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Damage and reconstruction of Ukrainian infrastructure

By **Oleg Nivievskyi** , **Dmytro Goriunov** (both Kyiv School of Economics, Kyiv), **Anna Nagurney** (University of Massachusetts Amherst)

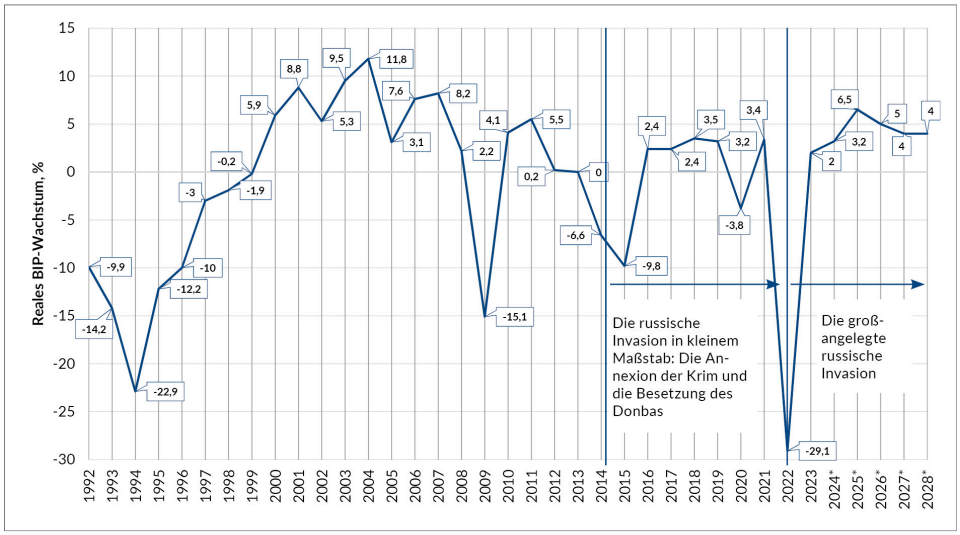
Summary

In 2014, Russia began its small-scale invasion of Ukraine before launching a full-scale invasion in February 2022. There is no end to the war in sight and its cost is already huge. Almost 20 percent of Ukraine's territory is occupied, and the total damage to infrastructure is almost as high as Ukraine's gross domestic product (GDP). Economic losses and infrastructural damage are two and a half times higher than Ukraine's 2023 GDP. Despite the ongoing war, Ukraine is already busy rebuilding and has so far managed to restore about 4.5 percent of the damaged infrastructure. Reconstruction and economic recovery require joint coordination between Ukraine and its partners and donors. A major challenge will be to find the balance between urgent reconstruction needs and a more sustainable development path that is consistent with EU accession commitments and sustainability goals.

Introduction

Since its independence following the collapse of the Soviet Union in 1991, Ukraine has experienced four major economic shocks (see Figure 1): In the mid-1990s there was a severe economic crisis as a result of the transition from a planned to a market economy. The next shock was the global financial crisis of 2007/08, and a third was Russia's first invasion of Ukraine in 2014 with the annexation of Crimea and the partial occupation of Donbas. The biggest shock, however, followed the large-scale Russian invasion of Ukraine on February 24, 2022.

Grafik 1: Reales BIP-Wachstum der Ukraine (in %)



** Schätzung*

Quelle: Eigene Zusammenstellung auf Grundlage von IMF-Daten.

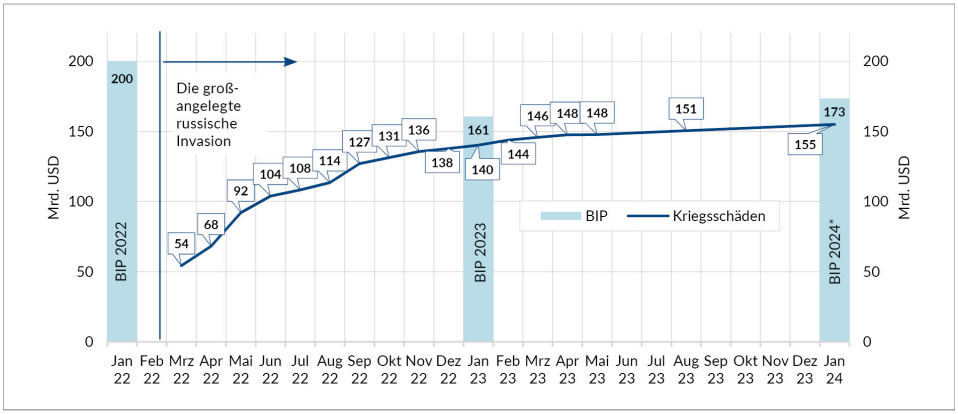
The war continues to this day, but is largely deadlocked (The Economist, 2023). The cost of ongoing war is immense. Almost 20 percent of Ukrainian territory was occupied. Ukraine's GDP fell by almost 30 percent in 2022, and the total damage to infrastructure ($155 billion) was almost as high as the GDP itself. The number of Russian soldiers killed or wounded since the start of the war is, according to US intelligence (Forbes, 2023) at around 315,000 and according to official Ukrainian figures at almost 425,000 (Ministry of Defense of Ukraine, 2024). On the Ukrainian side, according to President Zelensky, the number of military casualties is 31,000 soldiers killed, while others speak of almost 200,000 (NYT, 2023). The UN estimates that more than 10,500 civilians were killed and more than twice as many were wounded (UN, 2024). [1] Over 10 million Ukrainians have left their homes, 6.45 million of them have settled in other European countries (UNHCR, 2024). In this text we present the consequences of war-related damage and losses in Ukraine, based on ongoing monitoring of

the consequences of the Russian invasion on the Ukrainian economy. We also discuss the prospects of reconstruction in Ukraine, which has already begun.

Enormous damage and significant losses

The total documented damage directly inflicted on the Ukrainian economy by the large-scale Russian invasion is $155 billion (replacement value) as of January 2024. Fortunately, the increase in damage has been slowing since spring 2023. The extent of the damage roughly corresponds to Ukraine's current GDP - and is therefore unsustainable for Ukraine alone (Figure 2). Details of the damage calculation as well as data and exact methods can be viewed on the website of the " Russia will pay " project of the Kyiv School of Economics.

Grafik 2: Kriegsschäden im Verhältnis zum BIP

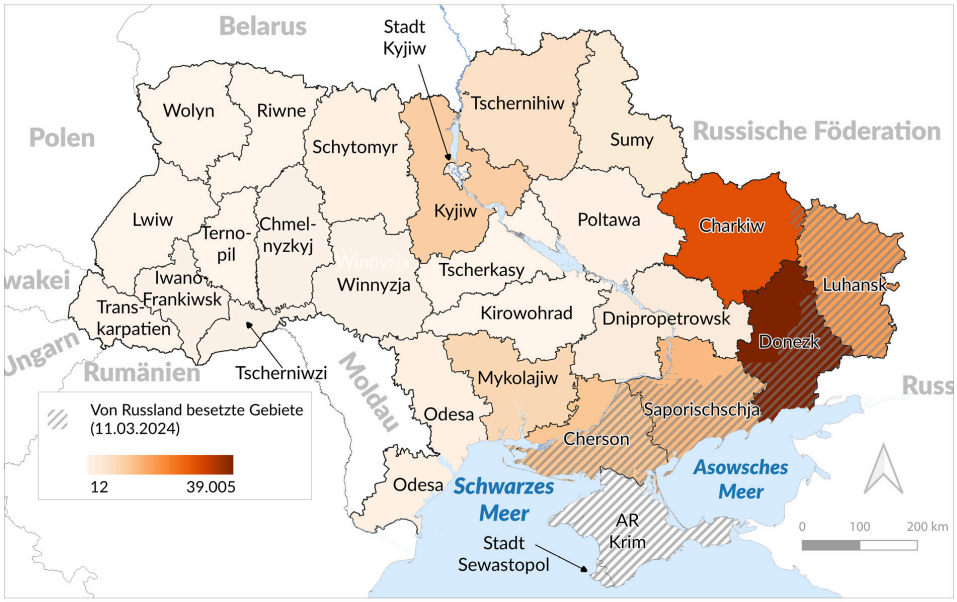


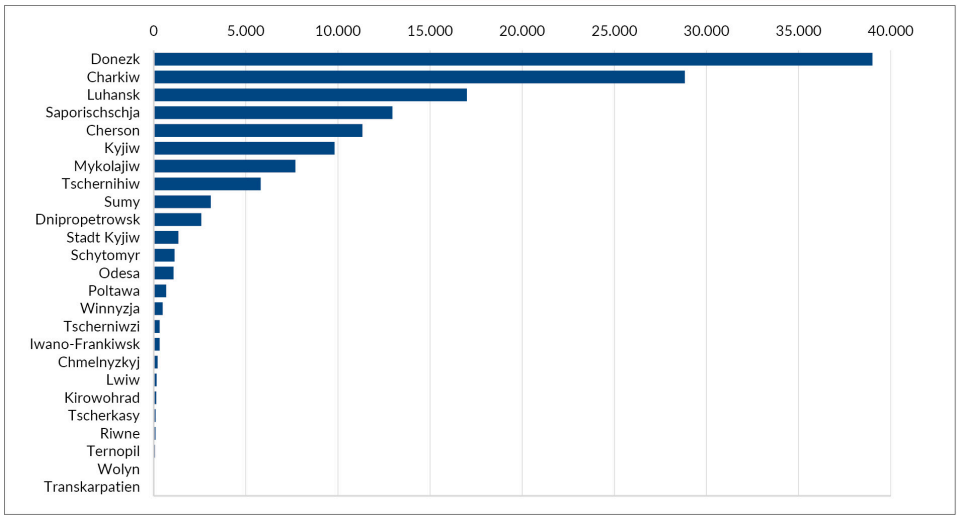
** Schätzung*

Quelle: Eigene Zusammenstellung auf Grundlage der KSE und des IMF.

The damage is greatest in the Ukrainian oblasts in the east and south, where the heaviest fighting took place (Figure 3). The largest category by total loss is the residential sector (Figure 4). In total, more than 250,000 residential units were destroyed or damaged as a result of hostilities: more than 222,000 private houses, 27,000 multi-family residential buildings and 526 dormitories. The Donetsk, Kyiv, Luhansk, Kharkiv, Mykolaiv, Chernihiv, Kherson and Zaporizhia regions were most affected by this destruction of buildings.

Grafik 3: Regionale Verteilung der Schäden, in Mio. USD





Charkiw	28.827
Cherson	11.329
Chmelnyzkyj	218
Dnipropetrowsk	2.591
Donezk	39.005
Iwano-Frankiwsk	325
Kirowohrad	141

Kyjiw	9.815
Luhansk	16.996
Lwiw	164
Mykolajiw	7.695
Odesa	1.077
Poltawa	680
Riwne	100

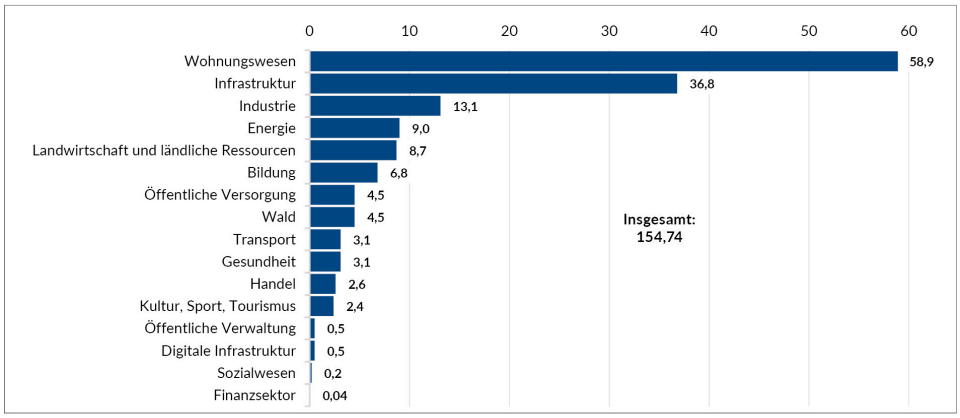
Saporischschja	12.956
Schytomyr	1.133
Stadt Kyjiw	1.347
Sumy	3.103
Ternopil	77
Transkarpatien	12
Tscherkasy	109

Tschernihiw	5.809
Tscherniwzi	327
Winnyzja	493
Wolyn	39

Quelle: »Russia will pay«, Kyiv School of Economics, https://kse.ua/russia-will-pay/.

The second largest category of damage is infrastructure. Since the start of the large-scale war, a total of 18 airports, at least 350 bridges and overpasses and over 25,000 kilometers of highways and roads have been destroyed. Damage to the industrial sector amounts to $13 billion, or 22 percent of the capital accumulated in this sector before the war. At least 426 large and medium-sized private and state-owned companies were damaged or destroyed. The mining and metals sector has been particularly hard hit, with some large companies in Mariupol, Zaporizhzhia and Avdiivka losing much of their assets (Ashapova, 2023).

Grafik 4: Gesamtschäden an der ukrainischen Infrastruktur nach Sektor (Mrd. USD, Stand Januar 2024)



Quelle: »Russia will pay«, Kyiv School of Economics, https://kse.ua/russia-will-pay/.

The next largest category of damage is agriculture. Total agricultural damage is estimated at $8.7 billion, or 30 percent of the capital accumulated in Ukrainian agriculture before the war. The largest category within agricultural damage is agricultural machinery, which accounts for just over half of agricultural damage (Nivievskyi and Neyter, 2024).

Another major issue is the destruction of land through mines and remnants of military operations. Ukraine is currently the most heavily mined country in Europe. An estimated 16 million hectares of land are mined - over a quarter of Ukraine's total area. About 11.2 of these 16 million hectares are agricultural land. For comparison: This corresponds to the entire agricultural area in Germany (Nivievskyi and Neyter, 2024).

The education sector has also been significantly affected, with damages totaling $3.1 billion. The number of damaged and destroyed educational institutions is over 3,500 and consists of more than 1,700 secondary schools, over 1,000 primary schools and 586 colleges. According to regional military administrations, the largest number of destroyed and damaged educational institutions are in the Donetsk, Kharkiv, Kherson, Mykolaiv, Zaporizhia and Kyiv regions.

The damage to the health sector is the same as that to the education sector: $3.1 billion. 1,223 medical facilities were damaged or destroyed, including 384 hospitals and 352 pharmacies.

This damage does not include the economic losses, generally speaking the income that Ukraine lost as a result of the war (e.g. due to interruptions in economic flows and production, falling producer prices and / or rising production costs, etc.). The last measured losses are around 290 billion US dollars (as of February 2023), the reconstruction and market recovery needs are estimated at 486 billion US dollars (World Bank, 2024). This dimension is huge, amounting to more than 2.5 times Ukraine's 2023 GDP - so the reconstruction and market recovery measures clearly require joint efforts and coordination by Ukraine and its partners and donors necessary. These efforts could be supported by the Russian Central Bank's reserves, which are currently frozen and immobile in the West. This is around 300 billion euros, which, according to Euroclear, has already generated 5.5 billion euros in income through net interest in 2023 (Euroclear, 2024). This money could possibly be used for the reconstruction and market recovery of Ukraine, although legal mechanisms and modalities would first have to be developed and introduced (FP, 2023).

In addition, reconstruction and market recovery require strong reform efforts and Ukraine's political will to improve the investment climate and enable private investments. These are essential not only for reconstruction but also for the long-term economic development of the country (Wessel and Asdourian, 2022). The scope of this undertaking is indeed huge. It can be estimated, for example, using a “Priority Reforms List” contained in a document that the USA provided to the donor coordination platform in Brussels in October 2023 (US Embassy in Ukraine, 2023). This list of key reforms also includes a timetable focusing, among other things, on the functioning of state-owned enterprises and anti-corruption authorities and infrastructure, a reboot of the judicial system, a simplified functioning of the Ministry of Defense and all executive bodies, and the further liberalization of electricity and gas prices lies.

The status of the reconstruction measures

A large part of the damage described is systemically relevant, so that it had to be partially or completely repaired during wartime. An infrastructure for documenting the reconstruction and market recovery measures and

projects is currently only being developed. So far there are two platforms for this, DREAM (Digital Restoration EcoSystem for Accountable Management) and BRP (Big Recovery Portal). DREAM is a comprehensive database resulting from a joint effort by government bodies such as the State Agency for Reconstruction and Development of Infrastructure of Ukraine (under the Ministry of Municipalities, Territories and Infrastructure Development), the RISE coalition of local and international NGOs and international partners , such as Great Britain, USAID, GIZ and others. These efforts demonstrate - among a few other things - the will to strengthen all reconstruction and market recovery measures through transparency and trust in Ukraine and to reduce corruption risks. However, filling the databases still means a lot of work for these platforms. A brief check based on the available information from the various parties involved (e.g. presentations from ministries, agencies, etc.) allows us to conclude that the databases currently available at DREAM and BRP are far from complete, although they are filled with the claim that all of them are currently available ongoing reconstruction and market recovery projects. For example, the DREAM data includes a total of approximately 1,000 projects with a total volume of $1.1 billion (KI, 2024). According to our estimates, six to seven billion US dollars (4.5 percent of the total damage) have been spent on reconstruction so far, including in the areas of housing, public utilities, transport and energy infrastructure and education (500 of 3,793 objects have been partially or completely damaged rebuilt - BRP, 2024) and health (857 of 1,692 objects were partially or completely rebuilt). A special focus is on mine clearance, as around 16 million hectares are potentially mined. Five million hectares have already been examined and demined where necessary in 2023, and another four million hectares are to be demined in 2024 (BRP, 2024). The reconstruction was financed by government funds and donor funds, although the amounts mentioned for the individual sectors and projects refer to budget commitments and do not necessarily represent amounts actually paid out.

In addition, the private sector is also investing in reconstruction. There are reports of some companies that suffered damage and have already resumed their activities. This even includes severely damaged facilities (such as the Retroville Mall in Kyiv, which was hit by a missile at the very beginning of the invasion; NYT, 2022). However, for security and other reasons, this data is not available.

Balance between acute needs and a more sustainable future

Despite the war, Ukraine continues to advance its European ambitions. By fulfilling a number of conditions, it did its homework and in December 2023 the European Council finally began accession negotiations (EC, 2024a). In February 2024, the EU heads of government agreed on a “Ukraine Facility” through which Ukraine will receive up to 50 billion euros in regular and predictable financial support by 2027 (EC, 2024b). The (post-war) reconstruction and market recovery measures must therefore be closely coordinated with the EU accession process and the EU acquis, a process that began a long time ago. It gained particular momentum after the Revolution of Dignity, which broke out because the then Ukrainian leadership was suddenly no longer willing to sign an association agreement with the EU and turned to Russia instead. Officially, Ukraine's EU path began with visa liberalization and the entry into force of the Association Agreement and the Deep and Comprehensive Free Trade Area with the EU in 2017 (EC, 2024a).

Ukraine will need to find a balance between its immediate needs and a more sustainable development path (Bjerde, 2023). On the one hand, Ukraine's accession process to the EU brings with it enormous challenges when it comes to improving the country's institutional governance in order to align it with the EU acquis, to incorporate climate-friendly or climate-reducing or "green" modalities into the reconstruction and Integrate recovery efforts and achieve carbon-neutral development goals. It is important to proceed in a “green” and climate-smart manner or to take climate protection aspects into account in market recovery and reconstruction measures in order to achieve the development goals of CO2 neutrality (Bjerde, 2023). Although this will come at a cost, it will pave the way for further sustainable development. Ukraine will also receive support in this regard, including from the EU. This has already launched the New European Bauhaus capacity building program for the reconstruction of Ukraine, which is intended to enable sustainable reconstruction solutions in the spirit of the European Green Deal . And because further support from other agencies will still be needed, donors such as the World Bank and the European Bank for Reconstruction and Development are likely to coordinate their assistance with the EU (von Cramon-Taubadel and Nivievskyi, 2023). This will make the focus on sustainability in reconstruction and market recovery measures even stronger. On the other hand, the urgent reconstruction needs will not necessarily be compatible with the sustainability goals aimed at the future - and this should not be seen as a problem, because the survival of the country is at stake and all available resources must be used to stop the aggression that exists today, instead of solving potential problems of tomorrow.

[1] The exact number of civilian casualties is unknown. Human rights organizations report that over 10,248 bodies were buried in mass graves in the city of Mariupol alone. According to other reports, the number of civilians killed in Mariupol is approaching 100,000, as countless bodies were buried under the rubble of the 90 percent destroyed city (https://www.hrw.org/feature/russia-ukraine-war- mariupol ; https://texty.org.ua/d/2023/mariupol_chronicles/).

About the authors

Prof. Dr. Oleg Nivievskyi is Associate Professor and Dean of the Postgraduate Program in Economics at the Kyiv School of Economics (KSE). He is also an honorary research fellow at the School of Economics at the University of Queensland (Australia). He has over 18 years of international experience in application-oriented research on agricultural food, sales markets and value chains as well as rural development and transport. His research interests also include spatial economics, econometrics and productivity analysis.

Dmytro Goriunov is one of the leaders of the “Russia will pay” project at the KSE Institute. Dmytro is an expert in calculating damage, losses and requirements as a result of catastrophic events. His first research of this kind was the calculation of Ukrainian losses from the annexation of Crimea. Today he is part of the team that calculates the damage, losses and needs caused by the large-scale Russian invasion since February 2022. The team calculates regularly, publishes its updates and participates in international efforts by the World Bank, IFC, UNDP and UNIDO.

Prof. Dr. Anna Nagurney is the Eugene M. Isenberg Chair in Integrative Studies and director of the Virtual Center for Supernetworks at the Isenberg School of Management at the University of Massachusetts Amherst. She is also co-chair of the board of the Kyiv School of Economics. She is a member of several professional societies and an expert in supply chains, including those for perishable goods such as food and healthcare products, as well as various network systems such as transportation and other critical infrastructure.

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