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Spatial and resource development in creating
a quality framework for the urban environment
of the Donetsk People's Republic

At the time of the actual collapse of Ukraine in 2014, the Donetsk and Lugansk regions together provided about 18 % of all industrial production in Ukraine, and the share of Donbass in the sale of industrial products of the country was higher than any other region.

Based on the Der Spiegel report, as a result of the events of 2014, the following crisis changes occurred in Donbass:

- industry fell by 59 % in Donetsk region and by 85 % in Luhansk region. Production of coke and refined petroleum products decreased by 52.0 %, metallurgical products — by 28.3 %, engineering products — by 22.8 %, electricity, gas — by 18.8 %;
- 69 of 93 coal mines have closed;
- construction in Donetsk region decreased by 37.5 %, in Luhansk region — by 42.4 %;
- 40 thousand small enterprises went bankrupt;
- more than half of the working population has lost their jobs and incomes.

By the end of 2023, the Ministry of Construction plans to restore 7,413 facilities on the territory of the DPR, LPR, Kherson and Zaporizhye regions, 151 of them will have to be built anew. In particular, 4,018 objects are apartment buildings, 39 of which will be built anew, and 238 individual housing construction facilities will also be restored. It is planned to restore 1,625 housing and communal services facilities, among which 78 will be built anew. 951 objects of social, cultural and household use will be restored, 27 will be built, and 7 objects of industrial and entrepreneurial activity will be restored. 402 infrastructure facilities are going to be repaired, 2 will be built from scratch. 68 administrative buildings will be restored, construction of new ones is not planned yet, 22 facilities will be improved. Buildings for 82 multifunctional centres will also be renovated, 7 will be built anew. In total, in the period from 2022 to 2025, there is a plan to restore and build 16,000 facilities during the implementation of a special infrastructure project of the Ministry of Construction of the Russian Federation.

The authors assess the state of the problem of updating and reconstructing the existing urban development.

Keywords: Renovation, reconstruction, revitalization, restoration of the destroyed housing stock, quality of the living environment, interregional industrial cluster

INTRODUCTION

The leading industries in Donbass are metallurgy, mining (coal mining), electric power, mechanical engineering, coke and chemical industries, and the industry for the production of building materials (Table 1) [1].

For industrial facilities in Donbass, in conditions of high anthropogenic load, the wear of structures of buildings and structures, according to experts for various sectors of the economy, amounted to 50–70 % and had a steady trend of further growth.

Table 1. The share of industries in the structure of industrial production

The structure of the industrial complex	Weight, %		
	1977	2014	Specific weight in gross value added
Total industry	100	100	45.0
Mining industry	17.8	15.6	14.7
Processing industry	65.7	68.6	25.3
Including: food industry	7.5	8.2	
light industry	4.7	0.2	
coke production, oil refining	5.2	7.1	
chemical and petrochemical	3.4	4.8	
industry building materials	3.2	2.2	
industry metallurgical production	27.4	33.8	
mechanical engineering	12.8	10.2	
other industries	1.5	1.6	

Before the outbreak of hostilities, Donetsk and Luhansk regions occupied an area of 9.2 % of the total area of Ukraine (53,200 square kilometers). 14 % of the total population of the state lived in Donbass (63 % of it were in the category of able-bodied). The export potential of Donetsk and Luhansk regions in 2013 amounted to \$ 16.6 billion, while imports amounted to \$ 7.7 billion. The total trade surplus is \$ 8.9 billion.

The territories of the former Donetsk and Lugansk regions of Ukraine occupied 25 thousand and 27 thousand square kilometers, respectively. Currently, the LPR and the DPR occupy today about 1/3 of the "initial" areas, located on the most urbanized and industrialized lands. Thus, 15 thousand square kilometers is almost the entire area of the republics of Donbass. According to the estimates of the DPR authorities, as of September 1, 2020, the population of the controlled territories was 2,244,547 people. The territory under the administrative control of the DPR and LPR is small and comparable in area to the smallest regions of Russia. However, the population is very high — more than 3.6 million people in total.

The beginning of the Russian special operation in Donbas was preceded by a humanitarian crisis that lasted eight years. Using heavy weapons, the Ukrainian security forces completely destroyed 19.5 % of the infrastructure of the People's republics of Donbass, up to 37 % of the infrastructure was destroyed with significant damage.

According to data from the DPR, most of the casualties occurred in the first two years of the conflict — 2014 (2,546 people died) and 2015 (1,395 people died) (Fig. 1) [2].

Despite the decrease in the intensity of hostilities, the humanitarian situation worsened as a result of the systematic destruction of civilian infrastructure and facilities protected by the Geneva Conventions of 1949. At the same time, almost daily shelling by the Armed Forces of Ukraine and nationalist battalions caused the destruction of 4,115 and damage to 55,310 infrastructure facilities, including residential buildings, educational institutions, hospitals and many other socially significant facilities. The number of deaths in Donbass has exceeded 14.5 thousand people since 2014 [3]. The Joint Centre for Control and Coordination of Issues Related to War Crimes of Ukraine analyzed data on the destruction (Fig. 2) of infrastructure facilities¹. As a result of the Ukrainian shelling, by the beginning of the special operation, more than 23 thousand private residential buildings and 5 thousand apartment buildings were destroyed, and individual settlements were virtually wiped off the face of the earth. The damage to the DPR industry due to the shelling of the Armed Forces of Ukraine exceeded 4 billion rubles [4].

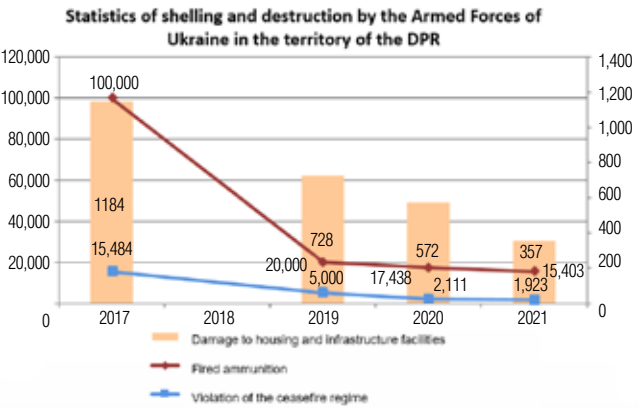


Fig. 2. Data on the destruction of the DPR People's Militia directorate from January 2017 to February 2022

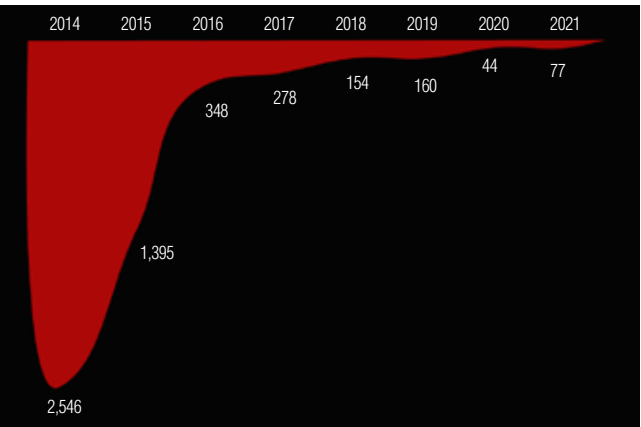


Fig. 1. Statistics of the death of the civilian population of the republic

If 3,166 objects have been destroyed in the republic since April 2014, 1,893 of them are in 2022. In percentage terms, this is approximately 60 % of the total number of destructions over more than eight years [5].

At first, there were about a thousand shelling attacks in Donetsk alone. Accordingly, the amount of ammunition is measured in tens and hundreds of thousands. To date, 837 apartment buildings, more than one and a half thousand private houses, 73 schools, 51 kindergartens have been damaged... [6].

According to the Ministry of Construction and Housing and Communal Services of the DPR, for example, only in Mariupol (Fig. 3) out of the total number of (2,327) multi-apartment residential buildings and (49,343) private residential buildings, 517 multi-apartment buildings and 7,929 private housing buildings are not subject to restoration. There are 261 apartment buildings and 10,802 private houses without damage. The proportion of completely destroyed houses in the city is about 15 % [7].

During the fighting in the territories of the Donetsk and Lugansk People's Republics, as well as the Zaporozhye and Kherson regions, housing stock, as well as social facilities, road network and communal infrastructure were severely damaged. To restore new regions, the Russian construction complex synchronized the efforts of more than 20 federal ministries and departments, 8 federal customers and 56 regional chiefs.



Fig. 3. The destruction of an apartment building that cannot be restored

1 Has Ukraine violated the Minsk agreements? Statistics of shelling and deaths in Donbas according to the DPR. Pikabu. URL: [tory.narushala_li_ukraina_minskie_dogovorennosti_statistika_obstrelov_i_smernosti_na_donbasse_po_dannym_dnr_10106221](https://torry.narushala_li_ukraina_minskie_dogovorennosti_statistika_obstrelov_i_smernosti_na_donbasse_po_dannym_dnr_10106221) (rus.).

Currently, 1,456 facilities have already been restored with the help of the sponsoring regions. Territories where more than 220 thousand people live are assigned to the subjects of the Far East. Among the protected areas are the cities of Torez, Debaltsevo, Kirovskoye, Shakhtersk, Zhdanovka, Svetlodarsk and the village of Mironovsky, Starobeshevsky and Amvrosievsky districts, the villages of Novoluganskoye and Luganskoye. In accordance with the agreed plan for 2023, work is being carried out at 221 facilities. It is planned to restore 21 schools, 14 kindergartens, 3 hospitals, 11 playgrounds and sports grounds, 25 km of aqueducts, 219.9 km of roads. 13 schools, 9 kindergartens, 3 hospitals, 7 playgrounds and sports grounds, 22 km of aqueducts, 219.6 km of roads have already been restored. Construction and installation works are underway at 23 sites by 8 contractors. Construction and installation works have been completed at 173 sites (78 %), 151 of them (68 %) have been commissioned [8].

HISTORICAL OVERVIEW

Intensive industrial development of the territory of Donbass is associated with the industrial development of Russia in the nineteenth century. During this period, the first geological map of the region was created, industrial coal mining began, which accounted for more than half of the total Russian volume at the beginning of the twentieth century. The availability of its own fuel and energy resources, the proximity of the iron ore deposits of the Krivoy Rog basin, and access to the sea make it possible to establish a metallurgical industry.

In the years of the first pre-war five-year plans, Donbass became a huge construction site, where basic industries are being modernized, mechanical engineering and chemical industry are developing, the first energy facilities, glass and cement plants are being built, etc.

In the territorial structure of the modern industrial complex of the Donetsk region, large industrial formations prevail — production agglomerations and centres concentrating the capabilities of vertically integrated companies of a multidisciplinary orientation and individual specialized enterprises [9, 10].

The *metallurgical complex* is represented by large metallurgical enterprises located in Mariupol, Donetsk, Yenakiyevo, Kramatorsk, Khartsyzsk, Konstantinovka and Druzhkovka. An important link in the functioning of the metallurgical industry is the coke and chemical industry. The leading coke plants are located in Avdeevka, Donetsk, Makeyevka, Yenakiyevo, Gorlovka, Mariupol.

The *coal industry* provides a raw material base for metallurgical, coke chemical and energy production. Most coal mining enterprises were developed during the Soviet period and require restructuring and modernization.

Thermal power plants are provided mainly with their own coal, which fully meets the needs of industry and the population. The largest producers of electricity are thermal power plants, including Uglegorskaya, Starobeshevskaya, Slavyanskaya, Kurakhovskaya, Zuyevskaya, Kramatorskaya. A wind power plant has been built in the Novoazovsky district, on the coast of the Azov Sea, representing an alternative development of electricity production methods.

The *machine-building base* of the Donetsk region was formed during the Soviet period, includes a full cycle of technological production, which is a decisive factor in the technical re-equipment of the coal and metallurgical complex. The product range of machine-building enterprises, among which the most significant are Azovmash, Mariupol Heavy Machinery Plant, Novokramatorsky Machine-Building Plant, Energomashspetsstal, Donetskorgmash,

Gorlovsky Mashinostroitel, includes metallurgical, hydraulic engineering, mining, lifting and transport equipment and specialized equipment for the leading sectors of the region's economy, the Middle East and far abroad.

Thus, the industrial and technological development of the Donetsk region contributed to the structural formation of the Donetsk-Makeyevka industrial agglomeration and Kramatorsk-Slavyansk, Krasnoarmeysky, Gorlovsko-Yenakiyevsky, Torezo-Snezhnyansky and Mariupol industrial districts.

The *branches of the fuel and energy complex, metallurgy and mechanical engineering* are of predominant importance for the economy of the region, which determine its position and importance in the system of territorial division of labor.

During the economic crisis of the 1990s, the largest reduction in production was observed in the manufacturing industry, especially in mechanical engineering and light industry. At the same time, the extractive industries and primary processing of raw materials have increased their share in industrial production. Changes in the industrial structure of the industry are also due to physical wear and aging of equipment, which has affected the upper floors of the industry, producing technically complex products. At the beginning of 2014 the degree of depreciation of fixed assets in the group of industries producing minerals exceeded 53 %, in manufacturing industries — 46 %, and in industries engaged in the production and distribution of electricity, gas and water — 52 %.

ENSURING THE IMPLEMENTATION OF THE PROGRAMME OF CONSTRUCTION, RECONSTRUCTION, REVITALIZATION, MAJOR REPAIRS AND DEMOLITION OF THE DESTROYED HOUSING STOCK

An important direction for the development of the DPR in 2023 is the continuation of work on economic development and attracting investments. Events to support small and medium-sized businesses, as well as to stimulate innovation, are of great importance. The Ministry of Construction and Housing and Communal Services of Russia has developed a master plan for the development of the Donetsk People's Republic, the priority concept of which will be the restoration, construction of housing and life-supporting social infrastructure. It is planned to ensure the development of project financing of housing construction using government support measures, private housing construction, to ensure the creation of road and communal infrastructure, and to expand the use of mortgages.

Despite the damage caused by the destruction as a result of rocket and artillery strikes on basic (industrial) enterprises (Fig. 4), the Government of the Russian Federation and the DPR set the task to revive the former productive and industrial power of the region so that residents who were forced to leave earlier return home to live and work [4].

As structural elements of the programme of reconstruction and renewal of the existing urban development, it is advisable to develop regulatory, urban planning, economic, financial, organizational and managerial blocks. All blocks are in a causal relationship that determines the sequence of their formation (Fig. 5).

The problem of implementing the urban renewal project programme related to achieving this goal can be divided into several components:

- *functional*, which reflects the main content of the programme, representing various options for the reproduction of individual elements, aggregates of elements and the land and property complex as a whole;



Fig. 4. Destruction of the industrial infrastructure of Donbass

- providing, mainly related to the development and organization of the functioning of the mechanism of economic relations between participants in the investment process, financing and management of programme activities.

The totality of all these real estate objects is the task of forming a portfolio of urban real estate, including real estate for various purposes (housing, office space, land, city rights, etc.).

Portfolio optimization consists of two stages:

- choosing the optimal combination of risky assets;
- combining the obtained optimal set of risky assets with risk-free assets.

Currently, a situation has arisen in the DPR housing market caused by certain difficulties in implementing the city's real estate renovation and new housing construction programme. The reasons for this situation are objective and are related (Fig. 6):

- to high prices for residential real estate;
- with increasing competition in the housing market;
- with the increase in demand for residential real estate in relation to supply;
- with the possibility of purchasing housing only for high-income segments of the population.

Data processing by the method of variant modeling has shown that about 65 % of families express firm confidence in the need to improve their living conditions, of which:

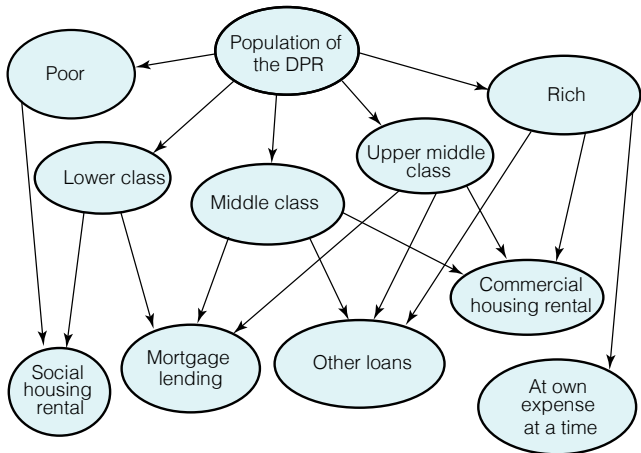


Fig. 6. Possible options for categories of citizens to purchase housing and consumer preferences

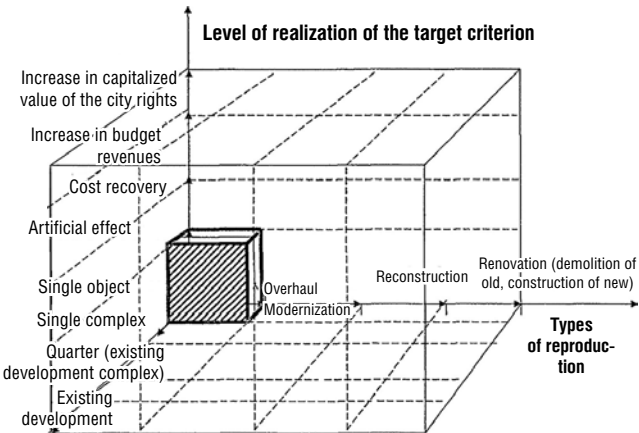


Fig. 5. The decomposition structure of the Programme [15]

- group of “poor” and “lower middle class” — about 70 %;
- “middle class” group — about 25 %;
- “upper middle class” group — about 4 %;
- “rich” group is less than 0.5 %.

Thus, the housing problem, as the analysis shows, concerns primarily the poor, the lower and middle classes.

The quality of the living environment determines the socio-economic development of a society both at the national level and on a city scale. The main criterion for assessing the quality of the living environment is to ensure a safe and accessible environment for all categories of citizens.

PROGRAMME-TARGETED MANAGEMENT OF THE RENOVATION OF EXISTING URBAN RESIDENTIAL BUILDINGS

The implementation of programme-oriented management methods in the Donetsk People's Republic entails the need for a detailed study of the features of spatial development of territories that have a significant impact on current socio-economic processes (Fig. 7)² [12–15].

The analysis of demographic processes indicates that the population of the Donetsk People's Republic is increasingly concentrated in cities. In particular, by the end of 2018, the urban population amounted to 95 % of the total available population, including 79 % living in such large cities as Donetsk, Horlivka, Makeyevka, Yenakiyev and Khartsyzsk. In this regard, problems in the operation of engineering and communal infrastructure are increasing; uneven distribution of material objects is traced; congestion of the road network and the social sphere is noted. Under the current conditions, the priority area of activity is the integrated development of territories through the development of new management mechanisms while increasing its competitiveness and investment attractiveness [16–19].

The Ministry of Construction of the DPR and the Unified Institute of Spatial Planning of the Russian Federation are engaged in substantiating the mechanism for using the Integrated Territorial Development Tool (ITD). As an example, we can cite the experience of developing urban planning documents for the central part of the city of Mariupol in the Raketa microdistrict. In total, four sites are

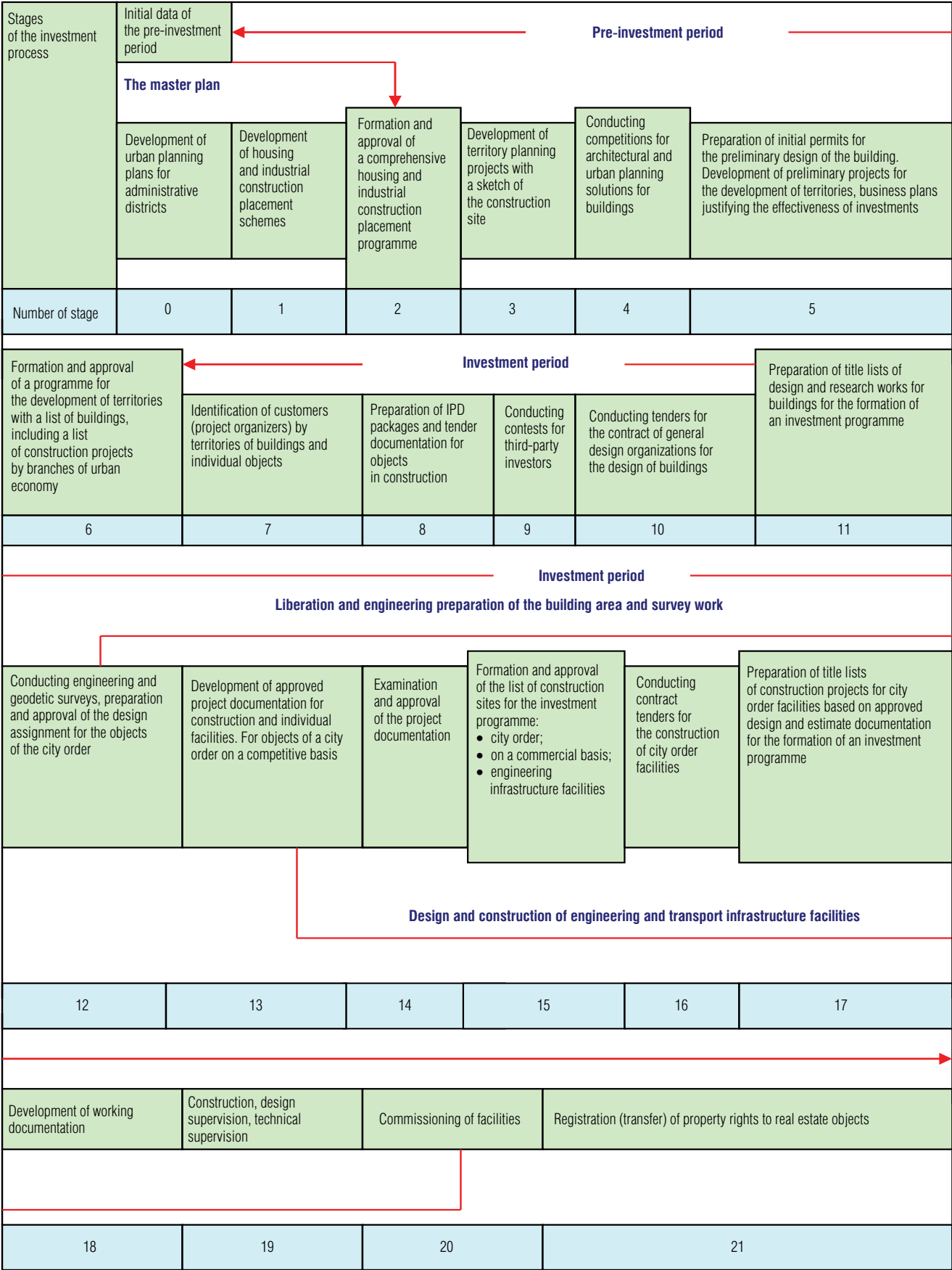


Fig. 7. Investment urban programme of construction, revitalization and major repairs in the cities of Donbass

being considered for the integrated development of territories in the DPR and the Zaporozhye region [20–22].

Residents of Donbass through the implementation of the programme will receive:

- modern, high-quality, comfortable conditions;
- the opportunity to improve your living conditions at an affordable price;
- minimizing the costs and inconveniences associated with relocation and major repairs;
- the ability to effectively influence the processes of complex reconstruction of existing buildings and the operation of housing stock.

The organization of programme management is determined by the following aspects.

In the organizational and functional structure of the process of complex reconstruction of the existing buildings, three main blocks of functions are sequentially distinguished:

- city regulation;
- investment and construction works;
- exploitation of the territory.

CONCLUSION

World experience shows the advantages of the cluster approach for a constructive dialogue between representatives of the business sector and the state. In the context of the recovery of the industrial sector of the region, the investment strategy involves increasing the effectiveness of interaction between the private sector, the state, trade associations, research and educational institutions in the innovation process. The cluster participants are characterized by cooperation and territorial concentration. In order to boost production, enterprises need profitable cooperative ties that have historically existed since the Soviet period. We cannot do without them, as our enterprises have been drained of both financial and human resources.

Currently, the first interregional industrial cluster in Russia, "KEMZ", is being created in Kemerovo with the participation of enterprises of the DPR and the Tomsk region. The Kemerovo machine-building cluster should include about 10 companies from the DPR, Kemerovo and Tomsk regions specializing in mechanical engineering for the mining industry. The task of the cluster is the implementation of projects providing for the development of components for equipment designed for vertical, horizontal underground mining and metro.

Small towns of the DPR open up wide opportunities for the implementation of bright and functional projects for the formation of a modern urban environment. Since joining Russia, one of the main tasks is to restore and bring the existing urban infrastructure to the national average. Of the 27 cities within the current borders, 23 belong to small towns. More than 500 thousand people live in them, and more than a third of the population is in their zone of influence. To participate in the All-Russian competition, the regional Interdepartmental commission sent projects of 14 cities to the Ministry of Construction of the Russian Federation for consideration. According to the results of the VIII Competition of the best projects for the formation of a comfortable urban environment, the submitted works were selected by experts in the field of architecture, urban planning, economics, sociology of cultural heritage protection, archeology. Among the 145 winners, three projects from the DPR received support: landscaping in Volnovakha — the Revival of the Summer Park; landscaping of the city centre Snezhnoye; landscaping of the square near the monument to V. Lenin in Shakhtersk.

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Пространственно-ресурсный девелопмент в создании каркаса качества городской среды Донецкой Народной Республики

На момент фактического распада Украины в 2014 г. Донецкая и Луганская области в совокупности обеспечивали около 18 % всего промышленного производства Украины, а доля Донбасса в реализации промышленной продукции страны была выше, чем любого другого региона.

Исходя из доклада Der Spiegel, в результате событий 2014 г. в Донбассе произошли следующие кризисные изменения:

- промышленность упала на 59 % в Донецкой области и на 85 % в Луганской. Сократилось производство кокса и продукции нефтепереработки на 52,0 %; металлургической продукции — на 28,3 %; машиностроительной продукции — на 22,8 %; электроэнергии, газа — на 18,8 %;
- закрылись 69 из 93 угольных шахт;
- строительство в Донецкой области обвалилось на 37,5 %, в Луганской области — на 42,4 %;
- обанкротилось 40 тыс. малых предприятий;
- больше половины работоспособного населения потеряло работу и доходы.

До конца 2023 г. Минстрой планирует восстановить 7413 объектов на территории ДНР, ЛНР, Херсонской и Запорожской областей, из них 151 придется строить заново. В частности, 4018 объектов — это многоквартирные дома (МКД), 39 из которых будут строиться заново, также восстановят 238 объектов индивидуального жилищного строительства. Планируется восстановить 1625 объектов ЖКХ, среди которых 78 будут построены заново. 951 объект социально-культурного и бытового назначения (СКБ) восстановят, 27 построек, а также восстановят семь объектов производственно-предпринимательской деятельности. Отремонтировать собираются 402 объекта инфраструктуры, два построят с нуля. Восстановят 68 административных зданий, строительство новых пока не планируется, благоустроят 22 объекта. Также будут отремонтированы здания под 82 МФЦ, два построят заново. Всего в период с 2022 по 2025 г. существует план восстановить и построить 16 000 объектов в ходе выполнения специального инфраструктурного проекта Минстроя РФ.

Авторы оценивают состояние проблемы по обновлению и реконструкции сложившейся застройки города.

Ключевые слова: обновление, реконструкция, ревитализация, восстановление разрушенного жилищного фонда, качество жилой среды, межрегиональный промышленный кластер

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