



Kyiv School of Economics

**Analytical approach to damage, loss and
needs assessment**

KSE | Institute

Background

Since the first days of the war, on February 2022, the assessment of damages, losses and needs was implemented by the KSE Institute (the analytical unit of the Kyiv School of Economics) with the support of Office of the President of Ukraine, Ministry of Infrastructure and Ministry of Community and Territorial Development, Ministry of Economy, Ministry for Reintegration of the Occupied Territories and other government bodies.

Volunteers from the Center for Economic Strategy, Dragon Capital, Anti-Corruption Staff, Institute for Analytics and Advocacy, Transparency International Ukraine, Prozorro.Sale, Prozorro, Ukrainian Council of Shopping Centers, CoST Ukraine, Vkursi Agro, TVIS Ukraine, and Association of Retailers of Ukraine work together with the KSE Institute team within the project.

The latest assessment of the damages was fully funded by UK aid from the UK government. The work also became possible due to the support of the American People through the United States Agency for International Development (USAID). The estimate and its result do not necessarily reflect the views of the UK government's official policies, the United States Government, and the United States Agency for International Development.

Object-by-object assessment vs Indirect assessment

- **Object-by-object assessment has always been the traditional method of assessing damaged objects in Ukraine.** Its goal is to record damage to government bodies and judicial needs.
- **Object-by-object assessment is not suitable for current situation in Ukraine:**
 - dependence on the possibility of obtaining physical access for a detailed inspection of the object;
 - significant amount of time required to assess each destroyed and damaged object, as well as significant amount of financial resources required for this.
- **Indirect valuation methods can be used in the absence of physical access to destroyed facilities** (e.g., estimation of total area and estimated cost, damaged/destroyed residential real estate in cities where active hostilities are currently taking place).
- This estimate is **less accurate, but it provides an estimate of the total loss of the economy**, by the time professional appraisers can access each destroyed facility.

World Bank Methodologies used in damage assessment

1. Jovel, Roberto J .; Mudahar, Mohinder. 2010. Damage, Loss, and Needs Assessment Guidance Notes: **Volume 1. Design and Execution of a Damage, Loss, and Needs Assessment.** World Bank, Washington, DC.
<https://openknowledge.worldbank.org/handle/10986/19047>
1. Jovel, Roberto J .; Mudahar, Mohinder. 2010. Damage, Loss, and Needs Assessment Guidance Notes: **Volume 2. Conducting Damage and Loss Assessments after Disasters.** World Bank, Washington, DC.
<https://openknowledge.worldbank.org/handle/10986/19046>
1. Jovel, Roberto J.; Mudahar, Mohinder. 2010. Damage, Loss, and Needs Assessment Guidance Notes: **Volume 3. Estimation of Post-Disaster Needs for Recovery and Reconstruction.** World Bank, Washington, DC.
<https://openknowledge.worldbank.org/handle/10986/19045>
2. 2017. **Post-Disaster Needs Assessments Guidelines Volume B** The Global Facility for Disaster Reduction and Recovery
<https://www.gfdrr.org/en/publication/post-disaster-needs-assessments-guidelines-volume-b-12>

Assessment methodology includes:

- **Damages** and destruction of physical assets
- **Losses** — preliminary assessment of losses by industry
- **Needs** — preliminary and top-level assessment of the economy's needs for recovery (in prices as of “today”; excluding the multi-year inflation index, investment projects, etc.)

Damages to are calculated in replacement prices (prices which at the end of 2021 it was possible to restore/rebuild a similar asset/building).

The recovery needs include the cost of repairing and replacing damaged assets based on the market price existing immediately after the end of the war.

On top of recovery needs can include part of losses and providing equitable and accessible services to vulnerable groups and affected population.

The needs for economic recovery reflect a mutually agreed vision of the recovery strategy of Ukraine as a whole and of each sector of the economy in particular as an important prerequisite for the planning of the reconstruction process, which is designed to restore the country's economic capacity and solve the social and humanitarian challenges that arose as a result of the war. The assessment of Ukraine's recovery needs is based on estimates of damages and losses, described in the relevant sections.

This assessment **does not take into account the need to implement other modernization projects than related to the war time damages.**

Methodological limitations of current assessments

Damages to are calculated in replacement prices (prices which at the end of 2021 it was possible to restore/rebuild a similar asset/building)

Losses do NOT take into account the total economic losses from the war (loss of GDP, investment, labor, etc.)

Needs are calculated without taking into account the growth of reconstruction prices due to inflation after 2022.

High expected inflation over the several postwar years will "push" the assessment upwards; use of the UAH market exchange rate against the US dollar - on the contrary, in the direction of reducing the need for recovery in US dollar terms

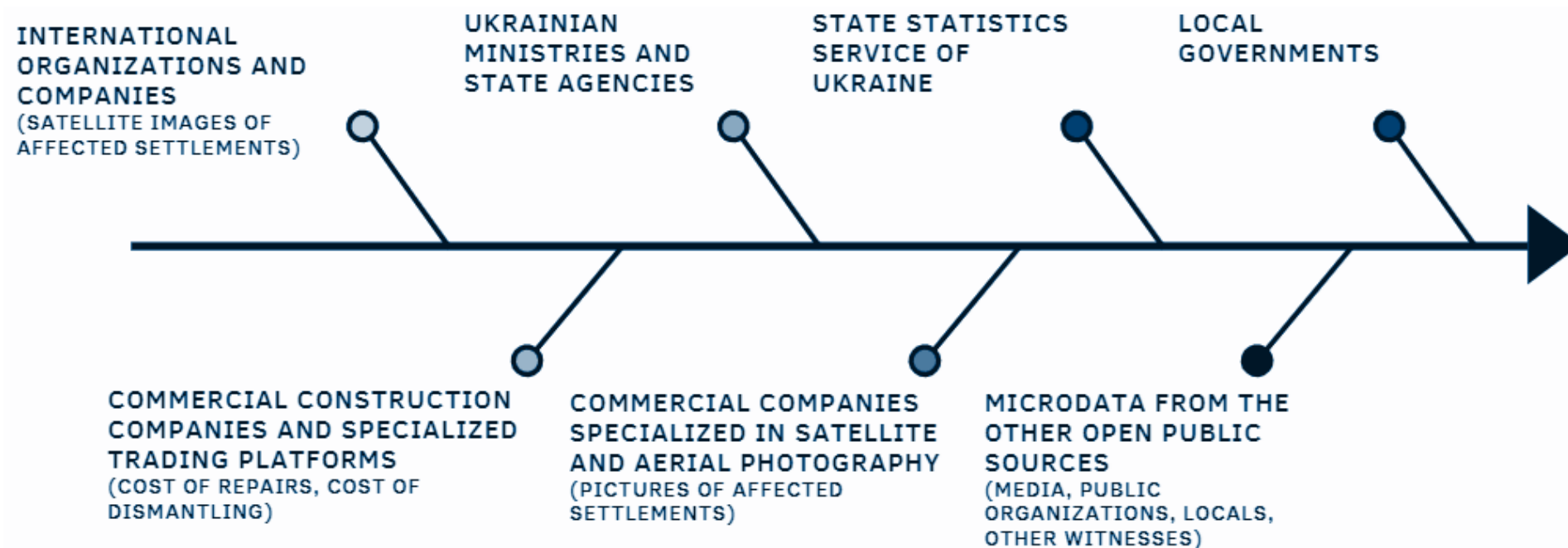
Assessment of economic losses and recovery needs at this stage does not take into account full amount of the monetary value of damages caused by the war to the ecology (forests, water resources, etc.)

As the fighting is still ongoing, most industry assessments **do not take into account**:

- changes in the volume of service provision due to significant demographic changes in Ukraine (change in the number of service consumers)
- additional measures to strengthen the institutional capacity of the authorities to provide the necessary services / implement additional measures to support the economy

Data sources

- Data sources were analyzed for evaluation of the data set and determination of the baseline
- Data collection process also included analysis of public sources, official statistics, internal private business information
- Collected datasets includes both aggregated data (available on regional or country level only) and microdata (with all detailed information on each damaged object in particular industry or of particular type)



DIGITIZATION OF DESTRUCTION | Methodology

1. Drone photography and orthophoto creation

The use of drones allows the project team to collect detailed data on the destruction:

to fly at low altitudes, and shoot buildings at different angles and from all sides.

For localities where drone shooting is not possible, we use high-resolution satellite images.

2. Collection of photos and videos

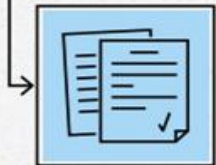
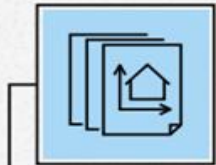
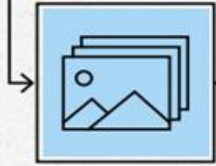
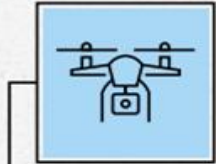
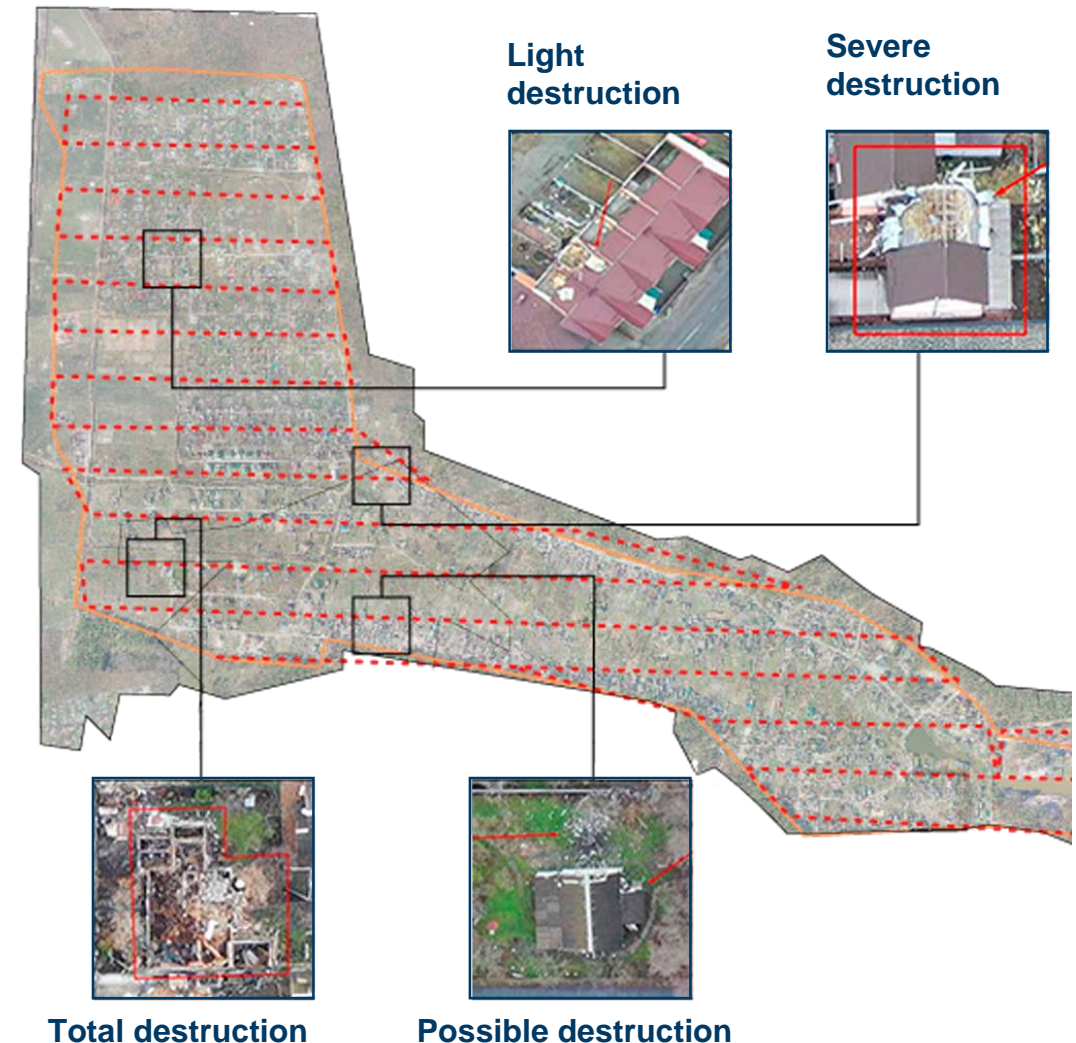
To ensure completeness of the input data, the project team captures photos and videos, as well as collects additional information from verified sources.

3. Destruction detection and data processing

Based on orthophotos, GIS specialists digitize all buildings, identify destroyed objects, classify building types, and determine levels of destruction.

4. Publication of analytical reports

Designers and content managers present the complete information in public infographic reports.



Satellites/ drones assessment as a data source

Photos by project partner RebuildUA



📍 Moschun

\$37.3 mln
total losses

1964
residential buildings
destroyed



📍 Horenka

\$85.1 mln
total losses

1 018
residential buildings
destroyed



📍 Pushcha-Vodytsia

\$17.5 mln
total losses

34
residential buildings
destroyed

Assessment sectors

All damages & losses incurred by Ukrainian economy were analysed and divided on over 10 separate sectors and several cross-sectoral studies.

The project has a wide range of stakeholders due to the wide range of industries and organizations impacted.



Housing



Industry & Business Assets



Administrative buildings



Agriculture & land resources



Social sphere (education, social security, culture, sport, tourism)



Infrastructure (railway, avia, water transport, vehicles)



Commerce



Energy



Health care

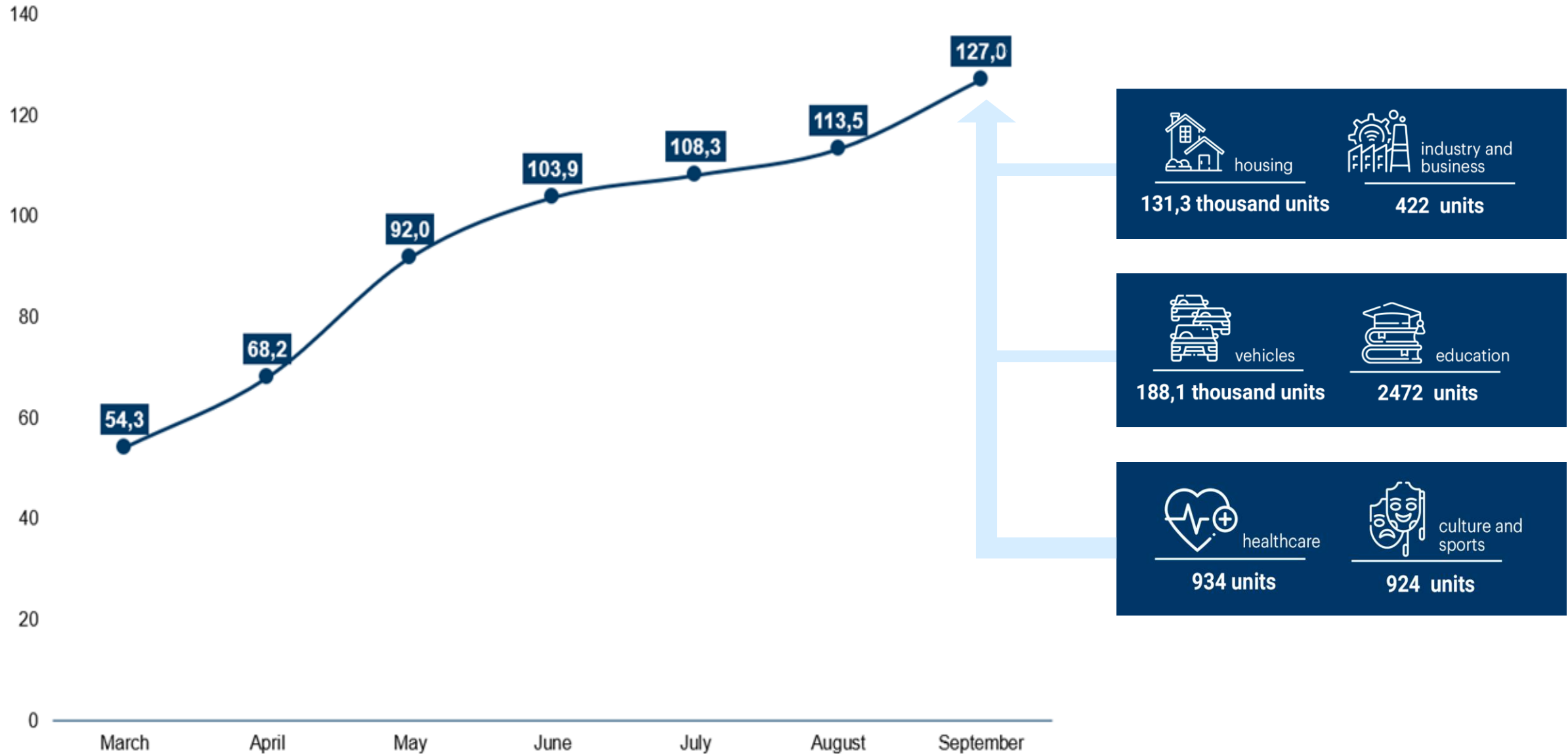


Environment *NEW*



Demining *NEW*

Dynamics of the aggregate damage assessment



Damages, losses and recovery needs calculations

Losses of Ukraine's economy from damage of physical infrastructure since the beginning of hostilities (in case of complete destruction)

AS OF 13.06.2022

The analysis of the project "Russia will pay" – damaged.in.ua

TOTAL
\$95,5
billion

\$564-600 billion*

Property types	Damages,\$ bin	Number of items, units
Housing*	36,8	121 thousand units
Private houses	32,8	107,7 thousand units
Apartment buildings	3,9	13,1 thousand units
Transportation infrastructure*	31,3	-
Roads	25,4	23,9 thousand km
Civilian airports	2,1	18
Industry and business services	8,0	388
Agri sector and land resources	4,3	-
Social services	0,2	56
Vehicles*	2,36	123,1 thousand units
Cars	1	105,2 thousand units
Public transport	1	17,3 thousand units
Education	3,5	2061
Education institutions	2,9	1371
Kindergartens	0,7	690
Commerce	2,1	2926
Energy	1,8	-
Health care	1,5	779
Utilities	1,3	-
Culture, religion, sport and tourism	0,7	735
Cultural facilities	0,5	527
Religious buildings	0,1	36
Sports facilities	0,1	95
Tourists facilities	-	49
Youth centers	-	28
Administrative buildings	0,9	511
Digital infrastructure	0,6	726
Financial sector	0,02	-

* As estimated by the Ministry of Economy and KSE, the overall Ukraine's economic losses due to the war, taking into account both direct losses calculated in this project and indirect losses (GDP decline, investment cessation, outflow of labor, additional defense and social support costs, etc), ranges from \$564bn to \$600bn

These estimates are not comprehensive, as the information on numerous damages and destructions may be missing due to the lack of possibility of citizens, local and state authorities to promptly record the damage in each city, town, villages, etc.

** Revaluation is caused by using a more precise estimate of an average unit cost. We are going to further update methodology for this group in the next release.



Damages, losses and reconstruction and recovery needs by sector breakdown, in monetary terms

AS OF AUGUST,1, 2022, \$BLN

Property types	Damages, \$ bln	Losses, \$ bln	Reconstruction and recovery needs, \$ bln
Housing	48,0	3,6	75,3
Transportation infrastructure	31,6	17,8	42,3
Industry and business services	8,8	29,8	18,3
Agri sector and land resources	4,3	23,4	17,5
Social services	0,3	6,4	6,7
Vehicles	2,4	0,2	4,6
Education	3,8	2,1	4,7
Commerce	2,1	23,3	3,9
Energy	1,8	11,6	3,5
Health care	1,6	2,7	2,4
Utilities	1,3	2,3	1,7
Culture, religion, sport, and tourism	0,9	4,3	1,6
Administrative buildings	0,9	0,1	1,3
Digital infrastructure	0,6	0,1	1,0
Financial sector	0,02	0,2	0,02
Total	108,3	128,8	185,0

Additional needs for demining

Demining (according to the World Bank preliminary assessment)

Total, with demining

70
255

Damages, losses and reconstruction and recovery needs by sector breakdown, in monetary terms

AS OF SEPTEMBER, 5, 2022

Property types	Damages, \$ bln	Losses, \$ bln	Reconstruction and recovery needs, \$ bln
Housing	47,8	3,5	75,3
Transportation infrastructure	35,1	18,7	51,1
Industry and business services	9,7	30,3	19,7
Agri sector and land resources	4,3	23,4	17,5
Social services	0,2	6,4	6,6
Vehicles	2,7	0,4	5,0
Education	4,4	2,1	5,4
Commerce	2,1	23,3	3,9
Energy	1,8	11,6	3,5
Health care	1,6	2,7	2,5
Utilities	1,3	2,3	1,7
Culture, religion, sport, and tourism	2,0	4,3	3,2
Administrative buildings	0,9	0,1	1,3
Digital infrastructure	0,6	1,1	1,0
Financial sector	0,02	0,2	0,02
Total	114,5	130,4	197,8

Additional needs for demining (according to the WB preliminary assessment)

Total, with demining

70
267,8

Damage Assessment Methodology

Damages – total or partial destruction of physical assets existing in the affected area.

Damage assessment methodology:

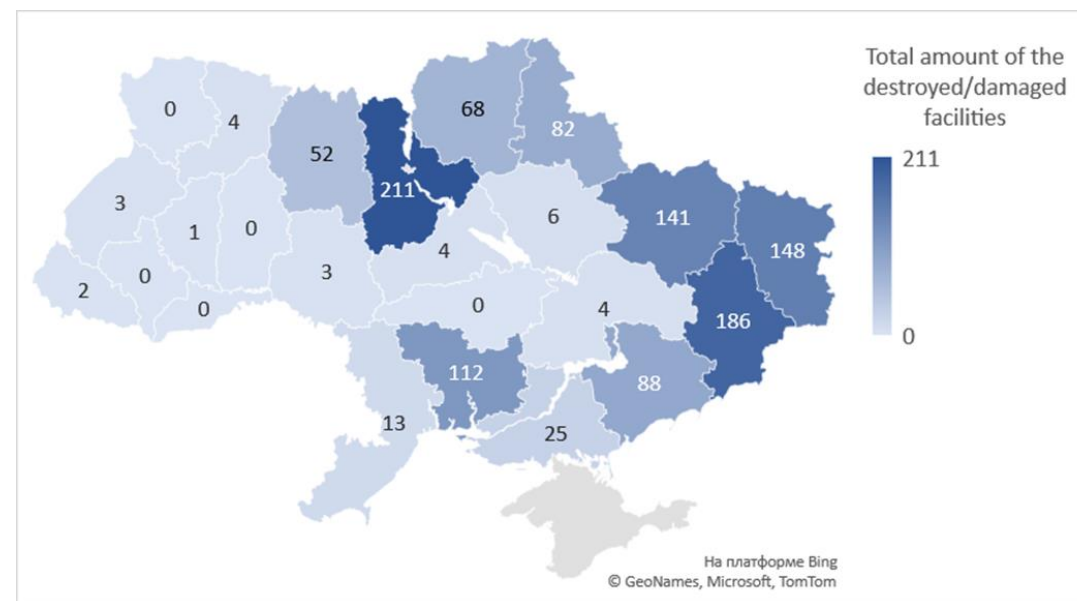
- **Damage assessment is calculated in replacement cost;** does not take into account objects in Ukrainian territories occupied after 24.02.2022, but considered undamaged.
- **Micro data and assumptions about the level of damage is used,** according to three coefficients (no damage; damage up to 40%; damage above 40%, which is equal to the need for complete reconstruction/replacement of the object).
- **Damage to large facilities is assessed individually using financial statements.** Individual coefficients of destruction can be used to estimate large infrastructure objects. The value of fixed assets as of the beginning of 2021 is taken for the identified enterprises. Medium-sized objects that can be counted are valued at the average unit cost (estimated from financial statements, Prozorro tenders, etc.). Mass facilities and networks are estimated via indirect methods, a combination of relevant regional statistics and the level of damages for individual regions or cities.
- **The assessment includes only losses from destruction/ ruining of buildings,** not taking into account the cost of equipment.

Damage Assessment in Units



Available datasets allows to determine not only value of objects damaged but also number of impacted assets in some sectors.

Map of damaged religious, cultural and sports facilities breakdown by region



Losses Assessment Methodology

Losses – a decrease in the number and value of flows (production, sales of goods and services, cash flows) caused by external factors; temporary changes in economic flows as a result of the war.

Losses arise from the moment of invasion to the moment of achieving full economic recovery and reconstruction, which often lasts for many years. In the case of this assessment, this period is 18 months, starting in June 2022, as well as the first three months of the war (a total of 21 months). Losses are expressed in current monetary value.

Losses assessment methodology:

- Losses are estimated in relation to defined baseline scenario, which reflects the basic scenario of economic development without war. In determining the baseline scenario, we used data on production, consumption and trade for the 2021 calendar year (or the last reporting year for which official statistics are available).
- To determine losses by project analysts use a regional approach, according to which differentiated loss coefficients were used (according to the duration and/or intensity of hostilities in the region, and, accordingly, the expected production losses).
- The starting point for estimating losses is the period from the beginning of the war (February 2022) to the moment of full recovery of the economy and infrastructure, complete resolution of social and humanitarian challenges arising from the war. The total period for which indirect losses are calculated is 21 months (March 2022 - November 2023), with certain exceptions for industries where the recovery of economic activity will take longer (e.g., horticulture, animal husbandry).

Needs Assessment Methodology

The recovery needs include the cost of repairing and replacing damaged assets based on the market price existing immediately after the end of the war.

On top of recovery needs can include part of losses and providing equitable and accessible services to vulnerable groups and affected population.

The needs for economic recovery reflect a mutually agreed vision of the recovery strategy of Ukraine as a whole and of each sector of the economy in particular as an important prerequisite for the planning of the reconstruction process, which is designed to restore the country's economic capacity and solve the social and humanitarian challenges that arose as a result of the war. The assessment of Ukraine's recovery needs is based on estimates of damages and losses, described in the relevant sections.

This assessment **does not take into account the need to implement other modernization projects than related to the war time damages.**

Needs Assessment Methodology

According to international approaches, **recovery needs are calculated as the aggregate need for financing the recovery of destroyed and damaged assets**, which includes:

- the cost of restoring destroyed/damaged assets, taking into account the Build Back Better principle;
- multi-year inflation (for objects that will be reconstructed/built after 2022)
- **the Government's vision of structural changes** that should occur, for example:
 - changing the location for individual objects (and, accordingly, the costs of land acquisition; relocation of enterprises and employees);
 - a change in the demographic structure of the population, the movement of the population inside and outside the country, and accordingly - a change in the structure of citizens' demand for public services by region;
 - replacing outdated facilities/objects with fundamentally new, more economically justified and energy efficient ones;
- sequence and priority of recovery needs (building a timeline of recovery needs, taking into account real opportunities and priority in recovery)
- the additional need for liquidity for business entities to resume their activities;
- an additional need to strengthen the institutional capacity of the Government to support economic development/relaunch of economic entities, for example, the launch of additional electronic services; registers; creation of credit institutions, etc.



For more information please visit our web resources:
<https://kse.ua/russia-will-pay/>
<https://damaged.in.ua/>

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