



Economic Losses from Russia’s Missile Attacks on Ukrainian Critical Infrastructure with the Aim of Destroying the Ukrainian Nation

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ABSTRACT

The author examines objects that were targeted by missile attacks, and their significance in the context of defining the concept of “critical infrastructure”. The aim of the analysis is to assess the economic damage caused to Ukraine and the extent of the destruction. The article raises the issue of genocide of the Ukrainian people in the context of attacks on Ukrainian critical infrastructure being carried out. The study shows that Russia’s shelling and destruction of Ukraine’s infrastructure are aimed at deliberately impacting living conditions in the Ukrainian nation, calculated to bring about its partial destruction as referred in Part. 6 (c) of the Statute of the International Criminal Court. Restoring infrastructure and creating safe living and working conditions in the country is an important task for Ukraine and its international partners. Restoration of critical infrastructure, energy systems, housing, and demining, will facilitate the return of Ukrainians home and will help prevent a rapid demographic crisis and the destruction of the Ukrainian nation, as planned by the Russian Federation when it launched the missile attacks.

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Introduction

The Russian military aggression, which has been going on for nine years, has caused extensive damage to Ukraine's critical infrastructure, electricity sector, industry, and the country's economy as a whole. The greatest damage was caused after the full-scale invasion that started on 24 February 2022¹. Armed conflict always stands in extremely negative correlation with the economic situation of the country where it occurs (Serneels & Verpoorten, 2015), however, its intensity, objects and the infrastructure destroyed will define the process and cost of recovery. According to preliminary estimates by the Ministry of Economy of Ukraine, the decline in Gross Domestic Product in 2022 amounted to 30.4%². Similar assessments are conducted by the World Bank, which estimates a 29.2% drop in GDP³. However, the real economic losses caused by the Russian aggression are much higher, as Ukraine is also losing the lives of its citizens (defenders and civilians), namely the working population, due to the mass emigration of its people abroad, and Russia continues to destroy residential buildings, enterprises, energy and transportation facilities, cultural, medical, administrative,

educational and scientific institutions. With regards environmental and subsoil damage, the Department of Environmental Control and Methodology of the Ministry of Environmental Protection and Natural Resources has already estimated the environmental damage at UAH 10 trillion⁴. It is critical to accurately calculate all economic losses caused by the Russian aggression and acts of the Russian armed forces, as this data can be used as evidence in international courts to compensate for the damage. It is important to note that Russia is not only trying to gain a military advantage through this destruction, but also to destroy the Ukrainian nation itself. This is evidenced by the targeted shelling of critical infrastructure. In the first weeks of the full-scale invasion, the main strikes targeted military objects; however, having failed to achieve military success due to the resistance of the Ukrainian armed forces and Ukrainians themselves, Russia then turned to the tactic of "missile terror" by launching missile strikes on civilian targets, seeing missiles deliberately aimed at residential buildings, shopping and entertainment centers, railway stations, and seaports.

According to the Head of the Office of the Prosecutor General of Ukraine, the main purpose of these attacks on the civilian population was to intimidate, create conditions for constant tension in society, and to pressure the Ukrainian leadership to make territorial and political concessions favorable to the Russian Federation⁵. The long-term goal of

1 The full-scale military invasion that started on 24 February 2022 was a continuation of Russian aggression since 2014, however, on 24 February 2022, Russian armed forces initiated attacks (with the use of its aviation and missiles) targeting every big city in Ukraine.

2 Official information available on: <https://www.kmu.gov.ua/news/minekonomiky-poperedno-otsiniuiie-padinnia-vvp-v-2022-rotsi-na-rivni-304> (Last accessed on 23 April 2023).

3 Information available on: <https://www.worldbank.org/en/news/press-release/2023/04/06/russian-invasion-of-ukraine-and-cost-of-living-crisis-dim-growth-prospects-in-emerging-europe-and-central-asia> (Last accessed on 23 April 2023).

4 Information available on: <https://www.radiosvoboda.org/a/news-mindovkillia-zbytky-nadram/32338768.html> (Last accessed on 24 April 2023).

5 Information available on: <https://www.gp.gov.ua/ua/posts/raketni-udari-po-budinku-u-dnipri-tc-u-kremen-cuci-ta-insix-civilnix-objektax-povidomleno-pro-pidozru>

the Russian Federation is the partial destruction of the Ukrainian nation. Since the beginning of fall 2022, the main target of Russia's missile attacks has been energy facilities: Thermal and hydroelectric power plants, substations, and power lines. Such acts at the beginning and during the heating season were aimed at destroying the Ukrainian economy and creating unfavorable conditions for the civilian population. In general, according to the Kyiv School of Economics, direct damage to Ukraine's infrastructure (based on the replacement cost method) as of March 2023, amounted to USD 144 billion⁶. However, the real figure of losses is much higher, since the replacement cost method used by the Kyiv School of Economics experts estimates only the minimum value of assets that can replace the destroyed ones, and does not estimate economic losses from lost opportunities, such as job losses, business cuts and closures, and the departure of the working class abroad. For example, World Bank President David Malpas estimates the cost of rebuilding Ukraine's destroyed infrastructure at \$350 billion⁷. The 2020 military conflict in Syria was the largest ongoing conflict in the world (Iacovoiu & Panait, 2020), however, the Russian military aggression against Ukraine seems to have changed the *status quo*.

The aim of this article is to analyze and assess the economic damage caused by Russia's

[komandiru-rosiiskogo-aviapolku](#) (Last accessed on 1 May 2023).

6 Official report available on: <https://kse.ua/ua/about-the-school/news/za-rik-povnomasshtabnoyi-viyini-rosiya-zavdala-zbitkiv-infrastrukturi-ukrayini-na-mayzhe-144-mlrd/> (Last accessed on 1 May 2023).

7 Information available on: <https://www.reuters.com/markets/imfs-georgieva-sees-rising-cost-keep-ukraines-economy-going-2022-12-01/> (Last accessed on 2 May 2023).

shelling of Ukraine's critical infrastructure with the aim of destroying the Ukrainian nation. To achieve this goal, the following tasks need to be accomplished: To analyze which infrastructure facilities were destroyed by missile attacks, the results and extent of the destruction, and to establish the economic damage caused and its impact on the civilian population of Ukraine. Such analysis will enable us to prove that the actions of the Russian Federation are aimed at deliberately inflicting on the group conditions of life calculated to bring about its physical destruction in part, which, according to Article 6 (c) of the Statute of the International Criminal Court, can be qualified as a crime of genocide (Rome Statute of the International Criminal Court).

The abovementioned analysis was based on synthesis and a statistical method that permitted us to summarize and process the collected data and draw conclusions.

1. Analysis of Critical Infrastructure Facilities Damaged by Missile Attacks

Since 24 February 2022, Russia has launched almost 5,000 missile strikes (including of the S-300 and S-400 systems) on the territory of Ukraine, and about 3,500 air strikes. Additionally, 1,100 launches of unmanned aerial vehicles were carried out. This data was reported as of 23 February 2023, by the Deputy Chief of the Main Operational Directorate of the General Staff of the Armed Forces of Ukraine, General Oleksiy Hromov⁸. Most of these strikes targeted

8 Information available on: <https://www.ukrinform.ua/rubric-ato/3674032-rosia-za-rik-zavdala-po-ukraini-majze-85-tisaci-raketnih-ta-aviacijnih-udariv.html> (Last accessed on 27 April 2023).

residential buildings and critical infrastructure. The concept of “infrastructure” appeared in the works of economists back in the 1940s. The term was first coined by P. Rosenstein-Rodan, who considered it a set of basic economic sectors, including roads, railways, dams, sewers, and other public utilities (Rosenstein-Rodan, 1961). P. Nurkse believed that the main purpose of infrastructure is to ensure a rational and uninterrupted process of servicing production, distribution, exchange and consumption in the structure of the national economy (Nurkse, 1966). Infrastructure is also interpreted as a tool for meeting the needs of the country’s population (Rostow, 1962). Regarding the definition of the term “critical infrastructure,” the U.S. Cybersecurity and Infrastructure Security Agency, according to the Presidential Political Directive, identifies 16 sectors of critical infrastructure, whose assets, systems and networks, both physical and virtual, are considered so significant that their disruption will have a debilitating impact on security, economy, health, and the social sphere⁹. The Ukrainian law “On Critical Infrastructure” defines such infrastructure as being of critical importance for the economy, national security and defense, and whose disruption may harm vital national interests (Закон України “Про критичну інфраструктуру”, 2021). Therefore, critical infrastructure is a set of facilities intended primarily to ensure the vital activity of the country’s civilian population. Such facilities include the energy sector,

healthcare facilities, communications and telecommunications, food, transportation infrastructure, water supply and sewerage, the pharmaceutical industry, financial sector, civil defense and rescue services. It can be assumed that the destruction of critical infrastructure threatens the survival of the civilian population of the state, especially those directly dependent on it.

The shelling and destruction of such facilities is aimed at the destruction of the Ukrainian nation, and constitutes a war crime against the civilian population. By launching missile attacks on Ukraine’s critical infrastructure, Russia is grossly violating international humanitarian law, as Article 48 of the Protocol Additional to the Geneva Conventions relating to the Protection of Victims of International Armed Conflicts of 8 June 1977, and other conventions,¹⁰ requires that in the conduct of hostilities, the parties must always distinguish between civilian and military objectives and, accordingly, direct their actions only against military objectives¹¹. The Protocol also prohibits “attacking or destroying, withdrawing or rendering unusable objects essential for the survival of the civilian population”. Russia has been deliberately targeting such objects.

According to the statistics of the ‘Damaged in UA’ project, which collects information from citizens, the government and local governments on losses and damage across the country, 207,500 private cars, 153,900

9 Official report of Cybersecurity and Infrastructure Security Agency of United States, available on: <https://www.cisa.gov/topics/critical-infrastructure-security-and-resilience/critical-infrastructure-sectors> (Last accessed on 26 April 2023).

10 For instance, Geneva Convention Relative to the Protection of Civilian Persons in Time of War (Fourth Geneva Convention), 12 August 1949, 75 U.N.T.S. 287.

11 Protocol Additional to the Geneva Conventions of 12 August 1949, and relating to the Protection of Victims of International Armed Conflicts (Protocol I), 8 June 1977, 1125 U.N.T.S. 3.

residential buildings, 16,000 public transport units, 3,170 educational institutions, 1,216 healthcare facilities, and 1,800 cultural institutions were destroyed during the first year of full-scale aggression¹². In addition, 340 bridges and other road structures and 25,000 kilometers of both local and national roads were destroyed or damaged.

The largest attack on Ukraine's critical infrastructure involved missile strikes to the energy system that began on 11 September 2022, seeing Russia launch 12 Kalibr and X-101 cruise missiles that hit the Zmiivska Thermal Power Plant, Kharkiv CHPP-5, and three high-voltage substations. It should be added that since 4 March 2022, the Zaporizhzhia Nuclear Power Plant, which is the largest nuclear power plant in Europe with 6 power units and a total capacity of 6000 MW, is under the occupation of the Russian armed forces. As a result of the seizure, the plant is no longer supplying electricity to the unified energy system of Ukraine.

On 10 October 2022, the first massive missile attack on the country's energy infrastructure took place, during which 84 cruise missiles were fired. The shelling damaged 11 critical infrastructure facilities in eight regions and the capital¹³. Following the attack, the National Energy Company 'Ukrenergo' introduced the first emergency and rolling blackouts in Ukraine. Electricity exports to the European Union were also restricted.

12 Information available on: <https://damaged.in.ua/damage-assessment> (Last accessed on 1 May 2023).

13 Information available on: https://biz.censor.net/news/3372646/rosiyiski_viyiskovi_poshkodyly_11_vajlyvyh_infrastrukturnyh_obyektiv_u_8_regionah_ta_kyvevi_shmygal (Last accessed on 2 May 2023).

The biggest missile attacks, in terms of the number of missiles launched, and the most destructive to the energy system, occurred between 15-23 November 2022, destroying almost half of Ukraine's power grid. The main missile attacks targeted high-voltage substations and power lines, causing emergency protection to be activated at all nuclear power plants under Ukrainian control, leading to automatic shutdowns of power units, and shutting down most thermal and hydroelectric power plants. According to energy experts, Ukraine experienced the first blackout in its history¹⁴ - some cities and regions were completely de-energized, and a significant power deficit occurred in the energy system. As a result, the National Energy Company 'Ukrenergo' was forced to introduce blackout schedules for all regions of Ukraine over the following few months.

According to the data provided on the official websites of the General Command of the Armed Forces of Ukraine, the Air Force Command of the Armed Forces of Ukraine, during the entire period of shelling of energy facilities and infrastructure (which lasted from 11 September 2022 to 9 March 2023), launched 908 cruise missiles of X-101, X-555, X-59, X-22, X-32, Kalibr, Iskander, Tornado, and Oniks, 648 of which were intercepted and shot down. However, the share of missiles that were not shot down by the Air Defense Forces caused significant damage to both the energy infrastructure and the civilian critical infrastructure of Ukraine as a whole.

14 Information available on: <https://www.epravda.com.ua/publications/2022/11/28/694331/> (Last accessed on 3 May 2023).

2. Assessment of Economic Losses Caused by Shelling of Critical Infrastructure In Ukraine

The replacement cost method (see more about application of the replacement cost method in: Jackson *et al.*, 2014) is most commonly used when assessing economic damage to critical infrastructure. The method allows us to calculate direct damage to infrastructure, and involves estimating the cost of constructing or creating an object that will be equal or equivalent to the destroyed one in terms of its properties, as defined in the Ukrainian National Standard No. 1 'General Principles of Property and Property Rights Valuation' (Постанова Кабінету Міністрів України, 2022). A similar method, called the cost approach, is proposed to be used in the absence of any relevant market evidence of the value of the damaged property, in order to put the injured party in the same position as it was before the damage occurred. This

approach is proposed for use as a method of damage assessment by the European Valuation Standards Council (Guidance on Applying EVS in Wartime Circumstances, 2022). The method of estimating direct costs at replacement cost is being actively used by the Kyiv School of Economics to assess the damage to Ukraine's infrastructure. As mentioned above, the total amount of damage caused by March 2023 was USD 144 billion, of which the largest amount of damage was caused to residential infrastructure (USD 53.6 billion), transport infrastructure (USD 36.2 billion), and industry (\$11.3 billion). The distribution of direct damage to Ukraine's infrastructure in value terms by replacement cost is shown in Figure 1.

At this stage, there is no single realistic assessment of the damage to critical infrastructure, primarily because the war is still ongoing and Russia continues to strike and cause destruction in Ukraine. However, open sources provide figures for the damage from the

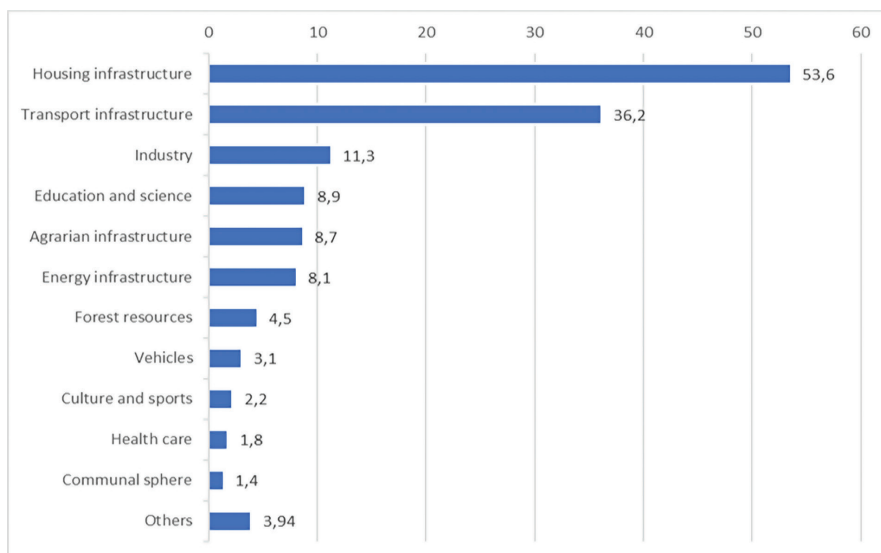


Fig. 1. Direct losses to Ukraine's infrastructure by replacement cost method (USD billion).

statements of Ukrainian leaders, politicians, and heads of international organizations. As part of the Recovery Plan for Ukraine, the National Council for the Restoration of Ukraine from the Consequences of the War prepared a draft 'Audit of the Damages Incurred as a Result of the War'¹⁵. According to this report, the total economic damage caused by Russian aggression and the destruction of infrastructure, including losses from a decline in gross national product, reduced foreign direct investment, labor outflow, and increased defense and social support costs, ranges from USD 564 to 600 billion. At the same time, according to the World Bank, Ukraine's gross national product in pre-war 2021 was only USD 200.1 billion¹⁶.

If we consider the economic damage to Ukraine's infrastructure caused solely by the shelling of the energy system during the heating season, according to the United Nations Development Program (UNDP), the amount of damage to the energy sector was more than USD 10 billion¹⁷. Transformer substations and power plants suffered the most damage among energy facilities. According to a preliminary estimation by the Ukrainian hydroelectric generating state-owned company 'Ukrhydroenergo,' the damage caused by missile attacks to hydroelectric facilities alone amounted to

about 40 billion UAH¹⁸. State Thermal Energy Company (DTEK), a private power generating company, estimates the damage caused by Russian missiles targeting its thermal power plants at 6 billion UAH¹⁹. The National Energy Company 'Ukrenergo' and the National Nuclear Energy Generating Company 'Energoatom' have not yet provided their final calculations for the damage caused by mass missile attacks. In general, the amount of direct damage from the destruction of energy infrastructure should be supplemented by the loss of income from electricity generation by state and private generating companies, green energy, a drop in income of the National Energy Company 'Ukrenergo,' and regional distribution operators from the provision of electricity distribution services to consumers, and the loss of foreign exchange earnings of Ukraine from energy exports abroad.

The power outages and restrictions imposed throughout Ukraine had a negative impact on the economy as a whole. The National Bank of Ukraine, in its commentary on changes in Ukraine's real gross domestic product, noted that in late spring and during the summer of 2022, the first signs of economic recovery after the shock caused by the start of the full-scale military invasion appeared. However, the recovery was abruptly interrupted by an electricity shortage that forced some businesses, organizations and individual entrepreneurs to either suspend

15 Official assessment of losses due to Russian aggression: <https://www.kmu.gov.ua/storage/app/sites/1/recoveryrada/ua/audit-of-war-damage.pdf> (Last accessed on 22 April 2023).

16 Data Commons. Ukraine: https://datacommons.org/place/country/UKR?utm_medium=explore&mprop=amount&popt=EconomicActivity&cpv=activitySource%2CGrossDomesticProduction&hl=en (Last accessed on 20 April 2023).

17 Ukraine Energy Damage Assessment: <https://www.undp.org/ukraine/publications/ukraine-energy-damage-assessment> (Last accessed on 21 April 2023).

18 Information available on: <https://finbalance.com.ua/news/ukrhydroenerho-otsinyu-zbitki-cherez-raketni-udari-rosi-na-40-mlrd-hrn> (Last accessed on 14 April 2023).

19 Information available on: <https://forbes.ua/news/v-dtek-energo-otsinyuyut-shkodu-vid-rosiyskikh-atak-mayzhe-v-6-mlrd-grn-22032023-12562> (Last accessed on 19 April 2023).

their operations entirely, or significantly reduce production and services. Thus, the electricity shortage caused by Russia's attacks on the energy infrastructure led to a deepening of the decline in the Gross Domestic Product in the fourth quarter, to 31.4% year-on-year²⁰. It is worth noting that some Ukrainian businesses and civilians have gradually adapted to the power outages by purchasing generators, inverters, and other autonomous power sources. In 2022, imports of generators to Ukraine increased more than 50 times, and the total number of officially imported generators amounted to 669.4 thousand units²¹.

When assessing the damage caused to the country's critical infrastructure, according to the methodological recommendations of the European Valuation Standards Council, the amount required for demining and clearing explosive ordnance from infrastructure facilities and territories should also be added. According to estimates by the 'CASE Ukraine' project, funded by the International Solidarity Fund under the Polish Development Cooperation Program of the Ministry of Foreign Affairs of the Republic of Poland, the estimated area contaminated by mines and ammunition ranges from 132,000 to 300,000 square meters. Accordingly, in relation to the contaminated area, the cost of complete demining of the territory will cost from USD 400 to 900 billion²².

20 Information available on: <https://bank.gov.ua/ua/news/all/komentar-natsionalnogo-banku-schodo-zmini-realnogo-vvp-u-2022-rotsi> (Last accessed on 13 April 2023).

21 Information available on: https://biz.censor.net/news/3391662/import_generatoriv_v_ukrayinu_zris_za_rik_u_ponad_50_raziv (Last accessed on 2 May 2023).

22 Information available on: <https://cost.ua/tsina-rozmi-nuvannya-do-900-mlrd-i-desyatky-rokiv> (Last accessed on 2 May 2023).

The scale of damage from the crimes of the Russian army seriously increased after 6 June 2023, when Russian forces provoked an explosion on the dam of the Kakhovska Hydroelectric Power Plant²³. The war crime and act of ecocide committed by the Russian occupation forces is another crime that deliberately impacted living conditions, and which was calculated for the partial physical destruction of the Ukrainian nation in the region of the Kakhovska Hydroelectric Power Plant.

3. The Impact of Economic Losses from the Destruction of Ukraine's Critical Infrastructure

The constant shelling of civilian infrastructure and residential buildings by Russian forces is a gross violation of international treaties, and can be qualified as a crime of genocide of the Ukrainian nation. The resulting destruction of housing, educational, medical and cultural institutions, and the energy sector, do not provide Russia with any military advantages on the battlefield. The fact that the actions committed by the military forces of the Russia against Ukrainian people can be qualified as genocide is evidenced by a large number of factors, including mass killings of civilians because of their nationality, deportation, and deliberate missile attacks on critical infrastructure. According to the Convention on the Prevention and Punishment of the Crime of Genocide, adopted by the United Nations General Assembly in 1948, genocide means any of the following acts committed with intent to destroy, in whole or in part, a

23 Information available on: https://www.ukrinform.ua/rubric-other_news/3720776-pidriv-rosianami-kahovskoi-ges-usi-novini.html (Last accessed on 15 June 2023).

national, ethnical, racial or religious group: Killing members of the group; causing serious bodily or mental harm to members of the group; deliberately inflicting on the group conditions of life calculated to bring about its physical destruction in whole or in part; imposing measures intended to prevent births within the group; and forcibly transferring children of the group to another group (Convention on the Prevention and Punishment of the Crime of Genocide, 1948).

The Convention provides for an explanation of the concept of genocide, but does not provide for jurisdiction to prosecute individuals who have committed the crime of genocide. The document that provides for jurisdiction and, at the same time, qualification of the crime of genocide is the Statute of the International Criminal Court. According to Art. 6(c) of the Statute, for the purposes of this Statute, "genocide" means any of the following acts committed with intent to destroy in whole or in part a national, ethnic, racial or religious group as such: "[...] c) deliberately inflicting on the group conditions of life calculated to bring about its physical destruction in whole or in part" (The Statute of the International Criminal Court, 1998). It is important to clarify that the crime of genocide is not only the intentional act itself, but also the intent to destroy a group in whole or in part. Missile attacks on critical infrastructure definitely impact the living conditions of Ukrainians, and therefore lead to the physical destruction of the Ukrainian nation. The intentionality of the missile attacks is undoubtedly evident, as the accuracy of the attacks cannot be accidental. It should be emphasized that all the missile at-

tacks occurred in the fall and winter, and the scale and timing of the shelling, proves the purpose of such actions – to create conditions for the partial destruction of Ukrainians, since such conditions turned their lives into a process of survival.

Constant missile attacks on peaceful cities and civilian infrastructure, and destruction of the energy system during the cold season when heating is required, are actions that violate a number of international treaties. By launching missile attacks on critical infrastructure, Russia is deliberately killing Ukrainians, exerting psychological pressure on the Ukrainian people, and creating living conditions aimed at their complete or partial destruction. In parallel, having occupied a part of the country's territories, Russia is carrying out repressions; killing, torturing and committing violent acts against Ukrainians; carrying out the forceful deportation of Ukrainian children; stealing grain and agricultural products; destroying agricultural machinery; and mining fields. All these actions are direct evidence of the aggressor's deliberate destruction of the Ukrainian people.

Russia has spent USD 7.5 billion on launching massive missile strikes against Ukraine²⁴. The total cost for Russia of waging its military invasion on Ukraine as of March 2023 reached 115 billion USD²⁵. However, there currently exist no accurate assessments

24 Information available on: <https://focus.ua/uk/voen-nye-novosti/554103-rf-za-5-mesyacev-potratila-nadary-po-ukraine-7-5-mlrd-analitiki> (Last accessed on 2 May 2023).

25 Information available on: <https://forbes.ua/war-in-ukraine/rosiya-vitratila-na-viynu-z-ukrainoyu-mayzhe-115-mlrd-i-vsi-tanki-yaki-mala-pered-vtorgnennya-rozrakhunki-forbes-24022023-11970> (Last accessed on 4 May 2023).

as to the total cost of Ukraine's destroyed critical infrastructure, which includes the aerial bombardment and artillery shelling of residential buildings in cities. It is estimated that the damage caused to such infrastructure amounts to USD 500-600 billion. And yet it did not result in the complete collapse of the Ukrainian economy (as noted before, the decrease in gross domestic product during the first year of the military conflict was approximately 30%), nor did it disrupt the implementation of the state budget and the financing of the military needs of the Ukrainian Armed Forces. Further, complete economic collapse is not likely, as Ukraine receives significant support from the Allied countries.

Still, the main goal of these attacks is the destruction of the Ukrainian nation by creating survival-like conditions for the Ukrainians. Russia has been able to cause a humanitarian crisis in some regions of Ukraine. According to analysts' assessments, based on data from the Ministry of Communities and Territories Development of Ukraine, more than 2.4 million Ukrainians lost their homes during Russia's full-scale invasion, while the total number of applications for compensation submitted through the Diia app and administrative service centers exceeded 300,000, submitted from the region with an area over 23 square kilometers²⁶. The Ukrainian government is currently unable to solve the problem of destroyed housing due to ongoing military activities, or to deal with the need to finance defense expenditures. A significant problem in the context of deliberately impacting on living conditions of

Ukrainians, calculated to bring about their physical destruction, is the number of internally displaced persons (IDPs). According to the report of the Ministry of Social Policy, over 4.9 million Ukrainians have officially become internally displaced persons due to the military activities and missile attacks. This phenomenon created an additional challenge for the Ukrainian government and local governments, seeing them having to deal with thousands of additional inhabitants flooding into their municipalities²⁷. Yet, the biggest difficulty for the Ukrainian nation has been the massive outflow of Ukrainians abroad. According to the UN High Commissioner for Refugees, around 8,174,189 people have left Ukraine, while 5,044,033 registered for temporary protection in the European Union member states²⁸, especially Poland.

The number of internally displaced persons and Ukrainians who moved abroad has resulted in a significant reduction in Ukraine's population, loss of employees (in both the public and private sectors), and the loss of skilled workers. According to the research conducted by the Center for Economic Strategy in cooperation with the Ukrainian mobile operator 'Kyivstar' and the National Bank of Ukraine, 87% of migrants are women with children. 65% of these women are of working age, while nearly 70% have higher education²⁹. Some of these people do not plan to

27 Міністерство соціальної політики України. Внутрішньо переміщені особи: <https://www.msp.gov.ua/timeline/Vnutrishno-peremishcheni-osobi.html#>

28 Operation data portal. Ukraine refugee situation: <https://data.unhcr.org/en/situations/ukraine>

29 Наскільки масштабною буде демографічна криза в Україні і як повернути біженців: <https://texty.org.ua/fragments/109074/yakym-ye-masshtab-majbutnoyi-demohrafichnoyi-kryzy-v-ukrayini/> (Last accessed on 21 May 2023).

26 2.4 мільйони українців втратили домівки за час війни: <https://www.epravda.com.ua/publications/2022/11/7/693516/> (Last accessed on 19 May 2023).

return to Ukraine even after the attacks on Ukraine's infrastructure stop and the Russian aggression ends, and the gradual integration of Ukrainians into foreign labor markets and educational processes will only increase the percentage of people who will not return to the country.

The deliberate missile attacks and destruction of that critical infrastructure, on which the survival of the Ukrainian nation depends, are aimed at the partial destruction of the Ukrainians. The economic and social development of every nation is an important factor for its future growth and progress within its own state. The substantial number of internally displaced persons, the migration of millions of Ukrainians abroad, and the humanitarian crisis in many regions of Ukraine are a notable obstacle to the nation's growth. The aggravation of the demographic crisis in Ukraine, due to the wave of forced migration of Ukrainians caused by the military activities and missile attacks on residential areas and critical infrastructure, may in the near future make the economic consequences much worse for the Ukrainian nation.

Conclusion

Missile attacks on Ukraine's critical infrastructure have caused significant economic losses for the Ukrainian nation. Direct losses from the destruction, according to the replacement cost method, currently amount to more than USD 114 billion, while the total losses, according to various estimations by Ukrainian think tanks, government authorities, and international financial organizations, amount to USD 500-600 billion. In to-

tal, 207,500 private cars, 153,900 residential buildings, 16,000 units of public transport, 3,170 educational institutions, 1,216 health-care facilities and 1,800 cultural institutions were destroyed during the first year of Russian aggression. One of the largest international crimes against Ukrainians are the missile attacks on critical infrastructure that began on 11 September 2022. Due to missile attacks on thermal and hydroelectric power plants, substations and power lines, some cities and regions were completely de-energized, and a significant power shortage was created in the energy system, leading to blackout schedules having to be introduced for all regions that lasted several months. The shelling of the energy system caused significant damage to the country's economy as a whole, although its main goal was to deliberately destabilize the living conditions of Ukrainians, a move calculated to physically destroy the nation in part and to put those living there under such psychological pressure that some Ukrainians were forced to migrate abroad.

It has been established that missile attacks of critical infrastructure violate not only a number of international treaties, but can also be qualified as a crime of genocide under Article 6(c) of the Statute of the International Criminal Court. The destruction carried out by Russian armed forces is aimed at the destruction of the Ukrainian nation, as by launching missile strikes on critical infrastructure, the Russian armed forces deliberately kill Ukrainians, exert psychological pressure on the Ukrainian people, and impact living conditions.

By shelling and destroying Ukrainian infrastructure, Russia has caused significant

economic and humanitarian damage to the Ukrainian nation. About 2.4 million Ukrainians have lost their homes, 4.9 million have been internally displaced, and more than 8 million have moved abroad seeking legal protection. All these factors may cause a demographic crisis in Ukraine. It is therefore important to restore the critical infrastructure, energy systems, and housing destroyed by the Russian armed forces, and to demine Ukrainian territory so as to ensure safe living and working conditions in the country.

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