected birds of prey. As troops concentrate here, they jeopardize the integrity of this biodiversity hotspot.[269] Additionally, as farmlands are being threatened with land mines, the country is forced to move into converting unique steppe areas into agricultural lands. This is an indirect impact of the war on biodiversity and ecosystem services.

Reconstruction and Recovery Needs, including Build Back Better

On April 21, Ukraine's President established by decree the National Council for the Recovery of Ukraine from the War. A working group on environmental safety has been created within the council. Its proposal for environmental restoration and action plan for postwar reconstruction and development of Ukraine were presented on July 4, 2022.[270] It identified five priority areas: (i) reform of public environmental administration; (ii) climate mitigation and adaptation policy; (iii) environmental safety and effective waste management; (iv) sustainable use of natural resources; and (v) conservation of natural ecosystems, preservation of biological diversity, and restoration and development of protected areas. These approaches outlined by the government provide very useful broad principles for addressing multiple types of environmental damage.

The working group's plan includes short- and long-term priorities, which reflect inputs from an extensive process of stakeholder consultations. As summarized by the OECD:

263 Asbestos, 9/11 and the World Trade Center Link.

264 T. Persico, "On Russia's Invasion and Environmental Devastation of Ukraine: An Introduction to the Toxic Remnants of War," April 26, 2022, American Bar Association, *Link*.

265 Ibid.

266 MENR, "9 Urgent Reforms and Dozens of New Environmental Protection Objects: Ruslan Strelets Presented the regional Component of the Recovery Plan of Ukraine" [in Ukrainian], July 4, 2022, *Link*.

267 Ibid.; WWF, "Assessing the Environmental Impacts of the War in Ukraine," June 13, 2022, *Link*.

268 MENR Facebook page, April 30, 2022, *Link*.

269 WWF, "Assessing the Environmental Impacts of the War in Ukraine," June 13, 2022, *Link*.

270 MENR, "9 Urgent Reforms and Dozens of New Environmental Protection Objects: Ruslan Strelets Presented the regional Component of the Recovery Plan of Ukraine" [in Ukrainian], July 4, 2022, *Link*.

- "In the short term, Ukraine should focus on eliminating and reducing immediate risks to human health and the environment from the impacts of the war. Preparing and carrying out a comprehensive environmental clean-up effort, especially related to collection, safe disposal and treatment of the vast amount of military and other waste, will help to reduce immediate health risks. At the same time, there will be an urgent need to repair and re-build more efficient environmental infrastructure to ensure the supply of safe drinking water, adequate sanitation and appropriate collection, storage and treatment of waste. The existing and potential impacts on human health should guide the prioritization of actions.

- "In the longer term, the post war economic development process should be used for a fundamental transformation of Ukraine towards a green and net-zero economy. The reconstruction should not recreate the prewar economy, which was fossil fuel based, energy inefficient and pollution intensive. Priority should be given to adjusting the economic structure by building more energy-efficient and less polluting industries and transport systems. Rebuilding of the housing stock, schools and hospitals should also improve their energy efficiency and use low-carbon materials. It will be important to clearly formulate and explicitly pronounce these objectives of moving away from the reliance on fossil fuels and incorporating long-term green transition and sustainability as the key approaches for all aspects of the postwar economic development. This vision should cover not just the areas most affected by war, but the entire territory of Ukraine."[271]

The Government of Ukraine's strategic goal of postwar recovery in a clean and safe environment includes organization of recovery efforts in compliance with the EU environmental legislation. The goal entails the following:[272]

- Integration of climate goals into development and reconstruction goals
- Minimization of long-term risks to environmental safety (chemical and radiation)
- Reduction and prevention of industrial pollution and introduction of the "polluter pays" principle
- Effective waste management
- Effective environmental monitoring to evaluate the overall environmental damage, take necessary measures to avoid further deterioration, and restore ecosystems for people and for wildlife
- Sustainable use of natural resources
- Biodiversity conservation and restoration; development of protected areas
- Implementation of the European standards of public administration in the environmental management.

Secondary hazards and environmental risks that result from the war need to be fully assessed and appropriate plans and procedures put in place to ensure they are dealt with adequately and carefully. The key element of this environmental risk assessment system is environmental monitoring of air, water, and land pollution that is focused on the main threats described above. This monitoring system should be accessible and transparent, available for analysis, and form the information base for future actions. After cleanup, rebuilding should follow the principles as described above. Regardless of competing and urgent recovery needs, strategic planning around pollution cleanup must begin immediately to ensure a better, safer recovery for Ukraine and its people.

As part of the recovery and reconstruction needs in the forest sector, reconstruction efforts include a functional review of the institutions in the sector, with a focus on modernized planning and on the best afforestation and reforestation methods for climate-smart forestry. These include the creation of investor-ready carbon projects and the potential for mass employment in afforestation and reforestation and in the downstream wood-processing industries.

Limitations and Recommendations

Most of the environmental risks are linked to the damage to industrial installations and houses (asbestos release), energy infrastructure (power plants, oil storage tankers, oil refineries, drilling platforms, and gas facilities and distribution pipelines), and ecosystems (forest fires and land mines). The main environmental risks include air pollution, water pollution, and soil pollution with accumulation of hazardous wastes that affect the health and safety of the population as well as biodiversity. Losses and damage in monetary terms are estimated where feasible, such as for the forest sector. Due to the active war situation, measuring of key pollutants in air, water, and soil was not possible. Therefore, the RDNA did not estimate damage and needs for these receptors. Only forest fire areas

271 OECD, "Environmental Impacts of the War in Ukraine and Prospects for a Green Reconstruction," *Link*.
272 Ibid.

were verified, with a cutoff date of June 1, 2022, according to the RDNA methodology.

Forestry

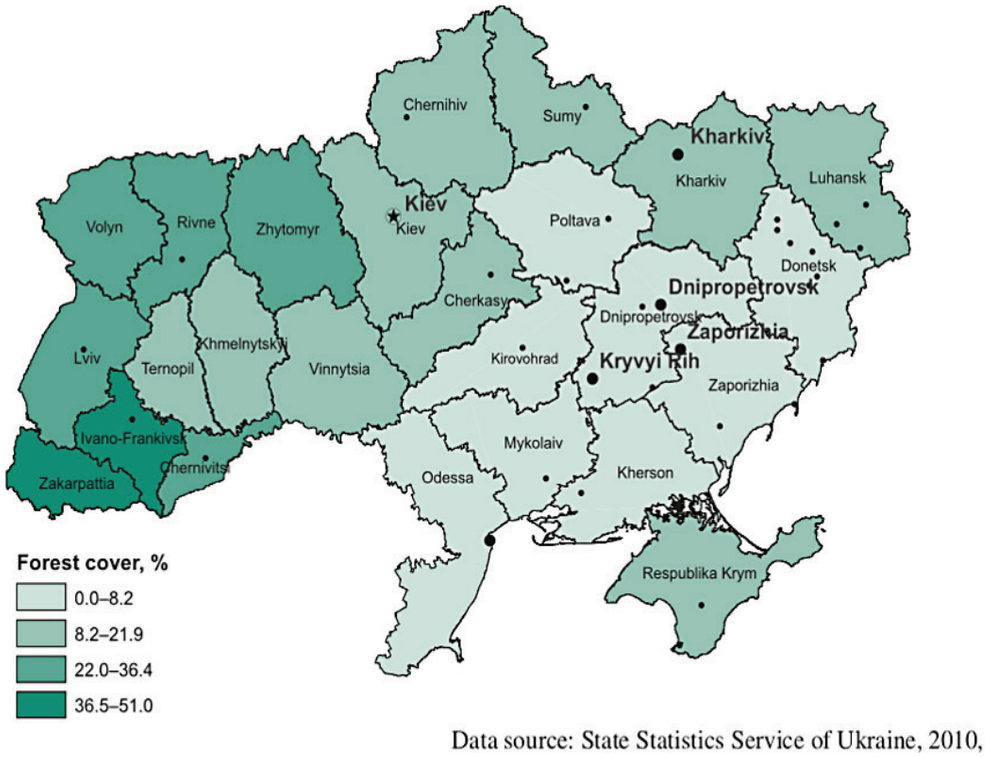
Background

Ukraine is considered a sparsely forested country, as just 15.9 percent of its territory has forest cover. However, Ukraine's 9.6 million ha forest area ranks ninth among European countries and is equivalent in area to the forests of Germany or Italy. According to the Food and Agriculture Organization of the United Nations,[273] total growing stock is 2.28 billion m^3, equivalent to average growing stock of 235.29 m^3 per hectare, and the road network extends over 6,000 km. Average annual increment per hectare is approximately 4 m^3 per hectare per year.[274] From a low of about 16 million m^3 in 2009 to current levels of over 22 million m^3, the overall timber harvest had been rising significantly in the last decade and now equates to about 60 percent of annual increment. The European average is over 70 percent, indicating Ukraine's potential for further sustainable production growth. See Figure 33 for an indication of the prewar spatial distribution of forests by oblast.

The forest sector normally employs a large number of people: the State Forest Enterprises retain about 49,000 staff, and overall employment in forestry and logging—including all State Forest Enterprises and private entities—was 68,000 in 2018. When wood processing (75,700) and the furniture industry, including artisanal enterprises (55,500), are also counted, direct employment in the sector was nearly 200,000.[275] It may be safe to assume that this figure would be much higher if employment in nature-based tourism, hunting, and the pulp and paper industry was also included.

The sector is estimated to contribute about 0.5 percent to the GDP. In 2018, the value of Ukraine's forest product exports (roundwood, timber, pulp and paper, and wooden furniture) was US$1.9 billion. Average annual unit sales price, adjusted to 2022

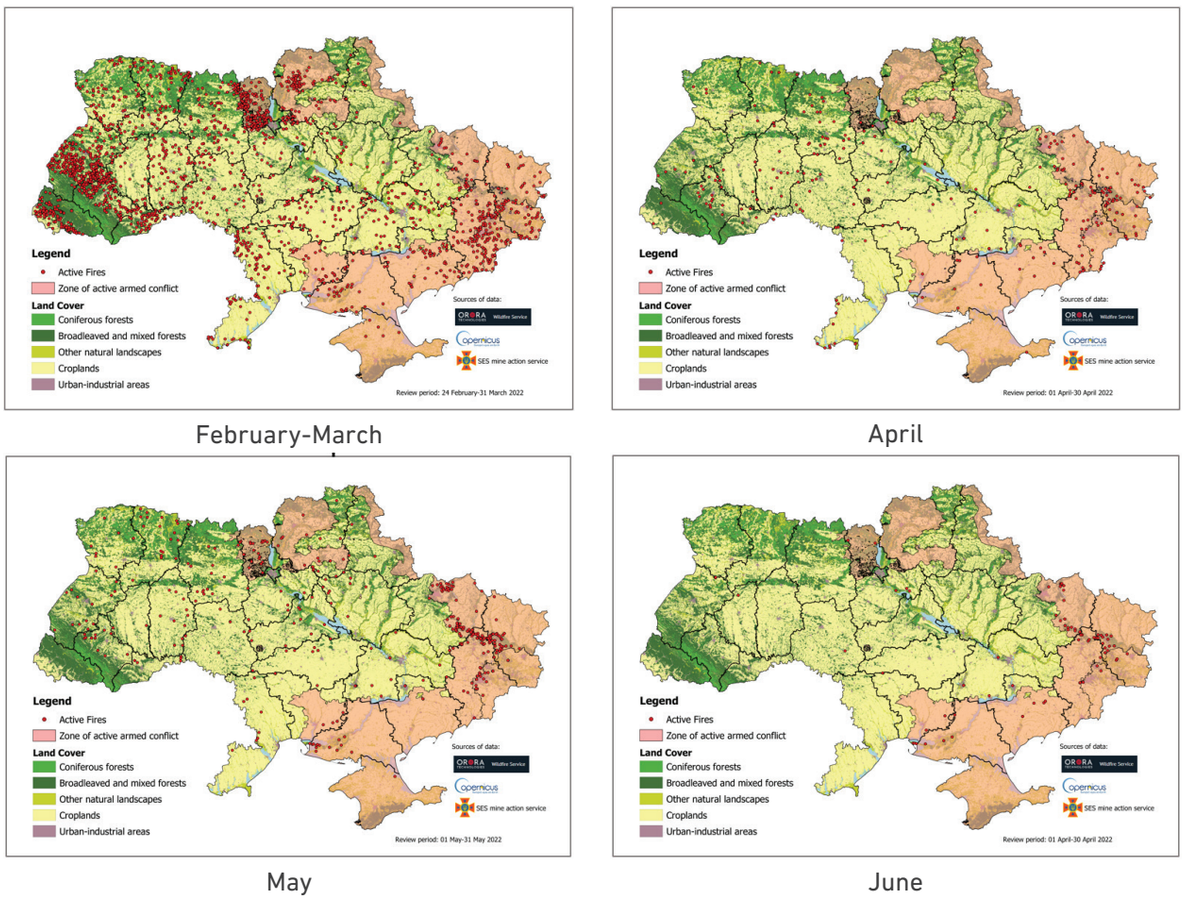
Figure 33. Prewar forest cover



Source: State Statistics Service of Ukraine.

273 FAO, "Global Forest Resources Assessment 2020: Report—Ukraine," *Link.*
274 FAO, "Global Forest Resources Assessment 2015: Report—Ukraine," *Link*.
275 World Bank, "Ukraine Country Forest Note: Growing Green and Sustainable Opportunities," 2020, *Link*.

Figure 34. Fire damage records by month during 2022



Source: Regional Eastern Europe Fire Monitoring Center (REEFMC), Fire Damage Bulletins (Інформаційний бюлетень: пожежі на території україни), *Link*.

prices, was UAH 1,218, or US$41.20 per m^3. The sector was slow in its transition to a market-based system and, in addition, was negatively impacted by the economic downturn of 2014–2015. It is noteworthy that despite these setbacks, overall forest cover was maintained and economic activity continued.

The State Forest Resources Agency (SFRAU) manages 73 percent of the forest area, with the remaining 27 percent managed by other central government bodies and municipalities. Less than 1 percent of forests are privately owned. Since 2019, the activities of SFRAU have been coordinated by the Ministry of Energy and Environment. Regional Forest Directorates, one for each oblast, serve as the SFRAU's regional bodies, with 310 state enterprises subordinated to them.

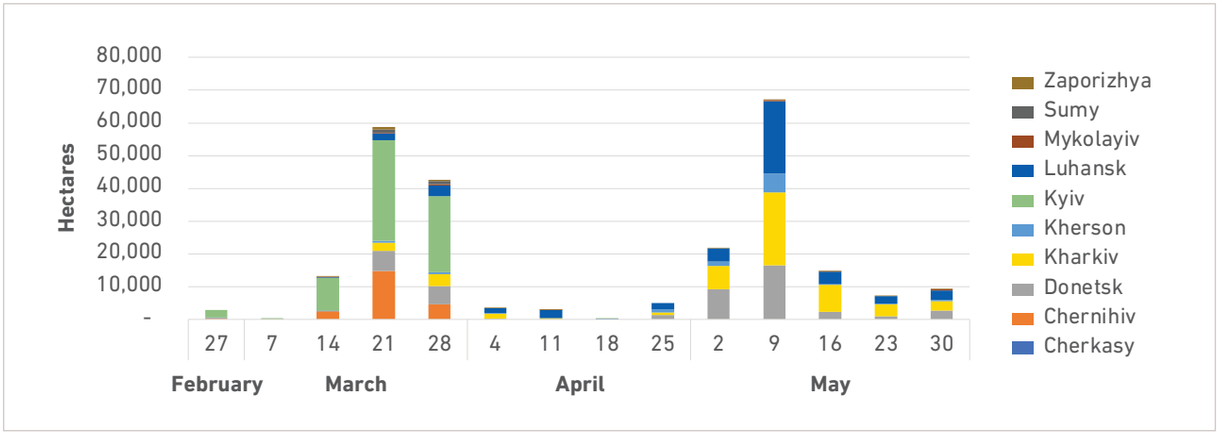
Damage and Loss Assessment

Fires haves been the principal source of war-related damage in forests.[276] During the first half of 2022, multiple fire incidents were recorded, as shown in Figure 34. For the RDNA analysis, Fire Damage Bulletins (Інформаційний бюлетень: пожежі на території україни) 1 to 14 were consulted, covering the period February 24, 2022, to June 2, 2022 (see Figure 35). These government-published bulletins are supported by data from ZOI Environment Network,[277] based on original analysis by Ororatech Gmbh using its Wildfire Detection and Monitoring Service. The mapping system aggregates near-real-time multispectral, hotspot, and auxiliary data from up to 20 different geostationary and low-earth-orbit

276 After harvest, metal inclusions may be found in forest timber due to discharge of armaments, thus devaluing the timber in areas that were not subject to fire damage; this source of additional damage is not analyzed here.

277 ZOI Environmental Network, "War on Ukraine," *Link*.

Figure 35. Week-to-week forest fire reports for combat zones (by middle day of reporting period) showing movement of conflict to different oblasts over the period



Source: Assessment team estimates based on Regional Eastern Europe Fire Monitoring Center (REEFMC), Fire Damage Bulletins (Інформаційний бюлетень: пожежі на території україни), *Link*.

Table 74. Damage by asset type (US$ million) as of June 1, 2022

Asset class	Values	US$ million
Burned area inside war zone	249,237 ha	-
Growing stock damage	58,643,000 m3	2,416
Roads requiring repair	374 km	7
Ancillary assets damage	Various (see Table 75)	73
Total		**2,496**

Source: Assessment team. *Note*: - = not available.

satellite data sources to detect areas producing high levels of infrared radiation to identify potential fire locations.[278] The progression of damage following the development of the war can be seen in Figure 34. The baseline used to establish the prewar vegetation cover was the "Vegetation and Energy" mapping by Copernicus Global Land Operations, which provides a detailed description with a resolution of 100 m as of 2019.[279]

Forest sector damage was calculated for growing stock, forest management–related assets (buildings, equipment), and forest roads (see Table 74).

Growing stock damage: The value of standing timber that has been destroyed is calculated as US$2.4 billion, based on an area damaged inside conflict zones of 249,237 ha, average timber sales value (adjusted to 2022 price) of UAH 936 per m^3,[280] and growing stock density of 235.29 m^3 per hectare. The unit price used reflects the average sales revenue achieved in 2018 by the SFRAU, adjusted to 2022.

Damage to ancillary forest assets: Additional damage was suffered by other assets and equipment used in forestry for which a national estimate was available (see Table 75).[281] This damage was allocated by oblast on the basis of fire damage suffered by each oblast as a proportion of the total (see Table 76).

278 OroraTech GmbH, "Service Description for the Wildfire Detection and Monitoring Service Version 1.15.0," April 14, 2022, *Link*.

279 "Copernicus Global Land Operations: 'Vegetation and Energy' 'CGLOPS-1'—Algorithm Theoretical Basis Document Moderate Dynamic Land Cover Collection 100 M Version 2 Issue I2.00," August 26, 2019, *Link*.

280 Bioenergy Association of Ukraine, "Forestry Activities in Ukraine 2019" [in Ukrainian], *Link*.

281 Based on draft analysis by national forestry consultants.

Losses were calculated based on (i) ecosystem services that no longer flow from burned forests, and (ii) economic impact of restricted access to forests due to the presence of mines. Losses by oblast are described in Table 77.

Ecosystem service losses: The combined economic value of five ecosystem services—recreation, hydrological services, habitat protection for biodiversity, non-wood forest products (NWFPs), and greenhouse gas removal—is estimated at US$431 per hectare per year (in 2022 constant US dollars).[282] This formula was applied to the fire-damaged area only.

Table 75. Damage by asset type (US$ million) as of June 1, 2022

Asset type	Destroyed	Damaged	Total
Buildings	29.97	21.10	51.07
Equipment	10.34	3.45	13.79
Office equipment	3.45	4.49	7.94
Total	**43.76**	**29.03**	**72.79**

Source: Assessment team.

Table 76. Damage and losses by oblast (US$ million) as of June 1, 2022

Oblast	Total forest damage	Total forest losses, annual equivalent	Sector losses over 21 months
Cherkaska	0.74	0.03	0.06
Chernihivska	222.05	16.99	29.74
Chernivetska	-	21.06	36.86
Dnipropetrovska	-	-	-
Donetska	452.88	21.96	38.43
Ivano-Frankivska	-	50.81	88.92
Kharkivska	526.10	22.64	39.62
Khersonska	102.56	4.41	7.72
Khmelnytska	-	-	-
Kirovohradska	-	6.25	10.93
Kyivska	668.06	28.75	50.31
Luhanska	474.53	20.42	35.74
Lvivska	-	55.28	96.74
Mykolaivska	11.99	0.52	0.90
Odeska	-	2.18	3.81
Poltavska	-	3.06	5.36
Rivnenska	$	-	-
Sumska	18.37	0.79	1.38
Ternopilska	-	16.30	28.53
Vinnytska	-	-	-
Volynska	-	55.58	97.27
Zakarpatska	-	-	-
Zaporizka	18.97	6.11	10.69
Zhytomyrska	-	89.13	155.98
Total	**2,496.26**	**422.29**	**739.01**

Source: Assessment team.

282 J. Siikamäki, F. J. Santiago-Ávila, and P. Vail, "Global Assessment of Nonwood Forest Ecosystem Services," PROFOR Working Paper, December 17, 2015, Link.

Losses relating to forest inaccessibility due to mines: **The normal production cycle will be disrupted in forests that are undamaged but are inaccessible for timber harvest and haulage vehicles.** The area affected in each oblast is the product of the area of forest in the oblast and the proportion of the oblast requiring nontechnical mine survey. Where the nontechnical survey area exceeded the area of the given oblast, the areas were decreased to equal the oblast areas. The annual increment of 4 m^3 per hectare per year is applied to estimate the gross increment of these lands.[283] Nationally, 54 percent of the Allowable Annual Cut has been cut in recent years,[284] and this adjustment is applied; finally, the value loss is calculated by applying the same average market price figure as for the damage assessment. No further impacts are expected on the overall revenue-generating capacity of the forests, e.g., activity in the undamaged and accessible forest is expected to increase output to compensate for the burned and inaccessible areas. The relatively low proportion of Allowable Annual Cut that is harvested annually (50–60 percent) indicates there is latent capacity in the accessible forests.

Table 77. Losses by oblast (US$ million) as of June 1, 2022

Oblast	Share of oblast that is forest (%)	Area for mine nontechnical survey (km^2)[a]	Forest area inaccessible due to mines (ha)	Total forest losses, annual equivalent (US$ million)
	A	B	A x B x 1,000	
Cherkaska	15	-	-	0
Chernihivska	21	4,000	83,601	17
Chernivetska	29	8,094	236,700	21
Dnipropetrovska	6	-	-	-
Donetska	7	4,000	27,783	22
Ivano-Frankivska	41	13,894	571,000	51
Kharkivska	12	-	-	23
Khersonska	4	-	-	$4
Khmelnytska	13	-	-	-
Kirovohradska	6	12,000	70,202	$6
Kyivska	27	-	-	29
Luhanska	11	-	-	20
Lvivska	28	21,824	621,200	55
Mykolaivska	4	-	-	1
Odeska	6	4,000	24,496	2
Poltavska	9	4,000	34,438	3
Rivnenska	36	-	-	$-
Sumska	18	-	-	$1
Ternopilska	13	13,817	183,200	16
Vinnytska	13	-	-	-
Volynska	31	20,135	624,600	56
Zakarpatska	51	-	-	$-
Zaporizka	4	16,000	59,481	$6
Zhytomyrska	34	29,819	1,001,600	89
Total		**151,583**	**3,538,300**	**422**

Source: Assessment team.

Note: a. The area for the nontechnical survey is adjusted as explained in the paragraph preceding the table.

283 FAO, "Global Forest Resources Assessment 2015: Report—Ukraine," *Link*.
284 World Bank, "Ukraine Country Forest Note: Growing Green and Sustainable Opportunities," 2020, *Link*.

Table 78. Recovery and reconstruction needs by oblast (US$ million) as of June 1, 2022

Oblast	Reforestation	Roads	Ancillary assets	Harvest equipment	Nursery	Overhead	Total
Cherkaska	0	0	0	5	0	1	6
Chernihivska	64	1	8	10	4	18	106
Chernivetska	-	-	-	4	-	1	4
Dnipropetrovska	-	-	-	3	-	1	3
Donetska	131	2	17	3	9	32	194
Ivano-Frankivska	-	-	-	9	-	2	11
Kharkivska	152	2	20	6	11	38	229
Khersonska	30	0	4	2	2	8	45
Khmelnytska	-	-	-	4	-	1	5
Kirovohradska	-	-	-	3	-	1	3
Kyivska	193	3	25	10	13	49	293
Luhanska	137	2	18	5	10	34	205
Lvivska	-	-	-	10	-	2	12
Mykolaivska	3	0	0	2	0	1	7
Odeska	-	-	-	3	-	1	4
Poltavska	-	-	-	4	-	1	5
Rivnenska	-	-	-	11	-	2	14
Sumska	5	0	1	7	0	3	16
Ternopilska	-	-	-	3	-	1	3
Vinnytska	-	-	-	5	-	1	6
Volynska	-	-	-	10	-	2	12
Zakarpatska	-	-	-	10	-	2	12
Zaporizka	5	0	1	2	0	2	10
Zhytomyrska	-	-	-	16	-	3	19
Nation-wide (capacity building)	-	-	-	-	-	-	5
Total	**721**	**10**	**95**	**144**	**50**	**204**	**1,229**

Source: Assessment team.

Reconstruction and Recovery Needs, including Build Back Better

Reconstruction needs are listed as reforestation, reinstatement of ancillary assets and forest roads, added nursery capacity, and realignment of timber production through targeted mechanization (see Table 80; by oblast see Table 78).

Reforestation needs: The area damaged by fire is assumed to be reforested. A unit cost of US$2,894 is proposed based on recent analysis undertaken for a World Bank project in Bosnia and Herzegovina (direct costs of using a mixture of forest enterprise and seasonal staff). The reference sites require removal of shrub vegetation, not unlike the sites likely to be encountered in reforesting burned areas in Ukraine, which will have snags and semi-burned areas that need clearance.[285]

Reinstatement of ancillary assets: These are the damaged assets assessed above, with a rebuilding premium of 30 percent added to build back better and to reflect the likely increased cost of materials, labor, etc. (Table 79).

285 World Bank, ***Bosnia*** and Herzegovina–Forest Economy Development ***Project,*** internal document, 2022.

Table 79. Recovery and reconstruction needs for ancillary assets (US$ million) as of June 1, 2022

Asset type	Destroyed	Damaged	All
Buildings	38.97	27.43	66.39
Equipment	13.44	4.48	17.92
Office equipment	4.48	5.84	10.32
Total	**56.89**	**37.74**	**94.63**

Source: Assessment team.

Realignment of timber harvesting efforts: **Building back better and seeking to achieve prewar levels of output within a short time frame will require a substantial investment in harvesting machinery.** The investment in harvesting machines outside of damaged areas is justified; without it, the damage caused by the conflict and the effects of mine laying could have a major systemic impact on the sector. Over one-third of the forest has been damaged or made inaccessible, and thus 200,000 jobs could be at risk. Whatever remaining, usable harvesting machines cannot be moved from damaged areas or where mines have made forestry inaccessible. Production in the areas that are still accessible should be intensified in order to maintain production, at least until such time as demining can have an effect. Thus, modern harvesting equipment is needed throughout the country to conduct low-impact felling over large areas.

In terms of building back better, such machinery will use less fuel and have lower emissions. Small agile models will be capable of harvesting in an environmentally sensitive manner under the "continuous cover" silviculture favored in Ukraine. An added benefit of this equipment is the ability to apply telemetry to remotely monitor the volumes being harvested and the locations being worked. This could be a major improvement in security and could reduce the risk of log and revenue losses, thus benefiting the build back better agenda regarding improved work processes. To equip the forest sector so that 20 percent of the harvest would be achieved by these machines, an investment of approximately US$144 million is needed for 180 teams of one harvester and one forwarder.

Added nursery capacity: **Current afforestation rates are low (c. 5,000 ha a year).** Modern precision nurseries with highly efficient use of water and minimal chemical inputs can raise many millions of seedlings very effectively. Quality control and cold-chain delivery of seedlings to site containerized, rather than bare-rooted, can extend the planting season and support better survival outcomes. Reforesting the fire-damaged area will require large quantities of different species. The existing capacity is not sufficient to meet the needs of such a large area of damage. At an estimated 20,000 ha of reforestation a year, 12 years and new nurseries with annual capacity of 50 million seedlings will be required. New nurseries of 12.5 million annual production each could be placed strategically in Kyivska, Kharkivska, Donetska, and Luhanska.

Transitional maintenance and overhead costs: **These costs are associated with managing the reconstruction phase and supporting staff during this time.** They are applied as 20 percent of total reconstruction needs.

Capacity building: **Capacity building should focus on the following:**

- **Studies for reforestation and afforestation:** Forest ecosystem losses, especially natural and semi-natural forests, are increasingly difficult, if not impossible, to replace in the context of climate change, where growing conditions are harsher and reestablishing tree cover more challenging. A holistic approach involving afforestation (planting of lands that never had forest previously) and habitat restoration, peatland rewetting, etc., will be a more sustainable mix of activities, applied at landscape level. There may also be a strong market for afforestation—of abandoned agricultural lands, for example—in favor of carbon credits under voluntary carbon trading schemes. Studies are required to inform climate-smart reforestation and afforestation strategies at landscape level, including proof of concept for carbon-credit forestry projects.

- **Functional review and reform roadmap.** Prior to the conflict, the Ministry of Ecology and Natural Resources had already embarked on an

ambitious institutional reform agenda. Building back better should include a careful rebuilding of forestry institutions to align with potential EU accession and with the EU Green Deal, specifically by targeting illegal logging under the FLEGT (Forest Law Enforcement, Governance and Trade) program and promoting sustainable forest management and sustainable fiscal policies for natural resources management as outlined in the recommendations of the World Bank Country Forest Note.[286] A functional review of forest institutions and their funding is needed during this phase, together with a roadmap for reform.

- **Modernization of forest management planning.** The use of big data, AI, and mathematical optimization is underutilized in forest management in Ukraine. Disasters such as wars, fires, or storms place a significant strain on forest authorities faced with pivoting entire management plans to align with the new constraints being imposed. As part of recovery, significant capacity building is needed in high-technology stand-level forest inventory and in optimization of forest management planning to allow deeper "what if" scenario analysis and rapid realignment of stand-level decisions.

All activities are to be organized under the MENR.

Limitations and Recommendations

There is limited baseline data on the harvesting fleet prior to the conflict. It is likely that a large number of machines and vehicles, including trucks, have been commandeered, destroyed, or damaged during the conflict.

It should be noted that the recovery period to again reach ecosystem service levels of $431 per hectare in the fire-damaged areas will require 10 years or more. Reforestation of 250,000 ha will also take much longer. The current rate is about 5,000 ha a year. Even if 20,000 ha were achieved annually, this would still require over 12 years. Such a replanting target will require new forest nurseries with an annual capacity of 50 million seedlings. Such capacity will require at least four years to establish and produce their first usable crop.

For future assessments, the following could be taken into consideration:

- Development of standards for carbon projects under voluntary carbon certification or Public Employment Services (PES) schemes to maximize the attractiveness of investing in the green recovery of Ukraine
- "Green wage" program for mass employment in large-scale afforestation under carbon projects and others
- Improved private sector access to finance for the wood-processing industry, emphasizing the need to concentrate on long-lived, high-value products using solid wood, with chips and pellets as by-products (in alignment with new EU Renewable Energy Directive strategy and reduction in whole tree biomass)
- Building back better by amending construction specifications to allow use of long-lived timber products in multistory buildings and other structural applications (bridges, etc.)

Table 80. Recovery and reconstruction needs by categories (US$ million) as of June 1, 2022

Values	Total (US$ million)
Reforestation	721
Roads	10
Ancillary assets	95
Harvest equipment	144
Reconstruction overhead/maintenance	204
Nurseries	50
Subtotal for capital investments	
Capacity building (nation-wide)	5
Total	**1,229**

Source: Assessment team.

286 "World Bank, "Ukraine Country Forest Note: Growing Green and Sustainable Opportunities," 2020, Link.

EMERGENCY RESPONSE AND CIVIL PROTECTION

Summary

As of June 1, 2022, the war has resulted in total damage of US$0.1 billion for the sector, while the aggregate losses total US$0.2 billion. The damage includes partial or full destruction of vehicles, equipment, and buildings used for the purpose of civil protection and emergency response. The losses include debris removal and additional operational costs related to increased involvement of first responders in emergency and rescue operations related to the war. **The total reconstruction and recovery needs from the sector are estimated at US$0.7 billion, with US$0.5 billion urgently needed**. The most pressing investments include repair, reconstruction, and replacement of damaged, destroyed, and seized assets, respectively. There is also a need to support scaled-up emergency response needs related to the war, including preparedness for chemical, biological, radiological, and nuclear (CBRN) incidents; measures related to disaster risk management to prevent, prepare, and respond to disasters; and restoration of institutions to effectively support the recovery and reconstruction effort.

Background

The 2022 war in Ukraine has tested Ukraine's civil protection capacities, as Ukraine is already exposed to various adverse natural hazards, including floods, droughts, and wildfires. According to EM-DAT, 749 disaster events were registered in Ukraine between 2012 and 2021.[287] Flooding occurs predominantly in the summer in the Carpathian region. It is partially driven by uncontrolled deforestation and increased construction in floodplains. Recent extreme flooding events in 2008, 2010, and 2020 demonstrate that flooding can have a devasting impact. For example, the 2008 floods on the Siret and Prut Rivers caused damage estimated at US$675 – US$909 million (€624–840 million). Droughts in Ukraine lead to water deficits that particularly impact the agricultural sector in the southern regions. In 2009, a drought reduced wheat production by 30 percent, and more recently, in 2020, a drought resulted in the loss of 234,000 ha of winter crops. In general, there is a high probability of partial or near-total loss of grain crops every four to five years, and catastrophic losses that lead to a complete loss of yield every 20 to 30 years. Large wildfires are becoming more frequent and are causing economic damage of US$109–291 million annually. The wildfires of 2020 are considered the most catastrophic in the country's modern history. Climate change may further increase the intensity and/or severity of these extreme weather events. Finally, the south of Ukraine is also exposed to seismic risk.

An important driver of risk relates to the country's aging infrastructure stock. Ukraine's infrastructure quality is deteriorating in absolute terms and compared to other countries. Ukraine ranked 66th of 160 countries on the World Bank Logistics Performance Index in 2018. [288] Specifically on infrastructure, it ranked 74th in the world in 2009 and 119th in 2018.[289]

Ukraine's DRM system is centralized and primarily focused on the prevention of and response to disasters, rather than proactive management of risks. The most important legislation that guides the system is the Civil Protection Code of Ukraine (2013), which defines roles and responsibilities of system participants.[290] Under the Civil Protection Code, the main institution responsible for DRM is the Ukraine State Emergency Service (SESU). Established in 2012, SESU is a central executive body that is led

287 Based on EM-DAT data for 1900–2019. "Global Occurrences from Natural Disasters," EM-DAT: The Emergency Events Database, Université Catholique de Louvain–CRED (EM-DAT, CRED / UCLouvain), D. Guha-Sapir. Brussels, Belgium, Link.

288 World Bank. 2018. LPI – Country Score Card: Ukraine 2018. *Link.*

289 Ibid.

290 Other critical legislation and regulations include, among others, the Law on the Legal Regime of a State of Emergency, the Law on Major Hazard Facilities (2001), the Law on the Nature Reserve Fund (1992), the Forest Code (1994), the Rules of Fire Safety in the Forests (2004), the Rules of Fire Safety in the Agro-Industrial Complex (2006), Regulations on State Forest Protection (2009), the Classification of Emergency Situations (2018), and the Law on Hydrometeorological Activity (1999).

and coordinated by the Cabinet of Ministers through the Ministry of Internal Affairs. The SESU's areas of engagement include, among others, civil protection, emergency response, search and rescue, firefighting, and hydrometeorological services. Within SESU, there are civil protection units at each level of public administration (national, regional, and local), with 25 territorial bodies, 13 units under central subordination (in particular, an interregional rapid response center and a special aviation unit of the operational and rescue service of the civil protection of SESU of the Central Department of SESU), two higher education institutions, and two research institutions. In total, the number of SESU personnel stands at 59,039 (civil servants and freelancers included), of which 12,469 (21 percent) are female and 46,570 (79 percent) are male.

The structure of the 25 territorial offices include: the technical service squads, state fire and rescue services squads, state fire and rescue posts, technical service departments, support centers, and operational and coordination centers, special purpose emergency-rescue squads, etc. The subdivisions of central subordination include, in particular, the Interregional Rapid Response Center of the SESU; Mobile Rescue Rapid Response Center of the SESU; Interregional Center for Humanitarian Demining and Rapid Response of the SESU; Interregional Center for Humanitarian Demining and rapid response of the SESU; two Special Rapid Response Centers of the SESU; and the Special Aviation Unit of the Operational and Rescue Service of the Civil Protection of the SESU. The Ukrainian Hydrometeorological Center (UkrGMC), and the hydrometeorological organizations subordinate to it, that are included in the sphere of management of the SESU and are represented in all regions of Ukraine s, perform functions associated with systematic observations of the parameters of the environment, analysis and forecasting of hydrometeorological conditions of the state of weather, rivers, reservoirs and marine areas, growing season conditions crops and yields, monitoring the state of the atmosphere, environmental pollution, modeling and forecasting of pollutant transfer substances in nuclear and environmental accidents, forecasts and warnings about dangerous and spontaneous hydrometeorological phenomena. The data is then shared with the Office of the President of Ukraine, the Cabinet of Ministers of Ukraine, the National Security and Defense Council of Ukraine, the Armed Forces of Ukraine, ministries and others central executive bodies, local governments, enterprises, institutions and organizations of all forms of ownership, as well as the population.

At the regional and local level, SESU's regional departments collaborate with local governments on risk assessments and emergency response. In the event of an emergency, SESU's response efforts are complemented by other agencies under the Ministry of Internal Affairs, such as the National Police. The SESU also engages with educational institutions, including the National University of Civil Defense of Ukraine; Cherkasy Institute of Fire Safety named after the Heroes of Chernobyl, part of the National University of Civil Defense of Ukraine; Lviv State University of Life Safety; Higher Vocational School of Lviv State University of Life Safety; Lyceum of Civil Defense of Lviv State University of Life Safety; and Institute of Public Administration and Research in Civil Defense. The regional distribution of SESU resources is portrayed in Table 81.

The speed and effectiveness of Ukraine's emergency response activities have been negatively impacted by a myriad of challenges, including outdated facilities. Lack of funding has resulted in aging and poorly maintained facilities and outdated technical equipment for emergency response. Inadequate emergency response facilities, warehouses, and storage buildings create challenges related to storage of equipment and supplies, which in turn compromise effective distribution of relief in the event of a disaster. While the government has made efforts as part of the country's decentralization process to construct local emergency facilities (e.g., professional fire brigades, volunteer fire brigades, and security centers equipped for emergency medical aid), the buildings constructed in recent years are highly energy inefficient. This results in high costs for local governments, which further reduces availability of resources to support emergency operations.

Ukraine's first responders are overstretched and equipped with inadequate equipment and technology. Ukraine has around 36,000 first responders to provide emergency services to a population of 42 million. These rescue workers are frequently exposed to high risks during rescue operations because they lack protective equipment like helmets, safety shoes, and breathing equipment. In terms of communication technologies, the interoperability of radio communication poses another challenge during emergency response operations. Radio communication to connect search-and-rescue aircrafts with ground-based search-and-rescue forces is not always possible, which puts first responders at risk and results in less efficient response.

Table 81. Regional distribution of SESU resources (number)

Oblast	SESU main department		Rescue service/ response center		Hydrometeorology/ geophysics
	Buildings	Vehicles	Buildings	Vehicles	Buildings
Cherkaska	433	305	0	0	0
Chernihivska	353	347	0	66	0
Chernivetska	271	224	0	0	0
Dnipropetrovska	905	562	56	148	105
Donetska	290	458	0	0	67
Ivano-Frankivska	266	292	0	0	0
Kharkivska	374	621	0	0	108
Khersonska	293	350	0	0	94
Khmelnytska	316	329	0	0	0
Kirovohradska	560	292	0	0	0
Kyiv (city)	200	290	0	0	153
Kyivska	427	574	135	187	0
Luhanska	315	384	0	0	60
Lvivska	449	447	44	60	0
Mykolaivska	453	354	0	0	81
Odeska	496	471	196	106	0
Poltavska	380	450	0	0	0
Rivnenska	190	356	0	0	0
Sumska	228	288	129	112	43
Ternopilska	165	248	0	0	0
Vinnytska	306	332	0	0	0
Volynska	240	242	0	0	0
Zakarpatska	225	280	0	0	0
Zaporizka	270	425	0	0	59
Zhytomyrska	305	341	0	0	0
Total	**8,710**	**9,262**	**560**	**679**	**770**

Source: Assessment team.

Note: To avoid double counting, universities, research centers, and institutes are covered under the education sector; the humanitarian demining center is covered under the demining sector; and medical rehabilitation centers are covered under the health sector.

SESU's involvement in war rescue operations so far has been extensive; for instance, it has extinguished 9,721 fires caused by shelling and supported rescue operations in 36,092 instances related to shelling damage. It has also provided immediate support to vulnerable populations, and so far has delivered 11,870 tons of drinking water and 2,427 tons of food. Most importantly, SESU participated in the evacuation of a total of 1,878,000 people and thus far provided psychological support to 137,368 persons. All in all, since the war began, the number of emergency calls to Ukrainian rescuers has increased dramatically. Unfortunately, 37 SESU personnel have been killed, 112 wounded, and 8 imprisoned while taking part in rescue operations.

Damage and Loss Assessment

As of June 1, 2022, the aggregate quantitative and qualitative damage to civil protection infrastructure and physical assets amounts to US$98 million. Damage includes SESU main departments and rescue/response centers; the hydrometeorological and geophysical organization infrastructure was partially damaged and/or completely destroyed, and vehicles have been damaged, destroyed, and seized. A total of 49 buildings in the emergency response and civil protection sector were completely destroyed and 147 buildings were partially damaged. The emergency response and civil protection sector also lost control of an additional 453 buildings in territory temporarily not under government control.[291] All in all, 6 percent of the buildings owned by the emergency response and civil protection sector were either damaged, destroyed, or seized. Another major asset that was either destroyed or seized was the specialized civil protection/firefighting vehicles; as a result, 669 of 9,941 vehicles are now out of service. Finally, some hydrometeorological instruments and equipment were damaged or destroyed, while some with points of hydrometeorological observations remained in the territories temporarily not under government control.

A major loss sustained by the emergency response and civil protection sector relates to the extra time put in by the rescue/response operatives due to increased demands for emergency operations. As a result, additional expenses amounting to US$241 million were recorded as a loss. The damage and losses were calculated by taking into account the damage and destruction of physical assets (buildings, equipment, and vehicles) as well as losses due to changes in financial flows related to access to goods and services (namely increased operational activities); these are divided according to level of damage/destruction (all assets are publicly owned). This approach covers the economic value of total/partial destruction of infrastructure and assets. In that regard, data were collected on the size of the partially damaged and fully destroyed buildings within the emergency response and civil protection sector, and unit costs (US$/m^2) were applied to estimate the damage, which was divided according to ownership (e.g., between SESU main departments, rescue/response centers, and hydrogeological/geophysical institutions), and then divided by oblast. In terms of firefighting/rescue vehicles, book value of a total of 669 either destroyed or seized vehicles was applied, resulting in an estimate of US$9 million in damage. Such a low estimate is due to the vehicles' obsolescence and old age, as most of them originate from Soviet times (1950 to 1990s).

Almost 99 percent of damaged/destroyed buildings were recorded with SESU main departments at oblast level (Table 82). Of affected buildings, 80 percent suffered damage and 20 percent were destroyed (US$70.1 million is estimated for damaged buildings versus US$18.2 million for destroyed buildings). The largest number of damaged buildings is recorded in Kharkivska oblast (32), followed by Kyivska oblast (15) and Donetska and Chernihivska (12 each). The highest number of destroyed buildings is recorded in Zaporizka oblast (35), followed by Luhanska (9) and Kharkivska (3). Concerning seized SESU buildings in territory temporarily not under government control, the largest number recorded is in Luhanska oblast (all 315 buildings were seized) and Donetska oblast (101 out of 290 buildings were seized). Concerning hydrometeorology/seismology buildings, 13 were damaged in Donetska oblast and 10 in Zaporizka. In terms of vehicles, by far the largest number of destroyed vehicles is recorded in Odeska oblast (67 out of total of 79 vehicles destroyed nationwide). The largest number of seized vehicles is reported in Zaporizka oblast (303 out of 384), followed by Donetska oblast (169 out of 458).

The total effects of the war as of June 1, 2022, are estimated at US$338.81 million, with damage accounting for US$98.26 million (29 percent) and losses accounting for US$240.54 million (71 percent) of the total (Table 83). The Donetska oblast incurred the most significant costs (US$45.38 million, or 13.4 percent), followed by Zaporizka (8.5 percent), Kharkivska (7.8 percent), and Kyivska (7.2 percent).

291 Those seized buildings were not calculated under damage.

Table 82. Damage inventory by asset types (number) as of June 1, 2022

Asset type	Baseline	Partially damaged	Completely destroyed	Seized assets	Total damage
SESU main departments by oblast (buildings)	8,710	117	48	453	618
Rescue Service/Response Centers (buildings)	856	0	1	0	1
Hydrogeological/Geophysical institutions (buildings)	770	30	0	0	30
Total buildings	**9,336**	**147**	**49**	**453**	**649**
Vehicles (firefighting / rescue vehicles)	9,941	0	80	589	669

Source: SESU reports. *Note:* All assets referenced are public.

Table 83. Damage and losses by oblast (US$ million) as of June 1, 2022

Oblast	Damage	Losses	Total costs	Share of total (%)
Cherkaska	-	6.7	6.7	1.98
Chernihivska	9.8	0.2	10.0	2.95
Chernivetska	-	5.1	5.1	1.51
Dnipropetrovska	3.4	17.1	20.5	6.05
Donetska	21.8	23.6	45.4	13.40
Ivano-Frankivska	-	7.8	7.8	2.30
Kharkivska	11.1	15.3	26.4	7.79
Khersonska	0.2	5.8	6.0	1.77
Khmelnytska	-	7.1	7.1	2.10
Kirovohradska	-	5.2	5.2	1.53
Kyiv (city)	1.5	17.0	18.5	5.46
Kyivska	14.0	10.5	24.5	7.23
Luhanska	6.4	13.1	19.5	5.76
Lvivska	-	14.3	14.3	4.22
Mykolaivska	5.5	6.4	11.9	3.51
Odeska	0.0	13.6	13.6	4.01
Poltavska	0.8	7.8	8.6	2.54
Rivnenska	-	6.6	6.6	1.95
Sumska	5.2	6.0	11.2	3.31
Ternopilska	-	5.9	5.9	1.74
Vinnytska	-	8.7	8.7	2.57
Volynska	-	5.9	5.9	1.74
Zakarpatska	0.0	7.2	7.2	2.13
Zaporizka	17.5	11.3	28.8	8.50
Zhytomyrska	1.1	6.8	7.9	2.33
Nationwide (no specific region)	-	-	-	-
Total cost	**98.3**	**240.5**	**338.8**	**100.0**

Note: In the regions with little military activity and always under government control, the damage were assumed to be zero.

Table 84. Loss by category (US$ million) as of June 1, 2022

Category	Total value (US$ million)	Share %
Debris removal	3.88	1.6
Increased operational costs	236.66	98.4
Total losses	**240.54**	**100.0**

Source: Assessment team.

The aggregate quantitative and qualitative losses to DRM/emergency management/civil protection services amount to US$241 million (Table 84). Losses include SESU's increased operational costs of US$237 million, and debris removal costs of US$4 million. The losses were estimated considering increased operational activities and salary increases of UAH 30,000 applied to all SESU response/rescue staff according to requirements under martial law (a total of six months since beginning of the war) and the debris removal costs applied to the area (m^2) of either partially damaged or fully destroyed buildings.

Reconstruction and Recovery Needs, including Build Back Better

There are two major considerations related to the reconstruction and recovery strategy within this sector. First, as the war is still ongoing, citizens are still in need of immediate support provided by the first responders. This means that priority short-term measures have to be aligned with those needs. Second, there is a substantial need to address the inadequate and outdated facilities and obsolete technical equipment and to provide training. In this context, emphasis should be on providing quick solutions that will enable safe and adequate protection of citizens as part of rescue operations. The immediate/short-term actions should consist of the following:

- **Procurement of 669 modern and fully equipped firefighting/rescue vehicles at a cost of US$395.96 million;** required to replace those either destroyed of seized
- **Procurement of mobile decontamination units (system and vehicles), heavy load CBRN (chemical, biological, radiological, and nuclear) vehicles, and mobile CBRN laboratories at a cost of US$65.76 million;** required given the nature of the war and the country's unpreparedness for CBRN events
- **Establishment and organization of oblast-level mobile command control points and four major logistics hubs at a cost of US$24.65 million;** required to support citizens in need of rescue
- **Construction of platforms and hangars for helicopters at oblast level costing US$45.82 million;** required to allow SESU to respond to increased demands, given the large territory that is being covered by rescue and immediate response operations
- **Establishment of sea and river rescue units costing US$39.32 million;** required to address the problem of mined area in waters and general lack of related preparedness
- **Construction of bomb shelters at oblast level within local fire and rescue units costing US$5.57 million;** required to provide safety to citizens and SESU staff in the case of shelling
- **Development of three nationwide training facilities costing US$12.09 million;** required to provide training for additional SESU staff and provide specialized education for existing staff

Specific needs for the Ukrainian early warning system are related to the items and quantities shown in Table 85.

In the medium to long term, SESU buildings—including main departments at oblast level, rescue/response centers, and buildings of hydrometeorological organizations—are to be reconstructed; the amount needed is estimated at US$178.68 million (Table 87). The recovery and reconstruction needs by oblast are displayed in Table 86.

Table 85. Recovery and reconstruction needs for early warning systems (number) as of June 1, 2022

Item	Quantity (pcs)
Automated meteorological station	28
Automated hydrological station / post	20
Aerological station for atmospheric sounding	2
Automated meteorological aviation complex	10
Marine automated post	10
Automated radar system	2
Servers with power supply	20
Personal computers complete with monitor and power supply	40

Source: Assessment team.

Table 86. Recovery and reconstruction needs by oblast (US$ million) as of June 1, 2022

Oblast	Immediate/short term	Medium- to long-term	Total
Cherkaska	6.6	-	6.6
Chernihivska	6.7	19.7	26.4
Chernivetska	3.0	-	3.0
Dnipropetrovska	15.9	6.3	22.1
Donetska	119.6	30.2	149.8
Ivano-Frankivska	2.7	-	2.7
Kharkivska	14.6	22.2	36.8
Khersonska	6.7	0.5	7.2
Khmelnytska	2.8	-	2.8
Kirovohradska	6.7	-	6.7
Kyiv (city)	8.9	2.9	11.8
Kyivska	10.1	25.8	35.9
Luhanska	202.2	12.8	215.0
Lvivska	8.4	-	8.4
Mykolaivska	8.4	10.5	18.9
Odeska	9.0	0.0	9.0
Poltavska	6.6	1.5	8.1
Rivnenska	4.0	-	4.0
Sumska	5.5	10.3	15.9
Ternopilska	2.7	-	2.7
Vinnytska	2.8	-	2.8
Volynska	2.7	-	
Zakarpatska	2.9	0.0	2.9
Zaporizka	-	33.8	114.6
Zhytomyrska	2.8	2.1	4.9
Nationwide (no specific region)	-	-	-
Total	**542.9**	**178.7**	**721.6**

Source: Assessment team.

The invasion has exacerbated existing challenges in the sector. The machinery and vehicles prior to February 2022 were reported to be outdated; such equipment has been pushed to its limit while also facing the effects of the war. Continuous efforts need to be made to strengthen Ukraine's civil protection service. For example, Ukraine's application to the Union Civil Protection Mechanism is a positive projection, particularly for the exchange of expertise and international cooperation. If measures are not taken to strengthen civil protection capacities in the short and long term, Ukraine will face the risks of man-made emergencies nature, occurrence of natural disasters, such as floods, fires, etc.

Limitations and Recommendations

This assessment recognizes the ongoing nature of the invasion and the continued attacks on critical infrastructure, including in the civil protection sector. The baseline data were provided by the SESU.

Further analysis of Ukraine's risk landscape and vulnerabilities is imperative for preparing targeted and effective investments in the recovery and reconstruction phase, through the lens of resilient recovery. It is recommended that existing civil protection capacities across Ukraine be assessed, specifically with an analysis of outdated capacities and investments into enhancing capacities. Additionally, the repurposing of donated equipment for civil protection could also be analyzed.

Table 87. Recovery and reconstruction needs by category (US$ million) as of June 1, 2022

Category		Immediate/short term	Medium- to long-term	Total
Reconstruction Needs	Buildings	-	178.7	178.7
	Debris Removal	3.9	-	3.9
Service Delivery Restoration Needs	Vehicles	396.0	-	396.0
	Service restoration	143.1	-	143.1
Total		**543.0**	**178.7**	**721.6**

Source: Assessment team.

JUSTICE AND PUBLIC ADMINISTRATION

Summary

In the justice and public administration sector, a total of US$0.1 billion in damage, US$0.03 billion in losses, and US$0.2 billion in recovery and reconstruction needs have been estimated as a result of the war. Related to justice, damage is estimated at US$69.30 million, while losses total US$32.11 million. These figures include damage of US$61.33 million for the judiciary and US$7.97 million for law enforcement, comprising partial or full destruction of buildings, furniture, and vehicles used for judicial or law enforcement purposes. Losses include US$9.09 million for the judiciary, and US$0.4 million for law enforcement. Losses consider items such as demolition and debris removal and loss of public services / fees. Reconstruction and recovery needs for the justice sector are estimated at US$152.89 million. The most pressing needs include restoration of delivery of justice services, specifically through the availability and training of law enforcement, anticorruption officials, private lawyers, and judges, as well as the reconstruction of the judiciary and judicial infrastructure. **Related to central-level public administration infrastructure and services (local-level administrative buildings are covered under municipal services sector), US$0.3 billion in damage is estimated based on government reports; estimates of losses, including debris removal, are US$3.36 million, while recovery and reconstruction needs are estimated at US$0.07 billion.**. The recovery and reconstruction of central-level public administration should prioritize the most-urgent public services.

Background

State power in Ukraine is exercised based on its legislative, executive, and judicial branches.

Justice

The justice sector in Ukraine consists of several subsectors and institutions that are involved in the management of the criminal and civil justice systems as well as the fight against corruption in the country. The justice sector is led by the Ministry of Justice, the judiciary and its courts, and the Office of the General Prosecutor (OGP). The judicial system consists of the courts of different jurisdictions, the High Council of Justice (HCJ), the High Qualification Commission for Judges (HQCJ), the National School of Judges, the Judicial Protection Service, and the State Judicial Administration (SJA). The key institutions involved in preventing and combating corruption include the National Agency for Corruption Prevention (NACP), the National Anticorruption Bureau (NABU), and the Special Anticorruption Prosecutor's Office (SAPO). The High Anticorruption Court (HACC) tries the corruption and civil forfeiture cases submitted by SAPO.

Prior to the war, the OGP had 845 buildings at the lowest or circuit level, including those for specialized services such as quasi-military prosecutions, and 104 buildings at the oblast level for a total of 949 buildings. The OPG owns or rents 10 buildings in Kyiv, and these have been unaffected by the war. Prior to the war the judiciary had 783 courthouses, 32 buildings in the SJA's territorial departments, 45 buildings in the territorial departments of the Judicial Protection Service, and nine buildings in the regional departments of the National School of Judges.

Prior to the war, both the judicial and law enforcement subsectors were functioning normally, with ongoing criminal and corruption investigations, prosecutions, and cases before Ukraine's courts, including the HACC. Ukraine's courts were also functioning, hearing civil, administrative, family, and other matters. While each of the institutions was fulfilling its mandate, the judiciary was subject to a high level of public scrutiny and criticism due to the widespread public belief that Ukraine's judicial sector suffered from corruption and extensive political influence. In addition, SAPO and NABU were both in the middle of leadership changes. The institutions that lead the judiciary, the HCJ and HQCJ, had either stopped functioning (HQCJ) or faced a wholesale change in membership (HCJ) due to the implementation of judicial reforms. In the case of the HCJ and HQCJ, international experts were selected to help with the vetting and selection of candidates for each institution—processes that began in early 2022.

In the spring of 2019, an ambitious reform program was launched in several areas of the justice sector in Ukraine. Some of these reforms were not completed for different reasons and stalled well before the war. Between the fall of 2019 and the winter of 2020, an attempt was made to reform the General Prosecutor's Office.

During the same period, the judicial system faced a number of false starts in the government's efforts to implement a top-down reform of the governing institutions in order to increase judicial independence and eliminate corruption. Initial reform efforts faced opposition from judicial leadership as well as from some members of the Rada (Parliament). With the termination of the HQCJ in November 2019, the judiciary has faced a staffing shortage across Ukraine. As many as 2,000 judicial positions remain vacant (nearly three vacancies per court), which has had a direct negative impact on service delivery. A European Union (EU)-funded regional survey conducted by the World Bank in 2020 found that only 29 percent of citizens and 30 percent of businesses perceived Ukraine's courts as efficient. However, these results jumped to 62 percent for citizens and 66 percent for businesses when the survey focused on those groups that had had recent, direct experience with courts.[292] It was not until early 2022 that broad judicial reforms were implemented with the creation of an Ethics Council, whose purpose was to vet existing HCJ members and HCJ candidates, and a Selection Commission, whose purpose was to vet candidates for a new HQCJ. Each of these bodies, with international experts as members, began its respective vetting and interview processes in late January and February 2022. Both processes were paused at the start of the war.

One of the most problematic issues in the field of combating corruption in Ukraine was the deliberate delay in appointing a new head of SAPO, without which NABU could not function efficiently. The selection process for a new head of SAPO lasted for over a full year. On July 28, 2022, the Prosecutor General appointed the new head of the SAPO.[293] In addition, shortly after the war began, the NABU director stepped down at the end of his term. As a result, both of the key corruption-fighting agencies have been working with interim or temporary leadership. The competition for the new Director of NABU has started. The selection commission includes three international experts who have a meaningful role in the decision-making process of this body.

With Ukraine's recent acceptance as a candidate country to the EU, reform of the justice and rule of law sector will take on a renewed urgency. Creating an independent, efficient, and effective judiciary is a key condition of the EU accession process. Ukraine will need to redouble its efforts to complete the top-down reform of the HCJ and HQCJ that were started before the war. A new, independent HQCJ will have to quickly move to fill the approximately 2,000 judicial vacancies that currently exist across Ukraine's judiciary. These challenges existed before the war and are likely to be even more important as Ukraine begins the EU accession negotiations.

Ukraine will also need to continue its long struggle against corruption as another key condition of EU accession. This will require the identification and appointment, as quickly as possible, of a new Director of NABU. The selection process should be competitive, merit-based, and transparent, and should be based on the continued international vetting of candidates. Strong and collaborative leadership is required at both agencies for Ukraine's anticorruption architecture to function effectively. Anticorruption efforts will also require continued political support for the operation of the HACC and the enforcement of its decisions.

Public Administration

According to the constitutional and legal model, three levels of executive authorities operate in Ukraine: higher, central, and local. Local executive bodies are responsible for a particular area represented by 24 oblasts, 135 districts, and two cities with special status. Higher and central executive power consist of 20 ministries with 12 subordinate bodies, 24 state or national services, 16 agencies, four inspections, nine central executive bodies with the special status, three collegial bodies, and five other central executive bodies.

Public administration in the RDNA relates to various services provided at central, oblast, and local levels. Central-level state administration is also represented at the local level through departments/services and is present in the oblasts in a supervisory capacity. Generally, state administration buildings are located in the oblast centers (except

292 World Bank, "Regional Experiences and Perceptions of Justice Survey: Cross-Country Report for Armenia, Georgia, Moldova and Ukraine," June 2021.

293 Office of Prosecutor General. 2022. News. "Prosecutor General introduced the new head of the SAPO". *Link*.

Table 88. Damage inventory by subsector (US$ million) as of June 1, 2022

Subsector	Partially damaged	Totally destroyed	Total damaged assets
Judiciary	2.83	58.50	61.33
Courthouse (building)	2.49	58.48	60.97
Territorial Department of State Judicial Administration	0.15	0.02	0.17
Territorial Department of Judicial Protection Service	0.19	0.00	0.19
Law enforcement	6.20	1.77	7.97
Territorial Prosecution Services	6.20	1.77	7.97
Subtotal	**9.03**	**60.27**	**69.30**
Public administration (buildings)	19.6	12	31.6
Subtotal	**19.6**	**12**	**31.6**
Total			**100.90**

Source: Assessment team. Data on public administration are from Minregion.

for in the Donbas region). Buildings may include oblast council buildings and national commissions buildings of large sectoral ministries (like education, energy, communications, etc.). Oblasts either have one building housing different line departments or different buildings for each line department. It can also be the case that a central level department of a particular line ministry is located within the local building providing the same service.

Damage and Loss Assessment

Prosecution Service: **As of June 1, the war has caused damage to the OGP mainly in the form of destroyed and damaged buildings at the level of circuit (local) prosecutor's offices.** Among oblast prosecutor's offices, only the building of the prosecutor's office of Chernihivska oblast was damaged. A total of 20 buildings have sustained significant damage, and 7 in the prosecution service have been destroyed since the beginning of the war. The total damage for the OGP amounts to US$7.97 million. The damage cost for completely destroyed buildings was about US$1.75 million (US$1.77 million including vehicles and furniture), and about US$6.2 million for partially damaged buildings (Table 88 and Table 89). The regions most affected in terms of damage to buildings are Donetska, Kharkivska, Sumska, and Kyivska oblasts (Table 90). Damage in terms of movable assets (inventory/furniture) was recorded in Kyivska and Sumska oblasts, for a total of US$8,919. A total of five vehicles were lost—three in Zaporizka oblast (seized by Russian occupiers) and one each in Kyivska and Chernihivska regions (destroyed or seriously damaged). The total damage to these assets amounts to US$9,890. Accurate data on the amount of damage is limited by the significant number of assets in areas temporarily not under government control; the status of many assets is unknown according to OGP. The infrastructure of SAPO and NABU was not damaged as a result of the war.

Judiciary: **Damage to courthouses has been recorded.** Forty-six courthouses have been partially damaged and 20 have been completely destroyed during the war. In addition, another three buildings from the SJA and the Judicial Protection Service have been partially damaged. The Donetska oblast suffered the greatest number of destroyed buildings with the loss of 11 courthouses. The Kharkivska oblast suffered the greatest number of partially damaged courthouses at 14. The total damage for the judiciary is US$61.33 million. This includes US$59.4 million in damage to buildings and US$1.90 million in damage to equipment, furniture, and vehicles. Completely destroyed buildings account for US$58.5 million and partially damaged buildings for US$2.83 million (Table 90). Across the judiciary sector, the Donetska oblast suffered the greatest damage to equipment, furniture, and vehicles. This e total for this damage was estimated at US$706,000.

Public Administration: **For central-level public administration infrastructure and services, damage of US$31.6 million was estimated, as a fraction of the estimate from Minregion of all damage to public administration.** Local-level administrative buildings are covered under the municipal services sector. The cost of goods and equipment is considered in the damage costs.

Table 89. Damage inventory by sub-sector and asset type (US$ million) as of June 1, 2022

Asset type	Partially damaged	Completely destroyed	Total damaged assets
Judiciary	2.83	58.50	61.33
Buildings	2.83	56.60	59.43
Vehicles	n.a.	0.00	0.00
Furniture	n.a.	1.90	1.90
Law enforcement	6.20	1.77	7.97
Buildings	6.20	1.75	7.95
Vehicles	n.a.	0.01	0.01
Furniture	n.a.	0.01	0.01
Subtotal	**9.03**	**60.27**	**69.30**
Public administration			
Buildings	19.6	12	31.6
			100.90

Source: Assessment team. Data on public administration is from Minregion.

Note: n.a. = no clear information available.

The total losses in the justice sector are US$32.85 million. This includes US$32.1 million for the judiciary and US$0.75 million for law enforcement. In the judiciary, total losses include US$5.9 million for the cost of immediate repairs to assets damaged in the war and US$16.4 million for the loss of court fees/public service fees in those parts of Ukraine where the courts have ceased to function. For the prosecution service, these losses include the costs of demolition and rubble removal. In law enforcement, among others, losses include US$0.11 million for the cost of immediate repairs to assets damaged in the war, US$0.01 million for the temporary rental of vehicles to replace damaged vehicles, and US$0.21 million for costs due to staffing changes.

Related to central-level public administration infrastructure, the losses are estimated at US$3.31 million, including debris management.

Despite the war, all the justice/rule of law institutions have quite quickly resumed their work on the territory controlled by Ukraine almost at the prewar level, with some limitations and exceptions. For example, the National Agency for the Prevention of Corruption (NACP) is not conducting verifications of asset declarations of public officials, and the Unified State Register of Court Judgments and other state-owned databases have been closed or inactive for months. However, other justice services and anticorruption investigation and prosecutions have been able to continue. For example, while some of the judges of the HACC joined the local territorial defense structures, they have all returned to the HACC as of June 1, 2022. As a result, while hearings were postponed at the beginning of the war, at this point in time, the HACC is functioning at its prewar level; however, the intensity of HACC hearings has decreased because of the reduction in cases and issues brought to the court by SAPO and NABU.

Given the nature of the damage to the infrastructure of the OGP, and despite the personnel losses of the SAPO, the OPG system was able to continue its daily work in the territories that remain under government control and where active combat operations are not conducted. Thus, in the larger territory of Ukraine, prosecutors continue to perform their ordinary functions. In addition, the OGP has taken on the additional task of the prosecution of war crimes. OGP prosecutors are closely cooperating with international colleagues and the Office of the Prosecutor of the International Criminal Court (ICC) in this effort, and a joint investigative group (JIT) was created to investigate these crimes.[294] SAPO prosecutors also continue to perform their functions, not only in the field of criminal prosecutions, but also in the civil forfeiture cases, for example, by participating in HACC hearings on civil lawsuits that SAPO prosecutors filed before the war.

294 Eurojust, "Eurojust Supports Joint Investigation Team into Alleged Core International Crimes in Ukraine," 2022, *Link.*

Table 90. Damage and losses by oblast (in US$ million) as of June 1, 2022

Oblast	Judiciary		Law Enforcement		Total	
	Total Damage	Total Loss	Total Damage	Total Loss	Total Damage	Total Loss
Cherkaska	0.00	0.00	0.00	0.00	0.00	0.00
Chernihivska	2.93	0.43	0.52	0.01	3.45	0.43
Chernivetska	0.00	0.00	0.00	0.00	0.00	0.00
Dnipropetrovska	0.00	0.00	0.00	0.00	0.00	0.00
Donetska	21.81	3.33	0.59	0.06	22.40	3.39
Ivano-Frankivska	0.00	0.00	0.00	0.00	0.00	0.00
Kharkivska	25.68	3.91	5.95	0.26	31.63	4.17
Khersonska	0.40	0.00	0.00	0.00	0.40	0.00
Khmelnytska	0.00	0.00	0.00	0.00	0.00	0.00
Kirovohradska	0.00	0.00	0.00	0.00	0.00	0.00
Kyiv (city)	0.08	0.00	0.00	0.00	0.08	0.00
Kyivska	0.92	0.12	0.32	0.02	1.24	0.14
Luhanska	2.90	0.32	0.00	0.00	2.90	0.32
Lvivska	0.00	0.00	0.00	0.00	0.00	0.00
Mykolaivska	3.42	0.53	0.00	0.00	3.42	0.53
Odeska	0.00	0.00	0.00	0.00	0.00	0.00
Poltavska	0.00	0.00	0.00	0.00	0.00	0.00
Rivnenska	0.00	0.00	0.00	0.00	0.00	0.00
Sumska	0.15	0.00	0.43	0.04	0.58	0.04
Ternopilska	0.00	0.00	0.00	0.00	0.00	0.00
Vinnytska	0.00	0.00	0.00	0.00	0.00	0.00
Volynska	0.00	0.00	0.00	0.00	0.00	0.00
Zakarpatska	0.00	0.00	0.00	0.00	0.00	0.00
Zaporizka	0.24	0.00	0.01	0.00	0.24	0.00
Zhytomyrska	2.79	0.43	0.16	0.00	2.95	0.43
Nationwide (justice)						22.60
Nationwide (public administration)					31.6	3.36
Total	**61.33**	**32.1**	**7.97**	**0.745**	**100.90**	**35.45**

Source: Assessment team.

After a pause at the beginning of the war, the reform processes for selecting new judicial leaders in the HCJ and the HQCJ were recently relaunched. In late April and early May 2022, the Ethics Council continued its review and interviews of sitting members of the HCJ and found only three who were ethically qualified to continue as members. The Ethics Council also continued its process of vetting and interviewing new candidates for the HCJ. Optimistically, it is possible that the HCJ will have an operational core of 15 members by September/October 2022. The Selection Commission met on July 13, 2022, to formally announce the resumption of the competition for members of the HQCJ—a process that will play the critical role of identifying and recommending new judges to fill the nearly 2,000 vacancies that exist across Ukraine's courts.

Reconstruction and Recovery Needs, including Build Back Better

The total reconstruction and recovery needs for the sector are estimated at US$222.2 million. A total of US$135.66 million would be needed for reconstruction and recovery of the judiciary, including US$47.15 million in short-term needs (Table 91). Needs for central-level public administration are estimated at US$69.32. Based on the available information on damage, a minimum of US$17.1 million would

be needed for reconstruction and recovery for the OGP. As shown in Table 91, this would be US$16.7 million in reconstruction needs and US$0.4 million in service delivery restoration needs.

With regard to recovery needs, the recovery of justice sector services will be contingent on the availability of Ukraine's trained and experienced law enforcement and anticorruption officials, private lawyers, and judges. The justice sector is more dependent on human resources than physical resources to deliver services, so priority should be given to ensuring that the OGP, SAPO, NABU, NACP, HACC, and Ukraine's other courts are fully staffed with trained prosecutors, investigators, judges, and other key personnel. Where the sector has suffered losses due to the war or emigration, new judges, prosecutors, investigators, police, customs and tax officers, and other justice sector staff will need to be recruited and trained after the war.

With regard to reconstruction needs, in order to restore the delivery of justice services in Ukraine, the reconstruction and repair of Ukraine's courthouses should be a priority. While it is likely that the OGP and other law enforcement services will be able to recover relatively quickly (due to limited infrastructure losses), the delivery of civil and criminal justice will depend on there being courthouses where Ukraine's judges can hear and decide cases. The delivery of justice in corruption cases will be particularly important in light of the pressing need to ensure that Ukraine's postwar reconstruction is done with integrity and with safeguards to prevent corruption and prosecute it when it occurs. Since the HACC has not suffered damage or losses, it should be able to continue operating at its prewar levels.

Law enforcement and judicial services will need to be prioritized once the war is over to ensure proper governance, law and order, and integrity during reconstruction and rebuilding. The damage inflicted on the justice/rule of law sector may inevitably lead to a disruption in the state's ability to investigate and prosecute crimes, ensure accountability through the judicial system, and provide the displaced population with access to critical government legal and judicial services. One possible option is to consider short-term temporary solutions such as mobile courts or temporary court locations for priority cases. Delivery of judicial services through e-justice tools should also be considered as a solution to the lack of physical courthouses or other damaged infrastructure.

Reconstruction and recovery of the justice sector must be done in line with the principles and objectives of the judicial reform laws that were being implemented as the war began. It will be critical that the judicial governance bodies, the HCJ and the HQCJ, are composed of qualified people who have passed the integrity and ethical reviews of the Ethics Council (for the HCJ) and the Selection Commission (for the HQCJ). In addition, the government must exhibit the political will to ensure both the genuine independence of SAPO with its newly appointed head and transparent, competitive selection of new NABU director based on merit. Each of these anticorruption bodies requires leaders with expertise, experience, and above all ethical integrity to lead the investigation and prosecution of corruption offenses during the reconstruction phase.

Practically, each of the justice subsectors will likely need to coordinate its own reconstruction and restoration process: the OGP for the prosecution services; the SJA, HCJ, and HQCJ for the judicial services; and the Ministry of Justice for those institutions within its competence. These institutions will need to coordinate closely with the authority in charge of supervising the overall reconstruction efforts. Justice/rule of law institutions, particularly those with the mandate to prevent, investigate, and combat corruption (e.g., NACP, NABU, SAPO, and HACC) will need to play a prominent role in the overall reconstruction process to ensure that the reconstruction and recovery efforts are implemented with transparency and integrity and that reconstruction funding is put to its intended use.

Approximately one-quarter of the SAPO's prosecutors joined the Armed Forces between February and March 2022 and are still serving there. Moreover, at the end of 2019, the SAPO was empowered to engage in civil forfeiture without increasing the number of prosecutors. In view of this, it seems appropriate to consider both the prompt filling of previously existing vacancies in SAPO and the reasonable increase of the staff.

The recovery and reconstruction needs of central-level public administration are estimated at US$69.32 million, including US$20.8 million in the immediate/short term. The estimation of the needs is directly linked to the identified damage. Activities related to most-urgent public services should be prioritized by respective level authorities.

Table 91. Recovery and reconstruction needs by subsector (US$ million) as of June 1, 2022

Category	Component	Immediate/short term	Medium- to long-term	Total
Reconstruction Needs	Judiciary	37.44	87.36	124.79
	Ministry of Justice	0.00	0.00	0.00
	Law enforcement	5.01	11.69	16.70
	Public administration	20.8	48.5	69.32
Service Delivery Restoration Needs	Judiciary	9.71	1.16	10.87
	Ministry of Justice	0.00	0.00	0.00
	Law enforcement	0.40	0.00	0.40
Total		**74.6**	**147.6**	**222.2**

Source: Assessment team.

Limitations and Recommendations

There are limitations related to damage and loss data for a number of justice/rule of law entities, including the Ministry of Justice and its various regional and affiliated buildings. There is limited information available on damage to Ukraine's various law enforcement agencies other than the OGP. SAPO does not have territorial departments, so the team presumes that there is no damage to buildings or inventory in relation to SAPO. As for the NABU, there has not been direct damage so far. The RDNA does not include information on Ukraine's Custom Service, and future assessments could be expanded to include new data. Key recommendations for further (future/more in-depth) assessments include the following:

- **Coordination of information:** Access to damage, loss, and needs information across the sectors will likely need to be better coordinated in order to improve the accuracy of future assessments. This may become possible and easier as the war concludes.
- **Human resources:** It will be useful at some point to try to identify the human resources lost by the justice sector during the war in order to better understand the likely staffing and training needs that will be faced during the reconstruction phase.
- **Areas** temporarily not under government control: As the war progresses and the lines of engagement change, it will be necessary to get damage and loss assessments from those areas that were not under government control as of June 1, 2022, the cutoff date for this RDNA.
- **Public administration buildings**. There is a need to improve data and specifically to disaggregate central administration data by function and location.

LAND DECONTAMINATION

Summary

Land decontamination, which covers demining and clearance of explosive remnants of war (ERW), is a precondition to safe rebuilding, resumption of service provision, and return to normality. The State Emergency Service of Ukraine (SESU) and Ministry of Internal Affairs (MIA) estimate that 13 percent of Ukraine's territory is contaminated. **Based on conservative estimates, land decontamination costs are expected to exceed US$73.2 billion**, with US$58.5 million to be urgently invested in equipment (demining machines, metal detectors, personal protective equipment [PPE] etc.), training, and salaries for the expanded land decontamination workforce in Ukraine. It will be critical to prioritize areas requiring the most urgent decontamination, such as areas with high concentrations of civilian populations and areas critical for restoring production and economic flows. In the immediate/short term, close to US$11 billion for equipment and training, non-technical and technical surveys, and clearance to ensure readiness for scaled-up decontamination efforts and to make significant progress in areas brought back under government control and areas where military actions have ceased. Costs associated with the removal of anchored and floating sea mines in the Black Sea are unquantified. However, until decontamination of the Black Sea and Ukraine harbours are completed, (re)insurers of shipping vessels in the Black Sea will continue to charge extremely high and even historic prices for insurance; these costs may exceed ship hiring costs and will eventually be passed on to consumers, a particularly significant issue when it comes to grain exports.

Background

Decontamination, mine action and recovery. Explosive hazards inhibit freedom of movement, put civilian infrastructure at risk, and limit access to food, water, schools, hospitals, and shelters; ultimately, they jeopardize the resumption of activities and the safe return of displaced persons. Humanitarian mine action helps people survive, for instance, by clearing vital access routes and making arable land available for farmers to safely grow and harvest crops. Mine action also improves the quality of life, for instance, by providing education and helping to meet the immediate and long-term needs of explosive hazard survivors and affected families and communities.

Effective and efficient mine action efforts, in particular nontechnical survey (NTS),[295] technical survey (TS),[296] and clearance,[297] are an essential part of land release. So too are the "Five Pillars of Mine Action" described by the United Nations Mine Action Service (UNMAS):[298]

- **Mine clearance.** This activity includes surveys, mapping, and minefield marking, as well as the actual clearance of mines from the ground ("demining").
- **Explosive ordnance risk education** (EORE). These are educational and awareness-raising activities that seek to lower the risk of injury from mines

295 NTS is the starting point for identifying, accessing, collecting data on, reporting, and using information to define where mines/ERW are to be found, as well as where they are not, and for identifying Suspected Hazardous Areas (SHA) and Confirmed Hazardous Areas (CHA) where further investigation and/or clearance need to take place.

296 TS techniques and methods involve a physical intervention, using survey or clearance assets to enter a hazardous area to do the following: (i) confirm the presence, or absence, of mines/ERW and identify the type of hazards present; (ii) better define the boundaries of the SHA/CHA that require clearance; and (iii) collect information to support land release decision-making. Technical surveys can be broadly characterized as either targeted or systematic depending upon the information gathered about hazard and threat. Technical survey assets must provide a high probability (near certainty) that the presence of expected hazard items will be indicated by the equipment and methodology in use and that TS personnel are safe to conduct the activity.

297 The most familiar and visible part of mine action is the clearance of mines and ERW. It is also the most expensive. Clearance refers to an intrusive information-gathering and threat removal process that fully defines a hazardous area while removing explosive hazards.

298 *Link*.

Box 6. Lessons learned on mine action from international experience

It is not uncommon for countries to have to deal with the threat of mines that were laid decades earlier. France and Belgium are still clearing land mines and ERW remaining from World War II, and Croatia is still clearing land mines and ERW from its War of Independence, which ended in 1995. Croatia started its Mine Action Program in 1998, and has decreased contaminated land from the initial estimate of 14,000 km^2 to some 1,800 km^2 through NTS and TS. In 2022, Croatia still faces contamination of less than 200 km^2 illustrating that mine action is a long process. Croatia was the first country to pass a Law on Mine Action; it also established a National Mine Action Authority and Croatian Mine Action Center and has conducted and completed NTS, TS, and orthophoto mapping. Yet 24 years after beginning the Mine Action Program, and having met all its preconditions, including securing funding, Croatia still has an issue of land mines. This experience suggests that clearing mines and ERW is a daunting and lengthy task—but also that progress in land mine and ERW decontamination depends on meeting key technical, organizational, funding, and other preconditions well in advance.

and unexploded ordnance and to promote behavioural change.

- **Victim assistance.** An obligation of the Anti-personnel Mine Ban Convention signatories, victim assistance is provided for mine accident survivors, their families, mine-affected communities, and persons with disabilities.
- **Advocacy.** Advocacy efforts by United Nations and others seek to achieve universal participation in international agreements that ban or limit the use of land mines.
- **Stockpile destruction.** Article 4 of the Anti-personnel Mine Ban Convention requires signatories to destroy stockpiled mines within four years of joining the Convention.

The extent of contamination from cluster munition remnants (CMR) in Ukraine was not quantified prior to the 2022 war but was considered extensive. It has been reported that unexploded submunitions contaminated the Donetska and Luhanska regions, and that the most intensive use of cluster munitions in and around the city of Debalcevo in Donetska oblast. In 2020, the Ukrainian Ministry of Defense (MoD) estimated that total contamination by mines and ERW (including CMR) could extend over 7,000 km^2, although international operators estimated that the size could be twice as large. Large parts of Ukraine were considered contaminated by considerable quantities of other ERW, as well as by anti-personnel and anti-vehicle mines used prior to the 2022 invasion. Ukraine has unexploded ordnance (UXO) and abandoned explosive ordnance (AXO) remaining from the two World Wars and from Soviet military training and stockpiles. In February 2016, it was reported that 32 former military firing ranges and other areas were contaminated with explosive items from past wars covered 1,500 km^2.[299]

All mine action in the Donetska and Luhanska regions, including CMR survey and clearance, has been overseen and coordinated by the MoD, which operates the Kamyanets-Podilsky Demining Center. Due to the open conflict in the period 2014–2022 and to the war beginning in February 2022, operators have submitted annual plans on mine action for MoD's approval. Other national bodies involved in the sector include the Ministry of Internal Affairs (MIA), the SESU (under the MIA), the Ministry for Reintegration of the Temporarily Occupied Territories, the State Special Transport Services (SSTS) of the MoD, the National Police, and the State Border Service. The MoD had organizational control of operations, while SESU was generally responsible for conducting clearance. Box 6 presents international experience related to decontamination relevant to Ukraine.

Ukraine's national mine action legislation (Law No. 2642) was adopted in 2018 and signed into law by the president in 2019. Prior to its adoption, Ukraine did not have any comprehensive legal act regulating the complex set of issues regarding mine action. The law foresaw the establishment of special governmental institutions to lead the national mine action response in the country. However, the law was not implemented because of inconsistencies with other legal acts. None of the institutions it called for were created, and as a consequence coordination of national mine action response in Ukraine needs significant improvement. The law also had gaps and weaknesses in its regulation of victim assistance and the safety of (and insurance for) mine action operators.

299 SESU presentation, February 17, 2016.

In June 2020, proposed amendments to the Law on Mine Action in Ukraine passed their first reading. Following this, the United Nations Development Programme (UNDP), the Organization for Security and Co-operation in Europe (OSCE) Project Coordinator in Ukraine (PCU), the HALO Trust, and the Danish Refugee Council/Danish Demining Group (DRC/DDG) formed a working group to prepare suggested amendments. These included comments on the status of mine victims and their rights; the training and insurance of deminers; handover procedure and liability of actors after handover; and the importation of dual-use goods, such as demining machines. They also commented on the possibility of allowing international operators to use explosives to destroy items found during demining. Currently, only MoD and SESU can perform that task.

The amendments to the Law on Mine Action in Ukraine were signed off on by the president in December 2020, and the recommendations of the working group were broadly considered. Yet the new law fell short of addressing two major concerns of the mine action community: operators' license to carry out disposal, destruction, and transport of explosive items for explosive ordnance disposal (EOD) procedures, and operators' permits for the import and use of so-called dual-use items, namely demining machines of varied types. Additional legislative amendments were required to resolve these concerns. These issues have not been resolved yet, and given the ongoing war, they are highly unlikely to be resolved soon. Lifting the ban to import the dual-use items (e.g., demining machines) would allow operators to deploy machinery during TS and clearance operations, which would significantly lower the primary risks for deminers when entering Suspicious Hazardous Areas (SHA) and Confirmed Hazardous Areas (CHA). Furthermore, machines would increase the speed of demining and ERW removal dynamics and thus lower the price and time needed to clear mines and ERW.

The approved law established a framework for humanitarian demining, divided responsibilities among state institutions, and foresaw the creation of a National Mine Action Authority (NMAA). However, a peculiarity of the law envisages the creation of two National Mine Action Centers (NMACs), one under the MoD and one under SESU (which sits under the MIA) called the Humanitarian Demining Center. The two NMACs were tasked to share information management, quality assurance, monitoring, planning, and certification of the operators, whose responsibility was envisaged to be divided territorially. Before the war, the SESU NMAC was in charge of all humanitarian demining across Ukraine with the exception of MoD infrastructure and railways, which were and remain under SSTS. The decision to create two NMACs as opposed to one comes as a compromise that allows both MoD and MIA to take the lead on mine action. However, in other countries that tried to divide mine action across two or more governmental institutions (e.g., Colombia, the Arab Republic of Egypt, Iraq), this approach did not promote efficient or effective mine action.

The NMACs are coordinated by the NMAA, an interagency body made up of the Cabinet of Ministers (CoM), today Secretariat of Mine Action Authority, which due to the conflict during 2014–2022 and to the 2022 war is chaired by the MoD, which is designated the chair while "special conditions" exist in Ukraine; during peacetime it is chaired by the MIA. The National Mine Action Standards and the national mine action strategy were to be adopted by the NMAA. In May 2021, the Humanitarian Demining Center (under SESU) was established in Merefa, Kharkivska oblast; the MoD NMAC was in an advanced stage in Chernihiv, Chernihivska oblast. Due to the intensified contamination of the territory with unexploded explosive ordnances, the Government of Ukraine approved the Operational Action Plan for Mine Action on April 15, 2022.

Assessment

Some key current and past producers and users of land mines, including the United States, China, India, Pakistan, and the Russian Federation, have not signed the Anti-personnel Mine Ban Convention. Ukraine has signed both the Convention on Certain Conventional Weapons[300] and Anti-personnel Mine Ban Convention,[301] but it claimed before the war that it could not fulfill its obligations because it did not control significant parts of the country—and this situation has worsened since the invasion. There is no credible information that Ukrainian government forces have used anti-personnel mines in violation of the Mine Ban Treaty since 2014 and into 2022. Russian forces have used at least seven types of anti-

300 The purpose of the Convention is to ban or restrict the use of specific types of weapons that are considered to cause unnecessary or unjustifiable suffering to combatants or to affect civilians indiscriminately. *Link*.

301 This is the Convention on the Prohibition of the Use, Stockpiling, Production and Transfer of Anti-Personnel Mines and on Their Destruction (also known as Anti-Personnel Mine Ban Convention, Ottawa Convention, or Mine Ban Treaty). *Link*.

Figure 36. Estimated areas for non-technical survey

Source: Government of Ukraine.

personnel mines in at least four regions of Ukraine: Donetska, Kharkivska, Kyivska, and Sumska.[302]

Both Russian and Ukrainian forces have extensively used anti-tank mines (also called anti-vehicle mines) in at least seven regions: Donetska, Chernihivska, Kharkivska, Kyivska, Odeska, Sumska, and Zaporizka. Hand-emplaced TM-62 series anti-vehicle mines appear to be the type most frequently used. All manner of land mine delivery methods have been documented: hand-emplaced, mechanically laid, and remotely delivered. Several new types of land mines have been used for the very first time in the war, including some produced as recently as 2021. Russian forces also emplaced many victim-activated booby traps and improvised explosive devices (IEDs) as they retreated from positions taken during the initial phase of the invasion. A booby trap can function as an anti-personnel mine when the fuse is activated unintentionally by a person.

Land mine casualties have been reported in the war in Ukraine. The impact of new mine use can also be seen in the denial of access to civilian homes, infrastructure, transportation routes, and agricultural lands. Evidence indicates that agricultural production is being affected due to land mines in fields and on rural paths and roads.

As of June 1, 2022, SESU estimates that NTS should be conducted over 272,000 km^2 of Ukrainian territory (Figure 36). This number is based on ground and aerial military activities. However, by application of lessons learned from Croatia, which experienced a similar war (conventional army conflict, without any guerrilla or similar paramilitary warfare), the RDNA assessment team has estimated that the total area foreseen for NTS, TS, and clearance is 267,638 km^2, with a breakdown of 194,647 km^2 for NTS, an additional 48,661 km^2 for TS, and 24,330 km^2 for the actual clearance operations. The assessment further estimates that it would take 10 years to complete NTS, 15 years to complete TS based on the NTS results, and 30 years to complete clearance based on TS findings and definition of SHA and CHA. These estimates assume that war activities stop,

302 Consultations with SESU in 20217 as apr of OSCE Building Ukrainian Humanitarian Mine Action Capacity" programme.

that additional needs and requirements are met (e.g., additional staff and equipment, including dual-use items), and that there are available funds.

Damage: Most of the mine action data are classified but based on the information provided for this RDNA by both the Mine Action Center and the Humanitarian Demining Center, it was established that as of June 1, 2022, there was no structural damage to actual buildings and training facilities.

Reconstruction and Recovery Needs, including Build Back Better

For several reasons, detailed land mine and ERW contamination information is not available:

- Information on minefields is too sensitive for sharing during the ongoing war.
- NTS across the country was not completed before the war.
- Because of the war, NTS can be carried out only in oblasts that have been brought back under government control (currently it is being conducted in Kyivska oblast and Chernihivska oblast by SESU, the Halo Trust, and Danish Refugee Council/Danish Demining Group).
- Because of increased contamination, there is a need to hire, train, and equip an additional 400 staff, which is currently not possible.

Total needs related to land decontamination amount to US$73.2 billion. This considers contamination per oblast and needs related to training of additional staff, procurement of equipment, conducting NTS and TS, and actual demining/clearance. It is noted that further investigation would be needed to determine the NTS and TS and the actual clearance area which, as well as the current prices for the above, both of which will affect the estimated needs.

In order to have safe, efficient, and high-quality mine action, first and foremost there is a need to provide proper training to additional staff and procure reliable, modern, and high-quality equipment, especially metal detectors, demining machines, and PPE. The two Ukrainian centers have confirmed the need for the CEIA CMD metal detectors (900 for their current and additional staff) and PT-300 D:Mine remote controlled mechanical demining machine (with flail, tiller, and dozer blade), along with training and one-year supply of consumables and critical parts (initially 21 pieces and later an additional 14). Use of demining machines would allow operators to deploy machinery during TS and clearance operations, which would significantly lower the primary risks for deminers when entering SHA and CHA. Furthermore, machines would increase demining and ERW removal speed and thus lower the price and time needed to clear mines and ERW. The advantage of demining machines is that in peacetime, they can be used in forestry (tiller), agriculture (tiller), quarries (flail), and construction (dozer blade).

Related to capacity-building, adequate training to at least EOD Level 3 of all additional staff is required. The Croatian Mine Action Center–Center for Testing, Development and Training has the capacity, knowledge, and experience in varied types of training, and it has signed a Memorandum of Understanding with SESU. Furthermore, EORE courses are needed to prevent civilian casualties: the statistics show that 92 percent of mine casualties and fatalities are from anti-vehicle (anti-tank) mines mostly activated by tractors, combine harvesters, and other agricultural equipment used by civilians entering suspicious hazardous areas to harvest crops. Appropriate education would include EORE, mine victims assistance, and training-of-trainer (ToT) courses. For example, the Croatian nongovernmental organization Hrvatska pomaže (Croatia Helps) has experience in EORE and mine victims assistance and has a partnership agreement to provide EORE education with the Ukrainian Deminers Association.

Other needs include assistance in elaborating efficient legislation by organizing study trips to other mine-affected countries, organizing varied workshops in country and abroad, and generally supporting Ukraine's efforts to decontaminate its land. OSCE, Geneva International Centre for Humanitarian Demining (GICHD), relevant UN agencies, and other international and national stakeholders would play a crucial role in meeting this need.

NTS activities are currently being conducted in Kyivska and Chernihivska oblasts. If financing was available, these two regions should be focused on for NTS, TS, and clearance in the highest priority areas. Priority areas could be considered as areas most crucial for safety, such as urban areas and villages undergoing reconstruction, key transport links to ensure safe connectivity and then areas critical for the resumption of services, productive and economic activity.

Table 92 provides an overview of estimated area per oblast. Figure 37 provides an overview of needs costs by type action; and Table 93 provides information on estimated costs.

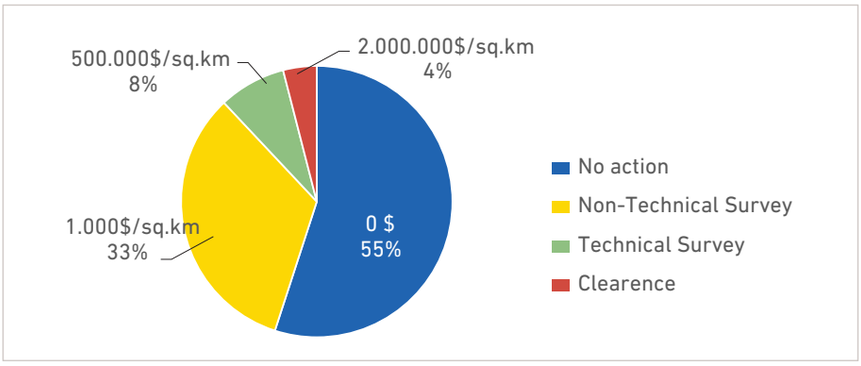
Table 92. Estimated area and needs for land mine and ERW decontamination by oblast as of June 1, 2022

Oblast	Area m²	Estimated area for nontechnical survey (km²)	Estimated area for technical survey (km²)	Estimated area for clearance (km²)
Cherkaska	20,891	0	0	0
Chernihivska	31,851	23,888	5,972	2,986
Chernivetska	8,094	0	0	0
Dnipropetrovska	31,901	4,000	1,000	500
Donetska	26,506	26,506	6,626	3,313
Ivano-Frankivska	13,894	0	0	0
Kharkivska	31,402	16,000	4,000	2,000
Khersonska	28,449	28,449	7,112	3,556
Khmelnytska	20,636	0	0	0
Kyivska	28,119	12,000	3,000	1,500
Kirovohradska	24,578	0	0	0
Luhanska	26,673	26,673	6,668	3,334
Lvivska	21,824	0	0	0
Mykolaivska	24,587	4,000	1,000	500
Odeska	33,296	4,000	1,000	500
Poltavska	28,736	0	0	0
Rivnenska	20,039	0	0	0
Sumska	23,824	16,000	4,000	2,000
Ternopilska	13,817	0	0	0
Vinnytska	26,502	0	0	0
Volynska	20,135	0	0	0
Zakarpatska	12,772	0	0	0
Zaporizka	27,169	27,169	6,792	3,396
Zhytomyrska	29,819	5,963	1,491	745
Ukraine	575,510	196,647	48,661	24,330
Total area for mine action				**267,638**
$/km2		**1,000**	**500,000**	**2,000,000**
Total per phase (US$)		**196,647,000**	**24,330,500,000**	**48,660,000,000**
Total (US$)				**73,185,146,700**

Source: Assessment team.

In the context of the planned 10-year span under the RDNA, some US$10.1 billion will be needed in the immediate/short term for procurement of equipment, training of additional staff, NTS, TS, and clearance; and an additional US$63 billion will be required to complete NTS, TS, and clearance over the next 10 years (noting that actual timeline will take decades; see below).

Figure 37. Estimated cost of mine action per km^2 by type of action as of June 1, 2022



Source: Assessment team.

Table 93. Estimated costs for decontamination of land mines and ERW by oblast (US$ million) as of June 1, 2022

Oblast	Estimated US$ need for Non-Technical Survey	Estimated US$ need for Technical Survey	Estimated US$ need for Clearance	Total
Cherkaska	0.00	0.00	0.00	0.00
Chernihivska	23.9	2,986.0	5,972.0	8,981.9
Chernivetska	0.0	0.0	0.0	0.0
Dnipropetrovska	4.0	500.0	1,000.0	1,504.0
Donetska	26.5	3,313.0	6,626.0	9,965.5
Ivano-Frankivska	0.0	0.0	0.0	0.0
Kharkivska	16.0	2,000.0	4,000.0	6,016.0
Khersonska	28.4	3,556.0	7,112.0	10,696.4
Khmelnytska	0.0	0.0	0.0	0.0
Kyivska	12.0	1,500.0	3,000.0	4,512.0
Kirovohradska	0.0	0.0	0.0	0.0
Luhanska	26.7	3,334.0	6,668.0	10,028.7
Lvivska	0.0	0.0	0.0	0.0
Mykolaivska	4.0	500.0	1,000.0	1,504.0
Odeska	4.0	500.0	1,000.0	1,504.0
Poltavska	0.0	0.0	0.0	0.0
Rivnenska	0.0	0.0	0.0	0.0
Sumska	16.0	2,000.0	4,000.0	6,016.0
Ternopilska	0.0	0.0	0.0	0.0
Vinnytska	0.0	0.0	0.0	0.0
Volynska	0.0	0.0	0.0	0.0
Zakarpatska	0.0	0.0	0.0	0.0
Zaporizka	27.2	3,396.0	6,792.0	10,215.2
Zhytomyrska	6.0	745.5	1,490.0	2,241.5
Ukraine	**196.4**	**24,330.5**	**48,660.0**	**73,185.1**
Nationwide	**Procurement of Equipment**			**58.6**
Total				**73,243.7**

Source: Assessment team.

Limitations and Recommendations

All mine action activities will take much longer than the above-planned 10 years. As noted in Table 93, these activities can take decades (e.g., up to 30 years). For the purpose of the RDNA, the financing was adjusted to 10 years. It is recommended that authorities also prepare a realistic timeline that can guide actions in this field. A proposed timeline is included in Figure 38.

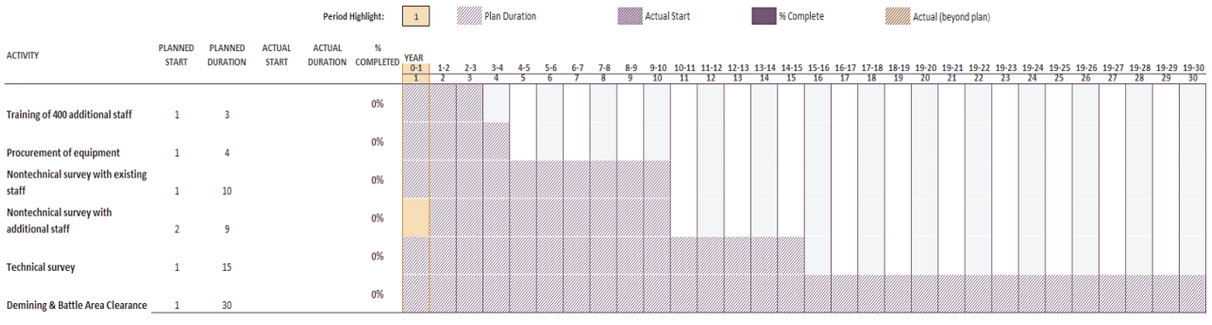
Key limitations of this assessment are the lack of reliable data and the unpredictability and uncertainty of the course of war. In addition, lack of physical contact with Ukrainian stakeholders and the lack of interviews on site also created difficulties in conducting the assessment.

Concerning the procurement of equipment needed, it will likely take up to four years until all of it is available and delivered to Ukraine; delays are especially likely for demining machines and other not-already-available hardware. Other limitations involve training an additional 400 persons in the specifics of EOD, since this training cannot be conducted in Ukraine (unlike EORE, Mine Victims Assistance, and ToT courses, which can be relatively easily conducted in Ukraine).

Further and more in-depth assessments are needed as more reliable information becomes available. When possible, it will be critical to conduct interviews with key national and international stakeholders, meet with all interested parties, and hold on-site inspections in Kyivska oblast, with frequent field visits to "safe" oblasts. It is necessary to maintain contact and relationships with all national and international stakeholders.

Finally, as a means of quality assurance and quality control, it is necessary to establish monitoring and evaluation arrangements related to the use of funds for mine action (such as for equipment and trainings) and for the provision of EOD courses.

Figure 38. Proposed timeline and key activities for mine action



Source: Assessment team.

Irpin. Photo by Julia Burlachenko for the World Bank.

TOWARD RECOVERY AND RECONSTRUCTION

There are already ongoing efforts by the Government to lead the country toward recovery and reconstruction.

In April 2022, the Government of Ukraine established a National Council for the Recovery of Ukraine from Consequences of War co-chaired by the Office of the President and Council of the Prime Minister. Working groups have been formed for economic recovery and development, agriculture, public infrastructure, private enterprise recovery, restoration of public services, housing, transport, communications, and social service delivery, among other sectors. In addition to the collection of data on damage and needs associated with the war, the National Council is charged with developing proposals for priority reforms and developing a postwar recovery and development plan. The current assessment is being conducted in collaboration with the National Council.

In July 2022, at the Ukraine Recovery Conference (URC2022) held in Lugano, Switzerland, Ukraine presented a US$750 billion Recovery Plan with three stages (blueprint, detailed roadmap, and implementation).[303] The Recovery Plan sets ambitious targets for 2032: it aims to accelerate sustainable economic growth, with a plan for 7 percent annual gross domestic product (GDP) growth and an increase in investments; to reach the top-25 of the Economic Complexity Index and the World Bank Human Capital Index; and to achieve a 65 percent reduction in CO2 emissions from 1990. Within the Recovery Plan, the following 15 national programs will support the achievement of short-, medium-, and long-term targets: [304]

1. Strengthen defense and security: secure defense sector modernization; build up the defense industry
2. Strive for European Union (EU) integration, in part by ensuring synchronization of Ukrainian regulation with Copenhagen criteria; secure access to markets
3. Rebuild clean and safe environment and ensure sustainable development in line with the EU Green Deal
4. (i) Strengthen integrated energy system resilience: increase European Network of Transmission System Operators (ENTSO-E) interconnects, link EU oil refineries with storage in Western Ukraine, build up gas storage; (ii) support the EU zero-carbon energy transition: develop zero-carbon power generation (nuclear and renewable), increase gas and biofuels production, develop H2 ecosystem linked with EU
5. Boost business environment: streamline regulation, transform tax and customs services to be service- and compliance-focused, develop effective labor market and at-scale reskilling program, strengthen Investment Promotion Agency to attract foreign direct investments
6. (i) Ensure emergency funding (grants, guarantees, interest rate compensation); (ii) ensure competitive access to funding: provide access to funding with competitive cost of capital by supporting growth of loans, establishing targeted state/donor guarantees, introducing war insurance

303 URC2022, "Recovery Plan," 2022, *Link*.
304 See Government of Ukraine, "Plan for the Recovery of Ukraine (ПЛАН ВІДНОВЛЕННЯ УКРАЇНИ)," 2022, *Link*.

7. Secure macro-financial stability: ensure stability of budget deficit and banking system while maintaining healthy debt level
8. Grow value-adding sectors of economy on the back of global trends, Green Deal, and Ukraine's competitive position: include steel, machine building (defense and aerospace), agro-processing and wood processing, construction sector, and IT
9. Eliminate logistics bottlenecks for integration with EU: (i) eliminate logistics bottlenecks with EU for supply chains' resilience, including in railway, river, and roads; (ii) strengthen interconnectivity of Ukraine by developing 1435 gauge railway, rebuilding roads and bridges, expanding corridor to EU
10. Recovery and upgrade of housing and regions infrastructure: (i) launch housing upgrade program with priority focus on at-scale energy efficiency program and new urban planning pilots (e.g., Bucha, Chernihiv); (ii) ramp up new housing construction and infrastructure upgrades in line with the urban planning and sustainability best practices (including transport); upgrade utilities, including electrification, heating and water systems, digital
11. Recovery and modernization of social infrastructure: rebuild destroyed social objects (education, health care, culture, sport); ramp up public-private partnership projects in social infrastructure in line with system reforms of education, health care, culture, and sport
12. Improve education system with focus on key competencies and innovation: New Ukrainian School (NUS) and core school reform, harmonization of university standards with EU; develop R&D at universities, reform vocational education, boost IT education, create science parks
13. Upgrade health care system: pursue universal health coverage and financing reform, develop efficient health care network, develop and promote digital health, conduct targeted intervention campaigns
14. Develop culture and sport systems to enable human capital growth ("strategic imperative"); rebuild clean and safe environment and ensure sustainable development in line with the EU Green Deal
15. Secure targeted and effective social policy: upgrade targeted subsidies system, introduce second level (accumulative) for pensions system, develop comprehensive ecosystem for child protection, develop support programs for integrating refugees and veterans, streamline immigration regulation.

The key guiding principles of the Government's Recovery Plan are to start now and ramp up gradually; grow prosperity in an equitable way; integrate into the EU; build back better (for the future); and enable private investment and entrepreneurship. The plan will be implemented in a region-focused and parameter-based approach.

At the Ukraine Recovery Conference, representatives from the international community adopted the Lugano Declaration with a commitment to 12 actions,[305] including these:

- Support the establishment of an effective coordination platform between the Government of Ukraine and bilateral and multilateral partners, organizations, and international financial institutions for the preparation and implementation of Ukraine's Recovery Plan, building on existing structures and establishing a clear link with the broad reform agenda.
- Affirm that integrity, transparency, and accountability are essential for the successful implementation of the national Recovery Plan.
- Stress the importance of fair and transparent development finance, lending, and borrowing practices in accordance with international rules, standards, and recognized principles.
- Welcome innovative approaches to recovery, such as digital transformation, green energy transition, and national and international innovative and sustainable financing, including harnessing of possible reparations and contributions by private donors and the private sector.
- Invite the private sector, academia, and civil society as well as actors at subnational level, such as cities, hospitals, and others, to enter into partnerships with Ukrainian counterparts.

305 URC2022, "Lugano Declaration," 2022, *Link.*

The Lugano Declaration for the Reconstruction of Ukraine also outlines the following Guiding Principles:

- **Partnership**: The recovery process is led and driven by Ukraine and conducted in partnership with its international partners. The recovery effort has to be based on a sound and ongoing needs assessment process, aligned priorities, joint planning for results, accountability for financial flows, and effective coordination.
- **Reform focus**: The recovery process has to contribute to accelerating, deepening, broadening, and achieving Ukraine's reform efforts and resilience in line with Ukraine's European path.
- **Transparency, accountability, and rule of law**: The recovery process has to be transparent and accountable to the people of Ukraine. The rule of law must be systematically strengthened and corruption eradicated. All funding for recovery must be fair and transparent.
- **Democratic participation**: The recovery process has to be a whole-of-society effort, rooted in democratic participation by the population (including those displaced or returning from abroad), local self-governance, and effective decentralization.
- **Multi-stakeholder engagement**: The recovery process has to facilitate collaboration between national and international actors, including from the private sector, civil society, academia, and local government.
- **Gender equality and inclusion**: The recovery process has to be inclusive and ensure gender equality and respect for human rights, including economic, social, and cultural rights. Recovery needs to benefit all, and no part of society should be left behind. Disparities need to be reduced.
- **Sustainability**: The recovery process has to rebuild Ukraine in a sustainable manner aligned with the 2030 Agenda for Sustainable Development and the Paris Agreement, integrating social, economic, and environmental dimensions including green transition.

The RDNA can be instrumental in supporting the government's recovery plan and implementation efforts. The RDNA provides a baseline of sectoral and cross-cutting information on recovery and reconstruction needs that is linked to the damage and losses incurred as well as sectoral prewar baselines, while also considering building back better, right-sizing, right-placing, and overall modernization efforts. This information creates a data set that can help guide recovery planning as well as monitoring and evaluation (M&E).

Beyond the guiding principles that the government's Recovery Plan establishes, the following could be considered based on international experience related to post-conflict and post-disaster recovery and reconstruction:

- **Balancing urgent needs and medium- to long-term goals:** The recovery and reconstruction planning will need to address the most urgent needs immediately and in the short term, while ensuring preparations for longer-term reconstruction and recovery. In the short term, there is a need to ensure safety and security of people and to address the most urgent and basic needs (including for vulnerable populations) through shelter, public services, and economic restoration activities. In the medium to long term, recovery and reconstruction should build on the foundation of green, resilient, and inclusive development; it should also ensure efficiencies by upgrading access to and quality of services and infrastructure and by right-sizing/right-siting service networks and infrastructure.
- **Strategic prioritization of reconstruction across all sectors**: Building on the identified baselines, damage, losses, and needs across sectors in a consistent manner as done under the RDNA, needs should be prioritized based on absorptive capacity of different sectors, priorities related to different geographic areas, and humanitarian and IDP needs, as well as financing availability, institutional capacity, and other elements.
- **Addressing needs of different (groups of) oblasts:** Ukraine will also need to balance its efforts across the different groups of regions of Ukraine—frontline, recovered, backline, and support areas—depending on the progress of the war. Specific recovery and reconstruction plans can help guide the recovery within relevant oblasts based on their highest needs.
- **Inclusiveness and equity:** Recovery and reconstruction need to be closely aligned with efforts to decrease poverty, efforts to enhance social inclusion and gender equity, and investments targeting the most disadvantaged social groups.
- **Resilience and building back better:** Most of Ukraine's infrastructure was built during the Soviet era and has suffered from years of underinvestment and neglect. The country's

economic infrastructure is in dire need of improvement to be done in alignment with broader climate change and sustainability goals and targets. For example, the road network suffers from chronic lack of maintenance and repair works and requires major upgrading. At the same time, about 40 percent of water supply networks are in critical condition. Social infrastructure is likewise deficient; schools, kindergartens, and basic medical facilities outdated and need to be rehabilitated and modernized, while also being made more energy efficient and climate resilient. In addition, the country's agricultural assets are increasingly vulnerable to weather-related events, as most of Ukraine's small and medium farm enterprises have not yet adopted climate-smart technologies. Ukraine's industries and the energy sector too will need to adapt to more efficient and sustainable good practice and standards.

- Leadership and coordination: Continuous leadership from the highest level of government will be essential, together with strong operational support. To keep the momentum for the revitalization of the county, the highest levels of central government will need to be involved and strategically lead this process. The operational structure will also be key for delivering results and preserving a sense of perspective among the population.
- Local solutions and local development: Recovery and revitalization will need to be designed and led in a way that strongly supports local economies. Any structure or process for recovery and revitalization should make use of the economic and human capital in the country. Local firms should be involved in the process, and partnerships between them and firms from other parts of Ukraine and abroad should be promoted and supported. Building reconstruction should rely as much as possible on the local industry and on solutions produced in Ukraine.
- Focus on community needs: Community-driven development with strong citizens' involvement is a crucial element for building ownership and ensuring sustainability of recovery and revitalization. Innovative approaches for ensuring that the entire local community participates in recovery and revitalization is instrumental. The needs of the community cannot be identified using a top-down approach, and any such attempts can only result in investments disconnected from the real needs on the ground and unlikely to achieve sustainable results.
- Transparency and good governance: The recovery process should be measured against established targets/performance indicators and timelines; and it should be monitored within a transparent M&E system and process, including consultation with the affected societies and stakeholders.

Related to the implementation of the recovery activities, the following practical considerations could be taken into account based on international experience:

- Project identification, prioritization, sequencing, and commercial strategy: There is a need to identify and frame reconstruction and recovery project packages and to sequence them over time. This should reflect the relative priority of needs, a logical sequencing of interdependent works, and commercial considerations for bundling contracts according to the scale and scope that the market for engineering and contractor services can meet. The commercial strategy for delivering works at the scale envisaged for Ukraine's reconstruction would likely require an increase in the number of international construction firms that are active in Ukraine in parallel with efforts to grow smaller domestic firms into internationally competitive firms.
- Use of common systems and processes: Where feasible, the use of agreed and common systems, processes, and procedures should be promoted for procurement, financial management, management of environmental and social risks, M&E, etc. across recovery and reconstruction activities/investments. This will ensure all government officials (horizontal and vertical) are using the same systems, thus maximizing efficiency, including benefits of training, and avoiding situations where the same implementing unit is using multiple different systems of donor or international financial institutions.
- Focus on developing institutional capacity and managerial and technical capacity of implementation units: Recovery efforts should focus on developing the capacity of institutions across different administrative levels. Moreover, Implementation units (or multiple units) that will manage projects in specific sectors, subsectors, and/or regions should be capable of preparing and managing projects to the requirements of bilateral or multilateral development institutions, with respect to technical, fiduciary, and environmental and social requirements. Therefore, capacity development should start early. Mobilization of

external resources to augment capacity will also be critical.

- **Mobilization of technical project preparation**: The nature of reconstruction projects needed across many sectors with large infrastructure works will be technically complex and engineering intensive. Beyond debris and waste management and land contamination, many projects will require environmental and social assessments and potentially land acquisition processes with public consultation processes. Alignment with European Union peers will also require Ukraine to apply standards that are different or modified from those previously used. While it may be possible to temporarily apply foreign standards, Ukraine's own domestic standards would eventually need amendments to align with the EU acquis. Project preparation tasks would reasonably be expected to cost between 2 percent and 10 percent of total civil works investment. Mobilizing funds for these project preparation tasks immediately, and beginning technical preparations for "no regret" investments that are highly likely to fall into highest-priority categories, is essential to rapid mobilization and Ukraine's ability to absorb reconstruction funding across different sectors.
- **Financial strategy and the roles of international funds, sovereign funding, and user charging in specific subsectors:** The scale of investment needed for Ukraine's reconstruction is beyond the financial capacity of the government and its subsidiary institutions in virtually all sectors. International assistance in the form of grants, loans, and/or guarantees from external sources is expected to augment the fiscal capacity of Ukraine during reconstruction. Beyond these sources, there will also be a role for user charging to support investment and long-term sustainability of public services. Each specific sector will accordingly need a financial strategy and indicative expenditure envelope that reflects credible funding sources and their role in supporting direct expenditures or underpinning different forms of financing (sovereign, nonsovereign, commercial, etc.). Providing financial strategies for relevant sectors during reconstruction is both necessary in the immediate term and likely to prove complementary for post-reconstruction efforts to ensure financial sustainability of critical public services.

Key highlights and priorities by sector are included in Table 94.

Table 94. Sectoral highlights and recovery and reconstruction priorities as of June 1, 2022

HOUSING	
Highlights	Priorities
Damage: **US$39.2 billion** Losses: **US$13.3 billion**	Total recovery needs (10 years): **US$69 billion** Immediate/short term: **US$33.1 billion** Medium-long term: **US$35.9 billion**
• **Apartment buildings have been most affected** – Of 692,210 units damaged, 266,571 have been completely destroyed and 425,639 have been partially damaged. • **Single-family houses** – Of 110,635 units damaged, 41,323 have been completely destroyed and 78,822 have been partially damaged. • **Dormitories** – Of 13,312 units damaged, 4,352 have been completely destroyed and 8,960 have been partially damaged. • **817,000 residential units impacted by the war** – 38% destroyed beyond repair • **The Donetska (28.92%), Luhanska (20.07%), Kyivska (18.13%), and Kharkivksa (15.07%) oblasts** account for majority of total damage to housing in the country.	Immediate needs: • Ensure the provision of temporary rental housing and rental subsidies for displaced households • Establish a housing reconstruction and recovery strategy and implementation mechanism Repair, reconstruct, and stabilize to ensure swift return and kick-start recovery: • Support repair of partially damaged housing units and winterization • Reconstruct fully destroyed housing units. • Organize decontamination, demolition, and debris removal. • Repair and rebuild key municipal services to accompany the housing unit repair, as well as key service reinforcement for internally displaced persons (IDPs) and returnee-hosting municipalities.

EDUCATION

Highlights

Damage: **US$3.4 billion**
Losses: **US$0.5 billion**

- **A total of 1,885 education institutions impacted by the war**, with 178 buildings destroyed and 1,707 partially damaged:
- **Damage to education infrastructure mainly located in the east**, especially in Kharkivska, Donetska, and Luhanska oblasts.
- **Nearly two-thirds of Ukrainian children have been displaced either internally within Ukraine or abroad**. Vinnytska, Ivano-Frankivska, and Kyivska oblasts are acting as major hubs for IDPs. As of June 20, there were at least 650,000 secondary students and 22,000 educators abroad. 164,000 IDP learners have joined schools in their place of temporary residence in Ukraine, with many registered in neighboring countries.
- **Education progressively resumed online, relying on the tools developed during the COVID-19 pandemic to deliver education inside and outside of Ukraine.**
- Losses accrued so far include demolition and debris removal, loss of income to teachers and institutions, and losses due to increase in operating costs.

Priorities

Total recovery needs (10 years): **US$9.2 billion**
Immediate/short term: **US$2.8 billion**
Medium-long term: **US$6.5 billion**

Reconstruct damaged education institutions (US$5.9 billion)

- Reconstruction is to align with demographics, patterns of resettlement, and network optimization, along with modern safety, quality and environmental standards.
- Prioritize hub schools and organize school buses.

Invest in service delivery restoration needs and safe access to education (US$2.6 billion).

- Prioritize the organization of in-person classes (at least in safer regions).
- Retrofit existing education institutions with shelters to speed up provision of in-person classes in safe conditions.
- Invest in provisional measures such as prefabricated education facilities and electronic devices.

Protect Ukraine's human capital and continue with education reforms (US$0.7 billion)

- Launch academic catch-up programs to limit learning losses, especially among vulnerable students.
- Couple return to both in-person and online classes in September with extensive psychosocial support to limit the prevalence of trauma among students.
- Invest in STEM (science, technology, engineering, and mathematics) education, VET (vocational education and training), and short-term skills training programs to avoid skill bottlenecks during the short- and long-term reconstruction and to ensure a flexible education, adaptable to the recovery needs.
- Pursue reforms initiated before the war to improve the quality, efficiency, and resilience of the education system.

HEALTH

Highlights

Damage: **US$1.4 billion**
Losses: **US$6.4 billion**

- **581 health care facilities were reported as damaged or destroyed, including 557 facilities in the public sector**. Most of the reported damage is for primary health care centers (264 facilities), followed by general and mono-profile hospitals (155 facilities).
- **Damage was recorded for approximately 5.6% of total health facilities in the public sector.** The most affected regions were Donetska, Kharkivska, and Mykolaivska.
- Damage to private facilities is reported as less significant.

Priorities

Total recovery needs (10 years): **US$15.1 billion**
Immediate/short term: **US$1.2 billion**
Medium-long term: **US$13.9 billion**

Rebuild lost or damaged infrastructure and build new infrastructure to address new or significantly increased health needs and upgrade the existing facilities.

- Provide additional resources within Program of Medical Guarantees (PMG) to address forgone care needs and additional needs related to mental health and rehabilitation of direct and indirect victims of war.

Infrastructure investments

- Use build back better approach and provide for new functionalities.
- Invest in mental health and rehabilitation centers. A total of 18 new rehabilitation centers and 59 repurposed facilities will be necessary to serve the needs of the population.

- Losses for private providers of health services, calculated by comparing economic activity and incomes in the months before and after the war, were highest in the following oblasts: Kyiv city (44%), followed by Donetska (13%), Luhanska (7%), Kyivska (7%), and Odeska (6%) oblasts. Losses also include deteriorated health of people and constrained access to services, as well as additional mental health and interpersonal violence burden.

Service delivery restoration

- Reconnect patients with health care providers for catch-up preventive or curative care.
- Provide additional investment in primary health care (PHC) to support this process; financing of PHC in the PMG is expected to scale in the next 10 years, from the current 0.62% of GDP to 0.86% of GDP, to cover these additional needs.
- Investments in additional mental health and rehabilitation services are also estimated as increased allocations in the PMG; these resources will need to increase by 0.3 percentage points of GDP for each PMG package covering rehabilitation and mental health services

SOCIAL PROTECTION AND LIVELIHOODDS

Highlights

Damage: **US$0.2 billion**
Losses: **US$4.5 billion**

- **56 stand-alone buildings**, such as residential care units, sanatoriums, or social centers, were damaged or destroyed; estimated cost of war damage is US$164 million.
- **64 out of 470 local service centers of the Pension Fund, as well as 19 out of 158 local units of the Social Insurance Fund,** have suffered extensive damage.
- **10 out of 62 long-term social care facilities for the elderly and persons with disability** were damaged.
- **14 rehabilitation facilities** were damaged.
- **The losses add up to US$50.1 billion;** the largest share comes from the permanent loss of jobs and labor force.
- **The International Labour Organization (ILO) estimates that about 4.8 million jobs were lost, equal to 30% of prewar employment in Ukraine.** A national poll conducted at end-April showed that 39% of those who were employed before the war still do not have a job. About 14% of all jobs may be lost permanently.

Priorities

Total recovery needs (10 years): **US$20.6 billion**
Immediate/short term: **US$8.1 billion**
Medium-long term: **US$12.5 billion**

Recovery of jobs and social protection sector requires concerted actions over different time frames:

- **In the immediate term,** finance the social expenditures aiming to protect vulnerable groups from the additional long-term impacts. Support low-income families through the Guaranteed Minimum Income (GMI) program to provide families with the income to cover basic needs and with housing and utility subsidies to prevent energy poverty, especially during the heating season in harsh winters. Costs for such programs (excluding subsidies) are expected to reach **US$8.1 billion.**
- **In the short-term period**, there is a need to expand programs aiming to stimulate employment and prepare for long-term recovery. The use of new technologies should be expanded to strengthen the adaptability of the overall system.
- **In addition, social infrastructure** needs to be rebuilt quickly, but this recovery effort should be aligned with investment, policy, and behavioral changes.
- **For the longer term**, focus on rehabilitation of war-affected groups such as orphans, IDPs, and persons with disabilities.

CULTURE AND TOURISM

Highlights

Damage: **US$1.1 billion**
Losses: **US$19.3 billion**

- **Some 260 cultural properties have been confirmed as fully destroyed,** including buildings and sites imbued with recognized cultural/social values, and movable cultural properties and collections, repositories of culture, and touristic facilities.

Priorities

Total recovery needs (10 years): **US$5.2 billion**
Immediate/short term: **US$1.6 billion**
Medium-long term: **US$3.6 billion**

Over US$5.2 billion is needed for safeguarding the sector.

- Prioritize cultural property that can foster a sense of shared heritage and also based on the extent of damage and risk magnitude. Consult a wide range of stakeholders, as it is vital that the community groups assess the value of their own culture.

- **Over 560 cultural properties are reported to be partially damaged**, including the historic wooden structure of All Saints Monastery of the Sviatohirska Lavra, the Chernihiv Regional History Museum, the Popov's Palace Complex, and the Kharkiv National Academic Opera and Ballet Theater. Major damage was sustained especially in Kyivska and the eastern region, including Kharkivska, Donetska, and Luhanska, and in religious buildings, including Orthodox and Catholic churches, as well as mosques and synagogues.

The first phase should focus on emergency and relief actions to protect and reduce further damage. Given complexities associated with "reconstructing" cultural property of historical significance, the process will require specialized labor, expertise, time, and considerable cost.

Restore the creative industry and safeguard intangible heritage

- Restore the processes for the production, distribution, and sale of creative and cultural goods.
- Document creative practices and human capital to maintain and rebuild communal and national identities, promote cultural diversity, and restore social cohesion.
- Invest in capacity-building programs, as recovery efforts require highly specialized expertise and skills.

AGRICULTURE

Highlights

Damage: **US$2.2 billion**
Losses: **US$28.3 billion**

- **The damage to machinery and equipment** was the largest source of total damage (41%).
- The war losses include the forgone farm income due to the lower production volume, the lower farm gate prices, and the higher additional farm production costs (e.g., fertilizers and fuel).
- The largest loss, accounting for 54% of the total losses, resulted from the decrease in farm gate prices of export-oriented commodities such as wheat, barley, corn, and sunflower seeds. Losses also included lower production of annual and perennial crops, lower livestock production, and higher farm production costs.

Priorities

Total recovery needs (10 years): **US$18.7 billion**
Immediate/short term: **US$10 billion**
Medium-long term: **US$8.7 billion**

Immediate needs can be addressed through these measures:

- Reconstruct/build back better the physical assets damaged by the war.
- Provide direct support to farmers through a combination of grants and soft-term credit lines to relaunch production activities, while also injecting liquidity into the banking system to recover past nonperforming loans (NPLs) and stimulate new agricultural lending.
- Clear mines, explosive remnants of war (ERW), and pollution from agricultural lands.

The priority medium-term and longer-run needs measures:

- Complete the reconstruction of the incurred war damage.
- Scale up direct support to farmers and banks (through liquidity support) during several production seasons to help agricultural production rebound.
- Scale up investment in agricultural public institutions for delivery of agricultural services, so institutions can better support the recovery of the agricultural sector. This would also require support for adaptation to climate change.

IRRIGATION AND WATER RESOURCES

Highlights

Damage: **US$0.2 billion**
Losses: **US$0.1 billion**

- Damage of US$4.7 million is attributed to flood protection and water storage, US$19.3 million to irrigation structures, US$6.76 million to drainage, and US$7.04 million to buildings and equipment.

Priorities

Total recovery needs (10 years): **US$7.5 billion**
Immediate/short term: **US$0.02 billion**
Medium-long term: **US$7.5 billion**

- Repair damaged systems, under a build back better approach.
- Design compensatory programs to maintain and improve production levels through improved drainage and expanded irrigation in the parts of the country that always remained under government control.

- **There were substantial operational losses among the different state entities**. In many areas, payment for water services by water users (which equals 60% of all operational costs) is hampered. Operational losses also reflect the damage to government and management of the water systems, as the financial basis is having a serious setback. The largest share of losses was found in the Basin Water Resources Departments.

Immediate needs

- Restore damaged hydraulic facilities and water management systems and buildings.
- Relocate, prepare and accredit the Eastern Region Water Monitoring Laboratory.

Medium- to long-term needs

- Reconstruct, overhaul, modernize, and construct new irrigation and drainage systems and if needed expand irrigation and storage in case of continued loss of control by government over certain areas.
- Construct water supply networks in settlements of Lvivska oblast, group water pipes on the territory of Odeska and Khersonska regions; reconstruct group water pipes due to damage in the territory of Mykolaivska oblast; reconstruct hydraulic protection structure around Dnipro reservoirs; invest in Kozarovytsia protective dam and operational section; overhaul Irpin pumping station covering Kyivska oblast.
- Restore drainage and water management systems, through nature-oriented solutions and economic validity of measures to address damage and profit losses, mostly in territories brought back under government control. Restore water monitoring laboratory in Sloviansk, Donetska region.

COMMERCE AND INDUSTRY

Highlights

Damage: **US$9.7 billion**
Losses: **US$47.5 billion**

- Most of the damage (77%) was to industry, with remainder under commerce.
- Much of the destruction occurred to large and medium-size private enterprises. About 80% of the damage to those firms (US$4.5 billion) was due to the destruction of two steel plants in Donetska oblast that destroyed about half the country's steel production capacity: the Azov Steel Plant and the Ilyich Iron and Steel Works in Mariupo.
- Approximately 2,900 retail shops, shopping malls, and warehouses have been damaged or destroyed.
- Commercial and industrial damage and losses are concentrated in oblasts in Eastern Ukraine.
- Many firms, in addition to suffering damage to assets and loss of revenue, have experienced other costs, such as employees being displaced or killed and customer bases shrinking or disappearing.

Priorities

Total recovery needs (10 years): **US$20.8 billion**
Immediate/short term: **US$6.6 billion**
Medium-long term: **US$14.2 billion**

Principles to revitalize the economy and build back better:

- Recognize and prioritize key sectors hurt by the conflict, such as metallurgy, machine-building, and construction.
- Strengthening the business climate, facilitating access to funding, rebuilding and upgrading logistics, and boosting human capital will help businesses build back better.
- Greater integration with the EU and unlocking of access to new markets will require businesses to adapt greener, more sustainable technologies

In the short term:

- Provide financial support to firms in the form of loans, grants, and guarantees as described in the finance and banking section.
- Rebuild the logistics infrastructure needed for access to inputs and markets.
- Streamline business regulations to make it easier to start and restart businesses and to enter into new product lines and delivery models.
- Facilitate domestic and foreign investment to rebuild key industries.
- Ensure private sector participation in reconstruction efforts and promote linkages with small and medium enterprises in priority sectors for recovery and investment.

In the medium term:

- Offer financial support to firms. Direct technical assistance to firms to enter new markets, move into higher-value-added products, and adapt more sustainable practices.
- Address business, investment, and trade climate obstacles present before the conflict.

FINANCE AND BANKING

Highlights

Damage: **US$0.03 billion**
Losses: **US$8.1 billion**

- While **the electronic payment system infrastructure** has remained fully operational since the start of the war, banks face a number of operational challenges.
- Liquidity remains at sufficient levels, given a relatively stable deposit base and refinancing support from the National Bank of Ukraine.
- Loss of business revenues and household incomes as well as collateral will significantly impact the quality of banks' loan portfolios.
- Since the start of the war, three banks have been declared insolvent—two subsidiaries of Russian state-owned banks and one private bank.

Priorities

Total recovery needs (10 years): **US$8 billion**
Immediate/short term: **US$6.4 billion**
Medium-long term: **US$1.6 billion**

Take actions to safeguard the financial system, maintain confidence, and minimize fiscal costs:

- Ensure a solvent, liquid, and operationally sound financial sector
- Coordinate efforts among financial market players with support of public authorities to ensure financial stability during the war and in the recovery/reconstruction phase.

In the short term, closely monitor the situation and get an early understanding of the impact of the war on the financial sector:

- Undertake a further assessment of the losses of financial institutions (in particular banks and insurance companies) and develop a financial sector restructuring strategy.
- Ensure the financial sustainability of the Deposit Guarantee Fund (DGF).
- Plan, adjust, and implement time-bound policy and regulatory responses to the changing environment.
- Develop a carefully calibrated plan for phasing out special measures put in place during the war, assistance programs for insured parties, and financial support programs that target affected borrowers and sectors using transparent rules and governance mechanisms.
- Reform NPL resolution mechanisms and create markets/mechanisms for distressed assets.

In the medium term, resume implementation of critical reforms:

- Strengthen bank and nonbank regulation, supervision, and resolution frameworks; enhance institutional and financial capacity of the DGF.
- Resume flow of credit into the economy, in part by strengthening governance in state-owned banks and enhancing the NPL resolution framework.
- Enhance financial sector diversification and financial inclusion; build modern financial system infrastructure.
- Introduce a special war insurance pool, which could cover some war risks during and after the war with the help of external donors.

ENERGY AND EXTRACTIVES[306]

Highlights

Damage: **US$3 billion**
Losses: **US$11.7 billion**

- **The power sector sustained the highest damage (US$1.4 billion),** followed by district heating (US$0.7 billion), gas sector (US$0.5 billion), transport fuel sector (US$0.4 billion), and coal mining (US$0.1 billion).

Priorities

Total recovery needs (10 years): **US$10.4 billion**
Immediate/short term: **US$7.3 billion**
Medium-long term: **US$3.1 billion**

Emergency repairs to restore energy provision:

- Conduct emergency repairs of equipment with the most urgent needs for the electricity and gas networks (around US$100–150 million)
- Conduct emergency repairs for district heating focused on safety (around US$100 million).

306 The above damage covers the damage incurred this year, and the figures do not represent cumulative damage since 2014. The cutoff date of this assessment is early June 2022. The estimations do not include the costs of overcoming logistical or safety challenges during reconstruction that may delay and impede recovery and reconstruction, nor the need to coordinate and phase reconstruction efforts among the sectors.

- **Damages cover the damage incurred this year and does not represent cumulative damage since 2014.** The cutoff date is June 1, 2022. The estimations do not include the costs of overcoming logistical or safety challenges during reconstruction that may delay and impede recovery and reconstruction, nor the need to coordinate and phase reconstruction efforts among the sectors.
- **Financial losses**: In March and April 2022, electricity consumption decreased significantly—by 35% compared to the previous year, and the collection rate dropped by around 40%, on average.
- **A similar situation can be observed in other energy subsectors.** Many large Ukrainian companies face a liquidity crisis, including Naftogaz, DTEK, Ukrenergo, public generation companies, renewable energy developers, and others. Naftogaz has very recently missed payments to bondholders. The liquidity problems of the energy companies will negatively impact the sector's creditworthiness, creating significant operational risks that will arise as the war continues.
- **The liquidity gaps** in the system important companies have developed significantly. TSO Ukrenegro has a deficit of US$2.6 billion in the power sector, and Naftogaz lacks at least US$5 billion for purchasing gas for the next heating season. As a consequence, Renewable energy developers and others, are currently facing a liquidity crisis and whose Fitch credit ratings were recently decreased. (Remark: Naftogas has very recently missed the deadline of payments to bondholders due to a recent government moratorium freezing foreign debt repayments for two years.)
- **Cumulative losses** from reduced production of mines are estimated at US$305 million since the start of the conflict.

Immediate needs for the upcoming season:

- Close the liquidity gaps in the power sector TSO (Ukrenegro) for US$2.6 billion and Naftogaz for at least US$5 billion to purchase the gas for the next heating season.
- Prepare the country for the coming winter heating season in the current context, beyond gas purchases (including using modular boilers that use coal, firewood, or straw).
- Ensure availability of power/heating backup solutions at the hospitals, schools, centers housing internally displaced people, etc. Solutions like pre-assembled distributed solar in combination with battery storage could become helpful.
- Provide fuel for internal transport in the very short term.

Estimated recovery and reconstruction needs as of June 1, 2022

- **Electricity:** power transmission network needs estimated at US$1,240 million.
- **Gas:** Minimal needs of the gas transmission network estimated at US$260 million.
- **District heating network** needs estimated at US$1.4 billion (short term: US$515 million).
- **Transport fuel network** needs estimated at US$784 million (short term: US$313 million).
- **Coal mining** reconstruction needs estimated at US$275 million.

Building Back Better principles

- Damaged or destroyed infrastructure will need to be built back to modern, more efficient standards or replaced by other sustainable solutions, combined with more energy-efficient reconstruction.
- Even if temporary solutions are adopted in the immediate future, there is a need for more comprehensive reconstruction, such as regulations to ensure both safety and environmental sustainability (e.g., in the case of biomass-based boilers to ensure that the policies are in place to prevent deforestation).
- Reconstruction should be based on the latest good practice standards, including building back better principles, and be aligned with the European acquis, acceleration of energy efficiency, renewable energy sources and sustainable heating solutions, etc.

Highlights	Priorities
Damage: **US$29.9 billion** Losses: **US$26.1 billion**	Total recovery needs (10 years): **US$73.8 billion** Immediate/short term: **US$8.9 billion** Medium-long term: **US$65 billion**

- The largest concentrations of damage are in (i) local oblast, village and communal roads combined (29%); (ii) motorways, highways, and other national roads (26%); (iii) road bridges on national roads (15%); and (iv) railways rolling stock, equipment, and other assets (12%).
- This includes (i) 8,699 km of motorways, highways, and other national roads; (ii) 7,619 km of oblast and village roads; (iii) 3 million m^2 of bridges on national roads; (iv) 428,470 m^2 of bridges on local roads; (v) 1,119 km of railway lines; (vi) 93 railway stations; (vii) 392,843 private vehicles; (viii) 9,473 km of communal roads; (ix) 16 airports; and (x) 850 units of urban public transport rolling stock.
- Losses in the transport sector are estimated at US$26.1 billion and are dominated by the effects of losing Black Sea access (US$17.6 billion or 67%
- Other losses includes: (ii) disruptions to road and rail transport services due to damaged infrastructure; (iii) losses associated with closure of Ukraine's airspace; and (iv) the cost of rail transport service provided free of charge for refugee evacuation as well as import of humanitarian supplies

- The largest category of need includes (i) motorways, highways, and other national roads (37%); (ii) railway rolling stock, equipment, and other assets (18%); (iii) road bridges on both national and local roads (11% combined); and (iv) railway track, bridges, and electrical equipment (10%).
- A large portion of needs for road- and railways-related investments reflects both the level of damage in these subsectors and large cost differentials between legacy national standards and the EU candidate standards.
- Needs are highest in the eastern and southern oblasts (Donetska, Luhanska, Khersonska, Kharkivska, Mykolaivska, and Zaporizka oblasts).

The highest priority needs for reconstruction are

- To restore basic network functionality (road, rail, and air) for both humanitarian aid flows and support to broader reconstruction efforts across sectors, as these will rely on transport access
- To enhance westward road and rail linkages to the EU to facilitate economic integration with Europe's single market and provide resilience to any potential future disruptions of Black Sea access
- To transform legacy networks toward EU standards for safety, service quality, and interoperability as a complement to Ukraine's stated policy objective of EU accession

TELECOMMUNICATIONS AND DIGITAL

Highlights	Priorities
Damage: **US$0.7 billion** Losses: **US$0.6 billion**	Total recovery needs (10 years): **US$3.3 billion** Immediate/short term: **US$1.3 billion** Medium-long term: **US$2 billion**

- Damage includes US$0.6 billion for telecom operators (fixed and mobile), US$0.08 billion for postal service companies, and US$0.04 billion for Ukraine's broadcasting provider.
- **67% of the damage to telecom operators** occurred in the Donetska, Kharkivska, Khersonska, and Zaporizka oblasts. Most impacted postal services are in Donetska and Kharkivska oblasts.
- **The damage to broadcasters is US$0.04 billion.** The damage stems from the destruction of 49 TV broadcasting towers over a three-month period, 11 of them in Luhanska oblast and 12 in Zaporizka.

In the short term, incorporate a build back better premium of 40% above damage estimates:

- US$0.9 billion is needed for the short-term recovery needs for infrastructure and for restoration of broadband, private postal service, and mobile coverage; US$0.4 billion is for service delivery needs, including higher service costs for the duration of the recovery period.
- Internet coverage and postal service access are of strategic importance.

Restore broadband connectivity for effective functioning of the public sector and for the return of the private sector to drive the recovery in war-affected regions:

- Restore the broadband coverage in territories that have been brought back under government control.

TRANSPORT

- **Damage to Ukrainian fixed broadband providers** is US$0.3 billion; it is US$0.2 billion **for mobile providers.**
- Overall, 1,767,269 fixed lines were damaged or destroyed, predominantly in Kharkivska, Zaporizka, Donetska, Khersonska Luhanska, and Chernihivska.
- The losses of fixed broadband providers are at least US$0.05 billion; for mobile providers they are US$0.1 billion. 22% of internet service providers' income has been lost due to subscriber loss and unpaid service provision. Mobile operators have been hit even harder.
- For Nova Poshta, a confirmed 18 postal depots and 51 postal service centers were damaged or destroyed.

- Provide Starlink terminals to ameliorate the adverse effects of the military actions on internet access. Restore broadband in the war-affected areas for the one- to two-year horizon; however, internet connectivity cannot be sustained through Starlink terminals alone in educational institutions, government institutions, and hospitals.
- Prioritize broadband recovery, in line with the National Broadband Development Plan of Ukraine and the country's Digital Agenda, to enable faster growth in sectors like e-commerce and IT services, which are critical for the country's economic growth as Ukraine rebuilds.

Restore postal service provision by the private provider Nova Poshta, which accounted for 65% of market share of postal deliveries prewar.

Invest in priority long-term recovery needs:

- US$0.4 billion is needed in the long term for infrastructure recovery and restoration of broadcasting infrastructure and the public postal service where damage was incurred.
- US$1.6 billion is needed for service delivery needs, including higher service costs for the duration of the recovery period.

WATER SUPPLY AND SANITATION (WSS)

Highlights

Damage: **US$1.3 billion**
Losses**: US$6.8 billion**

- The destruction of the hydroelectric power center of the Oskil reservoir in the Kharkivska oblast occurred early in the war. Around 355.5 million m^3 of water was released, which negatively affected municipal enterprises that provide water supply services in Luhanska and Donetska regions; significant portions of the population in these regions have limited or no access to water supply.
- According to UNICEF, around 13.6 million Ukrainians suffer from a lack of water for sanitary and hygienic needs.
- Among the most affected areas have been Druzhkivka, Donetsk, Kostiantynivka, Berdiansk, Mariupol, Mykolaiv, Popasna, Prymorsk, Izium, Rubizhne, Sumy, Lysychansk, Trostianets, Severodonetsk, Kharkiv, and Chernihiv.
- 53% of total losses relate to lost revenues from WSS services provision and the significant drop in the collection rate. Additional costs for WSS services provision were due to increased energy costs; energy is the second biggest cost component for Ukrainian vodokanals after salaries.

Priorities

Total recovery needs (10 years): **US$5.4 billion**
Immediate/short term: **US$3.5 billion**
Medium-long term: **US$1.9 billion**

Reconstruct partially damaged and destroyed WSS infrastructure and rebuild in a prioritized manner

- Prioritize build back better reconstruction of critical WSS assets at oblast level, along with support for utilities' operational costs to ensure provision of WSS services.
- Optimize further systems and facilities considering future growth projections.
- Take into account the broader water challenges in the country (such as water resources availability, climate change effects, and resulting droughts and floods) and ensure that the new WSS services are properly sized and easy to operate and maintain (like nature-based wastewater solutions) to ensure sustainability of services.

Ensure WSS services provision in the immediate/short term:

- Continue supporting (subsidizing) the additional energy and fuel costs until WSS utilities recover their prewar revenue levels. The energy/fuel cost support is based on calculations at national level and phases out this additional cost (or subsidy, which is currently covered mostly by the state budget) in the immediate/short term.

MUNICIPAL SERVICES

Highlights

Damage: **US$2.3 billion**
Losses: **US$4.3 billion**

- Large damage to communal infrastructure and breakdown of municipal service delivery estimated at least US$2.3 billion with highest level of damage estimated in the Donetska, Kharkivska, Kyivska, Luhanska, Chernihivska, and Zaporizka oblasts.
- **Scope of damage in the solid waste management sector indicates a breakdown of the entire service network.** Around 5% of all existing collection trucks, 17% of all biogas plants, and 9% of sorting lines have been destroyed or damaged.
- **Local mobility assets** (sidewalks and streetlights) had 39% of damage, followed by the public spaces and facilities category (28.5%). Local administrative buildings and centers sustained 24% of the total damage, of which 75% was derived from fully destroyed buildings.
- **Losses across Kyiv city, Donetska, and Kharkivska together account for more than 50% of the total.**
- **Over 90% of the total losses valued stem from incurred and projected revenue losses of local governments** indicating the huge fiscal burden on local government and the likely instability of service delivery in the second half of 2022. Between March-May the additional service delivery burden incurred by local governments was US$74.6 million.
- **Damage to local infrastructure and communal facilities has had significant impacts on access to critical and basic services and the overall the quality of life of residents.** Access to waste collection and disposal has severely deteriorated due to the war.

Priorities

Total recovery needs (10 years): **US$5.7 billion**
Immediate/short term: **US$1.9 billion**
Medium-long term: **US$3.9 billion**

- **There is an urgent need to ensure upkeep and increase of service delivery, and the formulation of citywide reconstruction and recovery strategies and action plans.**
- **Key guiding principles for recovery and reconstruction** include prioritization and sequencing of investments based on technical assessments, and facilitation of an enabling institutional and legal environment for the efficient implementation of plans.
- Strengthen monitoring, reporting, and verification systems for data collection.
- In areas with many IDPs, increase service coverage and repair partially damaged service delivery infrastructure and critical facilities (e.g., cemeteries/ crematoriums).

Coordinate debris removal and disposal while enhancing waste management capacity and infrastructure.

- Conduct assessments in sample sites for understanding debris composition and prepare a citywide plan for debris removal, sorting, treatment, and processing
- Procure necessary and critical assets to ensure timely waste collection and effective and efficient waste management in the short term.

Repair, reconstruct and stabilize prioritized assets based on local technical studies and strategic plans

- Prepare and adopt integrated immediate-to-medium-term citywide urban recovery and reconstruction action plans identifying and prioritizing needs and sequencing.
- Update local cadasters and land registries in coordination with the national-level ministry and conduct cadaster activities (systematic survey and property registration processes).
- Conduct engineering studies for specific sites and multi-hazard assessments to determine structural integrity and risks and specific needs for reconstruction.
- Undertake repairs and reconstruction

ENVIRONMENT, NATURAL RESOURCES MANAGEMENT, AND FORESTRY

Highlights

Damage: **US$2.5 billion**
Losses: **US$0.7 billion**

- Lost ecosystem services value—a result of land contamination making the forests inaccessible—is estimated at US$739 million over the 21 months from March 2022. These losses may extend much further beyond this period.

Priorities

Total recovery needs (10 years): **US$1.2 billion**
Immediate/short term: **US$0.4 billion**
Medium-long term: **US$0.9 billion**

Adopt strategic goals of postwar recovery in a clean and safe environment, in compliance with EU law:

- Set up effective environmental monitoring to evaluate the overall environmental damage, and take necessary measures to avoid further aggravation and recover ecosystems.
- Promote sustainable use of natural resources, biodiversity conservation, restoration, and development of protected areas.

- Over 250 environmental incidents and over 1,200 cases of damage to the environment have been reported from the aggression.
- **Damage to natural reserves and protected ecosystems:** As a result of the war, about 20% of the area of all protected areas of Ukraine is in danger, 17 Ramsar sites (wetlands of international importance) are under threat of destruction, and about 160 territories of the Emerald Network with an area of 2.5 million ha and four biosphere reserves have been degraded. At least 900 protected areas together covering 1.2 million ha, or 30% of all protected areas in Ukraine, have been affected by the war.
- **Fires have been the principal source of war- related damage in forests**. The value of standing timber that has been destroyed is calculated at US$2.4 billion, based on an area damaged inside conflict zones of 249,237 ha.

In the short term:
- Prepare and carry out a comprehensive environmental cleanup effort, especially related to collection, safe disposal, and treatment of the vast amount of military and other waste.

Related to the assessment of environmental risks:
- Ensure monitoring system are accessible and transparent.
- Commence with strategic planning around pollution cleanup.

Related to forestry sector recovery:
- Reinstate forests in burned areas, ancillary assets, realign timber harvesting efforts
- Expand forest nursery capacity to increase forest cover thus providing large scale labor opportunities in short term and an opportunity for investment (including international) in forest-carbon projects in Ukraine
- Align with European Green Deal to maximize sustainable production and export of long-lived forest products.

EMERGENCY RESPONSE AND CIVIL PROTECTION

Highlights

Damage: **US$0.1 billion**
Losses: **US$0.2 billion**

- 6% of the buildings owned by the emergency response and civil protection sector were either damaged, destroyed, or seized. 49 buildings were destroyed and 147 buildings were partially damaged. 453 buildings were seized in territory temporarily not under government control. The most-affected regions include Donetska, Zaporizka, Kharkivska, and Kyivska.
- 13 hydrometeorology/seismology buildings were damaged in Donetska oblast and 10 in Zaporizka. 30 hydrometeorological instruments and pieces of equipment have been either damaged or destroyed.
- The largest number of destroyed vehicles is recorded in Odeska oblast. The largest number of seized vehicles is reported in Zaporizka oblast, followed by Donetska.
- A major loss sustained relates to the extra time put in by the rescue/ response operatives due to increased demands for emergency operations; additional expenses amount to US$241 million. Losses include State Emergency Service of Ukraine's (SESU's) increased operational costs of US$237 million, and debris removal costs of US$4 million.

Priorities

Total recovery needs (10 years): **US$0.7 billion**
Immediate/short term: **US$0.5 billion**
Medium-long term: **US$0.2 billion**

- With the war ongoing, priority short-term measures need to be aligned with citizens' need for immediate support provided by the first responders.
- There is a need to address the inadequate and outdated facilities and obsolete technical equipment and to provide training. Priority is to provide quick solutions to enable safe and adequate protection of citizens as part of rescue operations.

Restore the capacities of civil protection and emergency response forces:
- Reconstruct and equip severely and moderately damaged buildings and conduct emergency repairs on slightly and moderately damaged buildings.
- Procure the necessary and improved equipment to replace damaged equipment.

Immediate actions:
- Procure 669 modern and fully equipped firefighting/rescue vehicles (US$395.96 million) to replace those either destroyed of seized and procure mobile decontamination units (system and vehicles), heavy load chemical, biological, radiological, and nuclear (CBRN) vehicles, and mobile laboratories (US$65.76 million).
- Establish oblast-level mobile command control points and four major logistics hubs (US$24.65 million) required to support rescue. Construct platforms and hangars for helicopters at oblast level (US$45.82 million) to allow SESU to respond to increased demands.
- Establish sea and river rescue units (US$39.32 million) to address the problem of mined area in waters and general lack of related preparedness.

- Construct bomb shelters at oblast level within local fire and rescue units (US$5.57 million) to provide safety to citizens and SESU staff in the case of shelling.
- Develop two nationwide training facilities (US$12.09 million) to provide training for additional SESU staff and specialized education for existing staff.

In the medium to long term, invest in SESU buildings—including main departments at oblast level, rescue/response centers, and hydrometeorology/geophysics buildings (US$178.68 million).

JUSTICE AND PUBLIC ADMINISTRATION

Highlights

Damage: **US$0.1 billion**
Losses: **US$0.03 billion**

- Prosecution service: 20 buildings have sustained significant damage, and 7 in the prosecution service have been destroyed since the beginning of the war. The most affected areas were Donetska, Kharkivska, Sumska, and Kyivska oblasts. The total damage for the Office of the General Prosecutor amounts to US$7.97 million.
- Judiciary: 46 courthouses were partially damaged and 20 were completely destroyed during the war. 3 buildings from the State Judicial Administration and the Judicial Protection Service have been partially damaged. The most impacted oblasts were Donetska and Kharkivska. The total damage for the judiciary is US$61.33 million.
- Public administration: For infrastructure and services, damage of US$31.6 million was estimated.

Priorities

Total recovery needs (10 years): **US$0.2 billion**
Immediate/short term: **US$0.08 billion**
Medium-long term: **US$0.1 billion**

Train legal professionals:

- New judges, prosecutors, investigators, police, customs and tax officers, and other justice sector staff will need to be recruited and trained after the war.

Restore judicial and law enforcement services:

- Prioritize the reconstruction and repair of courthouses, as this subsector sustained the highest damage. Prioritize law enforcement and judicial services once the war is over to ensure proper governance, law and order, and integrity during reconstruction.
- Consider short-term temporary solutions such as mobile courts or temporary court locations for priority cases, or the delivery of judicial services through e-justice tools.
- Justice/rule of law institutions, particularly those with the mandate to prevent, investigate, and combat corruption will need to play a prominent role in the overall reconstruction process to ensure that the reconstruction and recovery efforts are implemented with transparency and integrity and for intended use.

Repair and reconstruction of key public administration buildings should be prioritized in line with specific ministry requirements.

LAND DECONTAMINATION

Highlights

Losses: **US$73.2 billion**

- An estimated 13% of Ukraine's territory is contaminated.
- Based on conservative estimates, land decontamination costs are expected to exceed US$73.2 billion; US$58.5 million needs to be urgently invested in equipment, training, and salaries for expanded workforce for decontamination authorities in Ukraine.
- Russian forces have used at least seven types of antipersonnel mines in at least four regions of Ukraine: Donetska, Kharkivska, Kyivska, and Sumska.

Priorities

Total recovery needs (10 years): **US$73.2 billion**
Immediate/short term: **US$11 billion**
Medium-long term: **US$62.2 billion**

Ensure the safety of the population:

- Evacuate the population living in the areas at risk of remnants of war.
- Prioritize areas requiring the most urgent decontamination, such as those with high civilian populations, areas critical for restoring production and economic flows, etc.

In the short term:

- US$11 billion are needed for nontechnical and technical survey and demining, including US$58.5 million for procurement of varied equipment to scale up decontamination efforts and make significant progress in areas that have been brought back under government control and where active military actions have ceased.

- **Both Russian and Ukrainian forces have extensively used anti-tank mines** (also called anti-vehicle mines) in at least seven regions: Donetska, Chernihivska, Kharkivska, Kyivska, Odeska, Sumska, and Zaporizka. Hand-placed TM-62 series anti-vehicle mines appear to be the type most frequently used.
- **SESU has estimated that nontechnial survey (NTS) should be conducted** over 272,000 km^2 of Ukrainian territory. By applying international experience, the total area foreseen for NTS, technical survey (TS), and clearance is 267,638 km^2, with a breakdown of 194,647 km^2 foreseen for NTS, an additional 48,661 km^2 foreseen for TS, and 24,330 km^2 foreseen for actual clearance operations.
- According to RDNA estimates, it would take 10 years to complete NTS, 15 years to complete TS based on the NTS results, and 30 years to complete clearance based on TS findings and definition of Suspected Hazardous Areas and Confirmed Hazardous Areas. This is providing that war activities stop, that additional needs and requirements are met (e.g., additional staff and equipment, including dual-use items), and that there are available funds.
- Quantify costs associated with the removal of sea mines in the Black Sea.
- Provide training to additional staff and procure reliable, modern, and quality equipment, especially metal detectors, demining machines, and personal protective equipment.
- Scale up ongoing efforts, including NTS activities currently conducted in Kyiv and Chernihiv.

Invest in equipment:

- Invest in 900 CEIA CMD metal detectors and PT-300 D:Mine remote-controlled mechanical demining machines, with training and one year supply of consumables and critical parts
- Use of demining machines would allow operators to deploy machinery during TS and clearance operations and lower the primary risks for deminers. Machines would increase demining and ERW removal speed and lower the price and time. In peacetime, they can be used in forestry, agriculture, quarries, and construction.

Provide training to at least explosive ordnance disposal (EOD) Level 3 of all additional staff:

- Reach out to partners/other mining centers to support efforts.
- Provide explosive ordnance risk education courses to prevent civilian casualties.

Elaborate efficient legislation to improve efficiency.

MACROECONOMIC IMPACTS

Highlights

- The war has significantly disrupted economic activities by damaging productive assets and infrastructure and causing logistic problems, labor force losses, ruined supply-demand chains, and uncertainty and elevated risks.
- Ukraine's GDP shrank by 15.1% year over year (YoY) in Q1 (or 19.3% quarter over quarter seasonally adjusted), driven by a 45% GDP contraction in March YoY.
- After the reclamation of Kyivska oblast, economic activity in April showed the first signs of improvement, even though it remains much below the prewar levels.
- The duration of the war continues to be uncertain, but assuming that June's status quo continues until the end of the year, the GDP contraction in 2022 is estimated to be around 35% YoY. If the situation further deteriorates, the decline in economic activities could reach up to 45% in 2022.
- Inflation increased from 10% YoY in January 2022 to 21.5% in June, while food and fuel prices surged even higher—by 28.3% and 90.9% YoY, respectively.

Priorities

- Estimated GDP losses in 2022 go beyond physical asset losses, while the medium-term economic recovery will be affected by human capital reduction and the sheer size of reconstruction needs. The pace of the economy's recovery in the medium term will depend on the duration of the war and availability of financial resources.
- Economic activity has shown signs of improvement, with increases in economic activity; but the recovery is uneven and shows signs of stagnating at a low level. Problems with logistics and the destruction of capacities are holding back the recovery

Ukraine is facing three key macro-critical challenges:

- High fiscal financing needs and inability to mobilize domestic revenues
- Increasing reliance on monetary financing and deteriorating asset quality of the financial sector
- A weaker external position

Increased public expenditure in critical services

- Current expenditures are helping to prevent even deeper humanitarian and social impacts, and to prevent an erosion of institutional capital and capacity, which will be the bedrock of any future recovery and reconstruction efforts. One-quarter of the population receives old-age pensions, which are a key safety net.

- Since the beginning of the war, tax revenue collection has deteriorated significantly, tax administration and collection bottlenecks in war-effected areas, and tax policy changes. The nominal decline in tax revenues of the consolidated budget reached 24% YoY in March and April and 14% in May. In real terms the annual reduction in tax revenues exceeds 30% per month since the beginning of the war.
- Although nonmilitary public spending has been reduced, public expenditure increased sharply to ensure delivery of key public services during war time. The government has made efforts to cut nonessential current expenditures (by 78% YoY) and capital spending (by 61% YoY). Nevertheless, total public spending surged by 57% YoY in March–May due to higher expenditure on wages and salaries (109% YoY), including for emergency medical personnel and first responders, transfers and social protection needs (44% YoY), and procurement of goods and services (79% YoY), including for the restoration of public services such as electricity, water, and gas. On the functional side, expenditures for defense and security grew by 4.5 times and social protection and social security by 30% YoY (amounting to about US$3.5 billion a month), contributing the most to total increase.

Impacts on the most vulnerable must be monitored

- The government is making an effort to roll over domestic debt and is negotiating a two-year deferral on external debt amortization with external commercial and official creditors. To help Ukraine meet its current nonmilitary financing gap, further significant support from international finance institutions and bilateral lenders is needed; otherwise Ukraine will have to squeeze social expenditures and avail itself of domestic financing and monetization of the deficit from the National Bank. The National Bank has already monetized over US$7.7 billion in fiscal needs since the beginning of the war. This could deeply impact the poor: they could push the share of the population living below US$5.5/day to nearly 60% in 2023, up from 2% in 2021. Such a steep deterioration in poverty will take years to reverse.

Balance of payments

- To offset the effect of export losses in early March, the government announced import restrictions for all types of goods, with the exception of critical imports defined by the government. The withdrawal of import restrictions in July may lead to significant broadening of the current account deficit in the second half of 2022,
- Huge outflows of refugees have created capital account pressures due to the withdrawal of funds from Ukrainian accounts to finance spending abroad. Since the beginning of the war the National Bank has spent around US$12 billion for the currency interventions, including US$4 billion in June alone. This eroded international reserves, which declined to US$22.8 billion at the end of June from a prewar level of US$29 billion.

Restore collateral, assets, and revenues

- Bank branches in Western and Central Ukraine are almost fully operational while in the southeast the situation remains dire.
- Government's increasing reliance on the banking system for budgetary financing will further narrow the availability of liquidity for productive lending to the economy after the war, while the risk of investing in government securities is becoming more pronounced due to the volatility of government securities' value.

SOCIAL INCLUSION AND VULNERABLE GROUPS

Highlights

Displacement

- 1/3 of Ukrainians have fled their homes. Over 7.13 million people were displaced within Ukraine as of May 23, 2022. As of June 1, 2022, the total number of registered IDPs, including those displaced since 2014, amounted to 4,162,327 persons.
- About 6 million Ukrainians have left the country (14-15% of the resident population as of January 1, 2022). There were 4,712,784 individual refugees from Ukraine recorded across Europe as of June 3, 2022.
- 64% of IDPs who were employed before the war lost jobs. Only 9% of IDPs had found a new job as of May 23, 2022.

Priorities

Displacement

- Cash (financial support) remains a pressing need of IDPs (increasing from 49% to 77%).
- Transportation, clothes and other nonfood items, medicines and health services, lack of access to money, and food are other important needs mentioned by at least 25% of IDPs surveyed. Accommodation is a pressing need mentioned by 15% of IDPs.
- Support in accessing building/reconstruction materials to repair current shelters is needed for IDPs if they decide to return to homes that have been damaged by the war (29% among IDPs and about 10% among returnees reported some damage to their homes).
- Many IDPs will need support in reemployment or reestablishing business activity.
- Social cohesion and inclusion aspects should be considered within the recovery strategy.

Persons with Disabilities

- Allocate additional resources for rehabilitation, medical, and other special service providers and facilities and to attract more specialists and addressing overcrowding issues, with upgrading human skills and technologies.

Persons with disabilities

- As of May 23, 2022, 26% of IDP respondents indicated that at least one member of the family currently had a disability.
- Damage to care facilities reduces access to facilities, resulting in overcrowding and insufficient services in accessible facilities.
- Persons with intellectual disabilities are very marginalized.
- Tens of thousands of children from boarding schools have been returned to families.

Women and children

- As of May 6, 2022, 805 specialized support services for victims of domestic violence and sexual and gender-based violence (SGBV were established in Ukraine.
- 19% of specialized support services for victims of domestic violence and SGBV do not perform their functions as a result of the war.
- Women's share of employment fell from 64% to 42%.
- 86% of women vs 79% of men received additional financial assistance from different sources. 67% of women vs 57% of men state that they lack enough money to afford basic needs (e.g., food and clothes).

Lesbian, gay, bisexual, transgender, and intersex (LGBTI)

- There are reports of attacks against LGBTI rights activists and human rights defenders and shelters in Ukraine.
- Access to medical care, such as HIV medication or hormone therapy treatments, is limited.
- Tensions and conflict may have increased due to family members' lack of understanding or acceptance.
- Sexual and gender minorities may face barriers in securing safe housing options, while transgender people may experience challenges in accessing shelters and services based on their self-identified gender if their documents do not match.
- Identifying and responding to the immediate safety and health needs of disabled children.
- Consider additional support to families to care for disabled.
- Implement long-term solutions for the care of persons with disabilities, including transition to community integrated care.

Women and children

- Integrate gender-based differences throughout the response and recovery strategy with tailored responses to meet the needs of each group and address the risks they face.
- Support women as caretakers of children and elderly relatives (particularly among IDPs).
- Promote an approach that mainstreams and is sensitive to gender, with gender-differentiated needs across the full range of entry points for support: access to services and justice (including for SGBV and for forced recruitment of boys and men into armed groups), livelihoods, social resilience, and peacebuilding.
- Promote gender-sensitive and inclusive institutional arrangements in decision making.

LGBTI

- Ensure inclusive programming, advocacy, and responses to address the various vulnerabilities and risks.
- Establish specific reception, registration arrangements for safe identification and support.
- Ensure that specialized LGBTI shelters and centers are linked to the humanitarian system.
- Address barriers to safe and equal access for LGBTI persons to social services/program.
- Raise awareness and advocate equitable and nondiscriminatory provision of services to LGBTI individuals.
- Transgender IDPs may face additional difficulties accessing services due to discrepancies between their appearance and identity documents, this issue should be advocated for the reissuing of documents.

ANNEXES

ANNEX 1. RDNA TEAM

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