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State, Problems of Public Administration and Strategic Priorities for the Restoration of Critical Infrastructure of Ukraine (2022–2025)

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ABSTRACT

The article, based on data from the Kyiv School of Economics and RDNA3/RDNA4 reports, examines the scale of direct damage to Ukraine's critical infrastructure caused by Russian aggression in 2022–2024. It is established that the total amount of direct losses reached 169.8 billion USD, and long-term needs for restoration are estimated at 524 billion USD. The sectoral (energy, transport, housing and communal services) and geographical features of the destruction are analyzed. Systemic problems of public management of reconstruction are identified: corruption risks (on the example of NPP "Ukrenergo"), low efficiency of the corporatization model of state-owned enterprises, and delays in project implementation (on the example of restoring water supply to Mykolaiv). Positive foreign experience is presented (Costa Rica, Uruguay, Indonesia). A strategic framework for recovery is outlined (RDNA4 reports, National Critical Infrastructure Protection Plan, DREAM digital ecosystem) and the financial gap is characterized, which is 9.96 billion USD by 2025. Recommendations are proposed: introduction of mandatory due diligence, development of regionally differentiated performance indicators, and adoption of a single nationwide recovery plan.

KEYWORDS

critical infrastructure, direct damage, public administration, corporatization, RDNA4, DREAM, due diligence, financial gap.

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Філософія та управління

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Стан, проблеми публічного управління та стратегічні пріоритети відновлення критичної інфраструктури України (2022–2025)

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СТАТТЯ

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АНОТАЦІЯ

У статті, що ґрунтується на даних Київської школи економіки та звітах RDNA3/RDNA4, досліджується масштаб прямих збитків, завданих критичній інфраструктурі України внаслідок російської агресії у 2022–2024 роках. Встановлено, що загальний обсяг прямих збитків сягнув 169,8 млрд доларів США, а довгострокові потреби на відновлення оцінюються у 524 млрд доларів США. Проаналізовано галузеві (енергетика, транспорт, житлово-комунальне господарство) та географічні особливості руйнувань. Виявлено системні проблеми державного управління процесом відновлення: ризики корупції (на прикладі АЕС «Укренерго»), низька ефективність моделі корпоратизації державних підприємств та затримки у реалізації проєктів (на прикладі відновлення водопостачання в Миколаєві). Наведено позитивний міжнародний досвід (Коста-Ріка, Уругвай, Індонезія). Визначено стратегічні рамки відновлення (звіти RDNA4, Національний план захисту критичної інфраструктури, цифрова екосистема DREAM) та охарактеризовано фінансовий дефіцит, який до 2025 року становитиме 9,96 млрд доларів США. Запропоновано такі рекомендації: запровадження обов'язкового комплексного аналізу (due diligence), розробка регіонально диференційованих показників ефективності та прийняття єдиного загальнонаціонального плану відновлення.

КЛЮЧОВІ СЛОВА

критична інфраструктура, прямі збитки, державне управління, корпоратизація, RDNA4, DREAM, комплексна перевірка, фінансовий дефіцит.

1. Introduction

The full-scale invasion of the Russian Federation into the territory of Ukraine, which began on February 24, 2022, caused unprecedented destruction of critical infrastructure (CI) facilities - energy supply systems, transport communications, water supply and sewage systems, and communications. The restoration of these facilities is not only a technical but also a complex managerial task that requires a review of established models of public administration, the involvement of international technical and financial assistance, as well as the implementation of the "Build Back Better" principle [15].

The purpose of this article is to comprehensively assess the extent of damage, identify systemic flaws in the public management of the reconstruction of the CI, and determine strategic priorities based on official reports of international organizations and a comparative analysis of foreign experience.

2. Literature Review

The issue of public management of critical infrastructure in the context of military destruction is only slowly taking shape in the domestic scientific discourse. The vast majority of available literature focuses either on macroeconomic damage assessment (for example, reports of the Kyiv School of Economics [1] and the World Bank RDNA3 / RDNA4 series [2; 12; 18-21]), or on theoretical considerations of corporatization models without reference to specific realistic Ukrainian scenarios. At the same time, Magomedov's studies [9; 10] suggest adapting the public management system to modern security challenges and emphasize the need to implement the "Build Back Better" principle, but practical issues of critical infrastructure protection and recovery from emergencies remain outside the scope of their interests.

Among the results of foreign research, thematic studies of effective corporatization occupy a prominent place. MacDonald [11] argues convincingly that the "walls" between the state and the enterprise in this model are always porous and subject to constant negotiation, never an impenetrable barrier. In contrast, Chávez [3], using the Costa Rican state-owned energy company ICE as his argument, argues that success depends on the ability to finance socially important but economically unviable projects. The Uruguayan experience, described by Spronk, Crespo and Olivera [17], suggests that a constitutional ban on the privatization of water resources can provide a solid basis for long-term sustainability. The International Monetary Fund toolbox proposed by El Reyes et al. [7] (the "Health Check Tool" for assessing fiscal risks) demonstrates approaches to minimizing threats to the budget from investment projects by national corporations, but its application in Ukraine is hampered by the lack of independent monitoring and political consensus.

For strategic documents of Ukraine, the provisions of the Law "On Critical Infrastructure" [13] and the National Plan for Protection and Ensuring the Security and Resilience of CI [14; 22], the Categorization Methodology [15], which implement the corresponding standard regulatory package, are the regulatory basis, however, as Konev rightly notes [8], these documents do not create a single architecture of recovery management. Even the DREAM digital ecosystem [5;6;16], which has obvious advantages in the direction of transparency, suffers from incompleteness and lateness of data entry, and the effectiveness of this system is directly related to the political will to ensure real accountability. Thus, in the scientific literature, there is clearly a gap between quantitative assessments of damage and a deep institutional analysis of deformations of public administration, which gives rise to a request for current research.

3. Problem Statement

Despite a significant amount of analytical materials on direct damage to critical infrastructure in Ukraine [1; 6; 18; 21], and even some individual studies on public sphere issues [9; 10], a holistic study of systemic post-war (reconstruction) has not yet been developed. In particular, a combination of corruption risks (a case study is the scandal in the National Energy Company Ukrenergo), an imperfect model of corporatization of state-owned enterprises, a chronic financial gap (9.96 billion US dollars for 2025 alone), and the absence of a single legally binding national recovery plan remain outside the scope of a comprehensive analysis. Existing publications mostly focus either on macroeconomic calculations or on theoretical constructs that are not based on specific cases from Ukraine (the long-term rehabilitation of the water supply system in Mykolaiv, political interference in the activities of the

supervisory board). Therefore, there is a scientific and practical challenge: to identify institutional shortcomings in public management of critical infrastructure restoration and to formulate strategic priorities that would take into account the positive experience of international practice along with the security and financial realities of wartime.

4. Methods and Materials

The methodological basis of the study is formed by four complementary groups of approaches.

The first is the analysis of secondary statistical data, in particular the reports of the Kyiv School of Economics (KSE) [1], the World Bank (RDNA3 – [12; 21], RDNA4 – [2; 18; 19]), as well as the National Institute for Strategic Studies [12].

The second is the case study method applied to the analysis of three typical cases: large-scale destruction of the energy sector, the corruption scandal in NPC Ukrenergo and the protracted restoration of water supply in the city of Mykolaiv [1; 8].

The third is a comparative institutional analysis of corporatization models in Costa Rica, Uruguay and Indonesia [3; 4; 7; 17].

The fourth is a content analysis of the current strategic documents of Ukraine: the Law of Ukraine "On Critical Infrastructure" [13], the National Plan for the Protection of Critical Infrastructure [14; 22] and Methods of categorization of CI objects [15].

The source base is also supplemented by analytical materials [7; 9; 10] and data from the public procurement system "Prozorro" [1].

All sources cited in the article have direct links in the text, and their list is provided at the end of the publication.

5. Results and Discussion

5.1. Large-scale destruction of critical infrastructure

According to the KSE report (November 2024), the total amount of direct damage caused to the infrastructure of Ukraine reached 169.8 billion USD [1]. Compared to the beginning of 2024, this figure increased by 12.6 billion USD, or 8%, which indicates an intensive continuation of destruction throughout the year. Table 1 presents a general assessment of direct damage to infrastructure as of November 2024.

Table 1. Total assessment of direct damage to infrastructure as of November 2024

Property type	Estimated direct losses, $ billion	Share	Preliminary estimate, $ billion	Dynamics
Residential buildings	60,0	35,3%	58,9	1,9%
Infrastructure	38,5	22,7%	36,8	4,6%
Energy*	14,6	8,6%	10,0	46,0%
Enterprise assets, industry	14,4	8,5%	13,1	9,9%
Agriculture and land resources	10,3	6,1%	10,3	0,0%
Education	7,3	4,3%	6,8	8,8%
Forest fund	4,5	2,7%	4,5	0,0%
Healthcare	4,3	2,5%	3,1	32,3%
Culture, tourism, sports	4,0	2,3%	3,1	29,0%
Housing and utilities*	3,5	2,0%	3,5	0,0%
Transportation	3,5	2,0%	3,1	12,9%
Trade	2,8	1,7%	2,6	7,7%
Digital infrastructure	1,2	0,7%	0,5	140,0%
Administrative buildings	0,8	0,4%	0,5	60,0%
Social sphere	0,2	0,1%	0,2	0,0%
Financial sector	0,04	0,01%	0,04	0,0%
Total	169,8	100%	157,2	8,0%

** heat was transferred from housing and communal services to the energy sector, because CHPs produce both electricity and heat simultaneously*

Source: [1].

As can be seen from Table 1, the largest share in the total losses is occupied by the housing sector – 60.0 billion USD (35.3%), followed by transport infrastructure – 38.5 billion USD (22.7%), energy – 14.6 billion USD (8.6%), assets of enterprises, industry and construction – 14.4 billion USD (8.5%), agricultural sector and land resources – 10.3 billion USD (6.1%). Among other sectors, significant losses were recorded in education (7.3 billion USD), healthcare (4.3 billion USD), culture, tourism and sports (4.0 billion USD), as well as housing and communal services (3.5 billion USD) [1].

The energy sector turned out to be one of the most vulnerable: losses here are estimated at 14.6 billion USD, and their growth dynamics for the year amounted to 46% – a record figure among all infrastructure categories. According to the report, since the beginning of the full-scale invasion, all thermal power plants (TPPs) in the territory controlled by Ukraine, as well as 20 combined heat and power plants (CHPs), have been damaged. Direct losses for TPPs are estimated at $3.8 billion, for CHPs at $1.6 billion, and for hydropower (hydroelectric power plants and pumped storage plants) at $2.5 billion. [1].

The most devastating single event was the explosion of the Kakhovka HPP in June 2023, which caused direct losses of $586 million, caused flooding of dozens of settlements, disrupted the water supply of southern Ukraine (including temporarily occupied Crimea) and the cooling system of the Zaporizhzhia Nuclear Power Plant [1; 9]. The regional distribution of these losses is illustrated in Figure 1, which shows the damage caused to the energy infrastructure of the regions of Ukraine for the period from February 24, 2022, to December 31, 2023.

The renewable energy sector also suffered significant losses. According to the Energy Charter Secretariat, 13% of solar generation capacity was located in the occupied territories, of which 8% was damaged or destroyed; about 80% of wind power plants are under the control of the occupiers, and some of them were affected by shelling [1].

Direct losses for producers of "green" electricity (excluding large hydroelectric power plants) are estimated at $ 281 million. No less dramatic are the losses to transport infrastructure, which reach $ 38.5 billion.

Table 2 provides an assessment of direct losses to transport infrastructure, conducted by the Kyiv School of Economics in cooperation with the Ministry of Community and Territorial Development.

Table 2. Assessment of direct losses of transport infrastructure

Types of losses	Units of measurement	Original quantity	Destroyed/damaged	Estimated losses, $ billion
National roads	km	47 000	9 298	9,9
Local roads	km	120 000	9 056	9,6
Communal roads (cities and other settlements)	km	270 000	8 277	8,8
Bridges and overpasses UZ assets	od.	11 076	344	2,6
Infrastructure of sea and river ports	X	X	X	4,5
Aviation industry	X	X	X	1,0
Property of postal operators	od.	36	20	2,0
Total	X	X	X	0,01

Source: [1].

According to it, 9,298 km of national highways were destroyed or seriously damaged (losses estimated at $9.9 billion), 9,056 km of local roads ($9.6 billion), and 8,277 km of municipal roads in cities and other settlements ($8.8 billion). In addition, 344 bridges and overpasses ($2.6 billion) were destroyed, and significant damage was caused to railway infrastructure ($4.5 billion), sea and river port infrastructure ($1.0 billion), and the aviation industry ($2.0 billion) [1]. In total, 20 out of 35 airfields were damaged, including 12 civilian and 7 dual-purpose. The railway, which played a key role in the evacuation of millions of citizens, lost more than 700 km of tracks and about 10,000 buildings.

The housing and communal services, which provide the population with basic water and heat needs, suffered direct losses of $3.47 billion. The estimate of direct losses for the housing and communal services is presented in Table 3.

Table 3. Assessment of direct losses of housing and communal services

	Units of measurement	Original quantity	Destroyed	Damaged	Estimated losses, $ billion
Water treatment plants	units	400	7	18	0,36
Sewage treatment plants	units	967	23	28	1,03
Water pumping stations	units	5 646	109	73	0,24
Sewage pumping stations	units	2 908	63	120	0,35
Water supply networks	linear meter	98 076 470	1 947 026	0	0,54
Sewerage networks	linear meter	37 053 200	582 863	0	0,75
Wells	units	22 134	125	34	0,02
Laboratories	units	n.d.	4	2	0,001
Pure water tanks	units	2 129	33	4	0,04
Water towers	units	695	101	38	0,02
Containers for household waste collection	units	n.d.	23 145	0	0,02
Garbage trucks	units	3 669	222	0	0,05
Landfill sites for household waste	units	5 969	12	21	0,07
Waste sorting lines	units	34	3	2	0,01
Container sites	units	n.d.	813	97	0,001
Biogas plants	units	21	3	0	0,01
Total	X	X	X	X	3,47

Source: [1].

According to it, 925 boiler houses, 214 central heating stations, and over 354 km of heating networks were destroyed or partially damaged. In the water supply and wastewater sector, 7 water treatment plants, 23 sewage treatment plants, 109 water supply and 63 sewage pumping stations, as well as over 2.5 thousand km of water supply and sewage networks were damaged [1]. Among the regions, the Kharkiv, Chernihiv, Kyiv, Donetsk, and Mykolaiv regions were the most affected. The situation in Mykolaiv is especially critical, which will be discussed in detail in the next section. An important feature of the spatial distribution of losses is their extremely high concentration. Over 90% of the total direct losses fall on ten front-line regions, in particular Donetsk, Luhansk, Kharkiv, Kherson, Zaporizhzhia, and Kyiv. Figure 1 clearly demonstrates this unevenness: the highest rates were recorded precisely in the listed regions, while the western regions suffered relatively minor damage [1; 9].

The largest growth dynamics of losses during 2024 were observed in energy (+46%), administrative buildings (+60%) and digital infrastructure (+140%) [1]. According to the latest RDNA4 report, published in February 2025, total direct damage for the period from February 2022 to December 2024 increased to $176 billion (€170 billion), which is $24 billion more compared to RDNA3 [2; 18; 19; 21]. Long-term needs for recovery and reconstruction over the next ten years are estimated at approximately $524 billion [20; 21]. At the same time, 70% of generation, transmission and distribution facilities were damaged or destroyed in the energy sector, and the housing stock lost 13% of its volume, affecting more than 2.5 million households [19].

5.2. Problems of public governance: corporatization, corruption and delays

Despite the creation of a relatively developed regulatory framework, which includes the Law of Ukraine “On Critical Infrastructure” [13], the National Plan for Protection and Ensuring the Security and Resilience of CIs [14; 22] and the Methodology for Categorization of CI Facilities [6], the real

effectiveness of public governance of recovery remains extremely low [10]. Two cases are most illustrative: the corruption scandal at NPC Ukrenergo and the protracted restoration of water supply in Mykolaiv.

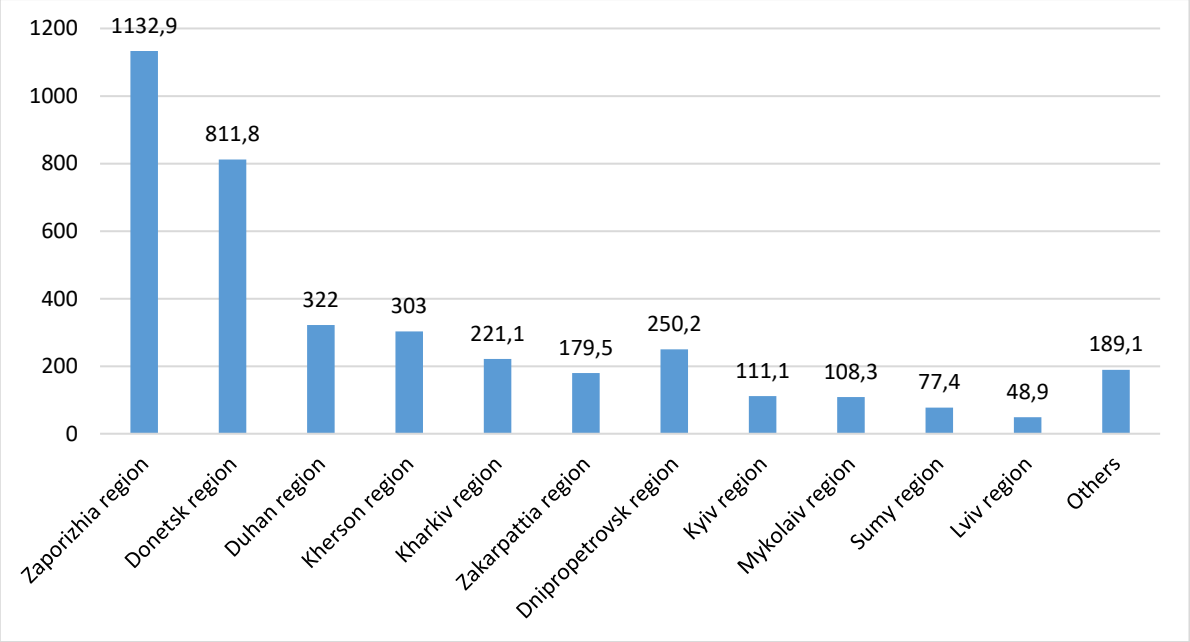

Figure 1. Distribution of direct losses by region, $ billion

Source: Completed by the author based on [1].

The case of Ukrenergo illustrates a deep conflict between the formal independence of the supervisory boards of state-owned enterprises and real political interference. According to the Prozorro public procurement system, in the fall of 2023, the company, bypassing tender procedures, concluded 63 similar contracts for a total of UAH 4.3 billion for the installation of protective structures on transformers [1]. As of September 2024, none of these contracts had been fulfilled, and their completion dates had been repeatedly extended. In August 2024, the Supreme Commander-in-Chief's Headquarters decided to dismiss the Chairman of the Board, Volodymyr Kudrytsky, officially citing unfinished defense structures. However, Daniel Dobbeni, Chairman of the Supervisory Board of Ukrenergo, called this decision political and resigned, which testified to a serious crisis of corporate governance [1]. Additionally, the Supreme Anti-Corruption Court ordered the NABU to open criminal proceedings against Kudrytsky for causing losses to the state of UAH 716 million at the beginning of the full-scale war.

The case of Mykolaiv demonstrates problems at the local level. In April 2022, Russian troops deliberately cut off the Dnipro-Mykolaiv water pipeline, and the explosion of the Kakhovka hydroelectric power station in June 2023 further complicated the situation. As of 2025, the city still does not have a centralized supply of drinking water - residents are forced to use technical water or imported water [1; 8]. Hundreds of millions of hryvnias have been allocated for the reconstruction of the water pipeline, but the work is accompanied by numerous corruption scandals: the head of the working group for the reconstruction of Mykolaiv, Serhiy Korenyev, is on trial for embezzling UAH 27 million (during the reconstruction of Sobornaya Square), and the contractors (Mykolaivmiskbud LLC, Odesaspetsenergo LLC, Gazvodmontazh LLC) have an extremely dubious reputation, in particular, they are involved in criminal proceedings for tax evasion [1; 8]. The mayor of Mykolaiv estimates the real need for funds to solve the problem at 200–300 million euros, but international donors (e.g., Denmark) are only willing to provide partial assistance.

One of the fundamental reasons for the described problems is the ineffective model of corporatization of state-owned enterprises of critical infrastructure. Law No. 5593-d, adopted in February 2024, significantly expanded the competence of supervisory boards, in particular in terms of appointing managers and approving strategic and financial plans. However, the transitional provisions of this law (for the period of martial law and for 12 months after its abolition) retain the authority of the Cabinet of Ministers and the Ministry of Finance to approve financial indicators for the most important state-owned enterprises [1]. As a result, chronic conflicts of interest arise, transparency of activities

decreases, and public enterprises are forced to focus on commercial rather than public goals. As D. MacDonald rightly notes, corporatization always involves the construction of a kind of "walls" between the state and the enterprise, but these walls are flexible and always act as a subject of negotiations, rather than an indestructible obstacle [2].

Positive foreign experience confirms that effective corporatization is possible provided that there are clear mechanisms of accountability and consideration of national characteristics. In Costa Rica, the state-owned energy company ICE has been operating under the "solidarity model" (modelo solidario) since 1949, which has allowed achieving almost 100% electricity coverage even in the most remote regions by investing in socially significant but economically unprofitable projects [3]. In Uruguay, following the reforms carried out by the Frente Amplio coalition (2004), state service agencies (water supply – OSE, electricity – UTE, railways – AFE, telecommunications – ANTEL) introduced horizontal integration and regular coordination meetings at the highest level; it is particularly important that the constitutional ban on privatization of water supply became the first in the world [4; 17]. In Indonesia, the International Monetary Fund introduced a special "Health Check Tool" to assess the profitability, stability and liquidity of state-owned corporations, which helps to minimize fiscal risks of investment projects [7].

That is why Ukraine needs to introduce mandatory due diligence for all investment projects in the field of CI with the involvement of independent anti-corruption bodies (NABU, SAP) and international agencies, develop a system of performance indicators that takes into account the security differentiation of regions, as well as strengthen the role of parliament and public organizations in monitoring the activities of corporatized structures [8-10].

5.3. Strategic planning for reconstruction and the financial gap

The strategic basis for the post-war reconstruction of Ukraine is formed by a series of rapid damage and needs assessment reports (RDNA1–RDNA4), prepared jointly by the World Bank, the Government of Ukraine, the European Union and the United Nations. The most comprehensive is the fourth report (RDNA4), published in February 2025. As already noted, it records direct damage at the level of 176 billion dollars. and long-term needs totaling 524 billion dollars [2; 18; 19; 21]. By sectoral distribution: housing - almost 84 billion dollars, transport - 78 billion dollars, energy and mining - 68 billion dollars, trade and industry - over 64 billion dollars, agriculture - more than 55 billion dollars. Separately, the costs of cleaning up and managing the remains of destruction are about 13 billion dollars [16; 21]. Figure 2 conceptualizes the financing needs and shows the ratio between secured and unsecured financing for both investment recovery projects and non-investment programs.

Despite the large-scale needs, the financing gap remains critical. In 2023, the Government of Ukraine allocated approximately $7.2 billion to finance urgent recovery projects in energy, critical and social infrastructure, housing, humanitarian demining, and support for the public sector [12]. Thanks to these funds, 3,836 apartment buildings and 19,091 individual houses, 448 schools, 237 kindergartens, 390 medical and social institutions were repaired; the construction of 9,200 critical infrastructure facilities, 449 heat supply facilities, 221 water supply and wastewater facilities was completed; emergency repairs were carried out on more than 2,000 km of highways, 115 highway bridges, about 26 km of railway infrastructure, and 46 railway bridges [19]. However, according to RDNA4, the financing needs for 2025 are $15 billion, of which only $5.5 billion has been provided by international partners and the state budget, i.e. the deficit reaches $9.96 billion (over 60% of the needs) [21]. The greatest lack of financing is observed in the energy, industry and services sectors.

The Prime Minister of Ukraine (at the time of preparation of RDNA4 – Denys Shmyhal, who remained in office at the time of writing, but may change in the future) has repeatedly emphasized that the main source of financing for reconstruction should be the confiscation of frozen Russian assets – "Russia must pay" [12; 21]. The government considers the use of income from these assets as a temporary mechanism, but full confiscation has not yet taken place due to political disagreements among international partners, which creates significant uncertainty for long-term planning.

A separate systemic problem is the lack of a single nationwide restoration plan that would have legal force and coordinate the actions of all stakeholders (territorial communities, civil society organizations, donors, private investors) [8; 22]. The documents available today – concepts, registers, methodologies – do not create a holistic restoration management architecture. A positive step was the implementation of the DREAM digital ecosystem (Digital Restoration Ecosystem for Accountable Management), which allows for real-time monitoring of restoration projects, involvement of the public

and donors [5; 6; 18]. However, as experts note, its effectiveness directly depends on the completeness, timeliness of data entry and political will to ensure transparency. It is noteworthy that the Ministry of Development, for example, spent only 1% of its annual budget on reconstruction in the first quarter of 2025, which indicates procedural delays and inefficient use of funds [8].

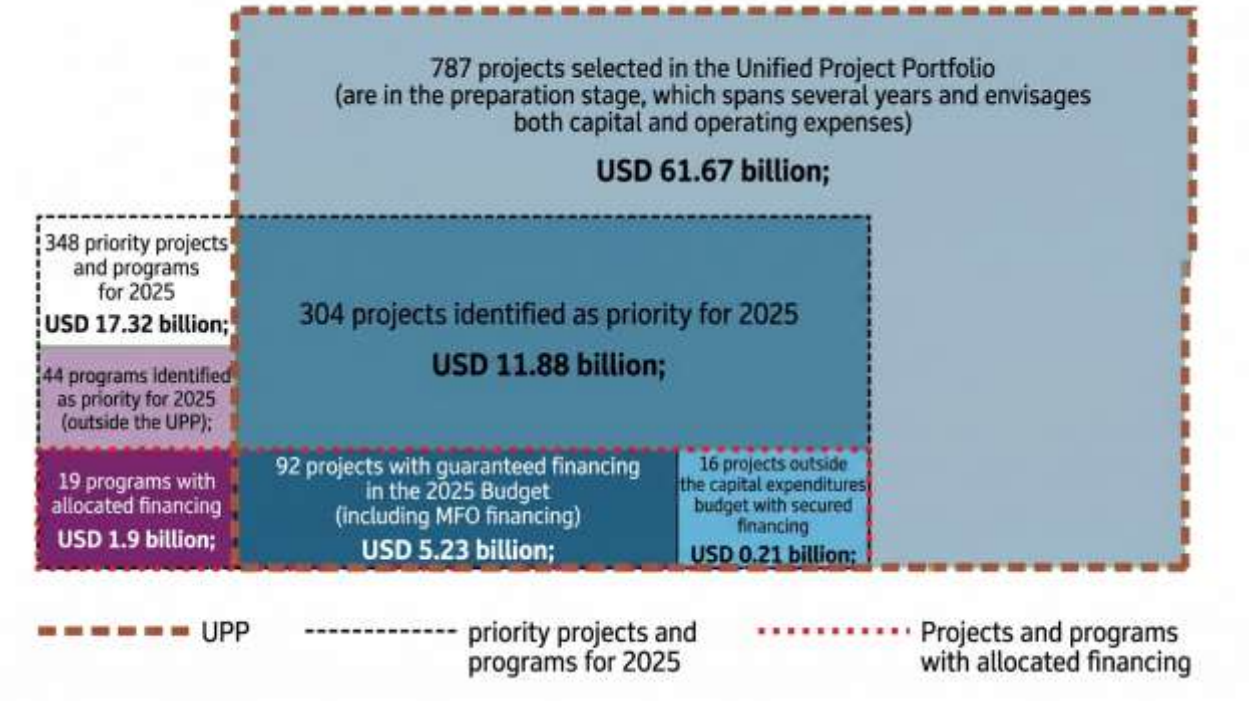

Figure 2. Financing needs and secured financing for investment projects for recovery and reconstruction and non-investment programs

Source: Completed by author based on [1].

6. Discussion and recommendations

The analysis allows us to identify three key groups of problems that hinder the effective reconstruction of Ukraine's critical infrastructure.

The first group is institutional and managerial. It includes an ineffective corporatization model, political interference in the work of the supervisory boards of state-owned enterprises, a high level of corruption (the most striking example is the scandal in Ukrenergo), as well as the lack of an effective system of due diligence for investment projects of the CI. As some domestic researchers rightly note [9; 13], Ukrainian scientific thought is focused mainly on adapting the management system to modern security challenges, but practical issues of protection and effective management remain out of focus.

The second group is financial. This is a chronic shortage of resources ($9.96 billion for 2025 alone), excessive dependence on the politically unresolved issue of confiscation of Russian assets, low absorption capacity of local authorities, as well as inefficient spending of available funds, which is confirmed by the meager volumes of budget development in the first months of the year.

The third group is strategic. It consists in the absence of a single legally binding national recovery plan, fragmentation of data on the current status of projects (despite the presence of the DREAM system), as well as insufficient attraction of private capital due to the persistence of high security and regulatory risks.

Based on the research conducted and taking into account positive foreign experience, the following recommendations are proposed:

1. Introduce mandatory due diligence for all investment projects in the field of critical infrastructure, which should be carried out jointly by independent anti-corruption bodies (NABU, SAPO) and international agencies. In this case, the security differentiation of regions (level of current and predicted danger) should be taken into account.

2. Develop a regionally differentiated system of indicators of the effectiveness of public management of recovery, which would include not only financial metrics, but also indicators of physical protection of facilities, resilience to cyberattacks, speed of restoration of services for the population, etc.

3. Adopt a legally binding nationwide recovery plan that would integrate the results of RDNA4 assessments, sectoral strategies, the budget process and international assistance, with clearly defined stages, responsible executors and performance indicators.

4. Intensify negotiations with international partners on the creation of an effective mechanism for the full confiscation of frozen Russian assets (about $ 300 billion) as the main source of long-term financing of reconstruction.

5. Expand the use of the DREAM digital ecosystem, making it mandatory to publish all recovery projects (regardless of funding sources) with quarterly implementation reports and ensuring real public control [5; 6; 18].

7. Conclusions

The study found that direct damage to Ukraine's critical infrastructure by the end of 2024 reached $169.8 billion (according to RDNA4, $176 billion), and long-term recovery needs over the next ten years are estimated at $524 billion. The greatest damage was suffered by the energy sector (70% of generation, transmission and distribution facilities), transport infrastructure (over 26,000 km of roads and 344 bridges), and housing (over 2.5 million households). Geographically, more than 90% of the losses are concentrated in ten frontline regions of Ukraine.

It was found that public management of reconstruction is characterized by extremely low efficiency, due to systemic corruption (for example, Ukrenergo, where 63 contracts worth UAH 4.3 billion were not executed), political interference in the work of supervisory boards, delays in the implementation of critical projects (Mykolaiv has been without drinking water for more than three years), and an imperfect model of corporatization of state-owned enterprises. On the other hand, positive foreign experience (Costa Rica - 100% electricity coverage, Uruguay - constitutional ban on water privatization, Indonesia - IMF fiscal monitoring) shows that effective corporatization is possible under flexible institutional arrangements, mandatory financial control and guarantees of public accountability.

Strategic planning for reconstruction is based mainly on RDNA4 reports, but the financial gap for 2025 is $9.96 billion. (over 60% of needs remain unmet), and the confiscation of frozen Russian assets remains politically unresolved. The lack of a single legally binding national recovery plan, the low absorption capacity of local authorities (expenditures at the level of 1% of the annual budget in the first quarter of 2025), and chronic bureaucratic delays require immediate institutional reform. Prospects for further research are seen in the development of a methodology for assessing the effectiveness of the use of international technical assistance in the restoration of the CI, the analysis of adaptive models of public-private partnership under martial law, as well as in the creation of an integrated system for monitoring corporatization risks based on the International Monetary Fund toolkit.

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