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## Regional trends in the development of the housing and municipal complex

The relevance of ensuring sustainable functioning of the housing and communal services (HCS) sets the task of studying its state and problems of functioning with the development of strategic approaches to an effective model of transformation and acceleration of modernization of engineering and communal infrastructure facilities. It is shown that the most significant influence on the state of the HCS is the level of potential of various types of cities, interconnected with the activities of enterprises and organizations, demographic forms of settlement and the living environment. It is proven that the largest cities with a population of over a million have a high potential for further development of the HCS, in this regard, the urgent task is to determine the models and drivers of their long-term development. Based on the analysis of the genesis of the development of the modern HCS system, certain structural shifts achieved in solving priority tasks in the HCS sphere are highlighted for further implementation of programmes for the resettlement of citizens from unsuitable housing, regional programmes for major repairs of common property in apartment buildings, implementation of targeted municipal programmes for the modernization of utility networks, adopted legislative acts promoting the development of concession mechanisms for attracting investment and implementing infrastructure projects. The features of the socio-economic and technological system of housing and communal services are highlighted and a set of modern problems and factors critically influencing the degree of adequacy of the housing and communal services structure that meets the needs of residents is revealed. The trends in the state and functioning of the housing and communal services system in the regions are determined, an analysis of the existing trends in the development of housing and communal services in a number of major cities is carried out. The key trends in the strategy for the development of housing and communal services are substantiated, allowing to improve the state of the infrastructural potential of housing and communal services and ensure accelerated development of the infrastructure of comfortable living conditions and the quality of life of the population.

**Keywords:** *potential, problems, analysis, criticality, imbalance, instability*



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### INTRODUCTION

To substantiate the methodological basis for a comprehensive study of trends in the development of the socio-economic complex of housing and communal services, it is necessary to highlight the key categories and, first of all, the concepts of behavioural economics and rationality of the population, as owners of residential real estate, the cost of the life cycle of its ownership from the standpoint of their well-being, comfort of living, quality of life, growing contradictions between the profitability of utilities and the cost of utilities, the need for harmonization and balance of interests of residents and management and utility companies.

The specifics of the activities of the housing and communal services sector, as a unique socio-economic-technological system, take into account the influence of such factors as the activities and financial results of public utilities, the balance of interests of consumers and service providers, tariff pricing, communication interaction between management organizations and residents, the quality of technical maintenance and repair of housing, the activities and financial results of utilities, the balance of interests of consumers and service providers, communication interaction between management organizations and residents, the quality of technical maintenance and repair of housing, etc.

A special feature of the socio-housing and communal economy is the equal attitude to the social and economic principles of life support in the implementation of the reproductive processes [1].

Achieving the strategic goals of the development of the construction industry and the housing and communal sphere will be aimed at increasing the level of housing provision for the population, the quality of utilities provided and measures of state support for the development of the housing and communal services sector<sup>1, 2</sup>.

Modern housing and communal services, being the most important structure-forming socially significant territorial-sectoral system of the city, is in constant organizational, technological and economic development due to the formation of various target trajectories of growth in the number of urban population and types of cities, the structure and specialization of their economies, and the urbanization of territories. Forms of territorial-spatial settlement and changes in urban development models associated with the formation of new centres of attraction in the largest cities and agglomerations create new competitive advantages over other regions [4, 5]. Based on the analysis of the genesis of the development of the modern housing and communal services system, presented in Fig. 1, the study of research and scientific approaches to

<sup>1</sup> Decree on national development goals of the state for the period up to 2030 and for the future up to 2036. The document was published on May 7 on the Kremlin website.

<sup>2</sup> Strategy for the development of the construction industry and housing and communal services of the Russian Federation until 2030 with a forecast until 2035.

▶ the development of the housing and communal services system, a set of modern problems and mechanisms of regulatory impact on the processes of synchronization of the digital transformation of management and sustainable development and functioning of the housing and communal services is determined [6–9].

The achieved positive structural shifts in solving priority problems in the housing and communal services sector are aimed at further implementation of the programme for the resettlement of citizens from dilapidated housing, long-term regional programmes for the overhaul of common property in apartment buildings. As part of the integrated development of territories, targeted municipal programmes for the modernization of utility networks are being implemented [10].

The adopted legislative acts contribute to the development of concession mechanisms for attracting investment and implementing infrastructure projects in the housing and communal services sector. A comprehensive renovation of existing residential buildings is being carried out. In 2023, most regions adopted programmes for the modernization of utility infrastructure for the period 2023–2027. To monitor the progress of the programmes, the Ministry of Construction of Russia holds meetings to discuss the weekly results of the implementation of programmes in the regions. The instruments of state policy that stimulate innovation processes and infrastructure development using public-private partnership mechanisms are development institutions. The Unified Development Institute in the Housing Sphere is aimed at developing mortgage housing lending and housing construction, developing and implementing mechanisms to increase the investment attractiveness of the housing sector, developing the market for mortgage securities and other financial instruments.

**METHODS**

The study of modern processes of development of housing and communal services is based on the reproductive approach to the implementation of the mechanism of investment provision taking into account the internal resource potential of housing and communal services and the nature of the influence of the external environment based on the synchronization of their cyclical activity [11–14]. Let us highlight the features of the socio-economic and technological system of housing and communal services, including the following indicators [15].

**Territorial and regional unevenness of development of housing and communal services systems**, which arose in the process of contradictions of the administrative-planning system characterized by the absence of certain types of public services, unsatisfactory quality of drinking water, low rates of development of the urban environment of municipalities and rural settlements.

**The criticality of the technical condition of public utilities** is confirmed by high physical wear and tear (more than 45 %) of the network economy. At the same time, according to Rosstat, if the dynamics of accidents in water supply networks tends to decrease, then the number of accidents at heat supply sources, steam and heating networks, as well as the share of heat losses in the total amount of heat supplied to the network characterize the growth trends of these indicators.

**Asynchrony of the development trajectories of various types of regional housing and communal infrastructure of municipalities**, housing and operational processes, production and provision of utilities, implementation of target regional and municipal programmes and projects are factors of varying development efficiency and low attractiveness for external investors, which requires the development of a methodology for investment synchronization and transformation of the housing and communal services management system.

**The imbalance of the physical condition and functioning of individual subsystems and types of housing and communal services elements** determines the need to implement a strategy for synchronizing development and mechanisms for ensuring advanced rates of modernization of communal infrastructure facilities.

**The instability of the functioning of the housing and communal services** is expressed in changes in the system parameters of the urban environment during periods of sharp quantitative and qualitative changes. Management of the transformation of the integrated development of the urban environment forms a tendency towards the sustainability of the functioning of the housing and communal services as a whole and is a factor in investment attractiveness. There is an inextricable connection and interdependence of the complex transformation and sustainable functioning of the production-technical, organizational-economic and social infrastructure of the urban housing and communal services, which presupposes certain proportions in their development, giving stability to cities. At the same time, the most significant influence on the state of the urban housing and communal services is the level of potential of various types of cities, interconnected with the activities of enterprises and organizations, demographic forms of settlement and the living environment<sup>3</sup> [16].

Currently, the housing and communal infrastructure of most Russian regions and major cities are being rebuilt to meet modern standards of quality and accessibility.

The positive dynamics of housing construction structurally in the context of regions has a trend in average housing provision per one person/sq. m, shown in Fig. 1.

The largest and major cities have a high potential for further development of the housing and utilities sector, in this regard,

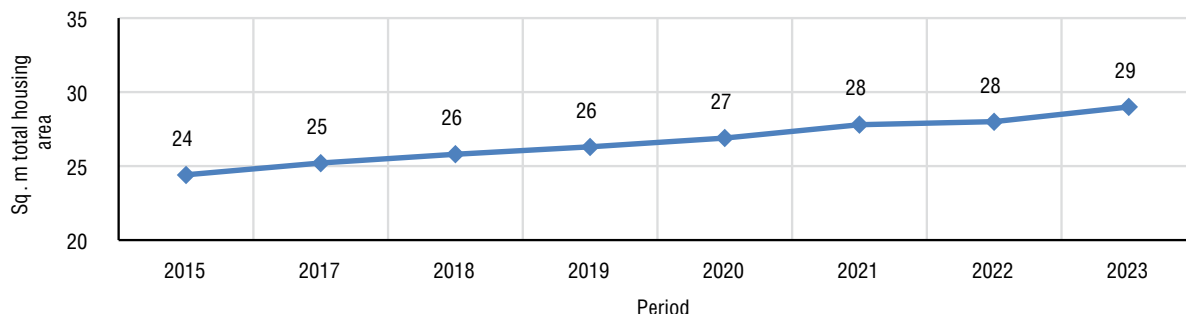


Fig. 1. Trend of average housing provision per one person/sq. m of total housing area

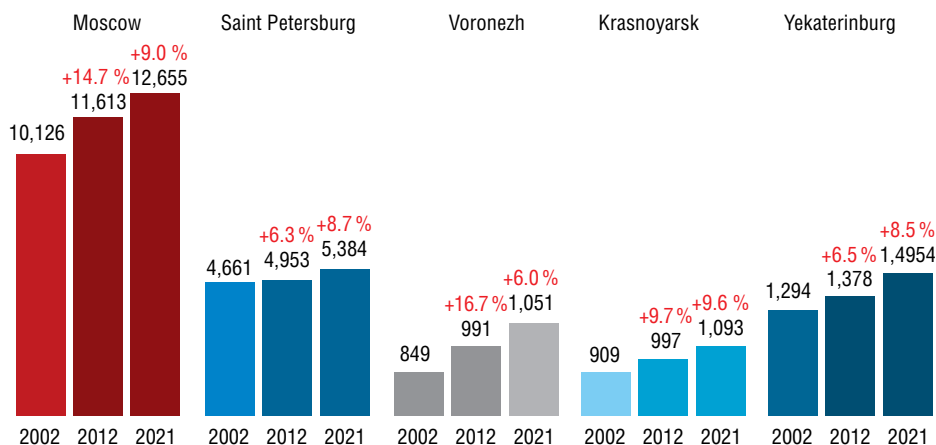


Fig. 2. Dynamics of population growth, thousand people (in % of the previous period)

an urgent task is to determine the models and drivers of their future development. The most significant cities in terms of potential are the largest cities with a population of over one million people, in which about 30 % of the urban population and almost 23 % of the total population of Russia currently live (Fig. 2)<sup>3, 4</sup>.

The largest cities make a significant contribution to the socio-economic development of the regions and are the centres of development and dissemination of innovations in all spheres of the economy [3]. Their attractiveness is explained by a diversified labour market, developed economy and quality of life. In Russia, the rate of migration of people to large cities is approximately the same as in the world [4].

**RESULTS**

Based on the analysis of the genesis of the development of the modern housing and communal services system, presented in Fig. 3, the study of scientific research and scientific approaches to the development of the housing and communal services system, a set of modern problems has been identified that suggest mechanisms for regulatory impact on the processes of formation of digital transformation of management and ensuring sustainable development and functioning of the housing and communal services. The availability of housing and communal infrastructure of the urban economy is a basic factor in the development of agglomerations (Fig. 4). The components of such infrastructure are the engineering and urban planning system, the principles of placement, operation and design of utility networks, equipment that provide comfortable living and conditions for the sustainable development of urbanized areas. In order to ensure maximum impact on economic growth with the centralized selection of infrastructure construction projects, it is necessary to make interconnected decisions on the creation and placement of transport, energy, engineering and social infrastructure facilities of federal significance, and in conjunction with them, the corresponding infrastructure of regional and local significance.

It is important to update the basic principles and approaches to the creation of engineering infrastructures in settlements of various sizes, balance the development and condition of housing and communal infrastructure with population growth, updated sanitary and technological requirements for the formation of engineering



Fig. 3. Algorithm of genesis of development of the modern housing and communal services system

equipment and their installation, complex laying of networks in the context of new construction and renovation of existing buildings.

The presence of significant volumes of dilapidated housing stock poses the task of accelerating the implementation of programmes for the demolition of such housing (Fig. 4).

The housing and communal services of most Russian regions and major cities are being restructured to meet modern quality and accessibility standards. At the same time, it is necessary to highlight the factors that critically affect the degree of adequacy of the housing and communal services structure that meets the needs of residents, such as high wear and tear and obsolescence, insufficient resource efficiency, network losses and accidents in engineering systems, the ecology of the collection and processing of

municipal waste, legal restrictions, insufficient funding to ensure modern standards of operation of facilities, etc. Identification of the technical condition of residential buildings and communal infrastructure facilities is shown in Fig. 5–11.

As the analysis of the cyclical development of the housing and communal services sector at the stage of the decade of the 1990s shows, the functioning of the housing and communal services sector was maintained in the minimum standard mode of operation of residential buildings and communal infrastructure. At the same time, in the modern period of recovery and active growth of the largest and largest cities, the housing and communal services system increases the economic potential within the framework of urban development of the territories of the urban environment, the construction of innovatively provided high-rise residential complexes,

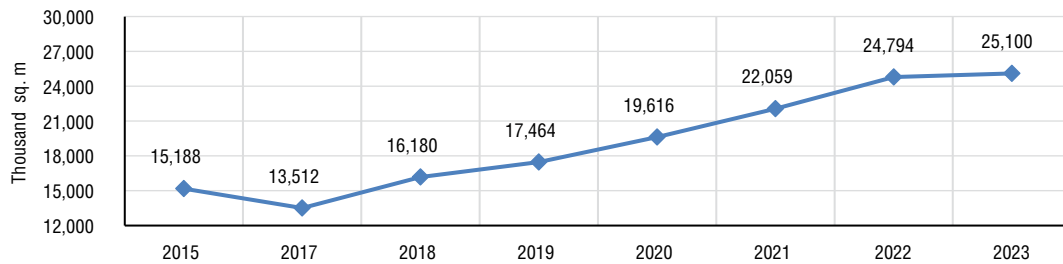


Fig. 4. Dynamics of demolition of dilapidated housing stock, thousand sq. m

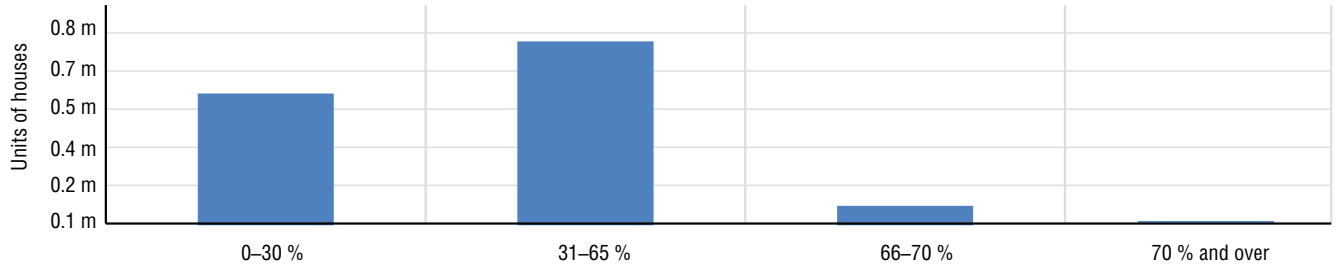


Fig. 5. Distribution of housing stock by physical depreciation

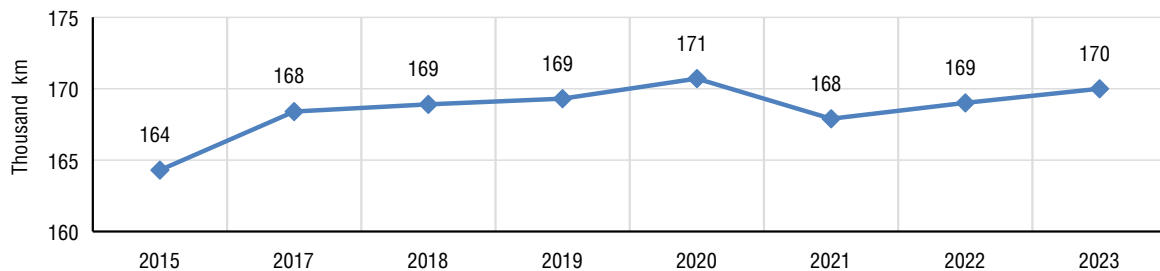


Fig. 6. Street water supply network in need of replacement, thousand km

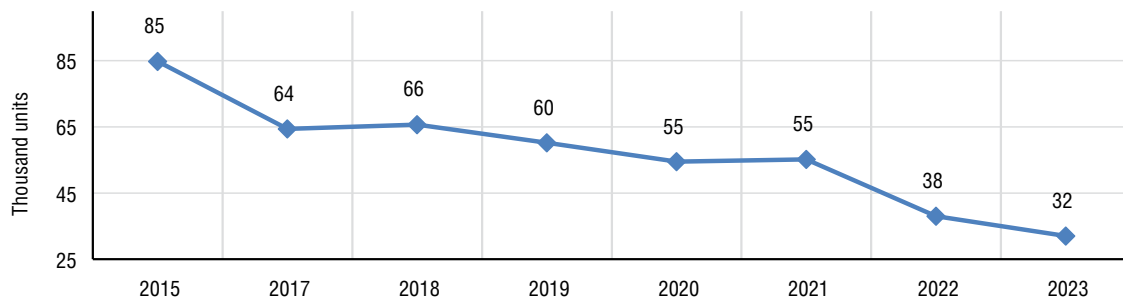


Fig. 7. Dynamics of reduction of accidents in water supply networks, thousand units

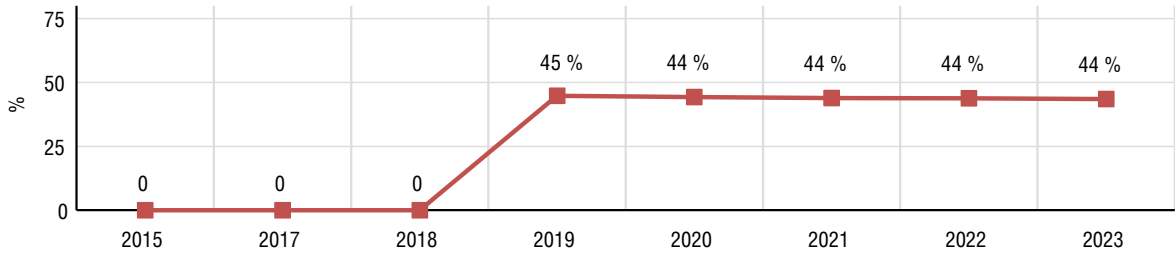


Fig. 8. The proportion of street sewerage networks requiring replacement, %

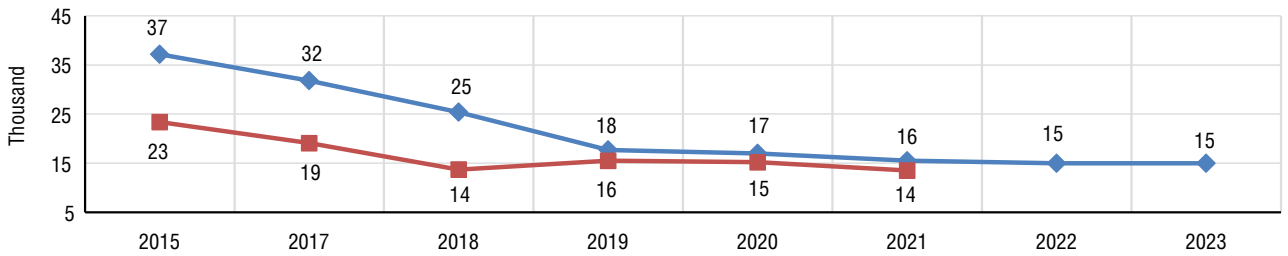


Fig. 9. Number of sewerage failures, thousand

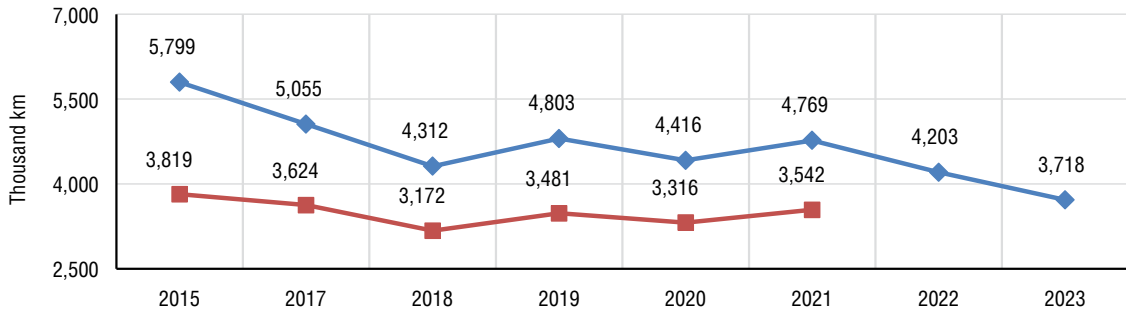


Fig. 10. Number of accidents at heat supply sources, steam and heating networks

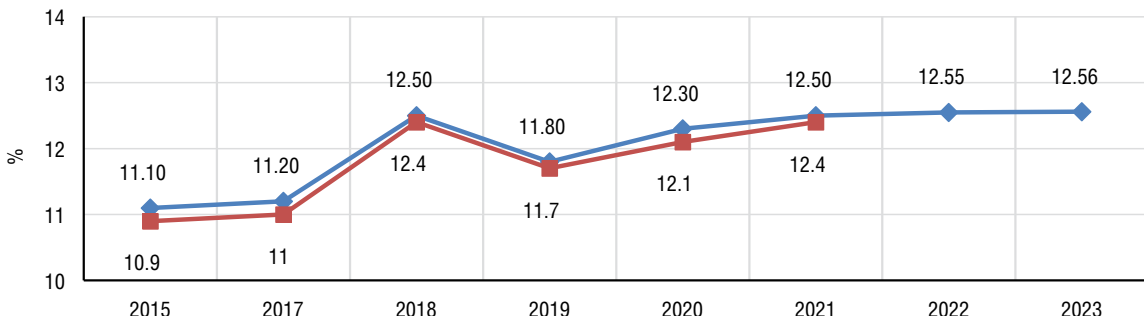


Fig. 11. Specific weight of thermal energy losses in the total amount of heat supplied to the network, %

renovation and modernization measures and major repairs of the housing stock.

The concept of housing and communal services management and its functioning presupposes the need to take into account new principles of development of processes interdependent with the need to accelerate work, improve the efficiency and manageability of business processes, the development of outsourcing in the communal infrastructure, adaptation to digital technologies, and the aggregation of operational work.

The lack of own resources underlies the key category of challenges in ensuring sustainable development of the housing and communal services sector. The need to overcome the investment deficit in the development of housing and communal services does not allow for economically efficient management of effective development models. An important trend of the current stage of development of the housing and communal services sector is significant municipal divergence, which increases the dependence of problem

▶ areas with low provision of housing and communal services on external sources of financing.

The problem cannot be solved by equalizing the levels of development of housing and communal infrastructure through only the redistribution of financial resources. Significant amounts of financial resources provided by the federal government to problem regions and municipalities for the development and modernization of communal infrastructure do not cover the needs for the required volumes of renewal of communal infrastructure.

Taking into account the various differentiation of the technical condition and quality of functioning of housing and communal services, an analysis of the current trends in the development of housing and communal services in a number of major cities was conducted.

An assessment of the introduction of fixed assets and their availability indicates maximum values of indicators for the cities of Moscow, Novosibirsk and St. Petersburg with some dynamics of their decrease. In the remaining major cities included in the analysis, there is a slight increase in the commissioning of assets, which, without reducing the overall state of depreciation of assets and the proportion of completely depreciated fixed assets, indicates a medium-term negative trend in the renewal of fixed assets in the housing and utilities sector (Fig. 12, 13).

It is necessary to highlight the rather high rates of depreciation of fixed assets for housing and communal services in the largest cities: for the cities of Moscow and St. Petersburg within 35–43 %, in other cities over 50–60 % (Fig. 14).

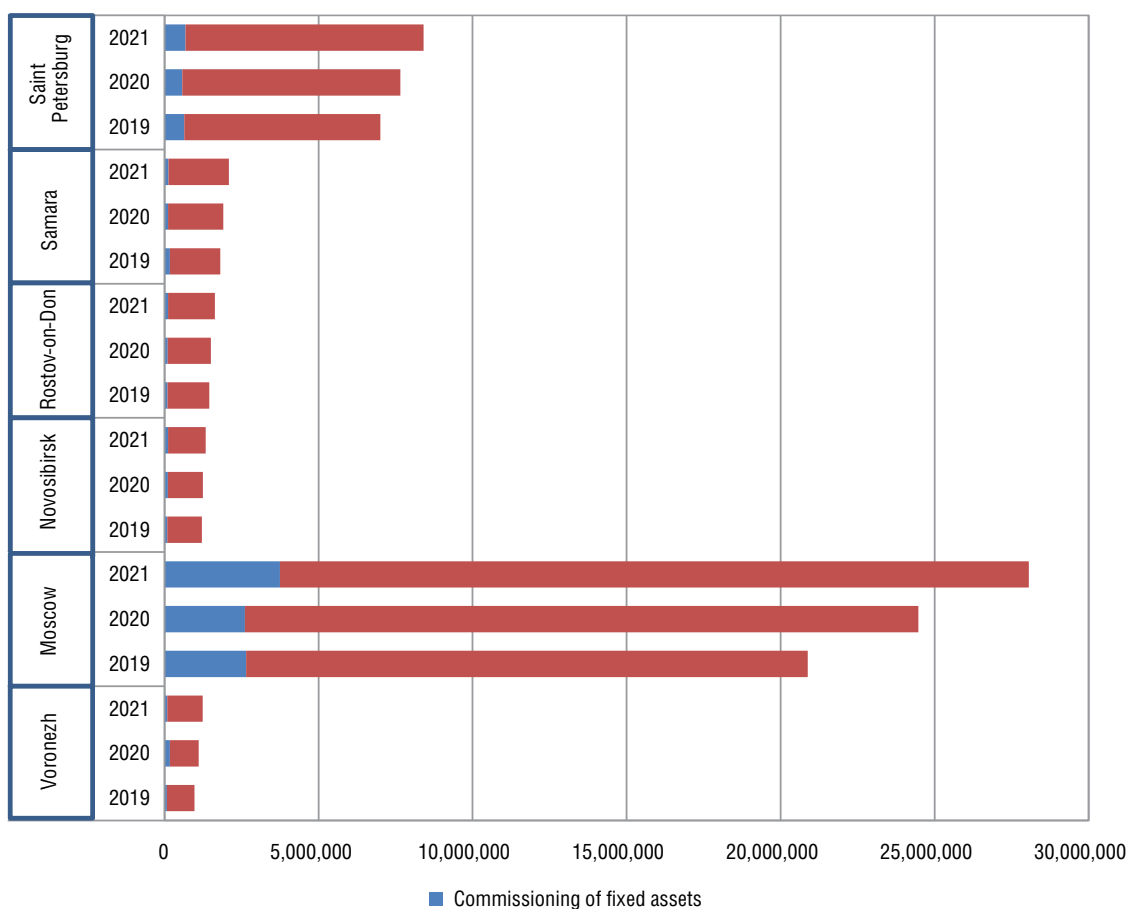


Fig. 12. Dynamics of commissioning of fixed assets in the total volume of fixed assets in the context of the largest cities, %

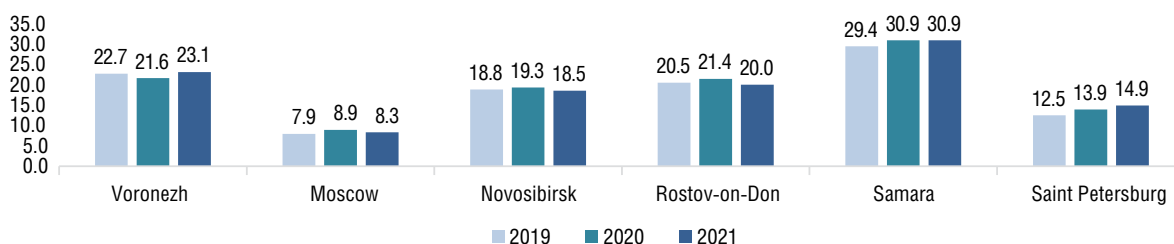


Fig. 13. The share of worn-out assets in the total volume of fixed assets in the context of the largest cities, %

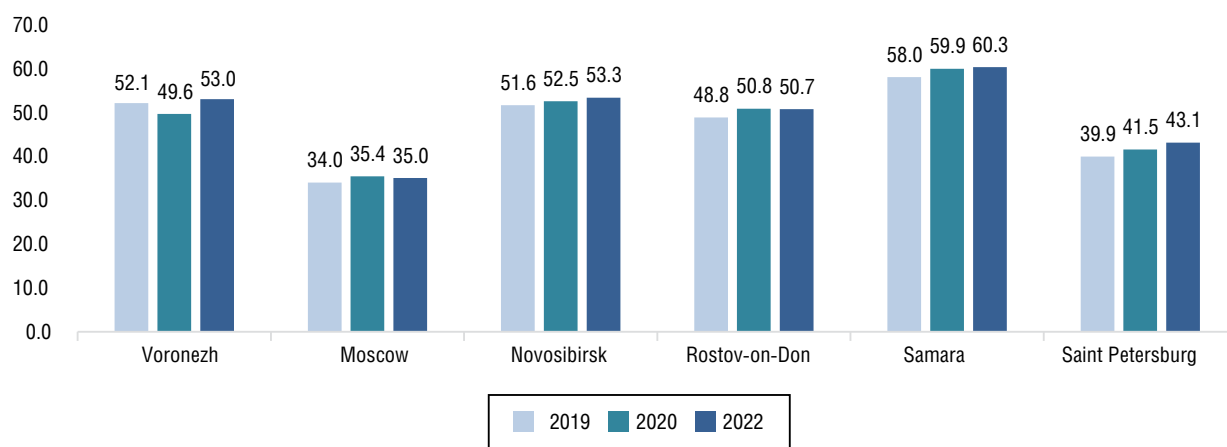


Fig. 14. Indicators of depreciation of fixed assets by major cities, %

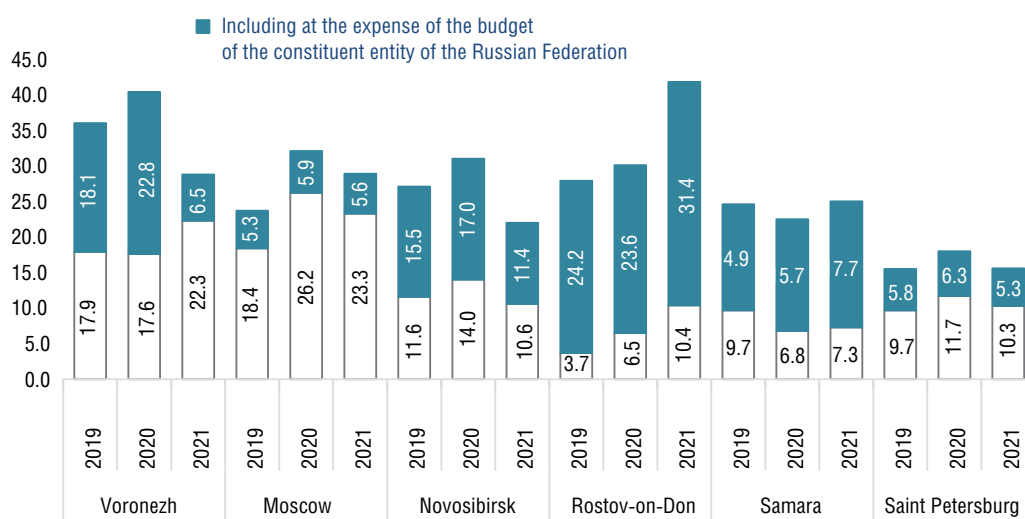


Fig. 15. The share of investments in fixed capital financed from the federal budget and budgets of the constituent entities of the Russian Federation, broken down by largest cities by year, %

The key problem of housing and communal services even for the largest cities is the deficit of investments in the communal infrastructure, which is confirmed by the decrease in the share of investments in fixed capital financed by budgetary funds, including by the federal budget, and the need to expand the organizational and legal field for the application of public-private mobilization partnership mechanisms (Fig. 15). Based on the general analysis of the state and functioning of the housing and communal services system and the assessment of some established trends in the development of housing and communal services in the largest cities, we note that the problems of the development and functioning of life-support systems have characteristic signs of insufficient financial stability, high physical depreciation and deficit of attracted investments for the modernization of communal infrastructure facilities with a degree of physical depreciation of 60 % or more, discrepancies in the volume and quality of work carried out to update housing and communal infrastructure facilities with the required actual needs and recommended standards.

### CONCLUSION

The key trends of the housing and communal services development strategy in the regions, which allow solving the problem of improving the state of the housing and communal services infrastructure potential and the accelerated development of infrastructure for comfortable living conditions and quality of life of the population, are proposed:

- optimization of models of regulatory impact on investment synchronization and balance of innovation and integration processes of reproduction of housing and communal services development in the structure of a single reproduction construction and housing and communal services cycle of each region, taking into account the specified level of resource constraints and the required planned volume of financing for projects for the construction of utility capacities, implementation of municipal programme measures for the modernization of public utilities networks, development of scenarios for combining public and private investments, which creates opportunities for the implementation of large investment projects of

- a strategic nature and eliminating imbalances in the development of housing and communal services;
- formation and implementation of effective models for transformation of the housing and communal services management system and scenario stages of planned implementation of stages of transformation into a service-digital economy, network Internet economy and Internet economy of artificial intelligence, taking into account territorial differences in the location of facilities, resource capabilities, population, different conditions of the housing and communal services infrastructure and development prospects of regions and settlements. It is proposed to create a single intelligent centre for monitoring, regulating and managing the functioning of the housing and communal services system to ensure the quality and reliability of services provided, rational use of resources, acceleration of management decisions, analytical research of incidents and forecasting of repair strategies;
  - expansion of the currently existing organizational and economic mechanism of inter-municipal interaction for the development of areas of housing and communal integration, which allows for a set of measures to eliminate imbalances in the development of housing and communal services in individual municipalities to update the inter-municipal communal infrastructure and social facilities, development and renovation renewal, primarily, inter-municipal communal infrastructure and waste management systems, creation of inter-municipal territories of investment attractiveness based on the digital platform of inter-municipal integration in order to more fully utilize the potential of resource and production integration and the use of digital technologies. The composition and structure of these mechanisms are determined by the combined potential of infrastructure and technical provision and the state of funds, the developed strategy and investment attractiveness of regional housing and communal services, as well as labour, production and technological, innovative, financial, institutional, consumer development potential.

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## Тренды стратегии развития жилищно-коммунального комплекса

Актуальность обеспечения устойчивого функционирования жилищно-коммунального хозяйства (ЖКХ) ставит задачу исследования его состояния и проблем функционирования с выработкой стратегических подходов к эффективной модели трансформации и ускорения модернизации объектов инженерно-коммунальной инфраструктуры. Показано, что наиболее существенным является влияние на состояние ЖКХ уровня потенциала различных типов городов, взаимосвязанных с деятельностью предприятий и организаций, демографическими формами расселения и средой жизнедеятельности. Доказано, что крупнейшие города-миллион-

ники обладают достаточно высоким потенциалом для дальнейшего развития ЖКХ, в связи с этим актуальной задачей является определение моделей и драйверов их перспективного развития. На основе анализа генезиса развития современной системы ЖКХ выделены достигнутые определенные структурные сдвиги в решении приоритетных задач в сфере ЖКХ по дальнейшей реализации программ переселения граждан из непригодного жилья, региональных программ капитального ремонта общего имущества в многоквартирных домах, реализации целевых муниципальных программ модернизации коммунальных сетей, принятых нормативно-правовых документов, создающих условия для использования механизмов государственно-муниципально-частного партнерства, роста инвестиций и возведения инфраструктурных объектов. Рассмотрены характерные особенности жилищно-



коммунального хозяйства и определен комплекс современных проблем и факторов, негативно влияющих на качество деятельности организаций и предприятий ЖКХ. Выявлены параметры технического состояния жилищно-коммунальной инфраструктуры и надежности функционирования системы ЖКХ регионов и ряда крупнейших городов. Обоснованы ключевые тренды стратегии развития ЖКХ, позволяющие улучшить состояние инфраструктурного потенциала ЖКХ и обеспечить опережающее развитие инфраструктуры комфортных условия проживания и качество жизнедеятельности населения.

**Ключевые слова:** потенциал, проблемы, анализ, критичность, несбалансированность, неустойчивость

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