EASTERN HUMAN RIGHTS GROUP

INSTITUTE FOR STRATEGIC STUDIES AND SECURITY

KONRAD ADENAUER STIFTUNG

Militarization of industry in the temporarily occupied territories of Ukraine:

Infrastructure remnants, repressive practices and military-industrial vectors of the rf

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Analytical report

Militarization of industry in the temporarily occupied territories of Ukraine: infrastructure remnants, repressive practices, and military-industrial vectors of the Russian Federation

September 2025

This analytical report was prepared by the Eastern Human Rights Group and the Institute for Strategic Research and Security based on materials collected in September 2025

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Main tasks

The Eastern Human Rights Group (EHRG) is a non-profit organization of lawyers and human rights activists from the eastern regions of Ukraine. Its goal is to protect human rights and monitor the situation in the southeastern regions and in the temporarily occupied territories of the Russian Federation.

The Institute for Strategic Research and Security (ISRS) is an expert association that studies Russian aggression against Ukraine and other countries.

The EHRG and the ISRS operate on the basis of international human rights norms and the Constitution of Ukraine.

Main tasks are:

- *Protection of human rights in the southeastern regions and occupied territories.*
- *Collection and analysis of information about violations.*
- *Informing authorities, international organizations and society.*
- *Drawing attention to the problems of violations.*
- *Promoting the development of mechanisms for the protection of rights and compliance with international law.*

Methodology

The study is based on the principles of a comprehensive analysis, integrating economic, military, environmental, and humanitarian aspects. The theoretical framework is based on concepts of military economy, security theory, and approaches to studying occupation practices.

The empirical base includes official Ukrainian statistics for 2014 and 2022, data on gross regional product, production volumes, and exports, materials from research centers and human rights organizations, satellite imagery, media publications and open sources, and **56 interviews with residents of the occupied territories**.

Testimonies from enterprise employees, expert assessments by military analysts, and materials from international organizations were also used. Historical, comparative, content, and cartographic analyses, statistical processing, scenario modeling, and legal analysis of violations of international humanitarian law were also used.

The study's structure encompasses an assessment of the pre-war industrial base, the transformation of enterprises after 2014 and 2022, the militarization of underground infrastructure, a logistics analysis, the integration of enterprises into the Russian military-industrial complex, and their military, economic, environmental, and humanitarian consequences.

The practical significance of this methodology lies in its ability to systematically assess the scale of militarization, identify infrastructure vulnerabilities, and prepare recommendations for Ukraine and its international partners on sanctions, information policy, and de-occupation strategy.

Resume

Окуповані Росією території України перетворилися на комплексну військову базу, де промисловість, транспортна та соціальна інфраструктура повністю перепрофільовані під військові потреби. Заводи та шахти, які раніше були промисловим серцем регіону, використовуються як склади боєприпасів, логістичні центри та ремонтні майданчики для техніки. Порти Маріуполя та Бердянська інтегровані у військову логістику, забезпечуючи постачання окупаційних військ та вивезення награбованих ресурсів. Азовське море фактично стало закритим військовим басейном, де Росія порушує міжнародне право та створює загрозу не лише Україні, а й міжнародній безпеці загалом.

Екологічні наслідки набувають катастрофічного характеру: затоплення шахт викликає кислотний дренаж та забруднення підземних вод важкими металами, площа заражених водоносних горизонтів перевищує 3000 км². Засолення та нафтове забруднення ґрунтів зробили десятки тисяч гектарів сільгоспугідь непридатними для використання. Атмосферне забруднення продуктами горіння від військової техніки та хімічних виробництв створило зони постійного смогу, підвищеного рівня канцерогенів та метанової небезпеки.

Азовське море постраждало від розливів нафтопродуктів, загибелі морської фауни та масштабного браконьєрського «зернового піратства». Економічні наслідки для регіону мають незворотний характер. За попередніми даними, зруйновано або зупинено до 90% підприємств, а ті, що залишилися, використовуються виключно у військових інтересах. Традиційні галузі — вугільна промисловість, металургія, аграрний сектор — втратили конкурентоспроможність та функціонують лише в обмеженому вигляді. Втрата портів Маріуполя та Бердянська позбавила Україну до 10 млрд грн щорічного доходу, експорт скоротився на десятки мільйонів тонн продукції. Загальні збитки оцінюються у десятки мільярдів доларів щороку.

Соціальні наслідки виражаються у демографічній катастрофі: масовий відтік населення, евакуація фахівців та виїзд молоді позбавили регіон людського капіталу. Населення окупованих територій скоротилося в рази, значна частина залишилася без роботи, а жителі, що залишилися, страждають від безробіття, низьких зарплат, зруйнованої медицини та відсутності освітніх перспектив. Ситуація посилюється зростанням захворювань, включаючи онкологічні, що підтверджується навіть заявами місцевих колаборантських медичних установ.

У сукупності це означає, що Росія використовує окуповані території як військовий плацдарм та ресурсну колонію, повністю ігноруючи права місцевого населення, екологічну безпеку та перспективи відновлення економіки. Ці землі стають джерелом загрози не лише для України, а й для всього регіону Чорного та Азовського морів, а також безпеки Європи.

За поверхневими оцінками, сума репарацій, які має виплатити Росія лише за окуповані території, становить близько 250 млрд доларів США. У цю цифру входять руйнація інфраструктури, втрата виробничих потужностей, екологічні збитки, соціальні втрати та блокада морських маршрутів. Реальна сума компенсацій може бути значно вищою, якщо враховувати довгострокові наслідки — від деградації водних та земельних ресурсів до медичних витрат на лікування населення та відновлення екосистем.

Introduction

Following the occupation of certain areas of the Luhansk and Donetsk Oblasts in 2014, the Oblasts' industrial base suffered profound degradation. Most enterprises were looted, decommissioned, or destroyed as a result of fighting and lack of maintenance. Those facilities that remained operational lost a significant portion of their production potential and were forced to operate in isolation from the Ukrainian and international economies.

The situation worsened sharply following Russia's full-scale invasion of Ukraine and occupation of the Luhansk, Donetsk, Zaporizhzhia, and Kherson Oblasts in 2022. Most of the existing enterprises there fell under the control of the occupation administrations: some were confiscated and incorporated into Russian economic activity, while a significant number were destroyed during the fighting or as a result of the deliberate dismantling of equipment.

A key focus of the occupiers' policy was **the reorientation of civilian enterprises to serve the needs of the Russian military-industrial complex.** Machine-building plants are used as repair bases for the restoration of military equipment, metallurgical plants are used to produce shell casings and fortification components, and chemical plants are used to produce components for explosives and ammunition.

Thus, the civilian industry of the temporarily occupied territories has ceased to be part of the Ukrainian economy and is effectively integrated into the system of supplying Russia's military needs.

Overview of the situation: the military presence of the RF in the occupied territories of Ukraine

A Russian military contingent of approximately **700,000 personnel,** including at least 35,000 members of the Russian National Guard, has been deployed in the temporarily occupied territories of Ukraine **[32]**. The occupation administration is conducting forced passportization, mobilization, and property seizure, ensuring the replenishment of human and material resources. The Russian National Guard performs control, filtration, facility protection, and support for mobilization activities. This number of troops is comparable to the combined forces of France, Great Britain, and Germany. Maintaining this contingent requires colossal resources: tens of thousands of tons of ammunition, fuel, and food supplies daily. The key logistics route has become the **Rostov-Mariupol-Berdyansk-Melitopol-Dzhankoi-Simferopol land corridor** (the R-280 "Novorossiya" highway), approximately 630 km long, with new branches and bridges, which has shortened the supply route compared to the Crimean Bridge.

Photo 1. *The key logistics route has become the land corridor Rostov-Mariupol-Berdyansk-Melitopol-Dzhankoi-Simferopol (highway R-280 "Novorossiya")*

In the Zaporizhzhia sector, a dense defensive line has been established between Orikhiv, Tokmak, and Melitopol, complete with trenches, minefields, and anti-tank obstacles. The **Melitopol airfield** is used to house helicopters, ammunition depots, fuel, and lubricants. The **port of Berdyansk** has become a transshipment point for cargo and equipment, working in tandem with Mariupol.

Large garrisons and dozens of military facilities, including ammunition depots, repair bases, and hospitals, are located in Donetsk, Makiivka, Horlivka, and Mariupol. These cities have been transformed into militarized zones with the permanent presence of thousands of troops, strengthening the occupation regime. In the Luhansk sector, **the Luhansk railway junction** and the M-04 and M-03 highways, connecting the Oblast with Russia, play a key role. Transshipment bases operate in Alchevsk and Stakhaniv, sending hundreds of tons of cargo daily to the front lines. **The Rodakovo station** serves as an unloading point for military echelons, while the roads through Svatove and Starobilsk provide supplies to the northern groups. The left bank of the Kherson Oblast is fortified by a 15-20 km-deep trench line from Nova Kakhovka to Hola Prystan. Supply hubs are located in Henichesk, Skadovsk, and Kalanchak, using the E-97 and M-14 highways, as well as the North Crimean Canal. Concealed ammunition and fuel depots, command posts, and shelters have been established here. A network of depots operates in Crimea in the areas of Sevastopol, Simferopol, Dzhankoi, Feodosia, and Kerch, as well as underground storage facilities near Sevastopol. Logistics is provided by a rail network connected to the mainland via the Crimean Bridge, the Tavrida and E-105 highways, and the ports of Sevastopol, Feodosia, and Kerch. Thus, the RF has created **a multi-layered occupation system**, where civilian infrastructure and industrial facilities are repurposed for military purposes. Warehouses, repair bases, and hospitals are integrated into the urban environment, ensuring their camouflage and using the population as a "human shield." This logistics network is critical to maintaining the group's combat readiness, and its weak points are strategically important for future operations.

The purpose and relevance of the research task

The aim of this study is **a comprehensive examination of the militarization of industrial infrastructure in the occupied territories of Ukraine after February 24, 2022.** The analysis aims to identify systemic changes in the functioning of industrial facilities, their integration into the military logistics system of the occupiers, and the scale of the transformation of the civilian economy into a militarized one. Particular attention is paid to **assessing the pre-war potential of Donbas enterprises**, their role in the economy, and their strategic importance for national security. After 2014, and especially after the full-scale invasion of 2022, the Oblasts' industries underwent a profound transformation. **Machine-building plants were repurposed as repair bases**, and metallurgical plants were converted into sites for the production of shell casings and fortification elements.

The militarization of underground infrastructure has become an important area: the Donbas mines and Soledar pits are used as secure ammunition depots, command posts, and repair bases. Significant changes have also affected **the transport and logistics system**: the ports of Mariupol and Berdyansk have been converted into military hubs, new railway lines and supply routes have been built, airfields and warehouses have been integrated into a unified military logistics system. At the same time, **captured enterprises are being integrated into the Russian military-industrial complex**, and the Oblast's resources—coal, metal, and grain—are being diverted to serve the Russian army.

This has far-reaching consequences: industrial zones are being transformed into fortified areas and defensive strongholds, used for the covert movement of troops and equipment, and for the creation of secure command centers. Thus, the occupied territories are effectively becoming **a unified military-industrial base for the RF**, which not only strengthens the resilience of its defense in Ukraine but also poses a threat to the security of the entire European region.

Photo 2. *Machine-building plants were re-profiled into repair bases*

Relevance to Ukraine's national security

Research into the militarization of industry in the occupied territories of Ukraine is critical, as it demonstrates that **Russia has transformed these Oblasts of Ukraine into a military base for waging a long-term war and a springboard for expanding aggression beyond Ukraine**. The integration of industrial capacity, resources, and logistics into the Russian military system forms the foundation for the potential deployment of military operations against European countries. **A deeply layered defense system has been created in the occupied territories**, where industrial enterprises have become fortified areas, and mines and quarries have become underground arsenals, repair bases, and command posts. This infrastructure not only strengthens the Russian army in Ukraine but also ensures its ability to rapidly build up forces in the western direction. At the same time, **the Sea of Azov has been transformed into Russia's internal military basin**, where the ports of Mariupol and Berdyansk serve as key transportation hubs, allowing Russia to transfer heavy weapons and equipment. This creates a real threat of naval operations and further pressure on the Black Sea

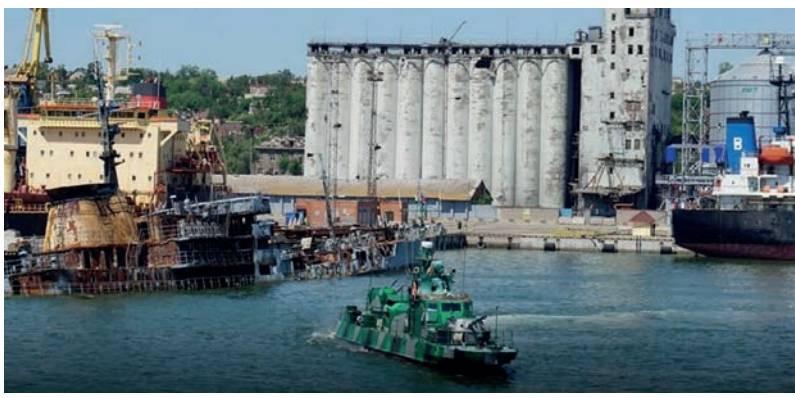


Photo 3. *The Russian Navy armored boat "Shmel" in the occupied Mariupol port*

> *Economic militarization is accompanied by the **full integration of enterprises into the Russian military-industrial complex**. The metallurgy and mechanical engineering industries of the occupied territories are used for weapons production, while coal, metal, and grain are used for military needs. This resource base allows Russia to offset the pressure of sanctions and create an industrial base for a protracted conflict, where Ukraine is only the first line of defense. Environmental consequences also have a transboundary dimension.*

The use of chemical plants for military purposes and the flooding of mines lead to groundwater pollution and the threat of man-made disasters. **The destruction of the Sea of Azov ecosystem** is already affecting the Black Sea region and could harm EU countries dependent on bioresources and maritime trade routes. **The humanitarian aspect shows that the occupation is accompanied** by the widespread use of forced labor, the depopulation of industrial centers, and the destruction of social infrastructure. This creates a zone of instability that will in the future become a source of illegal migration, economic crises, and new humanitarian challenges for Europe. Thus, the militarization of the occupied territories is not only a threat to Ukraine. It creates the basis for the expansion of Russian military aggression toward Europe and directly impacts NATO and EU security. Ukraine is currently the frontline, but the consequences of this militarization will inevitably affect the entire Europe.

Industrial and resource base before 2014 and in the period between 2014 and 2022

Before analyzing the raw figures of production capacity, it's important to emphasize that the region's industrial base prior to 2014 included unique human capital. Over the decades, dynasties of miners, metallurgists, and machine builders were formed here, and a vast network of vocational schools ensured a constant supply of qualified personnel. It was this industrial identity and work culture, not just the factories and mines, that formed the foundation of the economic potential that was destroyed as a result of Russian aggression.

The paragraph contains a large amount of statistical data on changes in the economic potential of regions, production dynamics, infrastructure losses and the functioning of key industries - coal, metallurgical, chemical, ore industries and ammunition production. Special attention is paid to defense complex enterprises that were critical to national security. This material will be useful to economists, regional analysts, security specialists, representatives of the defense sector, government agencies, international partners, as well as everyone involved in strategic planning, loss assessment and recovery potential

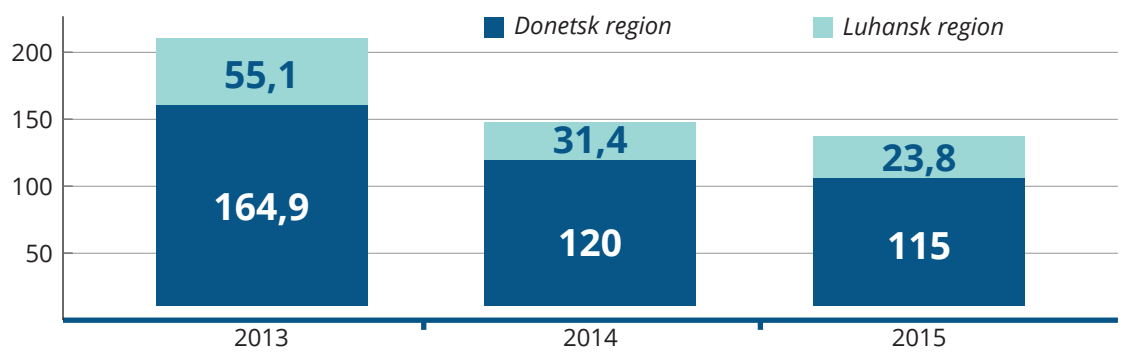
The industrial and resource base of the Donetsk and Luhansk Oblasts before and after the partial occupation in 2014

In 2013, Donetsk and Luhansk Oblasts occupied leading positions in Gross Regional Product (GRP) production: Donetsk was in 2nd place after Kyiv, Luhansk was in the top six Oblasts (Table 1) **[27, 28, 29]**.

The GRP of Donetsk Oblast was UAH 164.926 billion (10.83% of Ukraine's GDP),
Luhansk Oblast—UAH 55.108 billion (3.62%).
The combined GRP of the two Oblasts is UAH 220.034 billion, or 14.45% of Ukraine's GDP (UAH 1,522.657 billion).

Following the partial occupation in 2014, the figures dropped sharply:
Donetsk—up to 119.983 billion UAH (7.56%),
Luhansk Oblast—up to UAH 31.393 billion (1.98%).
The total GRP amounted to only UAH 151.376 billion, or 9.53% of Ukraine's GDP (UAH 1,586.915 billion).

Gross regional product (GRP) of Donetsk and Luhansk regions for the period from 2013 to 2015 (bn UAH)



*Thus, losses in 2014 reached **UAH 68.658 billion**, and in 2015, they reached **UAH 81.173 billion**. Cumulative losses over the two years, compared to 2013 levels, amounted to **UAH 149.831 billion**, demonstrating the large-scale degradation of industrial potential and the economic catastrophe for the region.*

Table 1. Data on the gross regional product (GRP) of Donetsk and Luhansk Oblasts for the period from 2013 to 2015

	2013	Share in Ukraine's GDP in %	2014	Share in Ukraine's GDP in %	Increase/decrease (-) compared to 2013	2015	Share in Ukraine's GDP in %	Increase/decrease (-) compared to 2013
Ukraine	1 522,657		1 586,915			1 988,544		
Donetsk	164,926	10,83	119,983	7,56	-44,943	115,012	5,78	-49,914
Luhansk	55,108	3,62	31,393	1,98	-23,715	23,849	1,20	-31,259
Total	220,034	14,45	151,376	9,54	-68,658	138,861	6,98	-81,173

More precise data on the losses of Ukraine's industrial base in 2014 as a result of the partial occupation of individual raions, cities, towns and villages in the Donetsk and Luhansk Oblasts is provided by an analysis of the number of operating business entities (legal entities) with a distribution among large, medium, small, and micro enterprises for the period 2013-2015 (Table 2) **[29, 30, 31]**.

Table 2. Data on the number of operating business entities with distribution by large, medium, small, and micro enterprises in the Donetsk and Luhansk Oblasts in 2013-2015

Oblasts of Ukraine	Years	Total, units	Including			
			Large enterprises (units)	Medium-sized enterprises (units)	Small businesses (units)	Of which micro-enterprises (units)
Donetsk	2013	28 731	103	1 587	27 041	23 049
	2014	11 366	55	773	10 538	8 861
	2015	11 763	40	872	10 851	9 172
Luhansk	2013	11 385	28	660	10 697	8 963
	2014	3 233	9	252	2 972	2 513
	2015	3 354	7	241	3 106	2 666

In 2013, there were 40,116 enterprises operating in the Donetsk and Luhansk Oblasts (10.19% of the 393,327 in Ukraine), including 131 large enterprises (19.87% of the 659 in the country). After the partial occupation of 2014, 25,517 enterprises remained in the territory controlled by Ukraine, while 14,599 (36.13%) were lost. Of the 131 large enterprises, 64 were seized (48.85% of the industrial potential). By the end of 2014, the share of the Donetsk and Luhansk Oblasts in the total number of enterprises in Ukraine (341,001) decreased to 4.28%, and that of large enterprises to 12.87% (497 in the country).

*In the Donetsk Oblast, the number of enterprises decreased **from 28,731 to 11,366 (39.56%), and large ones—from 103 to 55 (53.39%).***
*In the Luhansk Oblast, the number of enterprises decreased **from 11,385 to 3,233 (28.39%), and large enterprises decreased from 28 to 9 (32.14%).***

These indicators are confirmed by the dynamics of the decline in **the volume of products sold** in 2013-2015, which reflects the loss of production and economic potential of the Oblasts (data on the volume of products (goods and services) sold by enterprises in the Donetsk and Luhansk Oblasts for the period from 2013 to 2015 are given in Tables 3 and 4) **[28, 29]**.

Table 3. Volume of sold products (goods, services) of enterprises in Donetsk Oblast for the period from 2013 to 2015

	Total, billion UAH	Including							
		Large enterprises		Medium-sized enterprises		Small businesses		Of which micro-enterprises	
		billion UAH	as a percentage of total sales volume	billion UAH	as a percentage of total sales volume	billion UAH	as a percentage of total sales volume	billion UAH	as a percentage of total sales volume
2013	575,698	306,263	53,2	216,373	37,6	53,061	9,2	16,876	2,9
2014 excluding occupied territory	376,131	236,772	62,9	113,047	30,1	26,312	7,0	7,504	2,0
2015 excluding occupied territory	325,495	216,654	66,5	85,488	26,3	23,352	7,2	7,661	2,4

Table 4. Volume of sold products (goods, services) of enterprises in the Luhansk Oblast for the period from 2013 to 2015

	Total, billion UAH	Including							
		Large enterprises		Medium-sized enterprises		Small businesses		Of which micro-enterprises	
		billion UAH	as a percentage of total sales volume	billion UAH	as a percentage of total sales volume	billion UAH	as a percentage of total sales volume	billion UAH	as a percentage of total sales volume
2013	104,236	54,987	52,7	32,594	31,3	16,654	16,0	5,360	5,1
2014 excluding occupied territory	45,796	26,619	58,1	13,162	28,8	6,014	13,1	1,922	4,2
2015 excluding occupied territory	34,584	14,877	43,0	12,020	34,8	7,686	22,2	2,687	7,8

In 2014, following the onset of armed aggression by the RF and the establishment of control by the occupation administrations over a significant portion of enterprises in the Donetsk and Luhansk Oblasts, a sharp reduction in the volume of products (goods and services) sold was recorded.

Thus, in the Donetsk Oblast, sales volume decreased from UAH 575.698 billion in 2013 to UAH 376.131 billion in 2014 (34.7%). In 2015, the negative trend continued, with sales volume reaching UAH 325.495 billion, a 43.5% decrease compared to 2013.

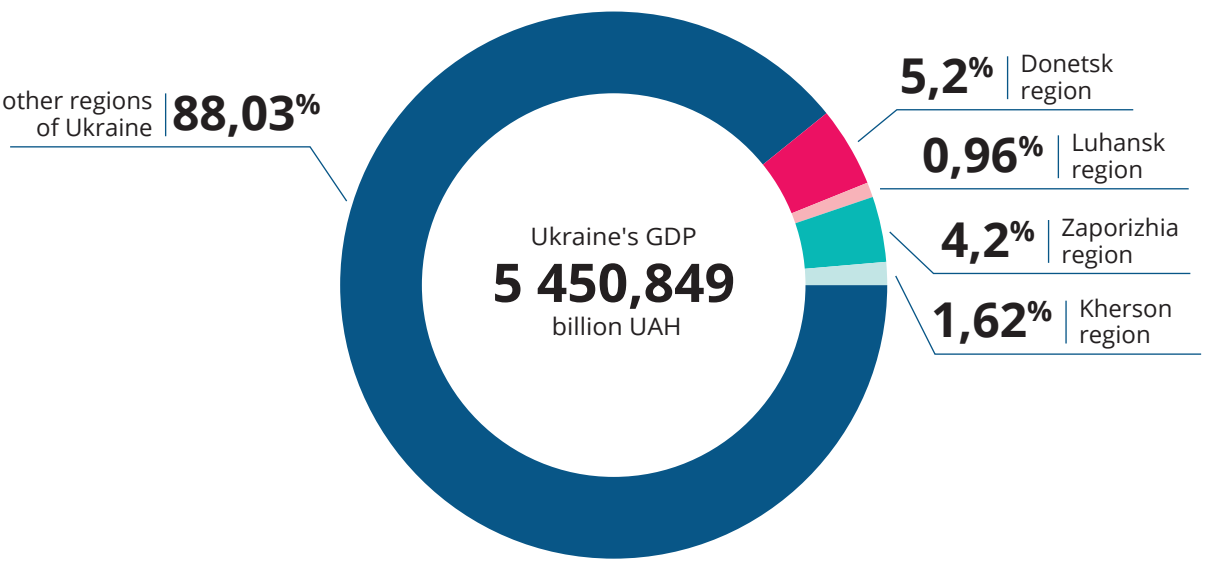
Luhansk Oblast demonstrated similar dynamics: in 2013, sales volume amounted to UAH 104.236 billion, while in 2014, it decreased more than twofold—to UAH 45.796 billion (-56.1%), and in 2015, it amounted to only UAH 32.495 billion, which is 68.8% lower than the pre-crisis level.

*The total volume of products sold in the two Oblasts fell from **UAH 679.934 billion** in 2013 to **UAH 421.927 billion** in 2014 (-38%), and in 2015, it decreased by another 14.7% to **UAH 360.079 billion.***

The industrial and resource base of the Donetsk, Luhansk, Zaporizhzhia, and Kherson Oblasts before and after full-scale Russian aggression in 2022

As of the end of 2021, before the start of the full-scale aggression of the RF against Ukraine, the combined GRP of the Donetsk, Luhansk, Zaporizhzhia, and Kherson Oblasts amounted to UAH 652.549 billion, or 9.53% of Ukraine's GDP (UAH 1,586.915 billion) (Table 5) **[28, 29, 30, 31]**:

- *in Donetsk Oblast—283.326 billion hryvnias or 5.2% of Ukraine's GDP;*
- *in the Luhansk Oblast—52.135 billion hryvnias or 0.96% of Ukraine's GDP;*
- *in the Zaporizhzhia Oblast—228.906 billion hryvnias or 4.20% of Ukraine's GDP;*
- *in the Kherson Oblast—88.182 billion hryvnias or 1.62% of Ukraine's GDP.*



Gross domestic product (GDP) of Donetsk, Luhansk, Zaporizhia and Kherson regions in 2021 (bn UAH)

Table 5. Data on the gross regional product (GRP) of Donetsk, Luhansk, Zaporizhzhia and Kherson Oblasts for the period from 2020 to 2021

GRP by year, in billion hryvnias				
	2020	Share in Ukraine's GDP, in %	2021	Share in Ukraine's GDP, in %
Ukraine	4 222,026		5 450,849	
Donetsk	206,309	4,89	283,326	5,20
Luhansk	43,204	1,02	52,135	0,96
Zaporizhzhia	167,260	3,96	228,906	4,20
Kherson	68,467	1,62	88,182	1,62
Total	485,24	11,49	652,55	11,97

At the end of 2021, there were 35,732 enterprises operating in the Donetsk, Luhansk, Zaporizhzhia and Kherson Oblasts (9.63% of 370,834 in Ukraine), including 68 large ones (11.14% of 610 large ones in the country)) (Table 6) **[27]**.

- *Donetsk Oblast—9,202 enterprises, including 30 large ones*
- *Luhansk Oblast—3,356 enterprises, including 5 large ones*
- *Zaporizhzhia Oblast—15,363 enterprises, including 28 large ones*
- *Kherson Oblast—7,811 enterprises, including 5 large ones.*

Following the full-scale aggression in 2022, the number of enterprises in the occupied territories fell sharply—from 35,732 to 12,922. Their share of the total number of enterprises in Ukraine (261,924) fell to 4.93% (compared to 9.63% in 2021). The number of large industrial enterprises in these Oblasts decreased from 68 to 33 by the end of 2022, and to 27 in 2023. Their share amounted to 6.68% of the 494 large enterprises in Ukraine (compared to 11.14% in 2021).

- *Donetsk Oblast—2,968 enterprises, including 8 large ones*
- *Luhansk Oblast—333 enterprises, no large ones left*
- *Zaporizhzhia Oblast—7,947 enterprises, including 25 large ones*
- *Kherson Oblast—1,674 enterprises, no large ones left.*

Table 6. Data on the number of operating business entities with distribution into large, medium, small, and micro enterprises in Donetsk, Luhansk, Zaporizhzhia, and Kherson Oblasts from 2020 to 2023

Oblasts of Ukraine	Years	Total, units	Including			
			Large enterprises (units)	Medium-sized enterprises (units)	Small businesses (units)	Of which micro-enterprises (units)
Donetsk	2020	9 473	27	572	8 874	7 637
	2021	9 202	30	568	8 604	7 377
	2022	2 968	8	250	2 710	2093
	2023	3 274	9	192	3 073	2 761
Luhansk	2020	3 408	3	225	3 180	2 742
	2021	3 356	5	212	3 139	2 705
	2022	333	-	14	319	266
	2023	1 022	-	20	1 002	985
Zaporizhzhia	2020	15 368	22	654	14 692	12 878
	2021	15 363	28	639	14 696	12 882
	2022	7 947	25	384	7 538	6 288
	2023	9 568	18	282	9 268	8 405
Kherson	2020	8 116	3	306	7 807	6 888
	2021	7 811	5	298	7 508	6 579
	2022	1 674	-	86	1 588	1 162
	2023	2 633	-	69	2 564	2 425

Considering the fact that there is no information on GRP in open data sources starting from 2021, the dynamics of lost operating business entities as a result of the full-scale invasion of the RF can be illustrated by analyzing the decrease in the volume of sold products (goods, services) for the period from 2021 to 2023, reflecting the cost of actually sold goods, products, and services provided (Tables 7, 8, 9, and 10) **[28, 29, 30, 31].**

Table 7. Volume of products (goods, services) sold by enterprises in the Donetsk Oblast for the period from 2021 to 2023

	Total, billion UAH	Including			
		Large enterprises	Medium-sized enterprises	Small businesses	Of which micro-enterprises
2021 excluding the occupied territory in 2014	612,663	430,737	129,83	52,095	16,229
2022 excluding the occupied territory	128,325	72,684	36,482	19,158	4,957
2023 excluding the occupied territory	117,508	76,559	27,635	13,314	4,482

Table 8. Volume of sold products (goods, services) of enterprises in the Luhansk Oblast for the period from 2021 to 2023

	Total, billion UAH	Including			
		Large enterprises	Medium-sized enterprises	Small businesses	Of which micro-enterprises
2021 excluding the occupied territory in 2014	54,895	confidential information	confidential information	16,757	6,171
2022 excluding the occupied territory	4,437	information is missing	2,868	1,569	0,346
2023 excluding the occupied territory	0,696	information is missing	0,455	0,240	0,159

Table 9. Volume of sold products (goods, services) of enterprises in the Zaporizhzhia Oblast for the period from 2021 to 2023

	Total, billion UAH	Including			
		Large enterprises	Medium-sized enterprises	Small businesses	Of which micro-enterprises
2021	433,081	230,696	116,313	86,071	29,78
2022 excluding the occupied territory	332,083	200,152	81,739	50,191	15,566
2023 excluding the occupied territory	293,607	164,222	80,126	49,259	17,57

Table 10. Volume of sold products (goods, services) of enterprises in the Kherson Oblast for the period from 2021 to 2023

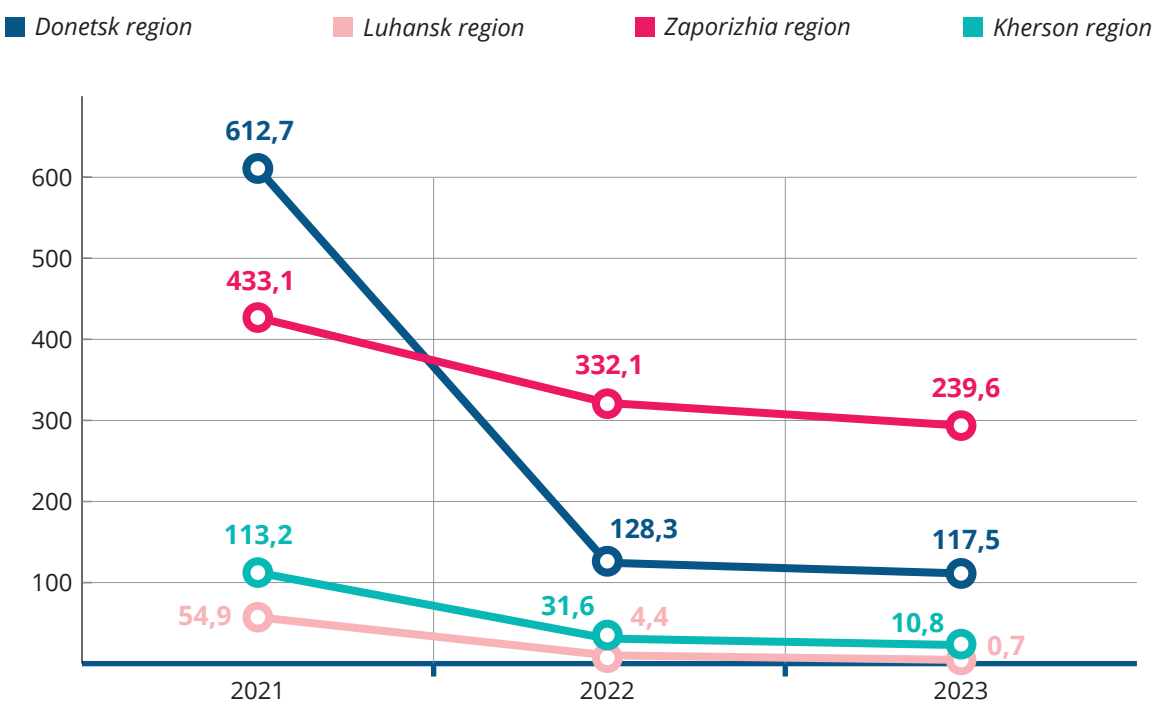
	Total, billion UAH	Including			
		Large enterprises	Medium-sized enterprises	Small businesses	Of which micro-enterprises
2021	113,198	14,675	56,691	41,831	13,228
2022 excluding the occupied territory	31,552	information is missing	18,2	13,351	2,942
2023 excluding the occupied territory	10,768	information is missing	5,913	4,855	1,7

At the end of 2021, before the full-scale Russian invasion, the total sales volume (of goods and services) of enterprises in the Donetsk, Luhansk, Zaporizhzhia, and Kherson Oblasts amounted to UAH 1,213.837 billion. This figure reflected the significant industrial and economic potential of these Oblasts.

In 2022, as a result of the active phase of armed aggression, sales volumes plummeted to UAH 496.397 billion, representing only 40.9% of the 2021 level. The most significant declines were recorded in the Donetsk and Luhansk Oblasts:

- *Donetsk Oblast: decrease from UAH 612.663 billion to UAH 128.325 billion (-79.1%);*
- *Luhansk Oblast: from UAH 54.895 billion to UAH 4.437 billion (-91.9%);*
- *Zaporizhzhia Oblast: from UAH 433.081 billion to UAH 332.083 billion (-23.3%);*
- *Kherson Oblast: from UAH 113.198 billion to UAH 31.552 billion (-72.1%).*

Volume of sales (goods, services) of enterprises in Donetsk, Luhansk, Zaporizhia, Kherson regions for the period from 2021 to 2023 (bn UAH)



Moreover, in 2022, Ukraine completely lost control over 10 large industrial enterprises located in the occupied territories of Luhansk and Kherson Oblasts (5 enterprises in each Oblast), which further exacerbated the industrial decline. **[33]**.

In 2023, due to continued full-scale aggression, the negative trend continued: the total sales volume of enterprises in four Oblasts amounted to UAH 422.579 billion, a 14.9% decrease compared to 2022. The decline was recorded in all four Oblasts:

- *Donetsk Oblast: from UAH 128.325 billion to UAH 117.508 billion (-8.4%);*
- *Luhansk Oblast: from UAH 4.437 billion to UAH 0.696 billion (-84.3%). Output was supported primarily by the relocation of small, medium, and micro businesses;*
- *Zaporizhzhia Oblast: from UAH 332.083 billion to UAH 293.607 billion (-11.6%);*
- *Kherson Oblast: UAH 31.552 billion (remaining at the same level in 2022 and 2023, but a decline of over 72% compared to 2021).*

> *These dynamics indicate a critical level of loss of economic potential in Ukraine's industrial regions due to armed aggression, destruction of production infrastructure, loss of control over key production assets, and forced business relocation*

The main enterprises and key industries of the Donetsk, Luhansk, Zaporizhzhia and Kherson Oblasts (coal, ore, metallurgy, chemistry, cartridge production, etc.)

In 1997, Cabinet of Ministers of Ukraine by Resolution No. 911 approved a list of 1,000 enterprises of strategic importance to the economy and national security. It included **121 enterprises in Donetsk Oblast, 64 in Luhansk Oblast, 63 in Zaporizhzhia Oblast, and 17 in Kherson Oblast.**

In 2015, Cabinet of Ministers of Ukraine by Resolution No. 83 reduced the list to 291 units. **24 strategic enterprises remained in four Oblasts:** 8 in Donetsk, 4 in Luhansk, 7 in Zaporizhzhia, and 5 in Kherson. Of the 77 defense security facilities, **14 were located in these Oblasts**. In addition, **16 Ukroboronprom enterprises operated in these Oblasts.**

Donetsk Oblast

At the end of 2000, there were 121 enterprises of strategic importance here; by 2015, there were 13 left. In 2013, the Donetsk Oblast accounted for 18-19% of Ukraine's industrial production, ranking second after Dnipropetrovsk (Table 11) **[28]**. Main industries are:

- *ferrous metallurgy—30-35% of industrial volume (cast iron, steel, rolled products)*
- *coal industry (mining and coke)—20-22%, the largest coke production in the country*
- *mechanical engineering and metalworking—about 16%*
- *chemical and coke-chemical industry—5-6% (Styrene, Donetsk State Chemical Plant, coke-chemical plants)*
- *electric power industry—5-6% (Uglegorsk, Starobeshevskaya, Slavyanskaya, Kurakhovskaya, Zuevskaya thermal power plants, with a total capacity of more than 10 GW)*
- *building materials, glass, woodworking—about 4%.*

The Mariupol seaport *was a key transport hub, important for the Oblast's metallurgy, coal, and agricultural products. In 2013, its cargo turnover amounted to* ***15 million tons****.*

Table 11.
Main industries of the Donetsk Oblast

Industry	Estimated share in the Oblast's industrial production	Estimated share from Ukraine (%)	Key enterprises
Ferrous metallurgy	~ 30-35%	~ 6-7%	Azovstal Iron and Steel Works, Ilyich Iron and Steel Works, Donetsk, Yenakiieve, and Makiivka Iron and Steel Works
Coal and coke industry	~ 20-22%	~ 4-5%	Avdeevsky Coke Plant, Yasinovsky, Makeevsky, Donetsk Coke
Mechanical engineering and metalworking	~ 16%	~ 2,5-3%	Azovmash, NKMZ, Dongormash, Yasinuvata Machine-Building Plant, Donetskgormash
Electric power industry	~ 5-6%	~ 1,0-1,2%	Uglegorsk, Starobeshevskaya, Slavyanskaya, Kurakhovskaya, Zuevskaya TPP
Chemical industry	~ 4-6%	~ 0,8-1%	Concern "Stirol", Donetsk State-Owned Plant of Chemical Products, PJSC "Yenakiieve Coke and Chemical Industry"
Building materials, glass and wood	~ 3%	~ 0,5%	Doncement, SEZ glass and reinforced concrete plants
Food and light industry	~ 4-5%	~ 0,8-1%	Donetsk meat-packing plants, tobacco and confectionery factories

At the end of 2013, Donetsk Oblast remained the leading Oblast of Ukraine in the ferrous metallurgy sector, accounting for approximately 30-35% of the Oblast's industrial output and accounting for approximately 6-7% of the total ferrous metal production in Ukraine. In 2013, the Oblast produced approximately 12.9 million tons of pig iron, 13.3 million tons of steel, and ~7.5 million tons of rolled metal products (Table 12) **[28]**.

The volume of exported metal products amounted to approximately USD 6.9 billion, which accounted for more than 55% of the Oblast's foreign exchange earnings.

Photo 4. *Metallurgical plant "Azovstal" (Mariupol)*

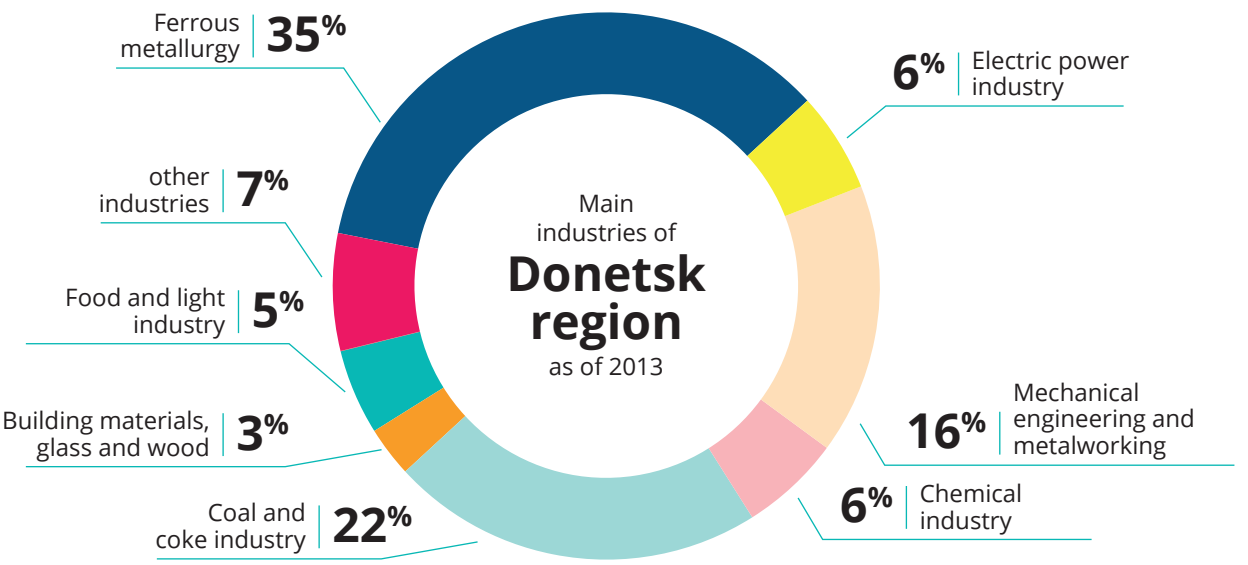


Table 12.
Metallurgical enterprises of Donetsk Oblast

Enterprise	Production volume (approximate), thousand tons, 2013 figures	Estimated share from Ukraine (%)	Main products
Azovstal Iron and Steel Works (Mariupol)	3600	~ 2,0-2,1%	Steel, cast iron, rolled products
Ilyich Mariupol Iron and Steel Works (Mariupol)	3075	~ 1,6-1,9%	Steel, cast iron, rolled products, sheets, pipes
Donetsk Metallurgical Plant	2785	~ 1,4-1,6%	Steel, cast iron, rolled products
Yenakiieve Metallurgical Plant	2100	~ 1,0-1,2%	Steel, rolled products
Makiivka Metallurgical Plant	1500	~ 0,7-0,9%	Steel, rolled products
Kramatorsk Metallurgical Plant	600	~ 0,3-0,4%	Rolled products, blanks
Donetsk Metal Rolling Plant	~59 thousand tons of rolled products	<0,1%	Rental, hardware
Khartsyzsk Pipe Plant	~200-250 thousand tons of pipes	~ 0,4-0,5%	Large diameter pipes

ДDonetsk Oblast maintained key importance in the coal and coke industries of Ukraine, accounting for over **20% of coal production and over 22% of coke production**. The coal industry ranked second in output after metallurgy (Table 13) **[28]**. In 2013, over **30 million tons of coal** were mined in the Oblast, a significant portion from the mines of the DTEK holding company and independent state-owned and private mines. The most productive were the **Komsomolets Donbasa mine (~4.6 million tons)**, **Krasnoarmeyskaya-Zapadnaya No. 1 mine (~3.1 million tons)**, the Zasyadko mine, and others. The coke industry was also concentrated in the Oblast. **Avdiivka By-Production Plant** remained the largest in Ukraine with an output of about **2.7 million tons of coke (13-14% of the national volume)**. Other significant producers included the **Yasinovsky Coke Plant, Makiivka Coke, and Donetsk Coke**. Coke products were sold both domestically (to the metallurgical plants of Mariupol, Yenakiieve, and elsewhere) and exported to Eastern Europe, Turkey, and the CIS. The industry's contribution to the Oblast's foreign exchange earnings was estimated at **approximately USD 2-2.5 billion.**

Table 13.
Coal and coke-chemical enterprises of Donetsk Oblast

Enterprise	Production volume (approximate), thousand tons, 2013 figures	Estimated share from Ukraine (%)	Main products
Komsomolets Donbasa Mine	~ 4600	~ 5,5%	Energy coke (G, D)
Krasnoarmeyskaya-Zapadnaya Mine No. 1	~ 3100	~ 3,7%	Energy coke (G)
Avdiivka Coke and Chemical Plant	~ 2700	~ 13-14%	Coking coke (Zh, K)
Zasyadko Mine	~ 2200	~ 2,6%	Anthracite (A)
Snizhne-Antratsyt Mine	~ 1300	~ 1,5%	Coking coke (Zh, OS)
Skochinsky Mine	~ 1100	~ 1,3%	Coke (coking product)
Yasinovsky Coke and Chemical Plant	~ 910	~ 4,3%	Coke (coking product)
Makeevkoks	~ 660	~ 3,1%	Coke (coking product)
Donetskkoks	~ 500	~ 1,0%	Coke (coking product)

In 2013, mechanical engineering accounted for approximately **16% of regional industrial output, or 2.5-3% of the national total**. Despite the decline, the industry retained its strategic importance, providing for metallurgy, mining, transport, and energy (Table 14) **[28]**. In the first half of 2013, companies in the industry earned a profit of **UAH 339 million**, but net positive profit was only UAH 14.9 million, which is more than half the 2012 level. Key industrial centers are **Kramatorsk (NKMZ), Mariupol (Azovmash), Donetsk, Yasinuvata, Avdiivka, and Horlivka**. The main areas are heavy engineering, railway tanks, equipment for metallurgy, mining, coke industries, and power units. In 2013, the Oblast's mechanical engineering industry generated foreign exchange earnings of **USD 1.5-1.7 billion, or 10-12% of its exports** (out of total revenue of **USD 15-16 billion**). The largest exporters are Azovmash, NKMZ, and Energomashspetsstal.

Table 14.
Machine-building enterprises of Donetsk Oblast

Enterprise	Production volume (approximate), indicators for 2013	Estimated share from Ukraine (%)	Main products
Azovmash (Mariupol)	~10,000 wagons	~ 0,3-0,4%	Railway cars, tanks, cranes, metallurgical equipment
Novo-Kramatorsk Machine-Building Plant	~UAH 2.2 billion in revenue	~ 0,2-0,3%	Machine tools, rolling mills, mining equipment
Energomashspetsstal (Kramatorsk)	~400-415 tons of large ingots	~ 0,1%	Large-sized ingots, forgings, special steel for nuclear and thermal power plants
Donetskgormash/ Dongormash	~Several hundred thousand tons of equipment	~ 0,1-0,2%	Mining equipment, roadheaders
Yasinuvata Machine-Building Plant	Special products for the mining industry	~ 0,1%	Equipment for the coal industry
Slavyansk Heavy Engineering Plant	Up to UAH 300 million in revenue	~ 0,1%	Equipment for metallurgy and coke chemistry
Makiivka Mining Machinery Plant	There is no exact data	<0,1%	Mining equipment
Horlivka Machine-Building Plant	Approximately ~100 million UAH	<0,1%	Machinery and equipment for the coal industry

Table 14. (continuation)
Machine-building enterprises of Donetsk Oblast

Enterprise	Production volume (approximate), indicators for 2013	Estimated share from Ukraine (%)	Main products
Avdiivka Machine-Building Plant	~50 million UAH	<0,1%	Repair engineering, non-standard equipment
Druzhkovsky Machine-Building Plant	~70 million UAH	<0,1%	Mine hoists, pumping stations
Torez Machine-Building Plant	~20-30 thousand tons of equipment	<0,1%	Conveyors, crushers, mine trucks
Khartsyzsk Machine-Building Plant	~50-80 million UAH	<0,1%	Repair and assembly of mining equipment
Konstantinovsk Plant of Metallurgical Equipment	~100 million UAH	<0,1%	Thermal furnaces, mechanisms for metallurgy

At the end of 2013, the Donetsk Oblast occupied a leading position in the electricity sector of Ukraine, providing approximately 10-11% of the total installed capacity of the country's energy system and producing approximately 10-12% of all electricity in Ukraine.

The Oblast's energy system was based primarily on thermal power plants (TPPs) fueled by anthracite and gas coal, which corresponded to the Oblast's industrial specifics and the presence of a developed coal mining industry. In total, more than seven large energy facilities operated in the Oblast, four of which were among the ten most powerful in the country (Table 15) **[28]**.

Key characteristics of the Oblast's electric power industry:

- *The total installed capacity is about 5,000 MW (~9-10% of the Ukrainian figure of ~55,000 MW)*
- *Annual generation is ~20-23 billion kWh (~10-12% of the total generation in Ukraine)*
- *The main type of fuel is coal (anthracite, gas), partly natural gas and fuel oil for thermal power plants.*

Table 15.
Producers of electric and thermal energy in Donetsk Oblast

Enterprise	Electric power (MW)	Share of installed capacity of Ukraine (~55,000 MW)	Estimated share of annual generation in Ukraine (%) (~195 billion kWh in 2013)	Thermal power (Gcal/h)	Fuel type
Kurakhovskaya Thermal Power Plant	1530	~2,8%	~3,0-3,5%	1370	Coal (gas, energy)
Zuevskaya Thermal Power Plant	1240	~2,3%	~2,5-3,0%	1250	Coal (anthracite)
Starobeshevskaya Thermal Power Plant	1200	~2,2%	~2,3-2,7%	1300	Coal (anthracite)
Slavyanskaya Thermal Power Plant	880	~1,6%	~1,7-2,0%	1140	Coal (anthracite, gas)
Mariupol Thermal Power Plant	60	<0,1%	~0,1%	250	Gas/fuel oil
Makiivka Thermal Power Plant	60	<0,1%	~0,1%	230	Gas/fuel oil
Avdiivka Thermal Power Plant	35	<0,1%	~0,05%	180	Gas/coal

At the end of 2013, the chemical industry in Donetsk Oblast accounted for approximately 6-7% of regional industrial output and up to 10% of regional high-value-added product exports. More than 400 chemically hazardous facilities operated in the oblast, including those classified as hazard classes I and II (Table 16) **[28]**.

Chemical exports from the Donetsk Oblast in 2013 amounted to approximately USD 400-500 million (approximately 3-4% of the Oblast's total export revenue). The main export markets were Russia, the CIS, Eastern Europe (Poland, Hungary), Turkey, and Egypt.

Table 16.
Chemical industry enterprises of Donetsk Oblast

Enterprise	Production volume (approximate), thousand tons, 2013 figures	Estimated share from Ukraine (%)	Main products
Concern Stirol (Horlivka)	~570 ammonia, ~560 urea, ~240 ammonium nitrate	~15-18%. The share of Ukrainian ammonia production is up to 25%, urea—18%.	Ammonia, urea, ammonium nitrate, caprolactam
Yasinuvata Coke and Chemical Plant (part of the Ilyich Iron and Steel Works)	~250-300 coking by-products	~4-5%	Coke products (phenols, resins, sulfur)
PJSC "Yenakiieve Coke and Chemical Plant"	About 1,000,000 t/year of coke; ammonium sulfate—14,800 t/year	The share is not specified, but the company is a major player in the Donetsk Oblast (among the leading coke producers)	Metallurgical coke; coke chemical products (ammonium sulfate, etc.)
Donetsk State Chemical Products Plant	Disposal of ammunition—304.2 tons; production of industrial explosives—4,000 tons	The share of national production of industrial explosives is not indicated.	Ammonite, grammonite, TNT blocks, seismic and cumulative charges (industrial explosives), ammunition disposal
Toretsk Chemical Plant	~50-70	~1%	Specialized chemicals, reagents
Donetsk Chemical Plant	~30	<1%	Industrial chemicals, paints and varnishes
Khartsyzsk Chemical Plant	~25	<1%	Polyethylene, industrial polymers
Avdiivka Chemical Plant of Special Reagents	~10 thousand tons	<1%	Special chemical reagents for the defense and mining industries

At the end of 2013, the construction materials and glass production industry in Donetsk Oblast accounted for approximately 5-6% of the Oblast's total industrial output and was a significant non-resource component of the economy.

*The Oblast was among the top five largest producers of construction materials in Ukraine due to its rich mineral resources (clay, limestone, sand), inexpensive coal, and extensive infrastructure (Table 17) **[28]**.*

Table 17.
Construction industry enterprises in Donetsk Oblast

Enterprise	Production volume (approximate), thousand tons, 2013 figures	Estimated share from Ukraine (%)	Main products
Promstroymaterialy Concern (Donetsk)	~2,000 cement and building materials	~8%	Cement, slate, reinforced concrete, expanded clay concrete
Amvrosievsky Cement Plant	~1,500 cement	~6-7%	Portland cement, dry mixes
Yenakiieve Building Materials Plant	~400-500 tiles and concrete	~2-3%	Ceramic tiles, cinder blocks
Kramatorsk Plant of Reinforced Concrete Products and Building Structures	~300 structures and reinforced concrete products	~2%	Reinforced concrete products, floors, columns
Slavic Glass Factory Torez brick factory	~200 ml glass container	~10-12%	Glass containers, sheet and clear glass
Donetsk Wood Panel Plant	~180 million bricks	~5-6%	Building and facing bricks
Artemovsky Building Materials Plant	~250 thousand m³ of wood boards	~8%	Chipboard, MDF, plywood
	~300-350 thousand tons of lime and mixture	~2%	Lime, mortars, fillers

The Donetsk Oblast focused on maritime infrastructure in Mariupol. The transport network (road and rail) connected Mariupol with Oblasts of Ukraine and Russia, increasing the port's strategic importance.

Mariupol seaport

- ***Port type:*** *Sea (Sea of Azov)*
- ***Cargo turnover (~2013)****: ~15 million tons/year*
- ***Basic infrastructure:*** *22 berths, berthing line is ~3.9 km, railway tracks, car access*
- ***Strategic role:*** *The Oblast's largest seaport, metallurgy, and coal exports*

Luhansk Oblast

At the beginning of 2000, there were 64 strategic enterprises in the Luhansk Oblast. By 2015, their number had decreased to 7. In 2013, the Oblast ranked 4th in terms of industrial production in Ukraine with a share of approximately 6.9%, second only to the Donetsk, Dnipropetrovsk, and Kyiv Oblasts (Table 18) **[29]**.

The key industries of the Oblast were :

- *mechanical engineering and metalworking (37%)*
- *the coal industry (22%)*
- *metallurgy (12%)*
- *the chemical and petrochemical industries (10-13%)*
- *electric power (10%)*
- *glass, woodworking, and construction materials production (5-6%)*

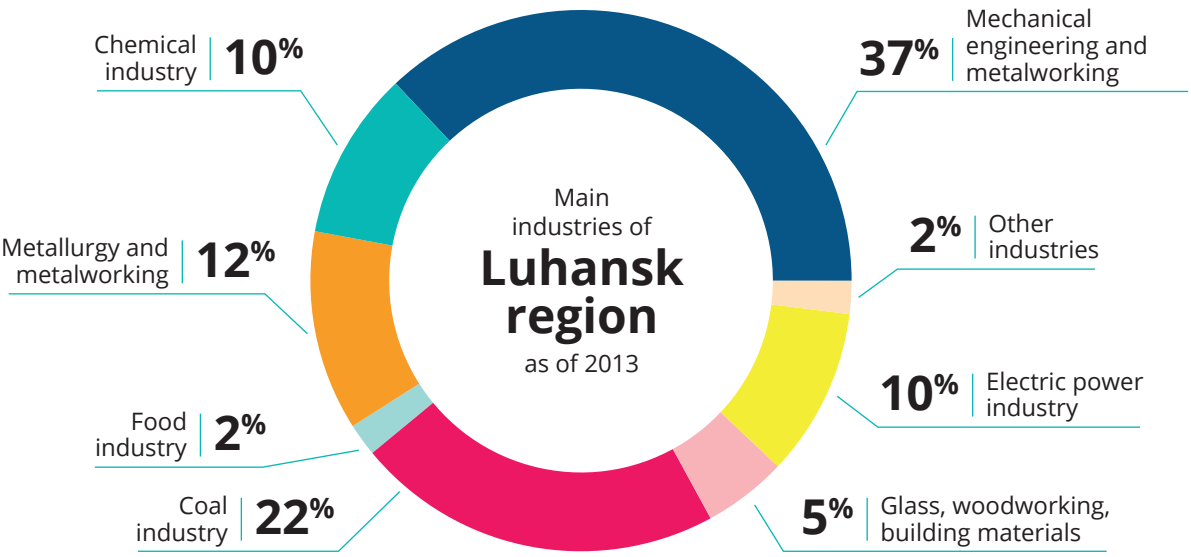


Table 18.
Main industries of the Luhansk Oblast

Industry	Estimated share in the Oblast's industrial production	Estimated share from Ukraine (%)	Key enterprises
Mechanical engineering and metalworking	~37%	~6-7%	Luhanskteplovoz, Stakhaniv Carriage Works, Luhansk Aircraft Repair Plant, Lutuginsky Rolling Mill, Pervomaysky Mechanical Plant
Coal industry	~22%	~20% (anthracite and energy coal)	"Anthracite", "Rovenkianthracite", "Sverdlovanthracite", "Krasnodonugol" (~90 mines, including "Komsomolskaya" and "Belorechenskaya")
Metallurgy and metalworking	~12%	~9-10% for rolled products, up to 50% for ferroalloys	Alchevsk Iron and Steel Works, Alchevsk Coke and Chemical Plant, Stakhaniv Ferroalloy Plant, Luhansk Pipe Plant, Severodonetsk Chemical Machine Building Plant
Chemical and petrochemical industry	~10-13%	~10-13%	Azot (Severodonetsk), Rubezhansky Zarya Plant, Luhansk Chemical and Pharmaceutical Plant, Plastik (Rubizhne), Lysychansk Oil Refinery
Electric power industry	~10%	~3.8%	Luhansk Thermal Power Plant (Schastye), Severodonetsk Thermal Power Plant
Glass, woodworking, building materials	~5-6%	~5%	Lysychansk glass factory, woodworking (Lysychansk, Severodonetsk), brick factories
Food industry	~2-3%	~2%	Lysychansk Brewery, Luhansk Meat Processing Plant, confectionery factories

In 2013, the mechanical engineering industry of the Luhansk Oblast was an industrial cluster that included **railway, aviation, metallurgy, mining, and energy segments.** Its distinctive feature was its high focus on exports to the RF. The industry accounted for approximately **37% of the Oblast's industrial output,** second only to the coal industry, and was more than five times higher than the similar figure for other Oblasts of Ukraine. Luhansk Oblast ranked **third in the country in terms of the volume of mechanical engineering products and their exports**, accounting for 6.9% of national mechanical engineering exports.

Total regional exports in 2013 amounted to ~2.8-3.1 billion USD, of which mechanical engineering accounted for ~18-22%, or 550-680 million USD in foreign exchange earnings (Table 19) ***[29]****.*

Table 19.
Machine-building enterprises of Luhansk Oblast

Enterprise	Production volume (approximate), indicators for 2013	Estimated share from Ukraine (%)	Main products
Luhanskteplovoz	~259 diesel locomotive sections were produced (91 2TE116U, 33 2TE116UD, 3 3TE116U sections). Turnover: ~3 billion UAH; net profit: ~158 million UAH	About 70% of the Oblast's mechanical engineering ~25-30% of Ukraine's diesel locomotives	Mainline diesel locomotives (series 2TE116, 3TE), electric locomotives, diesel trains
Stakhaniv Carriage Building Plant	Production ~≥ 5,000 wagons (before a 37% year-on-year decline)	Up to 10-12% of Ukraine's wagon engineering industry	Gondola cars, hoppers, tank cars, platforms, specialized freight cars
Luhansk Aircraft Repair Plant	Volume growth + 12%; profit ~48 million UAH in 2013	The key aircraft repair center of Eastern Ukraine	Repair and modernization of aircraft and helicopter engines
Lutuginsky Rolling Mill	Production of rolls for rolling mills	The only plant of this profile in Ukraine and the CIS	Rolls for hot rolling of steel, including for metallurgy, rubber and agricultural industries
Pervomaysky Mechanical Plant	There are no exact volumes; a key manufacturer of hydraulic units and components for helicopter aviation	A significant niche in the Oblast's aircraft engineering	Hydraulic motors and hydraulic pumps, fuel equipment and fuel regulators, control units for helicopters and airplanes, products for rocket technology
Luhansk Machine-Building Plant named after Parkhomenko	Manufactured equipment for mining: separators, centrifuges, conveyors	One of the leading suppliers of equipment for processing plants in Ukraine	Mining and processing equipment

As of late 2013, Luhansk Oblast retained its strategic importance in Ukraine's coal and coke industries, accounting for **~20-22% of national coal production**, including up to **45% of anthracite**, approximately **6-8% of coking coal, and 13-14% of coke production** primarily due to the Alchevsk Coke Plant and a number of auxiliary industries. The coal industry ranked second in terms of output in the Oblast after mechanical engineering, accounting for up to **22% of Luhansk Oblast's industrial output**. In 2013, approximately **18.2 million tons of coal** (22% of the national total) were mined here, including **~9.6 million tons of thermal coal and ~8.6 million tons of coking coal**.

In total, the coal and coke industries of the Oblast provided ~1.8-2.2 billion USD in foreign exchange earnings, which amounted to more than 60% of the export earnings of the Oblast's industry (Table 20) ***[29]****.*

Table 20.
Coal and coke-chemical enterprises of Luhansk Oblast

Enterprise	Production volume (approximate), thousand tons, 2013 figures	Estimated share from Ukrainian coal (%)	Coal brand
Sverdlovanthracite	~7 000	~11.7% of energy	Energy (anthracite, grade A)
Rovenkyanthracite	~6 600	~7.8% coking	Coking + energy
Krasnodonugol	~5 400-6 200	~6.5-7.4% coking	Coking
State Enterprise "Anthracite"	~3 800-4 200	~6.5-7% of energy	Energy (anthracite)
Alchevsk Coke and Chemical Plant	~2 800	~13.0% coke	Metallurgical coke
State Enterprise Pervomayskugol	1 350	~2.2% coal	Coking + power coal
State Enterprise "Donbasantratsit"	~1 300	~1.1-1.3% coking	Coking
OJSC Lysychanskugol	~1 200-1 500	~2% in total	Coking + energy
Mine named after Barakova	~1 000	~1.7% of energy	Energy (brand A)
Belorechenskaya mine	~800	~1.2-1.6% of energy	Energy (brand G)
Sukhodolskaya-Skhidna	~712	~1.2% of energy	Energy

At the end of 2013, Luhansk Oblast was among the top five Oblasts of Ukraine in terms of ferrous metallurgy production, accounting for approximately 12% of the Oblast's industrial output and providing ~6-7% of the nation's total production of cast iron, steel, and rolled products, as well as up to 50% of ferroalloys. The Luhansk Pipe Plant produced approximately 100,000-120,000 tons of pipes per year (including main and seamless pipes). The Severodonetsk Chemical and Metallurgical Plant specialized in aluminum powders, non-ferrous alloys, and dual-use chemical and metallurgical products (Table 21) **[29]**.

The volume of exported metal products from the Oblast in 2013 was estimated at ~1.5-1.8 billion USD, which amounted to 35-40% of the Oblast's foreign exchange earnings.

Table 21.
Metallurgical enterprises of Luhansk Oblast

Enterprise	Production volume (approximate), thousand tons, 2013 figures	Estimated share from Ukraine (%)	Main products
Alchevsk Metallurgical Plant	~830	~5,5%	Cast iron, steel, rolled products
Stakhaniv Ferroalloy Plant (special steels and alloys)	~1100-1300	~5-6%	Steel (including rolled products)
Stakhaniv Ferroalloy Plant	~50% of the total output	~50%	Ferrosilicon, special alloys
Luhansk Pipe Plant	~120	~5,8%	Seamless and welded steel pipes
Severodonetsk Chemical and Metallurgical Plant (minor production)	~105	<1%	Aluminum powders, non-ferrous alloys, dual-use chemical-metallurgical products

At the end of 2013, the chemical industry accounted for **approximately 10-13% of the industrial output of the Luhansk Oblast**, ranking fourth after mechanical engineering, coal mining, and metallurgy. The sector was distinguished by a high concentration of strategically important and potentially hazardous industries, some of which had military and dual-use purposes. The Oblast had approximately **1,220 chemically hazardous facilities** (hazard classes I-IV), including large factories, toxic substance warehouses, and transportation hubs. The Rubizhne State Chemical Plant "Zarya" produced nitrogen chemistry, agrochemicals, and explosives. After launching its production line in 2012, the plant could produce up to **6,000 tons of explosives per year**, and sulfuric acid shipments in 2013 reached

Photo 5. *Destroyed workshops of the largest exporter of Luhansk Oblast, Severodonetsk "Azot"*

7,000 tons per month. The Lysychansk Oil Refinery, the second most powerful in Ukraine, ceased operations in 2012. In 2013, the Oblast's chemical exports were estimated at **~650-750 million USD or 20-25% of the Oblast's export revenue**. The largest exporters were S**everodonetsk Azot** (up to 60% of chemical exports), the Zarya plant, and Rubezhansky Plastik (Table 22) **[29]**.

Table 22.
Chemical and petrochemical enterprises of the Luhansk Oblast

Enterprise	Production volume (approximate), thousand tons, 2013 figures	Estimated share from Ukraine (%)	Main products
Severodonetsk Association "Azot"	For 5 months of 2013: ~453.3 liquid ammonia ~261.6 ammonium nitrate ~216.2 nitric acid ~187.8 urea	~10% The share of ammonia in Ukrainian production is up to 10-11%, ammonium nitrate—9-10%, nitric	Nitrogen fertilizers, organic acids and alcohols, household and technical chemicals
Rubezhansky State Chemical Plant "Zarya" (LLC "Scientific and Production Enterprise "Zarya")	Plant protection products (PPP): ~3 Explosives: ~6 Sulfuric acid: ~84	acid—10%. About 30-40% of explosives production	Chemical protection products, industrial explosives, sulfuric acid, nitrobenzene, polymer resins
Luhansk Chemical and Pharmaceutical Plant	The production volumes were not published; revenue in 2013 was ~107 million UAH, net profit ~2.5 million UAH	~3-4% of pharmaceutical products	Pharmaceuticals: medications, dietary supplements, sorbents, antiseptics, ointments
Rubezhansky Plant "Plastic"	~15-20 plastics and technical polymers	~3-4% plastics and polyethylenes	Polyethylene, plastics, technical polymers
Lysychansk Oil Refinery	In 2012, approximately 806 thousand tons of oil were processed; polypropylene production was stopped. Since 2012, the plant has not been operating (idle/mothballed)		Oil refining, polypropylene, petrochemicals

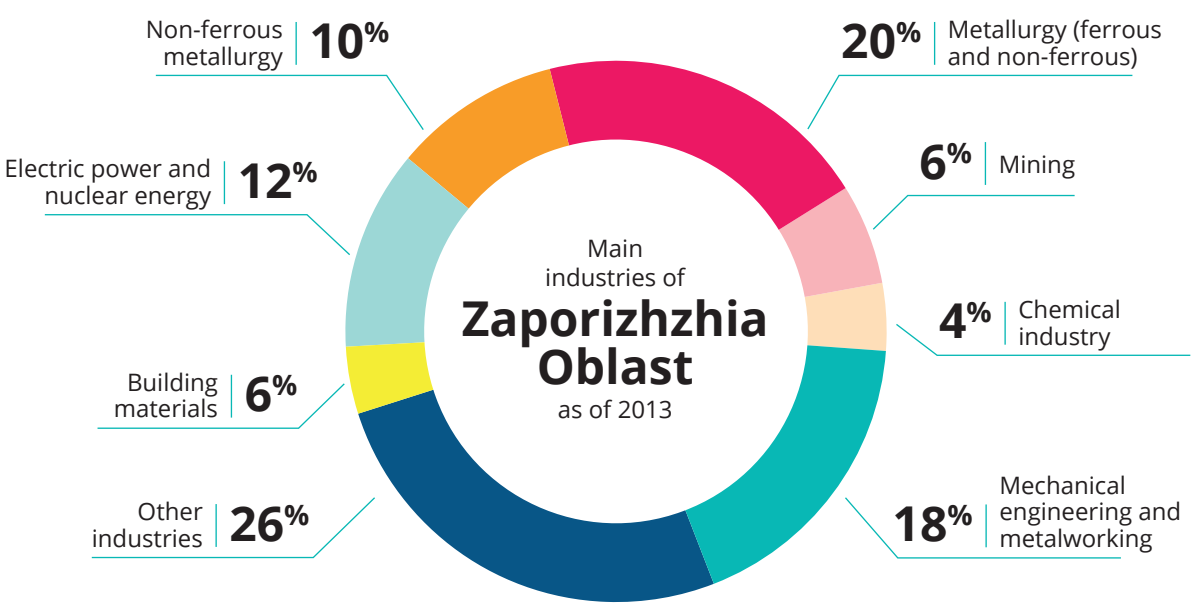
The Luhansk Oblast had its own thermal power plants, with **44% of coal consumption at the thermal power plants being provided by local mines.** The largest was the **Luhansk Thermal Power Plant in the city of Shchastya**, which was part of the Donbas power grid and practically completely covered the Oblast's needs. Its installed capacity was approximately **810 MW** (2012-2013). In 2012, the plant generated over **6 million kWh of electricity**. The Luhansk Thermal Power Plant ranked **second among thermal power plants in Ukraine in terms of generation in 2009-2011** and maintained its leading position by 2013. Smaller thermal power plants also operated in the Oblast, focused primarily on heat production, while electricity generation was of a secondary nature (Table 23) **[30]**.

Table 23.
Producers of electric and thermal energy in Luhansk Oblast

Enterprise	Electric power (MW)	Share of installed capacity of Ukraine (~55,000 MW)	Estimated share of annual generation of Ukraine (%) (~195 billion kWh in 2013)	Thermal power (Gcal/h)	Fuel type
Luhansk Thermal Power Plant (DTEK)	~1360	~2,47%	~2,6-3,0%	~895	Anthracite coal
Severodonetsk Thermal Power Plant	~260	~0,47%	~0,4-0,5%	~600	Natural gas, fuel oil
Stakhaniv Thermal Power Plant	~60-80	~0,11%	~0,1%	~150	Coal
Lysychansk Thermal Power Plant	~60	~0,11%	~0,1%	~160	Natural gas
Rubezhanskaya CHPP boiler house	~30	~0,05%	< 0,05%	~100	Gas/fuel oil

Zaporizhzhia Oblast

In 2000, there were **62 strategic enterprises in the Oblast**. By 2015, their number had been reduced to 13. At the end of 2021, the Zaporizhzhia Oblast accounted for **4-5% of Ukraine's industrial output, ranking among the top three in metallurgy and mechanical engineering. 166 mineral deposits** have been identified here, but only about 69 were actively developed, including deposits of iron, manganese, as well as non-metallic and construction resources (Table 24) **[30]**.



The industry was based on:

- ***Metallurgy (ferrous and non-ferrous)*** *accounts for approximately 20% of regional output and 18.6% of national output. Key enterprises include Zaporizhstal, Dniprospetsstal, and the Zaporizhzhia Ferroalloy Plant.*
- ***Non-ferrous metallurgy and ferroalloys*** *accounted for 8-10%; the Oblast produced up to 47% of Ukrainian ferrosilicon (manganese, magnesium, titanium).*
- ***Mechanical engineering****—15-18%; largest enterprises: Motor Sich, Zaporizhtransformator, ship repair and power engineering plants.*
- ***Energy****—10-12%, represented by nuclear power plants, the Dnieper Hydroelectric Power Station, and thermal power plants integrated into the country's energy system.*
- ***Chemical industry****—3-4% (about 2.5% of the national level), mainly export products.*
- ***Mining****—5-6% (iron ore, manganese, granite, sand, clay), about 5-6% of Ukrainian iron ore production.*
- ***Construction materials, glass, woodworking****—3-4% of industrial output.*

> *At the end of 2021, two key ports were operational: the **Berdyansk seaport** (export) and the **Zaporizhzhia river port** (with terminals in Nikopol), providing external and internal logistics for the Oblast*

Table 24.
Main industries of the Zaporizhzhia Oblast

Industry	Estimated share in the Oblast's industrial production	Estimated share from Ukraine (%)	Key enterprises
Metallurgy (ferrous and non-ferrous)	~20% ~8-10% ferrosilicon	~18.6% ~47% (ferrosilicon—Zaporizhzhia Ferroalloy Plant)	PJSC Zaporizhstal, PJSC Dneprospetsstal, Zaporizhzhia Ferroalloy Plant, Zaporizhzhia Aluminum Plant, Zaporizhzhia Titanium and Magnesium Plant
Mechanical engineering and metalworking	~15-18%	~14%	JSC Motor Sich, JSC Zaporizhtransformator, ship repair and power engineering plants
Electric power and nuclear energy	~10-12%	~21-22% (of total generation in Ukraine)	JSC Zaporizhzhia Nuclear Power Plant, JSC Zaporizhzhia Thermal Power Plant, State Enterprise DniproGES
Mining	~5-6%	~5-6%	Zaporizhzhia Iron Ore Plant, Nikopol Manganese Basin Mining and Metallurgical Plant, granite and clay quarries
Chemical and petrochemical industry	~3-4%	~2,5%	AZMOL British Petrochemicals, Zaporizhzhia Coke
Building materials, glass, woodworking	~3-4%	~3-4%	Zaporizhzhia silicate plant "EUROSILIKAT"

At the end of 2021, the Zaporizhzhia Oblast remained a key center of Ukraine's metallurgy, accounting for **approximately 20% of the Oblast's industrial output and ~18.6% of the national metallurgical output**. Ferrous and non-ferrous metallurgy, ferroalloys, titanium, specialty steels, and stainless steel alloys formed the core of this sector. In 2021, **approximately 4.4 million tons of pig iron, 3.9 million tons of steel, 3.3 million tons of rolled products** (including cold-rolled and galvanized), approximately **450,000 tons of ferroalloys, and up to 180,000 tons of specialty steel were produced**. **The Zaporizhzhia Ferroalloy Plant supplied 47% of the Ukrainian ferrosilicon market** and held a monopoly in the production of metallic manganese and carbon ferromanganese. Exports accounted for **~68% of output**, bringing in **USD 2.5-3.0 billion, or 35-40% of the Oblast's foreign exchange earnings** (Table 25) **[30]**.

Table 25.
Metallurgical enterprises of the Zaporizhzhia Oblast

Enterprise	Production volume (approximate), thousand tons, 2021 indicators	Estimated share from Ukraine (%)	Main products
PJSC Zaporizhstal	Cast iron: 4,400; Steel: 3,900;	Cast iron ~8.0%; Steel ~7.5%; Rolled steel ~6.5%	Cast iron, steel, hot and cold rolled products
PJSC "Zaporizhzhia Ferroalloy Plant"	Rolled steel: 3,300	~47% ferroalloys	Ferrosilicon, ferromanganese, metallic manganese
PJSC "Zaporizhzhia Titanium and Magnesium Plant"	Ferroalloys: 450	~100% titanium	Sponge titanium, titanium tetrachloride, ferrotitanium
PJSC "Zaporizhzhia Aluminum Plant"	Titanium sponge: 1.2-1.5 N/A (the plant was idle)	0%	Primary aluminum
JSC "Zaporizhzhia Livarno-Mechanical Plant"	N/A (foundry and mechanical components for Zaporizhstal)	As part of the Zaporizhstal production chain	Casting blanks, metal structures, mechanical processing
PJSC Dniprospetsstal	Special steel: 160-180	~85-90% special steels and stainless steel	Stainless and special steel, high-alloy alloys

At the end of 2021, mechanical engineering accounted for **15-18% of the Oblast's industrial output** and approximately **14% of the national industry output**. The core of the industry was formed by enterprises in the aircraft and power engineering industries, lifting and transport equipment, transformer technology, and foundry metallurgy. Zaporizhzhia remained Ukraine's leading center for the production of **aircraft engines, gas turbine units, crane equipment, and radar systems**. The Oblast's mechanical engineering exports were estimated at **approximately USD 1.4-1.6 billion, or 18-20%** of the Oblast's total exports (approximately USD 7.5-8.0 billion). The main sales markets are **the CIS, Eastern Europe, India, Egypt, and the Middle East** (Table 26) **[30]**.

Table 26.
Machine-building enterprises of the Zaporizhzhia Oblast

Enterprise	Estimated production volume for 2021	Estimated share from Ukraine (%)	Main products
JSC Motor Sich	Revenue exceeds UAH 8.1 billion (~USD 300 million); more than 200 engine types	~60-70% in the aircraft engine segment	Aircraft and gas turbine engines, auxiliary units
PJSC "Zaporizhzhia Heavy Crane Plant"	Up to 200 units of crane equipment per year	~40-50% of crane equipment in Ukraine	Bridge and gantry cranes with lifting capacity up to 1,000 tons
PJSC "Zaporizhzhia Electric Locomotive Repair Plant"	Repair and modernization of 70-90 locomotives/year; up to 11,000 spare parts	~25-30% in locomotive repairs ~20-25% of castings for	Electric locomotives, components, modernization of railway equipment
Zaporizhzhia Foundry and Mechanical Plant PJSC	Foundry products: 10-12 thousand tons/year	metallurgy	Metal structures, foundry units, castings
"Zaporizhtransformator"	Up to 25,000 MVA transformers per year; export to 30+ countries	~50-60% of transformer equipment in Ukraine	Power transformers, autotransformers, substation equipment
JSC ZAZ	~500-800 cars/year (declining in 2021)	~5-7% from the auto industry	Automobile production and assembly
JSC "Zaporozhabrasiv"	~120 thousand tons of abrasive materials	~80-85% in its segment	Grinding wheels, abrasive tools

At the end of 2021, Zaporizhzhia Oblast remained Ukraine's leading Oblast in the electricity sector, ranking first in terms of installed capacity and electricity generation volumes. The Oblast's electricity complex was balanced and included nuclear, hydroelectric, and thermal generation (Table 27) **[30]**.

Key characteristics of the Oblast's electric power industry:

- ***Total installed capacity:*** *~8,700 MW (~15.8-16% of the installed capacity of the Ukrainian power system of ~55,000 MW)*
- *Annual electricity generation (2021):* ***~37-39 billion kWh (~22-25% of Ukraine's total generation of*** *~158 billion kWh)*
- ***The main types of fuel:*** *uranium (nuclear units), natural gas, coal, hydropower.*

Table 27.
Producers of electric and thermal energy in the Zaporizhzhia Oblast

Enterprise	Electric power (MW)	Share of installed capacity of Ukraine (~55,000 MW)	Estimated share of Ukraine's annual generation (~158 billion kWh in 2021)	Thermal power (Gcal/h)	Fuel type
Zaporizhzhia Nuclear Power Plant	~6 000	~10,9%	~14-15%	-	Uranium (atomic energy)
Zaporizhzhia Thermal Power Plant	~1200	~2,2%	~2-2,3%	~790	Coal, gas
Dnieper Hydroelectric Station	~1578	~2,87%	~1,8-2,0%	-	Hydropower
Zaporizhzhia Thermal Power Plant	~120-150	~0,25%	<0,2%	~480	Natural gas, fuel oil

At the end of 2021, the Zaporizhzhia Oblast maintained a significant role in Ukraine's mineral resource complex, accounting for approximately 4.8-5.2% of the nation's total mineral production. The mining industry accounted for 6-7% of the Oblast's industrial output (Table 28) **[54]**.

The key mineral resources of the Oblast were:

- *iron ores (brown and oxidized)*
- *kaolins (plastic and refractory)*
- *graphite (flaky)*
- *non-ferrous metals (titanium and zirconium raw materials)*
- *construction and refractory raw materials (clays, sands, crushed stone, limestones, etc.)*
- *granites and basalts (quarry mining).*

The share of export-oriented mining in the Oblast was approximately ***40-45%*** *(primarily, iron ore, graphite, and kaolin). Foreign exchange earnings from mineral extraction were estimated at approximately* ***USD 350-450 million****, depending on foreign market prices.*

Table 28.
Mineral extraction in Zaporizhzhia Oblast

Enterprise	Production volume (approximate), thousand tons/2021 figures	Estimated share from Ukraine (%)	Main products
PJSC "Zaporizhzhia Iron Ore Plant"	~4 700	~5,5-6%	Oxidized iron ore
JSC Ukrgrafit (mining and enrichment)	~20	~25-30%	Natural graphite (concentrate)

Table 28. (continuation)
Mineral extraction in Zaporizhzhia Oblast

Enterprise	Production volume (approximate), thousand tons/2021 figures	Estimated share from Ukraine (%)	Main products
JSC Titan of Ukraine/ZTMC (with local raw materials)	~50-60 when converted to concentrate	up to 10% (in titanium production)	Titanium raw materials (rutile, ilmenite, concentrate)
JSC "Unigran" (quarry group)	~9,200 thousand m³ (equivalent to ~15-18 million tons)	up to 7-9% for non-metallic materials	Granite, crushed stone, rubble stone
PJSC "Zaporizhnerudprom"	~1200	до 2%	Limestone, construction sand
Kaolin quarries (Berdyansk, Tokmak districts)	~160	~6-8%	Refractory kaolin
Clay deposits (structural fireclay)	> 2000	~5-6%	Brick and cement clay
Sand and sandy loam quarries (construction needs)	~1800	~4-5%	Construction and molding sand

At the end of 2021, the chemical and petrochemical industry of the Zaporizhzhia Oblast, which accounted for about 4-6% of the Oblast's industrial sectors, continued to be an important part of the Regional industrial complex, although it was not among the Oblast's basic industries (where metallurgy and mechanical engineering dominated) (Table 29) **[30]**.

Table 29.
Chemical and petrochemical enterprises of the Zaporizhzhia Oblast

Enterprise	Production volume (approximate), thousand tons/2021 figures	Estimated share from Ukraine (%)	Main products
AZMOL British Petrochemicals	~125 liquid lubricants ~99.7 pastes	~8% of the national lubricants market	Motor oils, industrial lubricants, coolants, AdBlue
Zaporizhzhia Coke	~720 t/year potential capacity; Actual production in January-February 2021—~161 coke	It is one of the largest domestic coke producers	Metallurgical coke (for steel smelting)
UTK "KhimAlyans" (trademark BLAUchem)	~6/month; there is an expansion plan to 15/month	A significant agrochemical player in the Oblast	Liquid complex fertilizers (UAN, etc.)

The Zaporizhzhia Oblast had two port facilities:

- ***The Berdyansk Commercial Seaport**, a seaport on the Sea of Azov, the only operating one in the Oblast as of 2021, with a cargo turnover of 707,400 tons in 2020. The 2021 plan is approximately 920,000 tons.*
- ***The Zaporizhzhia River Port,** a logistics hub for coal, ore, and rolled metal products, had an annual cargo turnover of up to 5-6 million tons.*

Berdyansk Sea Trade Port

- ***Port type:*** *Sea (Sea of Azov)*
- ***Cargo turnover*** *(January-October 2021): 1.393 million tons*
- ***Basic infrastructure:*** *9 cargo berths, berthing line ~1.798 km, approach channel 20 km long (width 90 m, depth 8.55 m), access railways and roads*
- ***Strategic role:*** *Logistics hub for the export of grain, coal, metals and petroleum products*

Zaporizhzhia River Port

- ***Port type:*** *River (Dnipro)*
- ***Cargo turnover****: Up to 5-6 million tons/year (capacity is up to 6 million tons/year)*
- ***Basic infrastructure:*** *13 cargo berths with a total length of ~2,788 m (including 2 berths in Nikopol for 297 m); accommodates vessels up to 180 m long with a draft of up to 4 m; capacity—up to 6 million tons/year*
- ***Strategic role:*** *A logistics hub for handling metallurgy products, coal, ore, fertilizers, and building materials; important for the domestic transport network and cabotage*

Kherson Oblast

In 2000, there were **17 strategic enterprises in the Oblast**. By 2015, their number had decreased to 5. At the end of 2021, the Kherson Oblast accounted for only **0.6-0.7% of Ukraine's industrial output**, ranking among the last in the country. The economy had a pronounced agricultural specialization, and industry was oriented toward the processing of agricultural products, light and food industries, mechanical engineering (including shipbuilding), and energy (Table 30) **[31]**.

Main industries:

- ***The food industry*** *is the largest, accounting for up to 50-55% of industrial output (Kakhovka butter factories, fruit and vegetable processing plants, the Kherson grain processing plant, and canning plants).*
- ***Mechanical engineering and shipbuilding****—12-14%, including the Kherson Shipyard, Palada, and manufacturers of pumps and irrigation systems.*
- ***Light industry****—8-10%, concentrated in Kherson and Nova Kakhovka (textiles, knitwear, clothing manufacturing).*
- ***Chemicals and building materials****—5-6% (paints and varnishes, plastic pipes, glass containers, cement, reinforced concrete products).*
- ***Energy****—about 5%, the key facility is the Kakhovka Hydroelectric Power Station, which provides the Oblast with power and supplies power to the Ukrainian energy system.*
- ***Pulp and paper and printing****—2-3%, production of packaging and corrugated cardboard.*

*By 2021, four ports were operating in the Oblast: t**he Kherson sea and river ports** (strategic export hubs), **the Skadovsk port** (under restoration), and **the Henichesk port** (not functioning, but under consideration for resumption of work).*

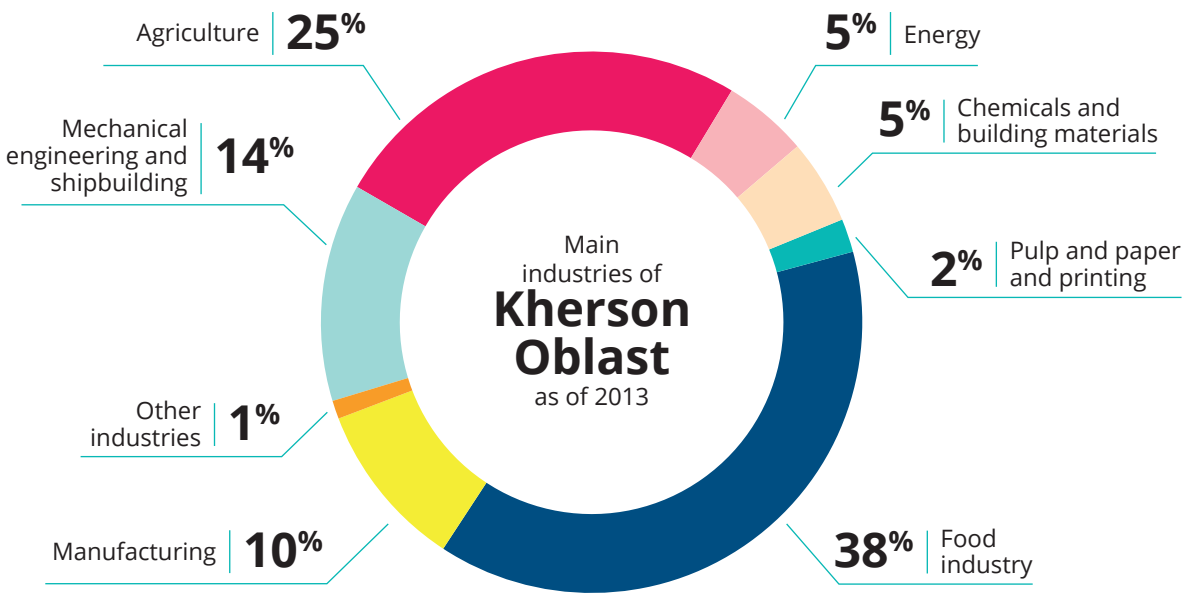


Table 30.
Main industries of the Kherson Oblast

Industry	Estimated share in the Oblast's industrial production	Estimated share from Ukraine (%)	Key enterprises
Food and processing industry Agriculture	~38,4% ~25-30%	5-6% 6-8%	Chumak, KAISSA Oil, Agroholding Sintal Agriculture Plc
Oil refining (petrochemicals)	-	The Kherson oil refinery was shut down in August 2005 and has not resumed operations since	Kherson Oil Refinery
Mechanical engineering and shipbuilding	~15%	< 1%	Kherson Shipyard "Palada" (floating docks, export deliveries); Kherson Shipyard—Smart Maritime Group (Kherson Shipyard), Nova Kakhovka Electromechanical Plant
Light industry	~2-4% (including textiles and clothing production)	Insignificant on a national scale	Textiles are practically non-functional today (the cotton mill has been liquidated)
Manufacturing and chemistry (reinforced concrete products, metalworking)	~10-12% (includes metalworking, reinforced concrete products, glass, building materials)	Low national share	Kherson Glassworks, Foundry

At the end of 2021, the Oblast was of strategic importance for agricultural production and food security in Ukraine, accounting for **30-35% of the Oblast's industrial output**. The industry included approximately **90 large and over 300 small and medium-sized enterprises**, producing a wide range of products: dairy and meat products, bakery, vegetable oil, fat products, tomato and canned goods, confectionery, pasta, and cereals. Agricultural farms were a key source of raw materials. In 2021, they harvested approximately **3.1 million tons of early grain**, including from irrigated lands—a record figure since Ukraine's independence. The Kherson Oblast accounted for **approximately 9% of national grain and oilseed exports** (Table 31) **[31]**.

Table 31.
Agricultural and processing enterprises of the Kherson Oblast

Enterprise	Production volume (estimated), tons, 2021	Share from Ukraine (%)	Main products/specialization
Chumak (Kakhovka)	~143,000 t/year	~5-6% of the tomato product market	Ketchup, tomato paste, sauces, canned vegetables, pasta, oil, salad dressings, tomato juices
KAISSA Oil	~182,000 t/year (~500 t/day × 365 days)	~8-10% of the sunflower oil market	Refined and unrefined sunflower oil in bottles and bulk
Voikov Confectionery Factory	~7,000 t/year	<0.1% (of the confectionery market)	Candies, caramel, dragees, wafers, marshmallows, cookies, toffee
Agricultural holding Sintal Agriculture Plc	Land bank >90,000 hectares in the Kherson Oblast		Wheat, corn, sunflower, barley, peas, buckwheat, soybeans
Kherson bakery plant	Silos 86,000 tons, oil extraction: significant capacity		Flour, compound feed, vegetable oil (silage, flour and feed logistics)

Elevators played a special role in the agro-industrial complex of the Kherson Oblast. The total capacity of the Oblast's elevator facilities in 2020-2021 was approximately 1.93 million tons of simultaneously stored grain, ranking 14th among all Oblasts of Ukraine. More than 56 elevators operated in the Oblast, with varying specializations and technical profiles (floor warehouses, silos, dryers, etc.) (Table 32) **[31]**.

Table 32.
Elevators of the Kherson Oblast

Elevator	Storage capacity (thousand tons)	Share from Ukraine (%)	Specialization/transport
Bratolyubovsky elevator	163,3	~0,16%	Railway line, laboratory; reception and shipment of grain (wheat, corn, soybeans)
Kherson KHP (port)	96,6	~0,10%	Reception by road, rail, and water, drying, cleaning, flour mill
Holy Prystan elevator	77,0	~0,04%	River terminal: reception and transshipment of barges
APK "DOM AGRO"	93,0	~0,05%	Private; large agricultural operator
Kalanchak KHP	86,7	~0,04%	Private; grain reception by road/railway
Belokrinitsky grain processing plant	52,4	~0,03%	Feed mill ~200 thousand tons/year
Skadovsk port elevator	33,42	~0,02%	Private; reception at port, loading
Brilevsky elevator	34,2	~0,03%	Road/railway reception, drying, cleaning

At the end of 2021, the Kherson Oblast retained its strategic importance for Ukraine's food production and exports. **The food and processing industries, together with the agricultural sector, accounted for 30-35% of the Oblast's industrial output.** They housed approximately **90 large and over 300 medium-sized and small-sized enterprises**, including creameries in **Kakhovka**, fruit and vegetable processing plants, **the Kherson Grain Products Plant**, and canneries. They supplied a wide range of products: meat, dairy, oil and fat products, bakery and confectionery products, tomato products, canned goods, pasta, and cereals.

- *Agricultural farms remained the backbone of the Oblast's raw material base. In 2021, they harvested approximately **3.1 million tons of early grain, including the harvest from irrigated lands—a record high since independence. The Oblast accounted for approximately 9% of the national volume** in grain and oilseed exports.*

At the end of 2021, shipbuilding was the key industry in the Oblast [34], (Table 33) [31]:

- *The Kherson Shipyard **specialized in the construction of dry cargo vessels, tankers, icebreakers, floating docks, repair and restoration work**. In the first half of 2021, the Smart Maritime Group, which includes the Kherson and Mykolaiv Shipyards, repaired 37 dry cargo vessels and modernized four others.*

- *The Kherson State Shipyard "Pallada" is a shipbuilding company **specializing in the production of reinforced concrete and composite floating docks, as well as pontoons and berths**. In January 2021, the shipyard began a joint project with Croatian partners to build a floating hospital capable of operating during pandemics or natural disasters. Just earlier, in December 2020, the shipyard completed and delivered the PZh-61U floating berth to the Ukrainian Navy, designed for mooring boats and ships at the naval base.*

- *NVP Kherson Machine-Building Plant LLC—produced grain harvesters and also manufactured reapers for grain, corn, and sunflower. In 2016, it was announced that **the plant planned to begin producing armored personnel carrier bodies for the domestic defense industry at its production facilities**.*

- *The Nova Kakhovka Electromechanical Plant was considered the largest **manufacturer of three-phase asynchronous electric motors in Ukraine**, as well as the only enterprise in the country that produced general-purpose industrial electric motors with dimensions of 132 mm and above, and the second largest producer of explosion-proof motors.*

Table 33.
Machine-building enterprises of the Kherson Oblast

Enterprise	Estimated production volume for 2021	Estimated share from Ukraine (%)	Main products
Kherson Shipyard	-	< 1% of shipbuilding output (repair/modernization on a regional scale)	Ship repair and modernization; hull works; projects for dry cargo ships/coasters; river-sea service.
Kherson State Plant "Pallada"	-	< 1% in shipbuilding by units/tonnage, but high export specialization	Reinforced concrete/composite floating docks, berths, pontoons (export to Europe, etc.).
LLC "NVP Kherson Machine-Building Plant"	-	~< 1% of the agricultural machinery output of Ukraine (niche regional producer)	Grain harvesters, reapers; units for grain, corn, sunflower; individual export deliveries.
Nova Kakhovka Electromechanical Plant	For the 25th anniversary (2020), a record 660,000 items (including engines and components) were assembled.	< 1% of the country's total electrical engineering volume	Asynchronous electric motors (general industrial series 4AMU, 6AMU, etc.; explosion-proof AIMM, AIU, etc.); gear motors, hydraulics, crane components, shut-off valves

There were four ports in the Oblast, two of which were operational and two were under reconstruction or decline:

- ***The Kherson Sea Trade Port*** *is the Oblast's largest port at the mouth of the Dnieper River, with access to the Black Sea. In 2021, its cargo throughput amounted to* ***approximately 2.6 million tons****, with a design capacity of up to 8 million. Its specialties include grain, scrap metal, rolled products, coal, coke, sand, and fertilizers. The infrastructure included* ***10 berths 1.5 km long****, depths up to 9.6 meters, extensive warehouses, railway tracks, and a fleet of equipment. In 2020-2021, the port was granted a concession for modernization.*

- ***The Kherson River Port*** *is an inland estuary port on the Dnieper River with year-round navigation. It handles river-sea shipments, handling up to* ***1.5 million tons of cargo*** *(metals, timber, coal, coke, fertilizers, and construction materials). The port has approximately* ***950 meters*** *of berth with seven berths, warehouses, a railway access road, and crane equipment.*

- ***Skadovsk Commercial Seaport*** *is a small port on the Dzharylhach Bay of the Black Sea. In 2021, it was undergoing restoration. Its design capacity was up to* ***1.3 million tons per year****, with priorities including grain, scrap metal, construction materials, and the resumption of ferry service to Turkey.* ***Three of its six berths were operational****, and infrastructure reconstruction was underway.*

- ***The Henichesk Port*** *is a small facility on the Sea of Azov. In 2021, it was practically inactive due to shallowing and deterioration of its hydraulic structures. It had two* ***berths****, a railway line, and gantry cranes. It was considered a promising project for restoration, focusing on agricultural products and fertilizers.*

Object	Port type	Cargo turnover (2021)	Basic infrastructure	Strategic role
Kherson seaport	Marine (Black Sea)	~2.62 million tons	The length of the berth line is about 1.5 km, including 10 berths, the maximum depth is up to 9.6 m	A logistics hub for the handling and export of scrap metal, rolled metal products, coke, coal, grain, mineral fertilizers, sand, and timber.
Kherson River Port	River (mouth of the Dnieper)	There is no exact data	~1 km berth line, 7 berths (950 m), cranes (up to 20 t), warehouses (covered and open), draft up to 7.8 m, railway and road access	A key river port on the Dnieper; integrated with maritime transport, handling metals, coke, and construction materials; year-round navigation
Skadovsk seaport	Marine (Black Sea)	Up to 1.3 million tons/year—design capacity	6 berths (~800 m), 3 active; warehouses (grain, licensed, general), platforms, port fleet (tugboats, motor ship, boats), restoration work	The Oblast's second seaport; handles grain, scrap metal, and building materials; previously served by ferry service to Turkey; restoration began in 2021.
Henichesk port	Small seaport (Sea of Azov)	Did not work in 2021	2 berths (200 m and 164 m), 5 portal cranes (5-20 t), railway line, weighing equipment	It was not actually operational due to shallowing. Reconstruction for transshipment of agricultural products and fertilizers was discussed.

Enterprises of Donetsk, Luhansk, Zaporizhzhia, and Kherson Oblasts whose work was related to the defense industry

The work of some enterprises in the Oblast was related to the defense industry. In 2010, by Resolution No. 1221 of the Cabinet of Ministers of Ukraine, the Joint-Stock Company ***Ukroboronprom was established***, uniting enterprises of the defense-industrial complex under state management. At the time of its founding, **on December 29, 2010**, it included 16 state-owned enterprises located in the Donetsk, Luhansk, Zaporizhzhia, and Kherson Oblasts. As of March 2022, their number had decreased to 14. Data on the enterprises that were part of Ukroboronprom as of 2010 and 2022 are provided in Table 34 **[31]**.

Table 34. Enterprises from Donetsk, Luhansk, Zaporizhzhia, and Kherson Oblasts that were part of Ukroboronprom as of 2010 and 2022

Name	Oblast	City	Type of enterprise	Brief description	2010	2022
State Enterprise "Horlivka Chemical Plant"	Donetsk	Horlivka	Chemical plant	Production of industrial explosives and chemical reagents	x	x
Donetsk State Chemical Products Plant	Donetsk	Donetsk	Chemical plant	Production of explosives and ammunition	x	x
State Enterprise "Makiivka State Design Institute"	Donetsk	Makiivka	Design Institute	Design of industrial facilities for the military-industrial complex and chemical industry	x	x
Konstantinovsk State Scientific and Production Enterprise "Kvarsit"	Donetsk	Konstantinovka	Research and production enterprise	Production of quartz products for military equipment	x	x
State Enterprise "Zaporizhzhia State Aircraft Repair Plant "MiGremont"	Zaporizhzhia	Zaporizhzhia	Aircraft repair plant	Repair and modernization of military aircraft	x	x
State Enterprise "Zaporizhzhia Automobile Repair Plant"	Zaporizhzhia	Zaporizhzhia	Automobile repair plant	Repair and re-equipment of military wheeled vehicles	x	-
State Enterprise "Zaporizhzhia Machine-Building Design Bureau 'Progress' named after Academician A. G. Ivchenko"	Zaporizhzhia	Zaporizhzhia	Design bureau	Development and production of aircraft engines and units	x	x
Zaporizhzhia State Enterprise "Radiopribor"	Zaporizhzhia	Zaporizhzhia	Radio Engineering Plant	Production of electronic equipment for military equipment	x	x
State-owned enterprise "Scientific and Production Complex 'Iskra'"	Zaporizhzhia	Zaporizhzhia	Research and production complex	Development and production of radar stations and control systems	x	x
State Enterprise "Luhansk Aircraft Repair Plant"	Luhansk	Luhansk	Aircraft repair plant	Major repairs of aircraft, including helicopters and airplanes	x	x
Rubizhne State Chemical Plant "Zarya"	Luhansk	Rubizhne	Chemical plant	Production of explosives and ammunition components	x	x
State Enterprise Production Association "Luhansk Machine-Tool Plant"	Luhansk	Luhansk	Machine tool plant	Production of metal-cutting machines and equipment for the military-industrial complex	x	x
State Enterprise "Luhansk Patron"	Luhansk	Luhansk	Cartridge factory	Production of small arms ammunition	x	x
State Chemical Association named after G. I. Petrovsky	Luhansk	Khrustalnyi	Chemical Association	Production of chemical products for the defense industry	x	x
State Enterprise "Kherson Plant of Marine Equipment and Marine Fittings"	Kherson	Kherson	Shipyard	Production of marine equipment and fittings for the fleet	x	-
Kherson State Plant "Palada"	Kherson	Kherson	Shipyard	Production and repair of floating docks and special-purpose vessels	x	x

In addition to Ukroboronprom's enterprises, other defense facilities operated in the Donetsk, Luhansk, Zaporizhzhia, and Kherson Oblasts. Cabinet of Ministers by its Resolution No. 83 in 2015 approved a list of **77 strategic enterprises, 14 of which were located in these Oblasts**, some of which were part of the concern (Table 35) **[56]**.

Table 35. Enterprises from Donetsk, Luhansk, Zaporizhzhia, and Kherson Oblasts that are of strategic importance for the economy and security of the state in the sphere of defense of Ukraine

Name of the company	Oblast	City	Type of enterprise	Description
JSC "Special Design Bureau of Radio Engineering Instruments"	Donetsk	Donetsk	Design bureau	Development of military radio equipment
Donetsk State Chemical Products Plant	Donetsk	Donetsk	Chemical plant	Production of explosives and ammunition
Konstantinovsk State Scientific and Production Enterprise "Kvarsit"	Donetsk	Konstantinovka	Research and production enterprise	Production of quartz products for military equipment
State Enterprise "Ukrainian State Research Institute of Structural Materials "Prometheus"	Donetsk	Mariupol	Research Institute	Development of structural materials for shipbuilding and armored vehicles
State Enterprise "Research Institute of Integrated Automation"	Donetsk (Kyiv)	Donetsk (Kyiv)	Research Institute	Integrated automation of production processes for the defense industry
PJSC Topaz	Donetsk (Zaporizhzhia)	Donetsk (Zaporizhzhia)	Manufacturing enterprise	Production of radar systems
JSC "State Joint-Stock Holding Company 'Topaz'"	Donetsk (relocation to Zaporizhzhia)	Donetsk (Zaporizhzhia)	Holding company	Specializes in the development and serial production of complex radio engineering systems and special-purpose complexes, as well as radio engineering products for a wide range of applications
State Enterprise "Zaporizhzhia State Aircraft Repair Plant "MiGremont"	Zaporizhzhia	Zaporizhzhia	Aircraft repair plant	Repair and modernization of military aircraft
State Enterprise "Zaporizhzhia Machine-Building Design Bureau 'Progress' named after Academician A. G. Ivchenko"	Zaporizhzhia	Zaporizhzhia	Design bureau	Development and production of aircraft engines and units
Zaporizhzhia State Enterprise "Radiopribor"	Zaporizhzhia	Zaporizhzhia	Radio Engineering Plant	Production of electronic equipment for military equipment
State-owned enterprise "Scientific and Production Complex 'Iskra'"	Zaporizhzhia	Zaporizhzhia	Research and production complex	Development and production of radar stations and control systems
State Enterprise "Luhansk Aircraft Repair Plant"	Luhansk	Luhansk	Aircraft repair plant	Major repairs of aircraft, including helicopters and airplanes
Rubezhansky State Chemical Plant "Zarya"	Luhansk	Rubizhne	Chemical plant	Production of explosives and ammunition components
State Chemical Association named after G. I. Petrovsky	Luhansk	Khrustalnyi	State-owned association	Production of chemical products for the defense industry

Thus, before the beginning of the war, 21 enterprises of strategic importance for state security in the sphere of defense were operating in the territories of Donetsk, Luhansk, Zaporizhzhia, and Kherson Oblasts:

- *in Donetsk Oblast—9 enterprises*
- *in Luhansk Oblast—5 enterprises*
- *in Zaporizhzhia Oblast—5 enterprises*
- *in Kherson Oblast—2 enterprises.*

Militarization of industry after 2022

Military losses and targeted destruction of enterprises

State and expert organizations have been assessing direct infrastructure losses to Ukraine from a full-scale Russian invasion since 2022. This report places particular emphasis on assessing the so-called "damage" to the infrastructure of the occupied territories, which Russia blames on the Ukrainian Armed Forces. According to the **Kyiv School of Economics (KSE)**, as of January 2024, the total direct damage to the infrastructure of the Donetsk, Luhansk, Zaporizhzhia, and Kherson Oblasts amounted to $81.551 billion [1] (data on direct infrastructure losses in the Donetsk, Luhansk, Zaporizhzhia, and Kherson Oblasts, including industry, infrastructure, etc., including the occupied territories, are presented in Table 36).

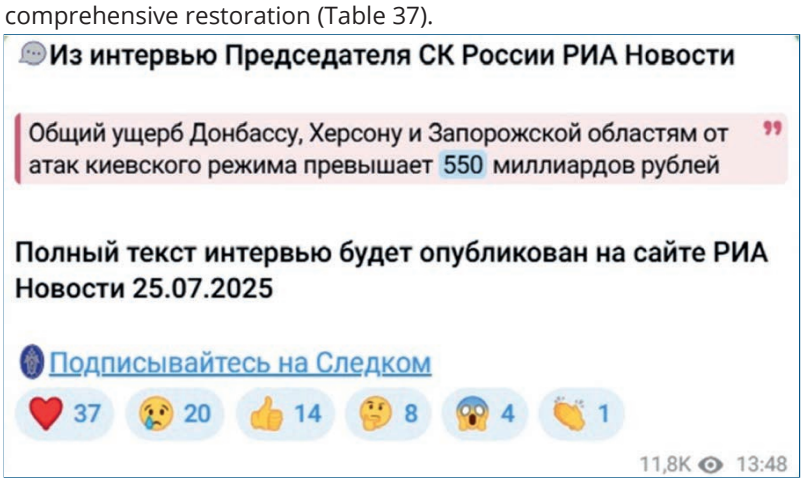
Photo 6. *According to the Kyiv School of Economics (KSE), as of January 2024, the total direct damage to the infrastructure of the Donetsk, Luhansk, Zaporizhzhia, and Kherson Oblasts amounted to $81.551 billion.*

The difference in damage estimates—**$81.5 billion** according to the Kyiv School of Economics (KSE) versus **$6.8-$19.3 billion** according to Russia—clearly demonstrates the contrasting approaches. Ukraine and international experts are recording the full extent of infrastructure and industrial losses in the occupied territories, taking into account the prospects for recovery and reintegration.

Table 36.
Direct losses of the territories of Donetsk, Luhansk, Zaporizhzhia and Kherson Oblasts, including industry, infrastructure, etc. (including occupied territories)

Oblast	Direct losses, $ billion
Donetsk	37,374
Luhansk	17,127
Zaporizhzhia	14,773
Kherson	12,277
Total	**81,551**

The RF, however, deliberately downplays the scale of the damage, reflecting only those facilities the Kremlin plans to use for **military logistics and propaganda purposes**, ignoring the devastated economy and humanitarian consequences. For its calculations, the RF relies on three sources: data from **the SEC SK**, funding from the federal program **"Restoration and Socioeconomic Development of the DPR, LPR, Zaporizhzhia and Kherson Oblasts"** (Resolution No. 2255 of December 22, 2023), and limited investments through **free economic zones (FEZ)**. Moreover, the scale of the "damage" has been consistently understated: in December 2023, the figure was **2.1 billion rubles**, in June 2024—**476 million rubles**, in September—**7.5 billion rubles**, and in November—almost **60 billion rubles** (over 25,000 facilities). Only in July 2025 did the SEC SK announce the final cost of **550 billion rubles ($6.9 billion) and 70,000 destroyed facilities**, which is still incomparable with the actual scale of the destruction **[2]**. Thus, Russian figures do not reflect the actual damage to industry and infrastructure, but only the minimum costs of operating the Oblast as a **military base**, while Ukraine and the international community record a real catastrophe requiring comprehensive restoration (Table 37).



Only in July 2025, the SEC SK announced the final figure of 550 billion rubles ($6.9 billion) and 70 thousand destroyed objects, which is still incomparable with the real scale of destruction

Table 37. Assessment of damage to infrastructure in Donetsk, Luhansk, Zaporizhzhia and Kherson Oblasts (including occupied territories) including industry, infrastructure, etc., from expert international organizations and from the RF, and the allocation of funding for the restoration of the occupied territories, $ billion

Kyiv School of Economics (KSE)	Forensic Center of the Investigative Committee of the RF	Allocation of funding within the framework of the federal program "Restoration and Socioeconomic Development" of the occupied territories, as well as attracting investment within the framework of the SEZ
81,551	6,866	19.298 (16.09 and 3.208 respectively)

The striking discrepancy in damage estimates—$81.5 billion (KSE) versus $6.8-$19.3 billion (Russia)—reflects a fundamental difference in approaches and objectives. While the Ukrainian side and international experts assess the full value of all lost and damaged assets for future reintegration and reconstruction, the Russian assessment is selective. It takes into account only that portion of the infrastructure that the Kremlin deems expedient to restore for its own military, logistical, and propaganda needs. Thus, the Russian figures do not demonstrate the scale of destruction, but only the volume of investment in exploiting the Oblast as a military staging area, ignoring the vast majority of the damage inflicted.

Dismantling, removal of equipment, flooding of mines

Following the occupation of certain areas of the Donetsk and Luhansk Oblasts in 2014, Russia began removing equipment from the most valuable industrial facilities **[35]**. Following the annexation of the Donetsk, Luhansk, Zaporizhzhia, and Kherson Oblasts in 2022, the policy changed: enterprises of interest to the Kremlin were transferred to federal ownership and managed by Russian state corporations, while the rest were nationalized and placed under external management.

From 2014 to 2022, equipment was dismantled and removed from a number of key enterprises: **Luhansk Electric Machine-Building Plant LLC** (equipment for enriching coal, ores, secondary raw materials, filters, and boiler equipment), **Stakhaniv Ferroalloy Plant** (ferrosilicon production), **Stakhaniv Carriage Works** (freight railway cars), **Lutuginsky Research and Production Rolling Plant (cast iron rolls for rolling mills), Luhansk Cartridge Plant, Luhansk Machine-Building Plant named after A. N. Parkhomenko** (Mashzavod-100, production of equipment for growing single crystals), **Yunost Plant** in Krasnodon (micro miniature relays for aviation and rocket technology), **Yasinuvata Machine-Building Plant** (mining equipment), and **PJSC GAKH "Topaz"** (radio engineering systems and complexes). Some of the enterprises were converted into militant bases, and much of the equipment was exported to Russia. In 2021, Topaz was formally incorporated into the Almaz Corporation, created by decree of the occupation administration of the "DPR."

As of 2014, there were **140 operating mines in the Donetsk and Luhansk Oblasts (excluding those closed and mothballed)** (30-40 in Ukraine and 96 (operating) under the control of the "LDPR"). By 2017, only **19 mines were operating in the occupied part of the Donetsk Oblast**, some of which discharged mine water into the Siversky Donets basin. In 2019, of the 96 mines, **most were in the process of flooding.**

Photo 7. *At the Bulavinskaya mine (occupied Yenakiieve), Russian projects for "humanitarian and ecological" drainage complexes do not provide for any cleaning of settling tanks*

According to expert estimates, 79 mines in the uncontrolled territories were 70-100% flooded:

The Bulavinskaya mine (occupied Yenakiieve)

At the Bulavinskaya mine (occupied Yenakiieve), Russian "humanitarian and environmental" drainage system projects do not provide for any treatment of the settling basins. Mine water from the workings is simply discharged onto the existing landscape. In the case of the Bulavinskaya mine, dirty water flows into the Dolzhik ravine, and then into the Volyntsevskoye Reservoir, a reserve drinking water supply. According to the plans of the Voda Donbasa utility company, the Volyntsevskoye Reservoir is intended to serve as a reserve water supply for cities such as Yenakiieve, Kirovsk, Debaltseve, and Shakhtarsk.

Miusinskaya mine (Krasny Luch city)

Miusinskaya mine in Krasny Luch was one of the largest coal mines in the Oblast, providing employment for thousands of workers before the war and remaining a vital part of the Donbas energy system. After 2014, the facility came under the control of the occupation administration and gradually lost its ability to operate normally due to a lack of investment. In April 2020, Moscow decided to stop pumping water, and the mine began to rapidly flood. This had serious environmental consequences: mine water, saturated with sulfates, heavy metals, and radioactive elements, began to leak into underground aquifers, threatening to pollute rivers and reservoirs, as well as create sinkholes. For Krasny Luch, this also had a social impact—hundreds of miners lost their jobs, and the town lost one of its main employers.

Novopavlovskaya mine (Krasny Luch city)

The smaller, but significant Novopavlovskaya mine in the same Oblast also ceased operations in the spring of 2020, when water pumping was stopped. Due to the geological features of the area, flooding occurred quickly. Environmental consequences included contamination of soil and water bodies, increased toxins in groundwater used for farming, and degradation of agricultural land around the mine. As with Miusinskaya, the social consequences were severe: miners were left without jobs and livelihoods, and many were forced to leave the Oblast.

Pervomayskugol state enterprise mine

After the uncontrolled flooding of the Pervomayskugol state enterprise mines in the "LPR" in May 2018, the flow of water into the Ukrainian-controlled territory of the Luhansk Oblast increased sharply, through the closed Rodina mine towards the Zolotaya mine.

The Yenakiyevskaya and Poltavskaya mines

The Yenakiyevskaya and Poltavskaya mines pose a particular threat, as their workings flooded after dewatering stopped. Water from these mines began to flow into the hydraulic system of the neighboring Yunkom mine, greatly increasing the risk of an environmental disaster. While the previous danger was the gradual rise of mine water in Yunkom itself, where an underground nuclear explosion was conducted in 1979 as part of Operation Cleavage, the flooding of Yenakiyevskaya and Poltavskaya has now become uncontrollable. Additional volumes of mine water accelerate the filling of cavities and could lead to the erosion of the "radioactive capsule" formed as a result of the nuclear experiment.

Photo 8. *In March 2018, the occupation "Ministry of Coal and Energy of the DPR" announced the cessation of water pumping at the Yuny Kommunar mine*

The consequences are complex: the risk of radionuclides entering underground aquifers and the drinking water supply in Donbas increases; surface water pollution increases, including in the tributaries of the Siversky Donets; the likelihood of subsidence in Yenakiieve and surrounding areas increases; and a transboundary threat is created for the ecosystems of the Rostov Oblast and the Don River basin. Thus, the flooding of the Yenakiyevskaya and Poltavskaya mines has transformed the situation around Yunkom into one of the most dangerous environmental bombs in the Oblast.

In March 2018, the occupation "Ministry of Coal and Energy of the DPR" announced the cessation of water pumping at the Yuny Kommunar (Yunkom) mine, sparking protests from residents due to the risk of contamination of groundwater and the Siversky Donets River, which also flows through Russian territory. Concerns were linked to the mine's unique history: on September 16, 1979, an underground nuclear explosion of approximately 0.3 kilotons was detonated there as part of Operation Cleavage. At a depth of 903 meters, a capsule approximately 30 meters in diameter was formed, where radioactive isotopes were intended to be "sealed" within a glassy mass.

Although official claims of "safety" and a positive effect on methane reduction were made, experts from the outset warned of the risk of radionuclide migration through water and cracks. Following the occupation of the mine in 2014, the decision to flood it without supervision became extremely dangerous: filling the workings with water poses a risk of radioactive elements being washed out and entering aquifers, threatening to contaminate local springs and major water systems in the Donbas and Rostov Oblasts.

Consequences of flooding:

- *radioactive contamination of groundwater and surface rivers*
- *the impossibility of long-term monitoring of the radiation situation in the mine*
- *threat to the health of the population living in the water intake area*
- *transboundary environmental effect, since the Siversky Donets is part of the Don basin, which has an outlet into the Sea of Azov.*

From 2019 to 2021, water sample analyses in the **Siversky Donets River showed a sharp deterioration in its quality**. In October 2019, water hardness was 8.8 mg-eq/L, sulfates 374 mg/dm³, and iron 0.37 mg/L. By October 2021, these figures had risen to 23.4 mg-eq/L, 1077 mg/dm³, and 0.46 mg/L, respectively. Russian drinking water standards limit hardness to 7.0 mg-eq/L, sulfates to 500 mg/dm³, and iron to 0.3 mg/L. The main cause is the uncontrolled discharge of mine water in the occupied territories **[2]**.

> *In 2024, research **by the Federal Agency for Fisheries (Rosrybolovstvo)** for the first time, recorded high levels of nitrogen, phosphates, mercury, and petroleum products in the rivers of the "LDPR" **[38]**. The pollution is due to the discharge of mine, drainage, and domestic wastewater, as well as fertilizer runoff from fields, exacerbating the environmental disaster and causing transboundary damage to water resources*

Repurposing of factories and plants to meet the needs of the military-industrial complex after the annexation of the occupied territories in 2022

Following the annexation of the occupied territories in September 2022, the RF built a systemic infrastructure for the occupation, repurposing industrial facilities for military purposes. Machine-building plants became repair centers, metallurgical plants became sites for the production of ammunition bodies and fortifications, and coke plants became disguised arsenals. By mid-2025, the Kremlin had completed the integration of the occupied territories into the military system: factories and mines were transformed into fortification and logistics hubs, ammunition depots were disguised as civilian facilities, and transport corridors served exclusively the army. Enterprises within the Russian military-industrial complex **[39]**, were involved in this repurposing, a key one being the state corporation ***Rostec***, created for the production and export of military and high-tech products. Also operating in the occupied territories is the Limited Liability Company “UK Ruseltech” (TIN 9704203028), whose sphere of management includes enterprises that produce products for the military-industrial complex of the RF.

Activities of the Rostec Corporation in the occupied territories

Since 2022, the state corporation Rostec has become the Kremlin's primary instrument for integrating the occupied territories of Ukraine into Russia's military-industrial complex **[3]**. This process involved converting civilian factories for military purposes, incorporating them into federal ownership, and using them as a base for military logistics. One of the first steps was the signing of an agreement in July 2022 between the **Uralvagonzavod concern** and the S**outhern Mining and Metallurgical Complex LLC** at the Innoprom-2022 industrial exhibition in Yekaterinburg. The agreement envisaged expanded cooperation and "innovative development" of the Donetsk and Luhansk Oblasts, but, in reality, meant their gradual incorporation into Uralvagonzavod's production sphere.

Photo 9. *Signing of an agreement in July 2022 between the Uralvagonzavod Concern and the Southern Mining and Metallurgical Complex LLC at the Innoprom-2022 industrial exhibition in Yekaterinburg*

Boris Myagkov, the company's Deputy general director, explicitly stated his intention to integrate the industrial potential of the Donbas into the Russian military-industrial complex. In June 2023, Uralvagonzavod's CEO Alexander Potapov met with Leonid Pasechnik, Head of the LPR's occupation administration. They discussed strengthening cooperation, specifically the procurement of raw materials from the **Alchevsk Iron and Steel Works** and oversight of the ***Stakhaniv Carriage Works. At the same time, a KAMAZ*** auto center was opened in Luhansk, symbolizing the beginning of Rostec's systematic presence in the Oblast. At the Army 2023 international forum, KAMAZ presented a line of armored vehicles (KAMAZ-4385PV and KAMAZ-5385P3) designed for transporting ammunition and personnel, demonstrating the corporation's direct military focus. In 2024, Rostec significantly strengthened its control over Donbas's industry.

The Stakhaniv Freight Car Building Plant, the Luhansk Aircraft Repair Plant, and the Snizhne Machine-Building Plant were incorporated into the corporation. The workforce at these enterprises was nearly doubled, and salaries quadrupled, accompanied by active propaganda promoting "improved living standards" in the "new Oblasts." A training and production center for retraining specialists was established at the Snizhne Plant, effectively turning it into a personnel reserve for the Russian defense industry.

Since the beginning of 2025, the **Stakhaniv Freight Car Building Plant**, transferred to Rostec through its subsidiary RT-New Horizons, has produced its first batch of 60 gondola cars. The plant has received certificates for the serial production of hopper cars, flatcars, dump cars, and specialized cars based on **Uralvagonzavod designs**. The corporation's plans included increasing production to 1,000 cars per year and creating 700 new jobs.

In May 2025, Rostec announced the creation of the first educational cluster in the Luhansk Oblast to train personnel in the mechanical engineering industry. A training and production complex is being established at t**he Stakhaniv College of Mechanical Engineering Technologies**, funded by the federal "Professionalism" project (1 billion rubles). This move is being presented as a means of "restoring" the industry, but, in reality, it addresses the acute personnel shortage in defense production.

Thus, Rostec is operating on a multi-tiered basis:

- *integration of strategic enterprises into the Russian military-industrial complex*
- *repurposing of factories for military needs (repair of equipment, production of ammunition and armored vehicles)*
- *creation of a personnel base and educational clusters*
- *the use of "social investment" as a tool of legitimization.*

In essence, the corporation is tasked with not only exploiting the industrial potential of the occupied territories, but also securing them within the orbit of the Russian military economy.

Activities of UK Ruseltech LLC in the occupied territories

Ruseltech Management Company LLC (TIN 9704203028) is a private management company based in Moscow, founded in 2023. For 2024, revenue was reported at approximately 10.6-11 million rubles and profit at approximately 2.0 million rubles. Its primary activity is managing financial and industrial groups.

UK Ruseltech manages companies in the occupied territories that manufacture products for the Russian military-industrial complex.

State Unitary Enterprise of the LPR "Central Design Bureau of Mechanical Engineering "Donets"

State Unitary Enterprise of the LPR "Central Design Bureau of Mechanical Engineering "Donets" (CDBME "Donets" was registered on November 29, 2022 in Luhansk; the founder is the Ministry of Industry and Trade of the “LPR”. The legal entity is in the process of liquidation. On April 11, 2025, a separate legal entity, JSC CDBME "Donets" (TIN 9726097045), was established in Moscow, with the management organization indicated as LLC UK Ruseltech)—production of equipment and apparatus for the production of semiconductor ingots or wafers, semiconductor devices, electronic integrated circuits or flat panel displays

Limited Liability Company "Yunost Plant"	Limited Liability Company "Yunost Plant" (TIN 9408009119), Luhansk People's Republic, Krasnodon, 60th Anniversary of the USSR Avenue, 40—production of weapons and ammunition
Limited Liability Company "Donetsk Electrotechnical Plant"	Limited Liability Company "Donetsk Electrotechnical Plant" (TIN 9715489650), Moscow, Altufevskoe sh., 79a, building 3, premises 21/3/2—production of electric motors, electric generators and transformers
Limited Liability Company "Donetsk Energy Plant"	Limited Liability Company "Donetsk Energy Plant" (TIN 9726081239), Moscow, Varshavskoe Shosse, 33, building 1, room 8/16—production of electric motors, electric generators and transformers

Participation of military-industrial enterprises from the occupied territories in the International Military-Technical Forum of the RF "Army-2023-2024"

In addition to Rostec, other enterprises manufacturing products for the Russian military-industrial complex operate in the occupied territories. Their activity is evident through their participation in the RF's International Military-Technical Forum "Army" in 2023-2024 **[4]**.

CDBME Donetsk **[40]** ("LPR's" State Unitary Enterprise, Taxpayer Identification Number (TIN) is 9403024184, registered in Luhansk in 2022, later transformed into JSC CDBME Donetsk, Taxpayer Identification Number (TIN) 9726097045, managed by Ruseltech Management Company LLC) presented a single-crystal design for the production of electronics and microchips for the military-industrial complex at Army-2023. Historically, CDBME Donetsk specialized in the synthesis of semiconductor compounds and the growth of sapphire single crystals.

Pervomaysky Mechanical Plant JSC (TIN 9407002858) presented units and equipment for aviation, rocket, and space technology at Army-2023. The plant manufactures hydraulic motors, pumps, fuel control equipment, pneumatic and hydraulic units. It has a full production cycle (casting, forging and pressing, machining, assembly, and testing). In 2023, the plant began obtaining certificates of conformity for inclusion in the Russian military-industrial complex.

Yunost Plant LLC (TIN 9408009119) presented weapons-related products at Army-2023. Ozon LLC (TIN 9403004935) announced the production of dual-use products, including special-purpose equipment.

Photo 10. *Stands of enterprises from the "LPR" at the International Military-Technical Forum of the Russian Federation "Army-2023", which took place from August 14 to 20, 2023 in Moscow*

In August 2024, the enterprises of the military-industrial complex of the "DPR" presented an exposition at the forum "Army-2024" in Moscow, where 47 samples of products manufactured in the occupied Donetsk Oblast were shown **[4]**. Among the participants were State Unitary Enterprise "Donbas Development Corporation" (TIN 9303024230), ANO "Republican UAV Center named after Zhoga" (TIN 9303040986), LLC "3D-Techno" (TIN 9308015581), LLC NPO "Front" (TIN 9308026569), LLC NPO "Utesov" (TIN 9308024040), and PE Grigoriadiadis. The exhibition featured military equipment, armor protection, electronic warfare systems, and the OKO-M aviation platform, which can be used as a strike UAV or aerial simulation. In April 2025, **the Bars-Sarmat Special Purpose UAV Center [41]** (TIN 6154168283, supervised by Senator Dmitry Rogozin) began operations in the Zaporizhzhia Oblast. The center develops UAVs, robotic systems, communications systems, and electronic warfare systems. The first prototypes, including the Sarmat-Mgla (vehicle-mounted) and Sarmat-Kentavr (portable) anti-drone systems, have been delivered to the Dnepr units of the Russian Ministry of Defense. The center has an engineering and design battalion and two combat testing battalions. First Deputy Prime Minister of the RF Denis Manturov visited the facility, where he was shown drones, boats, electronic warfare systems, and robotics **[5]**. The center includes an engineering and design battalion and two combat testing battalions.

Photo 11. *In August 2024, the enterprises of the military-industrial complex of the "DPR" presented an exposition at the forum "Army-2024" in Moscow, where 47 samples of products manufactured in the occupied Donetsk Oblast were shown*

Photo 12. *First Deputy Prime Minister of the RF Denis Manturov visited the facility: he was shown drones, boats, electronic warfare systems and robotics*

The Archangel Project has been deploying UAV schools in the Donetsk, Zaporizhzhia, and Kherson Oblasts. As of June 2024, over 1,000 pilots, including teenagers, have been trained. In April 2025, the project announced expansion into Crimea and Zaporizhzhia, where new bases and sites for UAV assembly and pilot training are being established.

In July 2025, at the Innoprom-25 exhibition, an agreement was signed to create the first interregional electronics cluster involving the Kherson Oblast, Sverdlovsk Oblast, and Krasnodar Krai. The initiator is **Elektronika LLC** (TIN 9308024201, Kherson), which produces IP video cameras, thermal imaging cameras, hardware and software systems, printed circuit boards, and plastic enclosures. The cluster is intended to integrate regional enterprises into federal production chains.

These facts demonstrate Russia's dual strategy for industrial militarization. On the one hand, it exploits the Soviet industrial legacy for current military purposes. On the other, it creates new technological clusters in occupied territories, focused on future warfare. The creation of centers for the production of UAVs and electronic warfare systems, such as the Bars-Sarmat, and the training of operators at Arkhangel schools are key military-industrial vectors aimed at the long-term integration of the Oblast into the Russian defense system on a new technological basis.

Use of resources of occupied territories for weapons production

Following the partial occupation of areas of the Luhansk and Donetsk Oblasts in 2014, the Kremlin set the task of establishing weapons production and equipment repair at local facilities.
In 2016, the State Innovation Company (SIC) (TIN 9308015165) was established in Donetsk. In 2017, by decree of the Head of the "DPR," Zakharchenko, the state-owned enterprises Donetskgormash (TIN 51014325) and Horlivka Machine-Building Plant (TIN 51018623) were transferred to its control.

On May 9, 2018, an exhibition of weapons produced by SIC was held in Donetsk. Among the exhibits are:

- *Oplot 3M pistol (9×18 mm PM, 10-round magazine);*
- *MLRS "Cheburashka" (64 launchers for 217 mm caliber rockets);*
- *MLRS "Cheburashka" (2 missiles of 324 mm caliber, range up to 9.6 km);*
- *remote module "Turret" (7.62 mm machine gun);*
- *60, 82 and 120 mm mortars with ammunition;*
- *ASKV-12.7 "Donchanka" rifle (caliber 12.7 mm, weight 26.2 kg, range 1.5 km, cartridge 12.7×108 mm for NSV "Utes", "Kord", DShK);*
- *ASKV-14.5 "Donchanka" rifle (caliber 14.5 mm, weight 27 kg, range 1.5 km, cartridge 14.5×114 mm for KPV and ZPU).*
- *Anti-sniper rifle "Separatist"—caliber 23 mm, weight 44 kg. Maximum range is 3.5 km.*

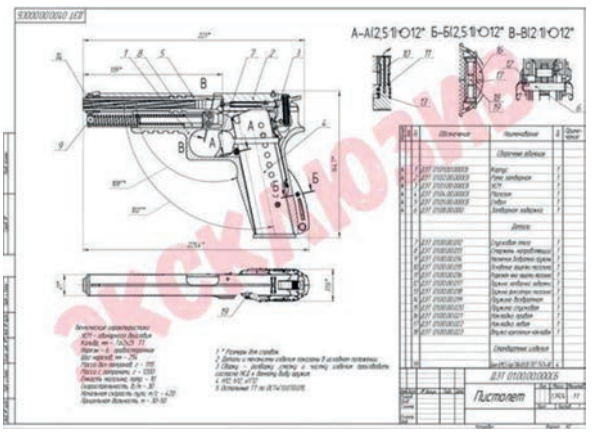


Photo 13. *Oplot 3M pistol (9×18 mm PM, 10-round magazine)*

On May 9, 2018, an exhibition of weapons produced by SIC was held in Donetsk. Among the exhibits are*(continuation)****:***

- *23×152 mm is a unitary projectile for artillery systems. It is used in the 2A7 (Shilka) and 2A14 (ZU-23-2 or ZUshka) anti-aircraft guns. Versions: armor-piercing incendiary tracer (BZT), fragmentation incendiary (OZ), fragmentation incendiary tracer (OZT);*
- *Submachine gun "Oplot" with a double-row magazine for 20 rounds;*
- *Stationary and mobile "Fog-dome" products that create interference against small-class UAVs;*
- *Electronic warfare station "Triton-M1";*
- *Electronic warfare station "Terrikon M2M";*
- *Electronic warfare station "Chameleon";*
- *Anti-aircraft missile system "Mantia".*

Photo 14. *Anti-sniper rifle "Separatist": caliber 23 mm, weight 44 kg. Maximum range is 3.5 km*

Photo 15. *Triton-M1 electronic warfare station*

On July 19, 2021, by decree of the Head of the occupation administration of the "DPR", the state corporation "Almaz" (SC "Almaz") was created [42] (TIN 9308018399). It included enterprises in the occupied Donetsk Oblast that were previously of strategic importance to the defense of Ukraine:

- ***Topaz (TIN 51020009)****—development and serial production of complex radio engineering systems and complexes;*
- ***Donetsk State Plant of Chemical Products (TIN 14311844)****—production of explosives and ammunition;*
- ***Makiivka State Design Institute (TIN 14314618)****—design of military-industrial complex and chemical industry facilities;*
- ***Research Institute of Integrated Automation (TIN 14310566)****—automation of processes for the defense industry;*
- ***Research Institute of Plastics (TIN 9303016180)*** *develops structural thermoplastics and binders and is the only manufacturer of a range of components for defense, aerospace, aircraft, and shipbuilding in the RF.*

The Almaz Group's goal is to implement defense industry policies: develop, manufacture, and export civilian, military, and dual-use products, as well as participate in social and economic projects. The corporation has been involved in the creation of high-value-added production facilities for shipbuilding, mechanical engineering, and the automotive industry, including as part of its import substitution policy.

In January 2024, the Azovmash production site was incorporated into the corporation. In August 2024, at the Army 2024 International Military-Technical Forum in Moscow, PSB Bank PJSC and Almaz Group signed a cooperation agreement. This agreement covered project advisory support, comprehensive banking services, joint investment programs, the implementation of financial management technologies, and the improvement of the mutual settlement system using PSB products.

Photo 16. *At the International Military-Technical Forum "Army-2024" in Moscow, JSCB Bank PSB and GC Almaz signed a cooperation agreement*

PJSC "Luhansk Cartridge Plant" (TIN 9403018416) and State Unitary Enterprise of the "LPR" "Luhansk Cartridge" (TIN 9403024057).

Until 2014, the Luhansk Cartridge Plant was divided into two enterprises: the State Enterprise Luhansk Cartridge, which produced small arms cartridges, and the Private Joint-Stock Company Luhansk Cartridge Plant, which produced sporting and hunting ammunition. Following the occupation of part of the Luhansk Oblast in 2014, both enterprises were nationalized by the "LPR's" authorities. In March 2016, a representative of the temporary administration announced that the plant had resumed operations in test mode: commissioning work had been completed and the full production cycle had been launched. According to him, the plant's capacity met the needs of the "LPR" and "DPR" for small arms cartridges (5.45 mm, 7.62 mm, and 9 mm), and in the event of active hostilities, it could be increased three to four times. By February 2025, Luhansk Cartridge Plant PJSC was excluded from the Unified State Register of Legal Entities of the RF (February 28, 2025), and Luhansk Patron State Unitary Enterprise has been officially in the process of liquidation since March 19, 2024.

State Unitary Enterprise of the "LPR" Luhansk Aircraft Repair Plant (LARZ) (TIN 9403015599).

In June 2023, the Luhansk Aircraft Repair Plant (LARZ) conducted its first bench test **[43]** since 2014 of the TV3-117 engine, used on Mi-8 and Mi-17 helicopters. The plant's restoration was carried out by Rostec's United Engine Corporation.

Deputy Prime Minister Marat Khusnullin stated at the time that the plant had potential for aircraft engine repair, with capacity utilization reaching 20%. By March 2024, LARZ announced the restoration and expansion of its workshops and preparations to obtain a license to manufacture helicopter engines. In August, it was noted that the number of personnel increased tenfold—up to 200 employees. Financial indicators for 2024: revenue increased from 37.2 to 55.1 million rubles, cost price was 60.9 million rubles, gross profit was negative (-5.75 million rubles), income from current operations—192.8 million rubles. LARZ performs maintenance of military, dual-use and civil aviation equipment: repair of TV2-117A/AG, TV3-117 engines of all modifications, R27F2M-300, R29-300, R29B-300, R35-300, VK-1, RD-45, as well as major repairs of VR-8A, VR-14, VR-24 gearboxes and units, with warranty and post-warranty service.

Photo 17. *In occupied Luhansk, Deputy Prime Minister of the Russian Federation Marat Khusnullin visited an aircraft repair plant*

In June 2023, LARZ conducted the first bench test of the TV3-117 engine, which powers the Mi-8 and Mi-17 helicopters, since 2014. The restoration of the plant's operations was carried out by the United Engine Corporation of the Rostec State Corporation.

What influence does the RF have on the composition of the labor force and working conditions in the occupied territories, including possible coercive measures?

The main socioeconomic problem of the occupied territories is the mass outflow of population and an acute labor shortage. Before 2022, approximately 9 million people lived in the Donetsk, Luhansk, Zaporizhzhia, and Kherson Oblasts. As of March 1, 2022, the "DPR" had less than 2.2 million residents, while the "LPR" had 1.39 million. In the second quarter of 2022 alone, more than 500,000 people resettled in the RF, and over 1 million for the entire year, primarily young people aged 18-35. By the beginning of 2024, the population had fallen to 3.2 million (according to the Federal Compulsory Medical Insurance Fund). By the beginning of 2025, only approximately 3 million residents had received compulsory medical insurance policies: 1.4 million in the "DPR," over 1 million in the "LPR," 427,000 in the Zaporizhzhia oblast, and 226,000 in the Kherson oblast. Due to destroyed infrastructure and emigration, there is a severe shortage of specialists in basic professions. According to Rabota Rossii, there were more than 40,000 vacancies in the occupied Oblasts as of March 2025 **[6]**. Teachers, doctors, construction workers, drivers, economists, blue-collar workers, and utility specialists are in demand. Healthcare, education, and energy industries account for approximately 20% of vacancies. As of July 2025, there were 27,900 vacancies in the “DPR” (56% for blue-collar jobs), and over 13,000 in the “LPR.” In the occupied Zaporizhzhia Oblast, employers have been permitted to use underage labor: since 2023, more than 45,000 residents have applied to employment centers, of which 36,000 have been employed. In the Kherson Oblast, the situation is catastrophic: out of 1,000 vacancies in May 2025, only 21 people found work. The SEZs, which the Kremlin presented as a tool for economic recovery, have also failed: instead of the promised 100,000 jobs by July 2025, only about 10,000 have been created. Meanwhile, 365 investors have registered, implementing 400 projects with investments of 46.5 billion rubles, instead of the planned 257 billion.

The military factor exacerbates the personnel crisis: any working man can be mobilized into the ranks of the occupation forces. This makes the Oblast's labor force extremely unstable and further reduces people's motivation to stay. Even large corporations such as Rostec are facing a labor shortage **[9]**. In May 2025, the company announced the creation of the first educational and industrial cluster in the "LPR" at the Stakhaniv College of Mechanical Engineering Technologies. Its purpose is to eliminate the personnel shortage and train specialists for mechanical engineering, including for defense enterprises. The cluster is being funded through the federal "Professionalism" project (1 billion rubles), with the participation of the Stakhaniv Carriage Works. Thus, the occupied territories are simultaneously suffering from a demographic crisis, the failure of socioeconomic policies, and the risk of forced mobilization of the working-age population, making any prospects for economic recovery illusory.

In addition to labor shortages, systemic labor rights violations and forced labor are being recorded in the occupied territories. Under threat of reprisals, the population is forced to work in repurposed factories, construct fortifications, and repair military equipment. These actions violate international humanitarian law and qualify as war crimes, turning labor into an instrument of occupation. Due to the massive outflow of population and the failure of the SEZ projects, the occupation authorities compensate for the shortage by importing workers from depressed Oblasts of the RF and Central Asian countries. They are used in construction and reconstruction projects, simultaneously fulfilling a demographic policy objective: changing the social and ethnic composition of the Oblast, undermining local identity and facilitating the maintenance of control.

Proximity to the front line: implications for logistics and storage

Following the annexation of the Donetsk, Luhansk, Zaporizhzhia, and Kherson Oblasts, Russia faced a serious logistical problem. Following the attacks on the Crimean Bridge, the Kremlin placed its emphasis on a "land corridor" through the Azov coast (Mariupol-Berdyansk-Melitopol to Crimea) and the restoration of the Azov Sea ports, transforming them into key elements of military logistics. In February 2025, the Russian president instructed Prime Minister Mikhail Mishustin and Russian Railways CEO Oleg Belozerov to prepare a plan by the end of March to develop freight and passenger traffic with Crimea through the occupied territories, including the modernization of port infrastructure for military needs **[10]**. Separately, consideration is being given to expanding the roads along the Sea of Azov to four lanes by 2030, which will allow them to be used as transport arteries for the transfer of military equipment and personnel.

Deputy Prime Minister Marat Khusnullin explicitly stated that the project's goal is to connect Crimea not only by road but also by rail through the occupied Zaporizhzhia Oblast, creating an alternative to the vulnerable Crimean Bridge. The project to establish a rail link from Crimea via Dzhankoi and Novooleksiivka is estimated to cost between 90 and 160 billion rubles and is being implemented by Novorossiya Railways Federal State Unitary Enterprise (FSUE) jointly with the Crimean Railway.

In March 2024, Oleg Kalevatykh, First Deputy Head of the company, announced the completion of the first stage: 63 km of new line had been built and 140 km of track had been restored. Completion of all work is scheduled for the end of 2024. In the summer of 2024, the occupation administration of the Zaporizhzhia Oblast declared the infrastructure ready for passenger train service to Crimea, but service is being restricted due to security concerns. This underlines the military nature of the project: new roads and railway lines are being built not so much for civilian transport, but to ensure stable military supplies and maneuvers of the occupying army in the southern direction.

Rail transportation

By order of the Russian government dated May 29, 2023, No. 1404-r, the Federal State Unitary Enterprise "Railways of Novorossiya" (FSUE "ZhDN") (TIN 9303033481) was established to organize transportation in the occupied territories of the Donetsk, Luhansk, Zaporizhzhia, and Kherson Oblasts. ZhDN's base was the captured rail infrastructure of these Oblasts, which was effectively integrated into the RF's military logistics system. In 2024, the enterprise transported over 21 million tons of freight (10% above plan), and in the first half of 2025, volumes increased by a further 33% compared to the same period last year. In August 2023, construction of the Karbidny-Kichiksu section began in the "DPR," completed in June 2024. This line connected the North Caucasus Railway with Donetsk and then, via the Zaporizhzhia and Kherson Oblasts, to Crimea, creating an alternative overland supply route for the Russian army. In 2024-2025 alone, over 2 million tons of cargo, including military goods, were transported to the peninsula along this line, completely bypassing the vulnerable Crimean Bridge. In April 2025, the first container train arrived in Crimea via the railway network, traveling over 3,000 km in five days from the Sverdlovsk Railway to the port of Sevastopol, where the containers were transferred to ships **[7]**. Roszheldor is simultaneously developing container shipping routes from the Kuibyshev, Oktyabrskaya, Gorky, and Severnaya Railways for the shipment of export products and military cargo to Crimean ports. In June 2025, Rostekhnadzor began construction supervision of a new 63.4-kilometer railway line connecting the logistics hubs of Donbas and Novorossiya. The project involves over 800 workers and approximately 900 pieces of equipment. These lines are being built from the outset with a military priority—ensuring the transport of troops, equipment, and ammunition. At the same time, the Kremlin is allocating significant funds to modernizing the Azov-Black Sea basin railways.

The goal is *to increase their throughput capacity to 152 million tons by 2030 to ensure the stable supply of military forces and the export of goods from the occupied territories. In 2024, as part of the "Development of Railway Approaches to Seaports of the Azov-Black Sea Basin" project, Russian Railways completed 40 billion rubles worth of work, including the construction of a bypass around Saratov and the modernization of approaches to the ports of Novorossiysk and Taman, which are also actively used for military purposes.*

Construction of highways

In the RF, priority has been given to the construction of roads in the occupied territories, where the key projects have become the "Azov Ring" project, which includes the R-280 "Novorossiya" highway **[44]**. The Kremlin presents them as infrastructural, but, in fact, they strengthen military logistics. In 2025, the modernization of the R-280 began in the Rostov Oblast, in the occupied lands of the Donetsk, Zaporizhzhia, Kherson Oblasts and in Crimea. Major repairs are planned for 139 km and widening of a 207.4 km section to 4 lanes.

Photo 18. *In the Russian Federation, priority has been given to the construction of highways in the occupied territories, where the key projects have become the "Azov Ring" project, which includes the R-280 "Novorossiya" highway*

The work is being carried out by the Federal State Institution "Taman Federal Road Administration" (TIN 4909083435). In the Donetsk Oblast, a bypass of Mariupol is being built (31.2 km, 4 lanes, 6 interchanges, 14 overpasses, 3 bridges); in the Zaporizhzhia Oblast, over 67 km are to be widened by 2027; In the Kherson Oblast and Crimea, sections with a capacity of up to 25,000 vehicles per day are being designed. 87.2 billion rubles have been allocated for this project through 2027, with a total cost of 500-600 billion rubles, and completion by 2030. At the same time, Moscow is integrating the Oblast into the international Europe-Western China transport corridor (9,000 km, 2,400 of which are in Russia) [12]. In the summer of 2024, a bypass around Togliatti (95 km of road and a 3.7 km bridge across the Volga) will open, becoming part of the route. The corridor will connect Tyumen, Yekaterinburg, Kazan, Saratov, Volgograd, and Rostov-on-Don, with access to the occupied ports of the Azov and Black Seas.

Thus, the road projects have a dual purpose: officially, they develop the transport network, but, in reality, they secure a "land corridor" to Crimea and ensure sustainable supplies for the Russian army, which is waging aggression against Ukraine.

Operation of seaports in the occupied territories

There are four seaports operating in the occupied territories: Mariupol and Berdyansk (Sea of Azov), Skadovsk (Black Sea), and Henichesk (Sea of Azov). Moscow is placing primary emphasis on Mariupol and Berdyansk, transforming them into key military and logistics hubs. As of April 2025, the port capacity of Mariupol reached 4.2 million tons, while that of Berdyansk reached 1.5 million tons. First Deputy Minister of Transport of the RF Valentin Ivanov stated that "the total carrying capacity is over 6 million tons, with an annual increase of almost twofold" [13]. Despite sanctions, the ports are actively increasing their shipping volumes, including agricultural products to "friendly countries." In 2022, 149.3 thousand tons of products passed through the port of Mariupol, and in 2023, it was 83.6 thousand tons. Today, the port has 14 berths capable of handling ships and military cargo. Four new warehouses with a capacity of 20,000 tons for grain and oilseeds are being built in Berdyansk, and additional equipment is being purchased.

500 million rubles have been allocated for modernization. At the same time, the Federal Enterprise NIKIMP announced a tender for dredging works in Mariupol and Berdyansk in 2025, valued at 483.7 million rubles, with completion scheduled by October 2025.

The Kremlin plans to integrate the Kherson ports of Skadovsk and Henichesk into military logistics: new railway lines are being built; logistics centers and industrial parks are being established. Their modernization will allow for the combination of sea, rail, and road transport. Thus, under the guise of "restoration," the RF is effectively turning the ports into military installations: Mariupol and Berdyansk into arsenals for supplying forces on the southern front, and Skadovsk and Henichesk into strongholds for controlling the Black and Azov Seas.

Problems with water supply in Luhansk, Donetsk, Zaporizhzhia and Kherson Oblasts

Following the full-scale invasion of 2022, the temporarily occupied territories of Ukraine faced a severe water crisis. Before the war, Ukraine had supplied water reliably to the Luhansk and Donetsk Oblasts, but the fighting, the destruction of pipelines and pumping stations, the shelling of civilian infrastructure, and the bombing of the Kakhovka Hydroelectric Power Station completely changed the situation. Russia, having seized control of water facilities, was unable and unwilling to provide the population with safe water, turning the problem into a long-term humanitarian disaster. In the Luhansk and Donetsk Oblasts, the main networks had not been repaired for decades. After the occupation, worn-out pipes began leaking massively: only 25-35% of water supplied from Russia reaches consumers.

Photo 19. *The shallow North Crimean Canal*

The Don-Donbas Water Pipeline, which the Kremlin used to compensate for the shortage, has proven virtually useless: the pipes have rusted, preventative maintenance and disinfection are carried out irregularly, and reagents are often not used. At the same time, an uncontrolled rise in mine water is occurring: dozens of flooded mines in the Luhansk and Donetsk Oblasts are releasing contaminated water containing high mineral content, heavy metals, and toxins.

Subsidence and flooding have been reported in areas of old mines, and sulfate and nitrate levels are exceedingly high in private wells. The use of mine water, as insisted by the occupation authorities, is mortally dangerous: it forms acidic mine drainage, unsuitable for drinking or irrigation, and when it enters rivers, it causes siltation and the destruction of ecosystems. The Yunkom mine, where the USSR conducted the Cleavage nuclear explosion in 1979, poses a particular threat. Since pumping stopped in 2018, the mine has been steadily flooding. If this trend continues, mine water will reach the surface by 2026, threatening the release of radionuclides into the Miussky Basin and subsequent migration into drinking water aquifers. This creates a long-term radiological risk for Donbas and neighboring Oblasts.

The situation is no better in the Zaporizhzhia and Kherson Oblasts. The explosion of the Kakhovka Hydroelectric Power Station in June 2023 was a key factor in the degradation of the water supply. The Kakhovka Reservoir, which fed the North Crimean Canal, dried up, depriving the Oblast of its traditional water source. The Kherson and southern Zaporizhzhia Oblasts are left without irrigation: over 340,000 hectares of farmland are unwaterable, and crop yields have plummeted. According to 2024 estimates, the grain harvest in the Kherson oblast was only 1.3 million tons, which is much shorter than the expected 2 million. By the summer of 2025, drought and lack of irrigation have destroyed over 52,000 hectares of crops, with damage estimated at 307 million rubles, and a state of emergency has been declared in nine raions of the Kherson oblast. Local residents rely on wells, tanker trucks, and infrequent water deliveries to survive. However, well water has high mineral content and microbiological abnormalities, as even Rospotrebnadzor confirms **[8]**. People receive only a few liters per person per day, the water is stored in inadequate conditions, and sanitary risks are growing.

Thus, the water crisis in the Donetsk, Luhansk, and Zaporizhzhia Oblasts is directly caused by Russian aggression. Russia has destroyed infrastructure, blown up the Kakhovka Hydroelectric Power Station, ignores technical standards, and uses resources exclusively for military purposes. A solution to the problem is possible only after de-occupation, restoration of Ukrainian control, major repairs to main pipelines, and the implementation of a fully-fledged water treatment and monitoring system.

Consequences for residents of the occupied Kherson and Zaporizhzhia Oblasts

The blowing up of the Kakhovka Hydroelectric Power Station dam by Russian troops on June 6, 2023, caused severe socioeconomic consequences for the occupied territories of the Zaporizhzhia and Kherson Oblasts. The shallowing of the Kakhovka Reservoir halted the flow of water to the North Crimean Canal, which provided up to 85% of Crimea's needs—primarily for agriculture and industry, as well as for the population. By June 22, 2023, all canals fed by the reservoir were shut off. The occupation authorities attempted to shift responsibility, promising to compensate for the shortage with underground wells, but these produced poor-quality water. In 2024, a "Regional water supply scheme" was developed in the Kherson oblast, but Rospotrebnadzor (Federal Service for Surveillance on Consumer Rights Protection and Human Wellbeing) tests showed that the water did not meet sanitary standards [14]. Residents of the occupied Zaporizhzhia and Kherson Oblasts began drilling wells en masse, depleting aquifers and deteriorating water quality. As of July 2025, 14 settlements in the Kherson Oblast (approximately 50,000 residents) lack centralized water supply; only 60 1-2 cubic meter storage tanks have been promised. The destruction of the hydroelectric power station destroyed the irrigation system's potential, which provided irrigation for 1.6 million hectares of land in the Kherson and Zaporizhzhia Oblasts and Crimea. Without the North Crimean and Kakhovka Canals, 344,000 hectares lost irrigation. In 2024, the area of irrigated land decreased almost 100-fold. The grain harvest in the Kherson Oblast amounted to only 1.3 million tons, compared to a projected 2 million tons—a 35% decline.

In June 2025, the crisis reached catastrophic proportions: an "Emergency commission" meeting was held in Henichesk, after which a state of emergency was declared in nine districts of the Oblast. Drought and lack of irrigation led to the destruction of over 52,000 hectares of crops. Total damage amounted to 307 million rubles **[9]**.

Specific data demonstrates the scale of the disaster:

- ***Henichesk district**—4.9 thousand hectares of lost crops, losses of 89.7 million rubles*
- ***Nyzhni Sirohozy**—12.7 thousand hectares, 67.7 million rubles*
- ***Kakhovka**—7.7 thousand hectares, 31.1 million rubles*
- ***Novotroitske**—7.7 thousand hectares, 38.1 million rubles*
- ***Ivanovske**—3.1 thousand hectares, 35.5 million rubles*
- ***Oleshky**—2.1 thousand hectares, 15.6 million rubles*
- ***Verkhnii Rohachyk**—1.2 thousand hectares, 15.5 million rubles*
- ***Velyka Lepetykha**—0.5 thousand hectares, 7.8 million rubles*
- ***Skadovsk**—0.2 thousand hectares, 2 million rubles.*

Russia's bombing of the Kakhovka Hydroelectric Power Plant has disrupted the water supply and irrigation systems, making life critically difficult for civilians **[46]** and farmers in the occupied territories. People are deprived of access to quality water, crop yields have plummeted, and farmers are suffering hundreds of millions in losses. The water crisis has become systemic and long-term, and its resolution is impossible without restoring Ukrainian control and completely reconstructing the infrastructure.

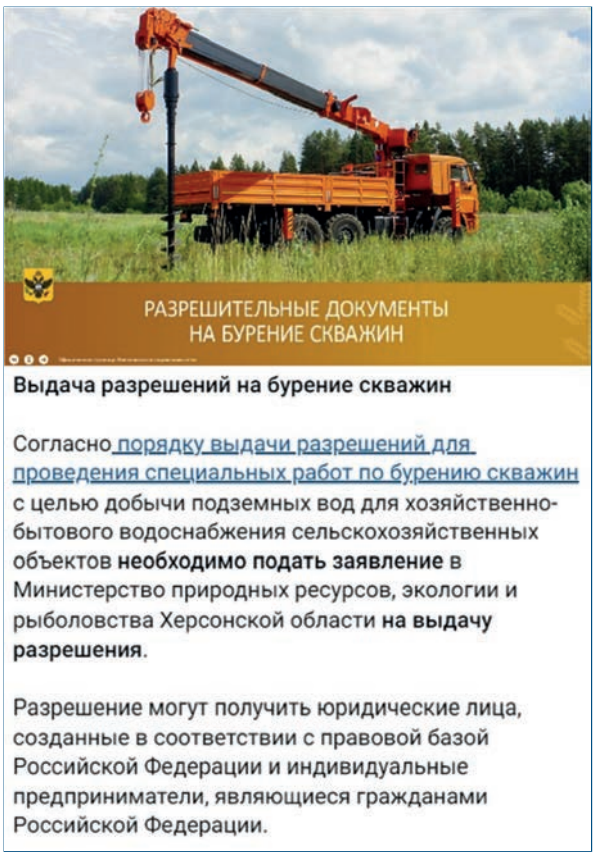


***Photo 20.** Residents of the occupied Zaporizhzhia and Kherson Oblasts have begun to drill wells en masse*

Residual infrastructure potential

Following the annexation of the Donetsk, Luhansk, Zaporizhzhia, and Kherson Oblasts, Russia's actions are aimed at exploiting the surviving infrastructure for quick profits and military needs. Restoration of unprofitable enterprises is practically non-existent. According to the Kyiv School of Economics (KSE), as of January 2024, direct damage to the Oblasts' infrastructure amounted to $81.551 billion **[1]**. Funding under the RF's federal program "Restoration and Socioeconomic Development" of the occupied territories, as well as investment within the SEZ, amounted to $19.298 billion ($16.09 and $3.208, respectively). The imbalance between destruction and minimal investment demonstrates that Moscow seeks to extract resources and strengthen the military machine, rather than develop the economy.

Investors from the RF systematically disregard environmental standards:

- *a coal enrichment plant in the Antratsyt raion took water from the Krepenskaya River without permits (fine 90 thousand rubles) [17];*
- *At the Dniprorudnensky Iron and Steel Works, a pipeline rupture discharged mine water into the Maly Utlyuk River, with damage amounting to more than 2 million rubles **[10]**;*
- *The Amvrosiivka Cement Plant (Peak-Cement), which covers up to 95% of the Oblast's needs, disposes of thermal power plant ash and metallurgical slag, increasing pollution.*

Photo21. *Coal enrichment plant in Antratsyt raion took waters from Krepenskaya River without permits*

Despite slogans about "achieving average Russian indicators by 2030," the Kremlin is actually closing mines and plants that do not generate "quick monetization." Russian Government Decree No. 908-r of April 12, 2025 ("Energy Strategy until 2050") provides for the liquidation of unprofitable mines in the occupied territories. In April 2025, the lessees of coal assets—Impex-Don LLC and TD Donskie Ugli LLC—returned nine mines (seven in the Luhansk Oblast and two in the Donetsk Oblast) to government control, citing unprofitability **[11]**. The mines are planned to be transferred to the State Unitary Enterprise "GURSh" for restructuring and liquidation. Discussions are underway not only on retraining miners, but also on converting a number of closed mines into ammunition depots, using underground workings as disguised arsenals. This industrial management perpetuates the military model: metallurgical plants produce military goods, cement plants produce fortifications, and decommissioned mines become potential arsenals. The Oblast's economy and ecology are sacrificed to the interests of the Russian military, and the occupied territories are transformed into a resource and military base for continued aggression. This approach, in which Russian investors close mines after assessing their unprofitability and demand tax breaks to secure excess profits, is an example of "industrial cannibalism."

This strategy does not envisage long-term development or modernization. Its goal is to maximize the extraction of remaining resources and profits in the shortest possible time, even at the cost of complete depletion and subsequent closure of enterprises, which condemns the Oblast's industrial complex to ultimate degradation.

The "Energy Strategy of the RF until 2050," approved in April 2025, **[46]** calls for the liquidation of unprofitable coal enterprises in the occupied territories. At the St. Petersburg Economic Forum in the summer of 2024, the "LPR" transferred five mines (Molodogvardeyskaya, Krasny Partizan, Sukhodolskaya-Vostochnaya, Kharkovskaya, and Barakov) and auxiliary facilities to the Rostov-based Trading House "Donskie Ugli." Three of the mines previously belonged to Rinat Akhmetov's Metinvest, and two—to Sverdlovantratsit. The investor announced it would invest 49 billion rubles between 2024 and 2028. In the spring of 2024, the "DPR" transferred four mines (Komsomolets Donbasa, Progress, Zarya, and Lutugin) to Impex-Don, with investments estimated at 16 billion rubles. The Volynskaya mine was leased to Energokoks Mining and Processing Plant LLC (planned investment: 211 million rubles).

According to the Russian Ministry of Energy, there were approximately 114 mines in the occupied territories, but only 15 were planned to remain in operation. Unprofitable mines are being decommissioned, and some are being considered for potential ammunition storage sites and disguised military depots.

Russian investors are lobbying for a zero mineral extraction tax (MET) and water tax. In April 2025, the State Duma began preparing amendments expanding benefits for SEZ participants **[21]**. The economic effect for the Soyuzmetallservis Group (UMMC) alone is estimated at 2.6 billion rubles over 5 years. The Southern Mining and Metallurgical Complex (UMMC), the largest industrial holding in the occupied Donetsk and Luhansk Oblasts (Alchevsk and Yenakiieve Metallurgical Plants, Stakhaniv Ferroalloy Plant, Makiivkoks, Yasinovsky Coke and Chemical Plant, and Komsomolsk Mining Administration), shipped almost 3 million tons of products in 2024 (60%—to the Russian domestic market, 40%—exported). In the spring of 2024, it announced annual investments of 8 billion rubles to double steel production from 2.5 to 5 million tons. However, in 2025, UMMC reported a 10-15% drop in demand for metal and a price reduction (down to -17% for rolled products). The company is demanding state support, shipping benefits, and import restrictions. Meanwhile, a significant portion of its output is being used for the Russian military industry: the production of armored hulls, ammunition, and fortification structures. Russian policy in the occupied territories is focused on exploiting resources for maximum profit and militarizing industry.

Metallurgical plants are being used for military purposes, while mines deemed "unprofitable" are being converted into ammunition depots. The Oblast's economy and ecology are being sacrificed for the war against Ukraine.

Training grounds for military personnel of the Russian armed forces in the occupied territories

On October 12, 2023, the Russian Ministry of Defense announced the completion of construction of the first of seven training grounds for the Russian Armed Forces in the occupied territories. Construction work for the Russian Ministry of Defense in the temporarily occupied territories is being carried out by the Southern Construction Directorate branch of the Federal State Unitary Enterprise Main Directorate of Special Construction (TIN 2315078029).

Photo 22. *"8th combined arms training ground "Zvezdny" for training Russian military personnel in the occupied Donetsk Oblast*

At the first training ground built in the occupied Luhansk Oblast, "a training tactical field has been equipped for the practical training of military personnel during combat operations in an urban environment with varying building densities. In addition, a modern tank range and a motor racing track have been built at the training ground." The training facility was the first of seven military training grounds being built in the territories of the "LPR" and "DPR" to begin operations. The remaining six are under construction and will be completed by the end of this year, the Ministry of Defense added. The facility's infrastructure was inspected by Colonel General Ivan Buvaltsev, Chief of the Main Directorate of Combat Training of the Russian Armed Forces **[12]**.

At the end of November 2023, the first full-time training ground, the 8th Combined Arms Training Ground "Zvezdny," was opened in the occupied Donetsk Oblast for military personnel training. The training ground covers approximately 27 hectares and includes training areas for artillerymen, tank crews, snipers, assault troops, grenade launchers, machine gunners, and other military specialists. The training ground can accommodate 3,000-4,000 personnel simultaneously **[13]**.

In 2023, the Russian occupation army established a tank training ground from scratch on an area of 4,000 hectares near the administrative border between Crimea and the captured part of Kherson. The training ground begins on the outskirts of the village of Popivka **[14].**

In January 2025, information emerged about the opening of a training ground for Russian Armed Forces personnel in the occupied Zaporizhzhia Oblast: "Cossack volunteers are training at one of the training grounds in the rear area of the Orikhiv direction, where participants in the armed aggression against Ukraine are mastering skills in preparation for carrying out missions as part of the Dnieper group of forces." The training includes physical exercises adapted to the realities of combat conditions. This includes a 10-kilometer run with obstacle course elements in full gear, trench assaults, evacuation of the wounded, terrain orientation, and tactical timed exercises

Photo 23. *Opening of a training ground and training of servicemen of the Armed Forces of the Russian Federation in the occupied Zaporizhzhia Oblast*

Underground and warehouse infrastructure as an object of militarization

The geographic and geological features of Ukraine's eastern Oblasts have created unique preconditions for the militarization of underground space. Donbas, as one of Europe's largest coal basins, has a vast network of mines with a total length of several thousand kilometers of underground workings. These mines are located at depths ranging from 200 to 1,500 meters **[15]** and have a complex multi-level structure with numerous horizons, drifts, and chambers. The salt and gypsum deposits of the Bakhmut-Soledar raion form natural cavities up to 30 meters high, which were used for salt extraction for many years [30]. Thus, the industrial legacy of the Soviet era has left behind thousands of underground technical rooms, bunkers, storage facilities, and communication tunnels, built with the possibility of nuclear warfare in mind [34]. Modern high-intensity warfare with the widespread use of precision weapons, drones, and space reconnaissance has forced a reconsideration of approaches to protecting critical infrastructure. Underground facilities provide natural protection against most types of modern weapons, including guided bombs, cruise missiles, and large-caliber artillery. Stable underground temperatures (8-12 °C) and low humidity create ideal conditions for the long-term storage of ammunition, fuel, and sensitive electronics.

Technical aspects of underground complexes

Life support systems for underground military facilities in the occupied territories are built on Donbas mine infrastructure, which has been converted into ammunition depots and equipment. Ventilation is partially provided by natural draft and the remains of old fans (VTsD-47, VRTsD-4.5), capable of delivering up to 600 m³/s of air. However, after the mines were closed, the equipment was dismantled or destroyed, leaving the workings with minimal air exchange. When generators and equipment are operating, the air quickly becomes saturated with toxic gases. Portable fans and open shafts are used for partial ventilation, which unmasks the facilities. Water supply is based on mine drainage systems: 100-1,000 m³/h of groundwater enters the workings. Pumping requires pumps, but interruptions lead to rising water and its penetration into the upper horizons. Mine water carries heavy metal salts, radiological contaminants, and methane, posing a threat of poisoning and contaminating springs in adjacent areas. Evacuation routes are destroyed: emergency exits are flooded or blocked, elevators have been dismantled, and stairwells are in disrepair. Fire protection systems are absent, and wooden supports are highly flammable. Methane accumulates in old workings, creating a risk of large-scale explosions when ammunition is stored. In the event of a detonation or fire, the blast wave, toxic emissions, and flooding can damage nearby homes and utilities.

Thus, the use of mines as military installations turns them into a source of constant danger: the risk of explosions, gas leaks, flooding, and water pollution directly affects settlements located near former mine fields

Use of mines, technical rooms, and ventilation shafts for military purposes

Military use of underground communications, warehouses and shelters.
The use of underground mines for military purposes offers Russia certain advantages. Their natural protection and stable microclimate allow them to be used as reliable ammunition depots and logistics hubs. The extensive network of mines in the Donbas has become the basis for a multi-layered defense: in the Pokrovsk area, ventilation shafts are used as hidden passages for delivering ammunition. The detonation of such shafts by Ukrainian troops, including in the Pischane area, confirms their critical role. Concealing ventilation outlets is a key element of defense. Russian engineers use false ruins, artificial rubble, and ventilation grates in the basements of destroyed buildings. False rubble tactics are effective: the appearance of destruction is created from above, while a fortified passage to underground depots is preserved inside.

Thus, mines are used not only as shelters, but also as hidden logistics hubs, ensuring the stability of the Russian military infrastructure in the occupied territories

Soledar Salt Mines. Following the city's capture in January 2023, the mine system, approximately 200 km long and up to 288 m deep, became part of the Russian military infrastructure **[16]**. The mines' conditions—a constant temperature of 14-15 °C and 60% humidity—are ideal for storing ammunition. Underground chambers up to 30 m high (the largest measuring 100×40×40 m) allow for the storage of large arsenals [30]. Hundreds of thousands of boxes of ammunition and weapons are stored here, including Soviet stockpiles and new deliveries that continue to arrive.

Photo 24. *Soledar's salt mines are ideal for storing ammunition*

Rodinskaya Mine. The waste heaps around the facility have been converted into strongholds: Russian troops have dug in on the heights, deploying ATGM crews and FPV drone operators. The high ground provides a tactical advantage—observation and increased range. As a result, the mine itself is used as cover, and the waste heaps have become key elements of territorial control.

The Kapitalnaya Mine (Novoekonomicheskoe) serves as a protected rear hub. The tunnels house ammunition and fuel depots, and some chambers have been converted into medical stations. Ventilation shafts serve as hidden entrances and exits, and key areas are reinforced with slabs and metal arches. Vehicle repair bays operate above ground, while waste heaps serve as observation positions and staging areas for ATGMs and FPV drones.

The Trudovskaya Mine is one of the main landmarks along the front lines. It houses ammunition depots and fuel tanks, as well as a field medical station. The shaft is covered with concrete slabs and partially reinforced, reducing its vulnerability to artillery fire. For Russian troops, the facility serves as a rear supply point and potential long-term shelter.

Photo 25. *The Trudovskaya mine serves as one of the main landmarks on the front line*

The Butovka-Donetskaya mine (near Spartak/Avdiivka) is used exclusively for military purposes. The underground workings are equipped with shelters where units can descend during artillery and air strikes. Galleries serve as storage areas for ammunition, weapons, and mortar shells, while some of the spaces are used for fuel storage. The industrial site houses repair areas for equipment—armored personnel carriers, trucks, and drones—with mobile workshops and generators. Above-ground structures are reinforced with concrete blocks and sandbags and serve as a stronghold.

Zasyadko Mine (Donetsk) The facility is located in an urban area, providing natural camouflage. The workings exceed 1,200 meters in depth [28], allowing the premises to be used as shelters and storage facilities. After production ceased, the mine came under the control of the "DPR" occupation administration and partially remained operational. In the summer of 2025, strikes on the area caused a fire in the administrative building, confirming its military use. The workings and shafts, located in residential areas, provide the opportunity to covertly store equipment, units, and ammunition. Thus, the mine is used as a highly secure rear base.

Lysychansk-Alchevsk Basin Old and partially flooded mines in the Oblast are being converted for military use. At several sites, workings have been drained to accommodate ammunition depots and fuel tanks. Specifically, at the Privolnyanskaya mine, ventilation shafts have been cleared, generators have been installed, and areas for military equipment have been prepared. These mines are being converted into fortified rear outposts, ensuring long-term use by the Russian army.

The Cosmonauts, Dariivka, and Frunze mines (Rovenky). Their distance from the front line makes them convenient for military needs. The underground workings have been converted into ammunition depots, where artillery shells, mines, and other weapons are stored at considerable depths. Furthermore, makeshift repair areas have been created in the former production facilities: generators, welding equipment, and lifting mechanisms have been installed. These "DIY workshops" allow for the rapid repair of equipment without sending it deep into Russia. The Rovenky mines have been transformed into multifunctional military facilities—protected warehouses, repair points, and logistics centers for the Russian army.

Krasnodon (Sorokyne). A large underground arsenal has been created on the site of former mine workings. In May 2024, a powerful explosion occurred here, resulting in fires and ammunition detonations. Despite the destruction, the arsenal was quickly restored and is once again serving as a strategic storage facility. This underscores the key importance of the facility, which was returned to service as quickly as possible.

Severodonetsk, Azot Plant. Beneath the plant's grounds lies a network of drainage tunnels and underground storage facilities, built during the Soviet era. During the fighting, they served as shelters for civilians and were later converted by Russian troops into warehouses and shelters. Today, these galleries and hangars have become an important element of the occupiers' military infrastructure and logistics system **[19]**. C Warehouses in the temporarily occupied territories serve as logistics hubs for Russian troops.

Photo 26. *Cosmonauts mine (occupied Luhansk Oblast): underground workings converted into ammunition storage*

Large-scale conversion of civilian infrastructure in the temporarily occupied territories turned industrial facilities into military logistics centers

Severodonetsk, Silicate Plant. Before the Ukrainian forces' targeted strike in June 2025, the facility functioned as an arsenal. Underground tunnels connected workshops into a single network, allowing for the covert movement of ammunition and fuel. Artillery shells, mines, and small arms ammunition were stored in storage facilities. The industrial site housed repair bays for armored vehicles and drones, as well as shelters. Thick ceilings and concealed entrances turned the plant into a fully-fledged rear base. A ventilation system and diesel generators ensured self-sufficiency. The destruction of the plant dealt a serious blow to Russian logistics.

Luhansk Machine-Building Plant. Russian troops converted the plant into a repair and maintenance base. Its workshops repair armored vehicles, trucks, and artillery systems, and store spare parts and technical fluids. Damaged equipment is stored in hangars. The plant has become a major military logistics hub, receiving vehicles from across the Oblast. This allows them to be quickly returned to service without being sent back to Russia, turning this civilian enterprise into a key element of frontline logistics.

Yasinovsky Coke and Chemical Plant (Khartsyzsk). The facility is fully adapted for use as a rear support center. Its infrastructure and storage facilities are used to stockpile large quantities of ammunition. The plant serves as a hidden arsenal and distribution hub: ammunition is transported here from the rear and then sent to the front lines. Large-scale detonations recorded during strikes confirm the facility's military purpose. Thus, Yasinovsky Coke and Chemical Plant has become one of the key supply hubs for the Russian army in Donbas.

Photo 27. *Yasinovsky Coke and Chemical Plant (Khartsyzsk): the enterprise was fully adapted to become the rear support center*

Photo 28. *Luhansk Machine-Building Plant. Russian troops converted the plant into a repair and maintenance base*

The Stirol Plant (Horlivka). The plant is used by Russian troops as a warehouse. The former production facilities and chemical raw material warehouses are now used to store ammunition, explosives, and technical equipment. Fires and shelling that damaged the warehouse areas confirm its role in the logistics of the Russian army. Thus, the Stirol Plant has become a key supply chain element.

The Mariupol Ilyich Plant. The plant has been converted into a major military hub. It houses ammunition and equipment depots, and separate workshops have been converted into repair shops. The facility refurbishes armored vehicles, trucks, and artillery mounts. Spacious hangars provide cover for the equipment from aerial observation, while the production facilities serve as repair bays and fuel storage areas. The plant functions as an arsenal, repair center, and deployment base, ensuring the combat readiness of Russian troops. Thus, the Mariupol Ilyich Plant has become a strategic hub for the occupiers.

Gidromash Plant (Melitopol). After the occupation, the plant was converted into a rear hub for the Russian army. Its workshops house ammunition depots, fuel tanks, and armored vehicle repair shops. In June 2025, a large fire broke out here, officially classified as an "accident," but the nature of the explosion indicated a detonation of the depots or fuel and lubricants. Today, the Gidromash Plant plays a strategic role in supporting troop groups in the Tokmak and Vasylivka directions.

Tokmak Forging and Stamping Plant (Tokmak, Zaporizhzhia Oblast) is used by Russian troops as one of the largest bases in the Oblast. The production facilities and warehouses house ammunition depots, equipment hangars, and personnel accommodations. The plant's strategic importance is determined by its direct rail link, which allows it to receive large shipments of equipment and ammunition from Russia and distribute them along the front lines [47]. Thus, Tokmak Forging and Stamping Plant has been transformed into a key logistics hub and a multi-purpose military base in the southern sector.

Semenivka (Zaporizhzhia Oblast). The village is located on the Melitopol-Tokmak highway and is used by Russian troops as a staging post. In July 2025, powerful explosions and detonations were recorded here, confirming the presence of large stockpiles of ammunition and fuel. Local civilian infrastructure facilities—grain elevators, grain silos, hangars, and agricultural warehouses—have been converted for storage. Disguised as civilian structures, the village allows for rapid supply of supplies to the Tokmak and Vasylivka sectors.

Melitopol Airfield. Following a series of precision-guided munitions strikes on above-ground storage facilities, the Russians moved all critical supplies to underground storage facilities. In July 2025, several underground fuel tanks detonated there, confirming their strategic role as storage points for Shahed attack drones and rear columns. Underground technical rooms beneath the runway and hangar area have been converted into a secure base for storing and servicing UAVs. Concrete galleries and former technical tunnels allow UAVs to be prepared for flights completely covertly. Thus, Melitopol Airfield has become one of the most important hubs for Russia's unmanned logistics on the southern front.

Photo 29. *PJSC Tokmak Forging and Stamping Plant (Tokmak, Zaporizhzhia Oblast) is used by Russian troops as one of the largest bases in the Oblast*

Environmental risks of industrial militarization

The large-scale military use of industrial facilities by Russian troops since February 2022 has created unprecedented environmental threats. The conversion of chemical plants, metallurgical plants, and mines into military bases, ammunition depots, and defensive positions has led to a cascade of man-made disasters with long-term consequences for the Oblast's ecosystems.

Chemical pollution of industrial facilities is evident through fires and destruction at the Avdiivka Coke and Chemical Plant **[20]**, where, since 2022, the burning of tar and naphthalene has released polycyclic hydrocarbons, benzopyrene, phenols, and cyanides into the atmosphere. Nineteen percent of the infrastructure has been destroyed, and treatment facilities are out of commission, resulting in discharges into the Kamyanka River tens and hundreds of times higher than normal [38]. At the Stirol chemical plant in Horlivka, equipment and reagents remain unused, and ammonia monitoring is lacking, making the facility a potential source of accidents. Following a series of fires, the Lysychansk Oil Refinery released sulfur dioxide and soot containing heavy metals into the atmosphere, and soil contamination has rendered hundreds of hectares unusable for decades.

*Water resource degradation is associated with the cessation of water pumping at mines since 2022: in Horlivka and Yenakiieve, flooded workings form acidic drainage with a pH of 2.5-3.5, saturated with iron, cadmium, and arsenic **[17]**. Kozatsky Pond has acquired an orange color due to iron compounds from the Krasny Oktyabr mine. Underground horizons covering an area of over 3,000 km² are contaminated with petroleum products and chemical reagents; restoring water quality will take 50-100 years.*

Atmospheric pollution pollution is caused by fires at coke plants and oil depots: emissions of benzopyrene, sulfur dioxide, nitrogen oxides, and carcinogenic dust create zones of chemical smog. Methane from flooded mines accumulates in basements and sewers; explosions in residential buildings have already been recorded **[18]**.

Soil degradation manifests itself in oil lenses with concentrations 150 times higher than normal, completely destroying biota. Salinization has affected over 8,500 hectares of agricultural land, rendering it unusable, and heavy metal levels around factories and battle zones exceed background levels by 10 to 100 times.

The impact on public health is manifested in chronic poisoning of residents within a 10-15 km radius of large industrial facilities. Benzopyrene and phenols cause asthma and increase the risk of cancer, lead and mercury damage the nervous system and kidneys, and nitrates in water trigger "blue baby syndrome." Destroyed sewer systems contribute to outbreaks of dysentery and hepatitis A, and stagnant bodies of water have become hotbeds of West Nile fever.

The Sea of Azov suffered from a 2,500-8,000-ton fuel oil spill in 2024: tens of kilometers of coastline are covered in an oil slick, fish contain mercury, lead, and cadmium, causing chronic poisoning, and the death of dolphins creates additional sanitary risks.

***Photo 30.** The Kozatsky pond acquired an orange color due to iron compounds from the Krasny Oktyabr mine*

The risks of infectious diseases and long-term health consequences in the occupied territories are exacerbated by the combination of destroyed infrastructure, polluted environments, and wartime conditions. Flooding and the formation of stagnant water bodies following the destruction of dams have created mosquito breeding grounds, and cases of West Nile fever, which can cause meningitis and encephalitis, have been reported.

The lack of a centralized water supply forces the population to rely on rivers, ponds, and wells, dramatically increasing the risk of intestinal infections, especially in the summer. Crowding in basements and shelters during shelling contributes to the spread of tuberculosis and other airborne diseases, while stress, hunger, and cold further weaken the immune system. The main threat is **a sharp increase in cancer cases**. The constant release of carcinogens (benzopyrene, phenols, and heavy metals) from destroyed coke plants, oil depots, and ammunition depots creates a "zone of acquired poisoning" for tens of thousands of residents. Air pollution leads to an increase in chronic obstructive pulmonary diseases, asthma, and respiratory cancer. Heavy metals deposited in water and soil accumulate in the body, damaging the liver, kidneys, and nervous system. Children and pregnant women are particularly vulnerable: miscarriages, premature births, and developmental disabilities in newborns are being reported. Even occupation forces are forced to acknowledge the crisis.

Thus, the "Chief physician of the 'DPR's' oncology center" publicly stated in January 2025: "Over the past two years, the number of diagnosed cancer cases in the Oblast has increased by more than 30%. The increase in lung, stomach, and blood cancer is particularly noticeable. We are recording mortality rates that, in some cases, are 1.5 to 2 times higher than pre-war levels."

Psychological stress from constant shelling and a toxic environment exacerbates the situation, increasing the risk of cardiovascular disease, diabetes, and depression. However, it is impossible to objectively assess the scale of the disaster: there is no monitoring of water and air quality, disease statistics are concealed, and medical examinations of the population are not conducted. **Experience from other wars shows that mortality from environmental and chemical pollution peaks after 10-20 years.**

Militarization of the Sea of Azov

Historical context and the transformation of the Sea of Azov into a military base

The Treaty between Ukraine and Russia of December 24, 2003, enshrined the special status of the Sea of Azov as "internal waters" of the two countries and provided for the joint use of the waters. It guaranteed freedom of navigation for merchant and military vessels of both sides, joint fishing quotas, and the peaceful settlement of disputes. Until 2014, this regime functioned, and the Ukrainian ports of Mariupol and Berdyansk accounted for up to 7% of the country's foreign trade turnover. Following the annexation of Crimea, Russia unilaterally established control over the Kerch Strait, violating the treaty. Mandatory pilotage by Russian pilots, lengthy inspections of Ukrainian vessels, and a de facto port blockade were introduced **[22]**. In 2019, an international arbitration court ruled that Russia had violated the immunity of Ukrainian military vessels and illegally built the Crimean Bridge. The full-scale invasion in 2022 completely destroyed the legal regime: Russia turned the Sea of Azov into a zone of military occupation **[21]**. The seizure of the entire Ukrainian coastline and the creation of the Azov Flotilla of the Russian Navy signify the de facto annexation of the waters. The Sea of Azov has become a military base: ships, air defense systems, and ammunition depots are stationed there, and the coast has been transformed into a network of military bases and logistics hubs. This has dealt a catastrophic blow to the Oblast's economy, destroying fisheries and exports through Mariupol [44] and Berdyansk, and putting thousands of people out of work. The ecology of the waters, extremely vulnerable due to their shallow waters, is deteriorating: fuel spills, destruction of spawning grounds, and an increase in man-made risks are being recorded.

Photo 31. *A 14.5-kilometer-long contaminated area with small fragments of solid fuel oil fraction was discovered on the Berdyansk Spit from the open sea side*

For the Kremlin, control over the Sea of Azov has three dimensions: military—use as a supply base and blockade of Ukrainian ports; political—demonstration of “complete dominance”; economic—depriving Ukraine of a key trade corridor. The Sea of Azov has transformed from a joint-use zone into **a full-fledged Russian military base**, creating a dangerous precedent for international maritime law and security.

> *The final step was Russia's declaration of the Sea of Azov as its "internal waters" after occupying the entire coastline.* ***This unilateral act grossly violates the UN Convention on the Law of the Sea (UNCLOS), depriving the waters of freedom of navigation.*** *The Kremlin set a precedent for the forcible annexation of a maritime basin, challenging not only Ukraine but the entire system of international maritime security, demonstrating that control of the straits can become an instrument of regional domination and blockades with the deployment of Russian naval forces and weapons.*

Formation of naval groups and transformation of occupied ports

Following the annexation of Crimea in 2014, Russia gained control of the Kerch Strait and began transforming the Sea of Azov into a military zone. A key step was the creation of the Azov naval region (December 2022), followed by the Azov Flotilla (July 2023), with its main base in Mariupol. The flotilla is subordinate to the Black Sea Fleet and performs logistics and water control tasks. It includes small Karakurt missile ships (Cyclone, Askold, and Amur) armed with Kalibr missiles, the minesweeper Kovrovets, ships of the Caspian Flotilla, and the armored boat Shmel.

Photo 32. *Unloading armored vehicles of the Russian Armed Forces from the large landing ship of the Russian Black Sea Fleet "Orsk" in occupied Berdiansk*

Photo 33. *Berdyansk port completely rebuilt for military needs*

The infrastructure is reinforced by the Yeysk airbase, the Bastion-P and Bal coastal defense systems, tactical aircraft (Su-24 and Su-30), and radar stations, forming a closed-loop control system. In parallel, the Dnieper River Flotilla (Tarkhankut, Lazurne) was created, including the Raptor, BK-16, Grachenok, and Shmel boats. Its strength is up to 1,500 personnel, including marines and coastal units. Its operational zone covers the Dnieper Delta and estuaries, indicating offensive missions and preparations for a possible river crossing. The occupied ports are integrated into this system.

The port of Mariupol has become a key hub: military cargo is received and shipped here, including concrete structures for the front. In 2024, its cargo turnover increased to 350,000 tons **[23]**. By 2025, more than 20 new berths are planned

The port of Berdyansk has been completely rebuilt for military needs: shelters have been equipped, air defense systems have been deployed, and infrastructure for the fleet has been created. The Kremlin has allocated 5.8 billion rubles to increase their combined throughput capacity to 5.9 million tons, transforming the ports into new supply channels. To facilitate transport integration, a Rostov-on-Don-Taganrog-Mariupol-Berdyansk-Dzhankoi railway line is being built, creating an alternative land corridor to Crimea **[24]**. In addition to their military purpose, the ports have become a hub for the export of stolen resources: grain, metal, and other products. To conceal their presence, Russia disables AIS, forges documents, and changes ports of origin **[25]**. The stolen goods are laundered through the Caucasus, Taman, and Novorossiysk and exported to Turkey, Syria, and Libya.

At the same time, the RF severely restricts freedom of navigation: the waters of the Sea of Azov are closed 3-4 times a month under the guise of “exercises,” up to 40 vessels navigate without transponders, and a system of barriers—barges, nets, mines, and booms—is in place in the Kerch Strait. Merchant vessels are only allowed in under the protection of Russian boats, after a 72-hour notice; delays can reach 10 days.

As a result, the Sea of Azov and the Kerch Strait have been completely transformed into a military base and logistics hub for the RF. International conventions are flagrantly violated here, and the waters themselves are being used as a testing ground for the total militarization of shipping, setting a dangerous precedent and threatening global maritime security.

Military training infrastructure

After capturing the city, Russia began transforming it into a training center for future naval personnel. In August 2024, the Mariupol branch of the Nakhimov Naval School opened there. This institution became the fifth in a network of schools established by Russia in various maritime areas. A modern complex was built for it in Mariupol, including an academic and administrative building, dormitories, gyms, a swimming pool, a library, drone and robotics laboratories, naval training classrooms, and spaces for music and choreography classes. Construction was completed less than a year later.

Photo 34. *In August 2024, the Mariupol branch of the Nakhimov Naval School was opened in occupied Mariupol*

Cadets are accepted starting in the fifth grade. They follow the general education curriculum, but also receive specialized training: they study physics and mathematics, maritime science, naval history, and complete internships on naval ships. The school is designed to accommodate over 500 students, signifying Russia's systematic commitment to nurturing a new generation of military personnel directly in the occupied Oblast.

The second element was the restoration of the Azov Maritime Institute, a former educational institution of the Odesa Maritime Academy, which has been subordinate to Sevastopol State University since 2022. The institute was damaged during the fighting, but Russian authorities have made it a symbol of "restoration." Its buildings have been restored, simulator rooms and digital labs have been installed, and the training vessel "Mechanic Ponomarenko" has been preserved. Thus, civilian maritime education has also been integrated into Russia's militarized system.

Together, these two institutions form a unified chain of command: from early cadet training at the Nakhimov Naval School to professional maritime specialization at the institute. This strategy allows Russia not only to consolidate its occupation but also to gradually create a new educational and training space focused on training sailors for its own navy. This is a long-term project demonstrating the Kremlin's intentions to transform the Sea of Azov and its coastal towns into hubs for naval infrastructure and the development of future personnel.

Environmental and socio-economic consequences of the militarization of the Sea of Azov

Russia's militarization of the Sea of Azov has led to large-scale environmental and economic disasters **[47]**. Fuel leaks from sunken ships and tankers, fuel oil spills, and pollution with heavy metals and toxic chemicals have been recorded in the waters. The sinking of the Volgoneft-212 and Volgoneft-239 tankers in December 2024 resulted in the release of up to 8,000 tons of fuel oil into the sea. A slick over 20 kilometers long covered the coast of the Priazovsky National Park and Kyrylivka, causing mass mortality of dolphins and seabirds, and damaging ecosystems.

Fishermen complain of oil spills near Berdyansk and Taganrog Bay, and the constant presence of military vessels makes fishing impossible. The destruction of port and tourist infrastructure has dealt a blow to coastal communities. The fishery is virtually paralyzed by mine threats and Russian control. The tourist season in Kyrylivka, Fedotova Spit, and Prymorsk has been disrupted, and small businesses have gone bankrupt. Pollution renders fish unfit for consumption, and coastal waters are dangerous for life and livelihoods.

Photo 35. *The sinking of the tankers Volgoneft-212 and Volgoneft-239 in December 2024*

Mass emigration is exacerbating the Oblast's depopulation: young people are leaving, leaving behind mostly elderly people unable to sustain economic activity. The destruction of schools, hospitals, and kindergartens is pushing families to permanently relocate. Russia has turned the Sea of Azov into a military base and an instrument of systemic pressure. This environmental disaster is compounded by the destruction of traditional fishing and the economies of coastal settlements, leading to their extinction and the loss of the Oblast's cultural heritage. This precedent demonstrates how control over a narrow body of water is being used for strategic dominance, jeopardizing not only Ukraine's security but also the global principles of freedom of navigation.

Conclusions and recommendations

The Russian-occupied territories of Ukraine have become **a complex military base**, where industry, transport, and social infrastructure have been completely repurposed for military needs. Factories and mines, once the industrial heart of the Oblast, are used as ammunition depots, logistics centers, and equipment repair sites. The ports of Mariupol and Berdyansk are integrated into military logistics, ensuring the supply of occupation forces and the removal of stolen resources. The Sea of Azov has effectively become a closed military basin, where Russia violates international law and poses a threat not only to Ukraine but to international security as a whole

The environmental consequences are catastrophic: flooding of mines causes acid drainage and groundwater contamination with heavy metals, with the area of contaminated aquifers exceeding 3,000 square kilometers. Soil salinization and oil contamination have rendered tens of thousands of hectares of farmland unusable. Atmospheric pollution from combustion products of military equipment and chemical production has created zones of constant smog, elevated levels of carcinogens, and methane hazards. The Sea of Azov has suffered from oil spills, marine life losses, and large-scale grain piracy.

The economic consequences for the Oblast are irreversible. According to preliminary data, up to 90% of enterprises have been destroyed or shut down, and the remaining ones are used exclusively for military purposes. Traditional industries—coal mining, metallurgy, and agriculture—have lost competitiveness and operate only at a limited level. The loss of the ports of Mariupol and Berdyansk has deprived Ukraine of up to 10 billion hryvnias in annual revenue, and exports have fallen by tens of millions of tons. Total losses are estimated at tens of billions of dollars annually.

The social consequences are reflected in a demographic catastrophe: a massive outflow of population, the evacuation of specialists, and the exodus of young people have deprived the Oblast of human capital. The population of the occupied territories has shrunk dramatically, a significant portion has been left unemployed, and those who remain suffer from unemployment, low wages, devastated healthcare, and a lack of educational prospects. The situation is exacerbated by a rise in illnesses, including cancer, as confirmed even by statements from local collaborating medical institutions.

*Taken together, this means that Russia is using the occupied territories as a **military base and resource colony**, completely disregarding the rights of the local population, environmental security, and prospects for economic recovery. These lands are becoming a source of threat not only to Ukraine, but also to the entire Black Sea and Azov Sea region, as well as to European security. According to rough estimates, the amount **of reparations Russia must pay Ukraine for the occupied territories alone is approximately $250 billion**. This figure includes the destruction of infrastructure, loss of production capacity, environmental damage, social losses, and the blockade of sea routes. The actual amount of compensation could be significantly higher if we consider the long-term consequences—from the degradation of water and land resources to medical costs for treating the population and restoring ecosystems.*

Analysis of key threats to Ukraine and regional security

- ***Militarization of the Azov and Dnieper rivers.*** *Formation of the Azov Flotilla and the Dnieper River Flotilla, bases in Mariupol/Berdyansk, Bastion/Bal coastal defense systems, electronic warfare, and air defense closed control zone, logistics for Kalibr strikes, UAVs, and the ability to cross certain sections of the Dnieper.*

- ***Land corridor and ports.*** *Rostov-Mariupol-Berdyansk-Dzhankoi rail/road corridor + port modernization permanent supply channel for troops and resource extraction.*

- ***Economic and environmental erosion.*** *Systemic "grain piracy," metal/coal theft, destruction of up to 90% of enterprises; acid mine drainage, water/air/soil pollution long-term degradation of the health and productivity of territories.*

- ***An international challenge.*** *The transformation of the Sea of Azov into a de facto military base with restrictions on freedom of navigation sets a precedent for other regions.*

Necessary steps for Ukraine

- ***Military interdiction of logistics. Priority targets:*** *Mariupol, Berdyansk, Melitopol, Tokmak, Dzhankoi hubs, fuel depots, dredgers and cranes in ports, ammunition depots in mines/industrial zones. Tools: unmanned aerial vehicles (UAVs), long-range weapons, and reactive armament. Integrate Long Neptune batteries (range is approximately 1,000 km) for strikes against the Novorossiysk-Temryuk bases and the rear personnel of the Russian Black Sea Fleet. Use the following cascade: UAV reconnaissance—unmanned aerial vehicle distraction—Neptune/Thunder-2 against critical targets (docks, fuel depots, cranes, dredgers).*

- ***Countering flotillas.*** *Strengthening coastal anti-ship missiles (Neptune, etc.), deploying a network of sea/river "drone barriers," deploying mobile air defense/ATGM batteries in the Dnieper delta and along the coast, and prioritizing the engagement of minesweepers/patrol boats.*

- ***Export resilience.*** *Expansion of the Danube Corridor (port capacity, insurance guarantees, unmanned convoy protection), fast rail connections from the EU.*

- ***Evidence base for reparations.*** *Unified registry of losses in the occupied territories (economic, environmental, demographic), standardized collection of OSINT/satellite evidence of grain/metal theft and blockade.*

- ***Environmental and water safety.*** *Mobile laboratories, acid mine drainage map, ban on the use of mine water for drinking, emergency drinking water supply programs, rapid response protocol for oil spills.*

- ***Strategic "repulsion" of the Russian fleet.*** *Increased range/scale of strike capabilities against bases, warehouses, and ship repair facilities; serial production of unmanned aerial vehicles (UAVs); integrated maritime surveillance system (satellite + radar + AIS analytics).*

- ***Demilitarization of ports after de-occupation.*** *Inspection/demining, reconstruction of critical hydraulic structures, and return of civilian traffic under international guarantees.*

- ***Restoring human capital.*** *Reemployment/return programs, SME incentives, reindustrialization with clean technologies, medical screenings (cancer screening, toxicology), and eco-remediation.*

International pressure, sanctions, information counteraction

- ***Sanctions priorities (primary/secondary).***
  - *Maritime logistics: insurance/class/port circle bans for vessels that turn off their AIS or are involved in STS transshipments of "black" grain/metal; blacklisting of brokers, insurers, and P&I clubs. "AIS-24/7" standard: a vessel with its AIS turned off for more than four hours is automatically denied entry to Black Sea ports.*
  - *Infrastructure: sanctions against Rosmorport, the ports of Kavkaz/Taman/Novorossiysk, dredging contractors, the Federal State Unitary Enterprise Novorossiya ZhD, and associated railway/road operators of the corridor.*
  - *Industrial occupation groups: UGMK/YUGMK, Rostec structures, RT-New Horizons, etc.—for using assets in the WTO and exporting stolen goods.*

- ***Law and Diplomacy.*** *ITLOS/UNCLOS claims regarding freedom of navigation, mechanisms for confiscation of Russian sovereign assets for reparations (base: ≈$250 billion under the TOT alone); coalition of Black Sea states and Turkey on passage/security regimes; IMO/FAO/UNEP participation in recording environmental and food crimes. Update the submission in case PCA-2017-06, adding evidence of restrictions on freedom of navigation and environmental damage after 2022.*

- ***Information counteraction.*** *Regular "Azov Watch" reports: satellite images, maps of closed zones, and "pirated" grain routes; targeted communications in Turkish/Arabic for importing markets; public naming and shaming of vessels/owners/charterers; work with the global media/Lloyd's insurance market. Launch "Azov Watch 2.0"—a weekly trilingual dashboard (Ukrainian/Turkish/Arabic) with a live "grain piracy" tracker and alerts for brokers and insurers.*

What does this mean in practice?

In short: *we disrupt Russian logistics (port-rails-fleet), deprive the shadow fleet of insurance/trade access, secure evidence for courts and reparations, support Ukrainian exports with alternative corridors, and minimize environmental/sanitary risks in liberated lands.*

Strategically: *the Azov and Dnieper seas are no longer Russia's secure rear, and the occupied territories are no longer a "resource colony"; an international legal framework is being established for collecting compensation and criminalizing "grain piracy."*

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