

“Green Agenda” for urban development in the context of climate change adaptation

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Abstract. The issues of sustainable urban development in the context of the global climate change are becoming increasingly relevant. The article investigates the “green agenda” for urban development in the context of climate change adaptation. It studies the key strategies and aspects contributing to reducing the negative impact of climate change on the urban environment. In the frame of the adaptation process, particular attention should be paid to involvement of the local communities, integration of the green technologies, improvement of the energy efficiency of buildings and infrastructure, as well as to development of the green spaces. Upon studying the comprehensive approach to implementation of the “green agenda”, the solutions contributing to increasing the urban sustainability and improving the quality of life of the urban residents have been revealed.

1 Introduction

In the modern world, the influence of globalisation and climate change on the life of cities is increasing, therefore the issues of sustainable development acquire the new importance. As a result, the problems of urban development get foregrounded not only in the frame of local problems but also in the context of global efforts for reducing the humanity's ecological footprint and climate change mitigation.

In such a global context, the following general concepts can be distinguished among the conceptual fundamental units:

- “smart city”;
- low-carbon development and minimising the negative impacts on climate and environment;
- energy saving and energy efficiency improvement;
- sustainable development;
- environmental, social and (corporate) governance (ESG) standards;
- closed-loop economy (circular economy);
- green building.

These mechanisms for implementing the concepts and their target settings, taken together, overlap in many aspects and are sometimes referred to as the “green agenda” (Figure 1) [1].

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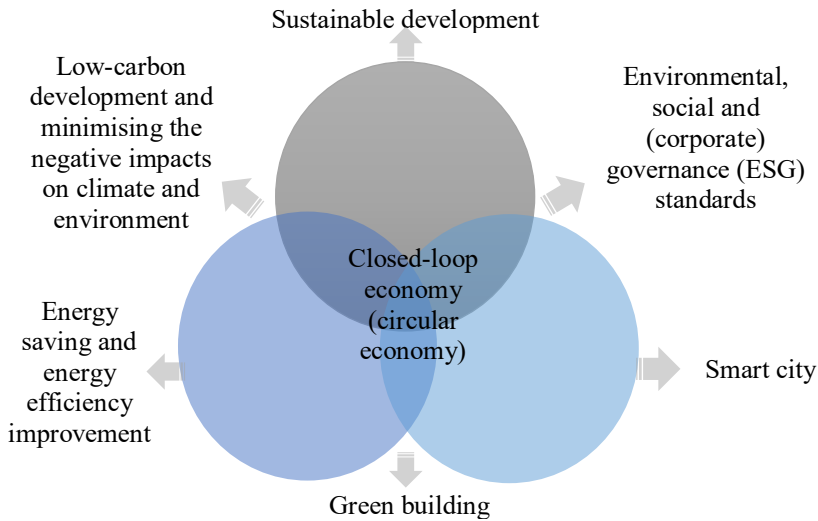


Fig. 1. Forming the concept of “green agenda” for sustainable urban development.

The concept of “green agenda” for sustainable development is becoming increasingly important for the Russian cities, due to significant climate changes in the period from 1970 to 2023. The increased demand for cooling and decreased demand for heating are observed, moreover, in the most regions of Russia, the tendency of water level decrease in the natural water reservoirs is observed, whereas the direction and intensity of these changes vary depending on the city [2].

The key aspects in transformation towards the sustainable cities include implementation of the “green agenda” and compliance with the main concepts of sustainable development (Figure 2). Of this list, provisions 1 and 6 are directly related to the economy and governance of the municipalities, provisions 2–5 and 9 cover the wider issues of urban economy, and provisions 7 and 8, which seem to be the least related to urban planning, still have elements referring to the urban development. Based on the practices of the foreign and Russian cities, an attempt was made to identify the key directions of the “green agenda” for sustainable development most relevant for the Russian cities. These directions include:

- implementation of the "green agenda" tools into municipal governance to allow the municipality to solve the environmental problems within its authority and foster greening activities of the other economic entities in the city;
- inclusion of the sustainable development goals into the strategic planning of spatial development of municipalities, as well as socio-economic regulation of the urban planning;
- identification of the sectors to be stimulated to enable the municipalities to increase the environmental sustainability of the urban territories, determining the high-potential areas for greening the urban economy.

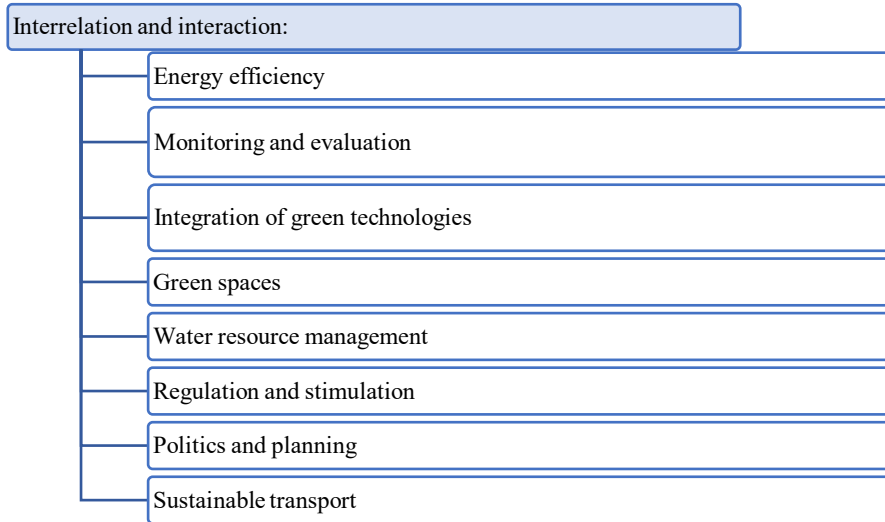


Fig. 2. Main concepts of “green agenda” for sustainable development.

Each of the above-mentioned aspects interacts with the others, therefore implementation of the “green agenda” requires an integrated approach, which creates a synergy for achieving a general goal of sustainable development. Thus, implementation of the sustainable transport will help to improve the air quality and reduce energy consumption, and development of the green spaces will contribute to improvement of the water management system. Efficient implementation of the “green agenda” into the municipal governance system can lead to significant positive changes, which imply improvement of the well-being and health of the citizens, creation of the new jobs, stimulation of the economic growth and reduction of the carbon footprint [3].

In Russia, these conceptual units are often implemented and perceived separately from each other, thus, the urban development issues are considered in a formal and insufficiently comprehensive way.

Figure 3 demonstrates the main directions of sustainable (including green) development of the Russian Federation approved by the Russian Federation Government Directive No. 1912-r of July 14, 2021:

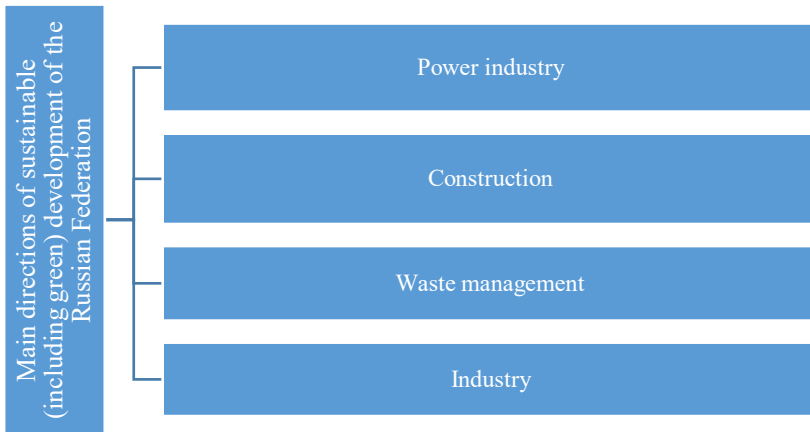


Fig. 3. Main directions of sustainable (including green) development of the Russian Federation.

Climate change is difficult to notice in the “current moment”, because the weather is transitive. One summer can be cold and rainy, and the next – hot and dry. The difference is becoming dramatically noticeable on a time scale of decades. According to the World Meteorological Organization, 2023 was the hottest year in the history of meteorological observations [4]. However, in Russia the last year took only the fifth place, and the record is yet held by 2020, and the trend is obvious: within the last decade, the temperature was 2.2 °C higher than in 1950–1979. In the record-breaking 2020 year, it was 3.6 °C higher than in the reference period, and in 2023, it was 2.4 °C higher. Anyway, the general trend is as follows: it is getting warmer in Russia.

Due to the global climate change, the weather in Russia has undergone significant changes since the middle of the last century. The analysis of some of the key climate changes is provided below.

1. Changes in snow cover.

A decrease in the amount of snow in some regions of the country in winter affects the traditional activities and ecosystems.

2. Increase in temperature.

In some regions, especially in the Far East and Siberia, warming is going faster than the global average, therefore the mean annual temperature has increased in Russia as well.

3. Permafrost thawing

Permafrost thawing is observed in the northern regions of Russia, which leads to infrastructure problems and landscape changes.

4. Changes in precipitation

In some regions, a decrease in precipitation is observed, while others face its increase. For example, in the south of the country and in the European part of Russia the amount of precipitation has increased, while in the Far East and in some parts of Siberia it is in a deficit.

5. Extreme weather events.

The number of extreme weather events, such as abnormal heat, heavy rains, droughts and floods, has increased. These events are becoming more intense and frequent.

The above changes significantly affect people's lives, ecosystems and the economy of Russia.

2 Materials and methods

Warming in Russia is most noticeable in winter and spring, due to ability of the earth to reflect solar energy, and because at these times of the year the main territory of the country is covered with ice and snow. The passing sun rays are reflected, preventing the earth from warming up, since white colour has a high albedo [5-7]. But from year to year, the area covered with ice and snow decreases, and without them, the solar energy is absorbed by the earth's surface, which contributes to the increase in warming. It turns out that climate change accelerates itself and its visible changes are most clearly observed in the cold season. Due to reduction of the ice-in period in the seas of the Arctic Ocean, warming is especially noticeable in autumn in the north of the Far East and Siberia. Thus, compared to other seasons, warming is on average less noticeable in summer, but extreme events occur more and more often at this time of the year. For example, severe thunderstorms and abnormal heatwaves. Climate change has always affected human economic activity, therefore, it is important to learn to adapt to it: to use all the possible benefits and minimise the associated risks. Thus, within the strategic planning of the Russian Federation the main types of mechanisms for implementing the goals and objectives of “green agenda” have been created in the regulatory documents. (Figure 4) [6]. In recent years, a trend towards synergy of climatology, meteorology and machine learning has emerged. The specialists select and find relationships between the business operational indicators and historical weather data. As a result, solutions are developed to raise the efficiency of enterprises by planning their work in accordance with the climatic and weather factors

Type 1. Improvement of legislative regulation (delimitation of the powers of public authorities, sectoral regulation)

- 1.1. Federal Law No. 7-FZ of January 10, 2002 "On Environmental Protection"
- 1.2. Climate Doctrine of the Russian Federation
- 1.3. Principles of the State Policy in the Area of Environmental Development of the Russian Federation for the Period up to the Year 2030.

Type 2. Information support (creation and development of the state information systems, disclosure of the information on the origin of electric power and its "carbon footprint" to consumers)

Type 3. Audit and supervision (increasing the efficiency of the state environmental audit at the federal and regional levels, developing social supervision)

Type 4. Monitoring, keeping record and inventory (maintaining a register of the sources of emissions and absorption of greenhouse gases, creation and development of a unified automated state system of environmental monitoring)

Type 5. Technological regulation, implementation of standards and norms (ecological standardization based on technological norms, environmental certification, establishing the requirements for energy efficiency of buildings)

5.1. Federal Law No. 7-FZ of January 10, 2002 "On Environmental Protection"

5.2. Principles of the State Policy in the Area of Environmental Development of the Russian Federation for the Period up to the Year 2030

5.3. Strategy of Ecological Security of the Russian Federation for the Period up to the Year 2025

5.4. Strategy of Socio-Economic Development of the Russian Federation with Low Greenhouse Gas Emissions for the Period up to the Year 2050

Type 6. Economic and financial stimulation (quotes for greenhouse gas emissions, implementation of financial and tax policy measures to stimulate the reduction of greenhouse gas emissions, development of sustainable, including "green", financing)

6.1. Federal Law No. 7-FZ of January 10, 2002 "On Environmental Protection"

6.2. Principles of the State Policy in the Area of Environmental Development of the Russian Federation for the Period up to the Year 2030

6.3. Strategy of Socio-Economic Development of the Russian Federation with Low Greenhouse Gas Emissions for the Period up to the Year 2050

6.4. Federal Law No. 34-FZ of March 6, 2022 "On Conducting an Experiment to Limit Greenhouse Gas Emissions in Certain Constituent Entities of the Russian Federation".



Fig. 4. Main types of mechanisms for implementing the goals and objectives of "green agenda" in the regulatory documents.

3 Results

For efficient implementation and development of the activities of the "green agenda" for sustainable development, the municipality should possess the regularly updated comprehensive information on the state of the urban environment, which would also allow predicting its future:

1. Normative legal regulation;
2. Greening the provided municipal services and municipal procurement;
3. Moderating and accelerating the processes of greening the urban economy;
4. Encouraging the environmentally responsible behaviour of the city residents.

As a result, it is important to create and maintain an environmental monitoring system at the municipal level that could track the environmental situation in the city.

Environmental monitoring is closely related to the process of supervision, which focuses at the activities of the organizations and enterprises affecting the environment. The process of supervision is carried out by the institutions entitled to impose the administrative measures in case of finding the violations. Since 2006, the environmental supervision (audit) in Russia has been the authority of the regional and federal powers. Municipalities can carry out supervision only if the subjects of the Russian Federation transfer to them the certain state authorities for implementing the regional environmental supervision (Table 1) [8].

Table 1. Tools for implementing "green agenda" for sustainable development in the municipal governance system.

Involving the local community into implementation of "green agenda" for sustainable urban development	Providing the targeted subsidies for implementing the energy-saving measures during major repairs of the apartment houses
	Support of the local community projects aimed at improving the environmental characteristics of the adjacent territories and public spaces
	Consulting the homeowners on improving the energy efficiency of buildings
	Support of the non-profit organizations' activity on collecting waste suitable for reuse and (or) recycling, but not recycled by the regional agency
Energy and ecological balance calculations	Calculating the balance of the generated, disposed and recycled solid municipal waste
	Calculating the fuel and energy balance
	Calculating the balance of the pollutant emissions into the atmosphere and wastewater
Taking into account "green" standards when providing the tax benefits to business entities	Defining a criterion of the implemented project compliance with the "green" principles as condition for providing benefits to business entities
Monitoring the environmental situation on the territory of the municipality	Interaction of the municipality with the other actors affecting the environment for information exchange
	Formation of a network of monitoring stations for collecting primary information
	Creation of a centralised office for summarising and analysing the information received during monitoring
Taking into account "green" standards when concluding civil law and concession contracts	Addressing a verifying agency to get a Statement on the project's compliance with the criteria of green or adaptive projects
	Providing conditions for implantation of "green" standards and ESG principles when concluding civil law and concession contracts
Greening the inter-municipal cooperation	Joint implementation of "green" investment projects
Greening the municipal procurement	Harmonizing the strategic and local planning documents and programs for integrated development of the infrastructure to prevent the inter-municipal environmentally-induced conflicts
	Accounting for the cost of expenses on elimination of the negative consequences to the state of environment when concluding the life cycle contracts
	Inclusion of the environmental requirements into the supplier qualification requirements
	Inclusion of the environmental requirements into the requirements for the object of procurement

The present monitoring should be carried out openly and transparently, and the results

should be regularly updated on an accessible information portal and visualized on the maps. A variety of technological solutions can be used in the studied field, including the existing developments.

4 Discussion

Despite the intense debates and diversity of interpretations available in a large number of studies in the subject of the research, it is commonly recognised that the challenges targeted at by the “green agenda” of sustainable development have a long-lasting importance regardless of the current economic situation and can hardly be questioned. Nowadays, “green agenda” for sustainable development can be claimed to have a firm position in the strategic and policy-making documents, in the standards of the Russian Federation, and in the legislation, however its implementation is often restricted by the administrative limits, and in such cases the main problem is the lack of coherence of the measures, actions and their coordination. The need for a comprehensive approach to implementation of the "green agenda" for sustainable development is especially evident at the municipal level, and in the first place in the cities [9].

The local self-government bodies, having limited resources and powers, are becoming the main accelerators and moderators to implement the tools of “green agenda” and develop the urban environment institutions. As follows from the analytical reviews, this trend is typical today for many countries of the world. And already existing opportunities of the local self-government bodies in tax and budget policies, legal regulation, municipal procurement and municipal enterprises’ management, as well as in urban planning, enable them to boost significantly implementation of the "green agenda" for sustainable development.

Another topic for discussion is environmental monitoring, which, unlike the environmental supervision, does not include imposition of the administrative action on the business entities and can be carried out within the framework of solving the local problems of environmental protection. The environmental monitoring system can include monitoring the state of surface waters, atmospheric air, soils, as well as placement of landfills, industrial emission facilities and other objects, which depend on the update of the relevant risks. Usually, to conduct such a monitoring it is necessary to:

- establish cooperation with the other participants having impact on the environment for the exchange of information within the municipality;
- create the networks of monitoring stations using the automated systems for collecting the primary data on the state of environment;
- organise a centralized office for the analysis and collection of data obtained during the monitoring process.

All the above mentioned is necessary for a comprehensive assessment of the impact of the economic and other activities on the environment, for collecting data on the environment, increasing the transparency of government activities and developing the efficient managerial decisions. The following priority directions for further research on the issues of “green agenda” for sustainable urban development can be distinguished:

- development of the priority activities taking into account the characteristics of the different types of the cities and their unique challenges for implementation of the “green agenda” for sustainable development;
- creation of a comprehensive system of incentives to change the behaviour of city residents and increase their contribution to implementation of the "green agenda" for sustainable development, which would combine the non-financial and financial measures;
- development and creation of a system of measures to reduce the managerial costs for the socio-economic development and implementation of the “green” initiatives compared to

the traditional approaches, thus providing additional motivation for active promotion of the "green agenda" for sustainable urban development.

5 Conclusion

The analysis presented in the paper demonstrates a deep correlation between the concepts of low-carbon and sustainable development, and such an analysis is getting more and more recognised both by national governments and international organisations. The research on the efficient adaptation to climate change conducted and presented in the article emphasises the acute importance of integrating the "green agenda" into the urban development strategies. At the same time, the adaptive measures aimed at increasing the sustainability of the urban systems and reducing the carbon footprint are becoming an integral part of global efforts for ensuring the sustainable future, whereas the exchange of the advanced practices and international cooperation play a key role in accelerating these processes by creating the more sustainable cities.

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