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CONTENT

CRITICAL INFRASTRUCTURE ENTERPRISES AS THE FOUNDATION OF UKRAINE'S ECONOMIC SECURITY UNDER MARTIAL LAW

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In the context of ongoing full-scale armed aggression against Ukraine, critical infrastructure is not only a target of deliberate destruction, but also a determining factor in ensuring national resilience, economic security, and social stability [1]. Enterprises operating in the energy, transport, water supply, communications, healthcare, and food security sectors are subject to the combined impact of military risks, which leads to a significant reduction in their operational capacity, loss of fixed assets, and destruction of logistics chains.

The formation of an effective economic security system for these enterprises requires a rethinking of traditional approaches to risk management, ensuring the sustainability of business processes, and adaptability to emergency conditions [2]. Of particular relevance is the integration of mechanisms for strategic planning, financial stability, cyber security, and information transparency [3], which can minimize losses and ensure the continuity of operations in emergency situations. In this context, research into the economic security of critical infrastructure enterprises under martial law is a necessary scientific and practical prerequisite for the development of effective public policy tools aimed at increasing their resilience, competitiveness, and ability to recover.

According to data from the Ministry of Economy and international donors, as of the end of 2024, direct infrastructure losses from Russia's full-scale aggression amounted to nearly $176 billion USD (Fig. 1), with a need for restoration of $524 billion USD during 2025–2034. [4]. According to estimates by the Kyiv School of Economics (KSE), as of the end of 2024, total direct losses from damage and destruction of infrastructure facilities exceeded $170 billion USD, of which approximately $38.5 billion was attributable to transport infrastructure facilities and $14.6 billion USD [5].

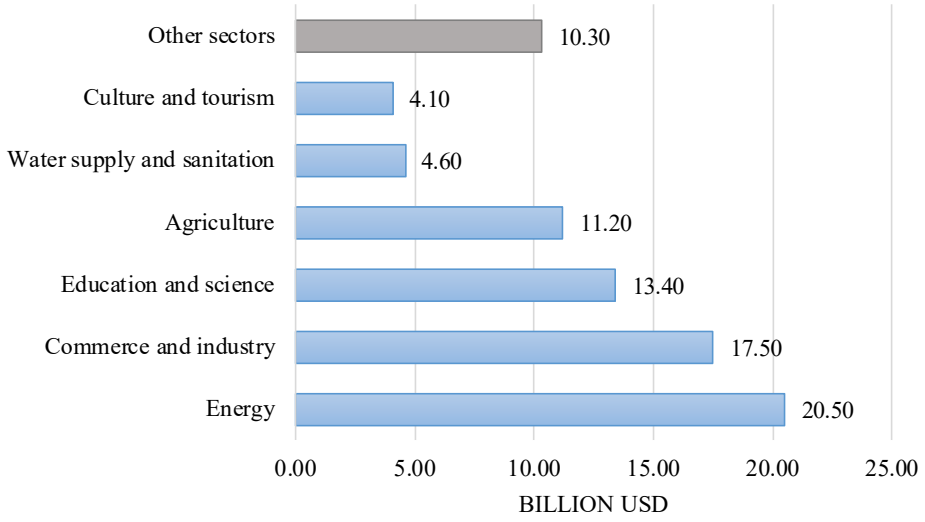

Figure 1. Damage caused to Ukraine's infrastructure.
Source: compiled by the author according to [6]

Power generation companies were hit the hardest: over 9 GW of capacity was destroyed, which is more than half of peak winter demand. Such a loss of generating capacity leads to systemic interruptions in energy supply, which directly affects the production cycles of industrial enterprises, the activities of medical institutions, and the uninterrupted supply of water and heat [7]. Constant massive attacks on Ukraine's energy system facilities have led to a significant increase in lost productive time. Thus, after the strikes in November 2022, productivity losses reached 55% in the first days after the shelling, remaining at 17–25% over the following weeks [8]. These consequences had a particularly devastating impact on critical infrastructure enterprises with continuous production cycles, where every hour of downtime means losses not only on an economic scale, but also on a social scale.

A separate threat is posed by systemic food security disruptions due to the loss of agricultural production infrastructure. About 20% of agricultural land was occupied or mined, leading to a significant reduction in food exports and instability in the domestic market [9]. Food logistics chains, which are closely linked to the functioning of ports, railways, and storage facilities, have been particularly vulnerable. As a result of the destruction of grain storage and transportation infrastructure, the country has lost part of its logistics potential, which reduces foreign exchange earnings and destabilizes the financial system.

Cyber threats have become another powerful destructive factor. For example, an attack on the national mobile operator Kyivstar in December 2023 led to the temporary paralysis of communications for nearly 24 million users, including critical infrastructure enterprises. This demonstrated the high vulnerability of the telecommunications sector to hybrid threats and the need for immediate strengthening of cyber resilience [10].

Financial support for critical infrastructure resilience remains one of the most difficult challenges. In 2024, international aid amounted to more than $35 billion, of which 41% was in the form of grants, but this amount is insufficient to ensure the full

reconstruction of systemically important enterprises [5]. The involvement of private capital is still limited, although positive examples, such as the implementation of the Olimpex project in the port of Odesa [11], demonstrate the potential of sustainable business models [12] even in wartime.

Thus, under conditions of systemic pressure and multifactorial threats, Ukraine's critical infrastructure enterprises are becoming a strategic axis of economic security. Their functional capacity determines the state's ability to meet the basic needs of the population, maintain economic activity, and carry out rapid recovery after destruction [13]. Therefore, the integration of risk-oriented approaches to management, the digitization of monitoring processes, and the reservation of resources are key areas for strengthening the resilience of critical infrastructure in conditions of martial law and during the post-war recovery phase.

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