



Green building in the ESG agenda for sustainable development of Russia: conditions and trends

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Abstract. To achieve the sustainable development goals proclaimed by the UN, we need to use more green building technologies that meet the principles of sustainable development, increase energy efficiency and achieve the environmental direction of the country's ESG transformation. The authors consider the main problems and directions of green building in the Russian Federation. The study highlights the main limiting factors to develop green building in the domestic building industry. It was revealed that the main ones are related to the inconsistency of legal regulation, lack of demand from consumers, lack of specialists in the field of green building, assessment and certification of green objects. The study found that no more than a third of the country's population knows about green building, only 20% are aware of the need for environmental certification of buildings, and only 6% of the population require this certification when purchasing housing. At the same time, the development of green building is hampered by difficulties with import substitution of green technologies and green building materials. The purpose of the study is to analyze the conditions and trends for green building development in the Russian Federation. The scientific research hypothesis is to introduce the ESG principles into building as an effective approach for sustainable development in Russia. The main conclusion of the study is to develop incentive tools for transition to green building technologies and green certification of building projects. The results of the study will contribute to the expansion of green building projects in the domestic building industry.

Keywords: green building, ESG agenda, sustainable development, green certification, green technologies

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1. INTRODUCTION

Building is one of the most strategically important and rapidly developing sectors of the economy of the Russian Federation. It is often called the “locomotive of the Russian economy” and the pillar of

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economic growth and development of Russia. The building industry accounts for between 4% and 8% of the country's gross domestic product. The urgency of demand for new projects and infrastructure in the country stimulates building in new areas of development and modern technologies. Since the building industry occupies a leading place in the society and country, the use of sustainable building methods and the limited impact on the environment should become its priority strategic development [1].

For the first time, the need to change approaches to buildings and structures was addressed in Europe in the late 80s of the last century. When, against the backdrop of the energy crisis, there was the need to reduce energy resources. At the same time, cities and buildings account for about half of the energy resources consumed in the world [2]. In addition, urbanization and the increasing standard of living of the population, on the one hand, have caused the deterioration of the biosphere, and on the other hand, the introduction of new requirements for the quality of life. "Green building" was finally formed in the 90s of the twentieth century and it is considered one of the main strategies for responding to environmental degradation [3]. At the same time, there are questions about the need to standardize approaches and requirements for green building projects, first of all, their classification, as well as quantitative and qualitative assessment of characteristics. As a result, special voluntary certification systems for green buildings have emerged. The approximate number of which currently amounts to about two dozen in the world practice. The most famous certification systems include the American LEED system, the British BREEAM and the German DGNB model. The methods involve scoring based on such characteristics as comfort, energy efficiency and environmental friendliness of the building. For example, the BREEAM standard includes such criteria as: management; health; energy; transport; water; materials; recycling; use of land; pollution. This set of characteristics has received the greatest application in the national standards of green building in various countries. The number of points scored affects the degree of the certificate issued.

It should be noted that the Russian Federation has developed and approved several dozen state standards in the field of environmental protection, requirements for drinking water, non-traditional energy-saving technologies, environmental requirements in building, etc. However, the possibility of certifying green buildings in the country is limited due to high requirements of international standards, which do not consider the peculiarities of the domestic building market. Considering green building the most important standards are the following:

1. Standards of organizations NOSSTROY 2.35.4–2011 Residential and public buildings. Rating system for assessing the sustainability of the environment;
2. GOST R 54964–2012 Conformity assessment. Environmental requirements for real estate. Characteristics of Russian greens;
3. GOST R Standard for green building of multi-apartment residential buildings;
4. GOST R 58875-2020 Greenable and maintained roofs of buildings and structures.

The analysis showed that domestic green building standards are more similar to the LEED certification system, which includes sections on safety, new technologies in design, and design solutions.

Thus, the country has adopted and operates a system for assessing the compliance of real estate with environmental requirements. However, mass certification of buildings has not been carried out yet. The introduction of green building practices in Russia is associated with a number of problems, the key of which are related to the lack of a regulatory framework requiring the mandatory use of green technologies; high cost and difficult access due to external sanctions to high-quality green building materials and technologies; lack of adequate demand from consumers and investors. Another problem is the lack of a sufficient number of design specialists capable of designing buildings for subsequent green certification. At the same time, world practice shows that green building is a driver of innovative and investment development of national economies. In this regard, the purpose of the work is to study the conditions and trends for green building development in the Russian Federation, both from the point of view of respecting the interests of building companies and on the part of the main stakeholders (state and population).

2. METHODS AND MATERIALS

Modern strategies and business processes of Russian building companies are subject to the ESG transformation. In this context, the use of green technologies meets the principles of sustainable development of the country, increasing energy efficiency and achieving the environmental direction of the ESG transformation. The concept of ESG translated from English means “environment, society, governance”. ESG is based on the strategic development of companies based on transparent management, care for people, and the environment [4, 5]. From this point of view, green building means not just the construction of buildings and structures. It means the creation of the comfortable environment that meets the principles of safety and sustainable development, minimal impact on the environment and human health. Thus, the main goal of green building is to create buildings that are adapted to the environment without causing harm to it. The most active promoters of green building in the Russian Federation are the following:

- The Union of Architects of Russia - since 2010, as part of the Green Project Festival, it has been talking about innovative ideas and technologies in the field of building;
- The non-profit partnership “Promoting Sustainable Development of Architecture and Building”, together with the Green Building Council, has been holding annual conferences since 2011 to improve the standard of living of the population using methods of eco-sustainable design, building and operation of buildings and settlements throughout the entire life cycle of “Eco-sustainable position”;
- The Guild of Managers and Developers, as part of the Green Awards competition, disseminates information about successful experience in the design and implementation of resource-efficient and environmentally friendly projects in Russia.
- Passive House Institute – annually organizes conferences and exhibitions on modern technologies in the field of energy-efficient building.

Most countries that signed the Paris Climate Agreement have included the environmental or so-called green building in their government projects. Along with solving environmental problems, green building quite effectively solves the problems of high energy consumption [6]. It has been established that green building allows saving at least 30% of energy consumption compared to conventional buildings [7, 8], and the payback period for investments is no more than eight years [9, 10]. In this regard, issues of expanding and accelerating green building technologies into domestic practice are of increasing interest.

3. RESULTS AND DISCUSSION

The transition to green technologies in building is aimed at solving one of the main tasks of the ESG agenda – a gradual transition to a green economy, designed to solve the global environmental problem – “reducing emissions of harmful substances into the atmosphere by increasing the use of renewable raw materials and materials of biological origin, expanding the use of renewable and low-carbon energy sources in the production of goods, works, and services.” Note that to stimulate the transition to the green economy, the state uses various tools: preferential and additional financing of green projects, green mortgage, green bonds, green loans, etc. The transition to green technologies involves investment, financial and image benefits (Fig. 1).



Fig. 1. Benefits of ESG in the green economy.

Green building, according to the Standards of organizations NOSTROY 2.35.4-2011 standard, refers to the process of constructing residential buildings for the population that meet the conditions of comfort, environmental friendliness and sustainable development. Eco-sustainable design and development of green building in Russia is the responsibility of organizations, a list of which is given in Table 1.

Table 1. Russian organizations for sustainable design and development of green building.

No.	Name of company	Functional activity	Area of activity
1	Non-Commercial Partnership of Green Building Council	Development of documents for certification of all types of buildings is voluntary.	Application of passive methods for energy saving and objective criteria, involvement of experts. Assistance from the Ministry of Regional Development.
2	Non-Commercial Partnership of Ecological Certification Center – Green Standards	Development of documents for certification of all types of buildings, structures and linear objects is voluntary.	Application of the LEED, BREAM standards and subjective assessment methods of experts. Assistance from the Ministry of Natural Resources and Environment of the Russian Federation.
3	NOSTROY	Development of documents for certification of building projects and design documentation is voluntary.	Admission to the list of evaluators “Rating system for assessing the sustainability of the living environment” if you have experience in the building industry.
4	Non-Commercial Partnership of ABOK	Development of documents for certification of all types of residential and public buildings for the NOSTROY association is voluntary.	Community of Energy Conservation Engineers, the LEED and BREEAM oriented standards are applied.
5	Green Building Council	Development of documents according to the LEED, BREAM standards.	Application of the international quality control tools in Russian companies, training of specialists.
6	Skolkovo Research Center	Providing special conditions for organizations in priority industries.	Information technology, telecommunications, energy and nuclear industries, medicine, space.
7	State Corporation Olympstroy	Programs to attract investment in innovation for Sochi and development of green standards.	Green standards in the design, building, and rebuilding of Olympic venues in Sochi.

The green standards developed by these entities are voluntary and based on international standards. It has been revealed that today there are more than 200 buildings that have green certificates in Russia. Most building projects are certified according to the BREAM standards. The method, proposed in 1990 by the British multidisciplinary scientific organization in the field of building BRE (Building Research Environment), involves assessing building projects according to five criteria in two stages: at the design stage and upon completion of building. The structure of domestic certified buildings by functional activity is presented in Fig. 2.

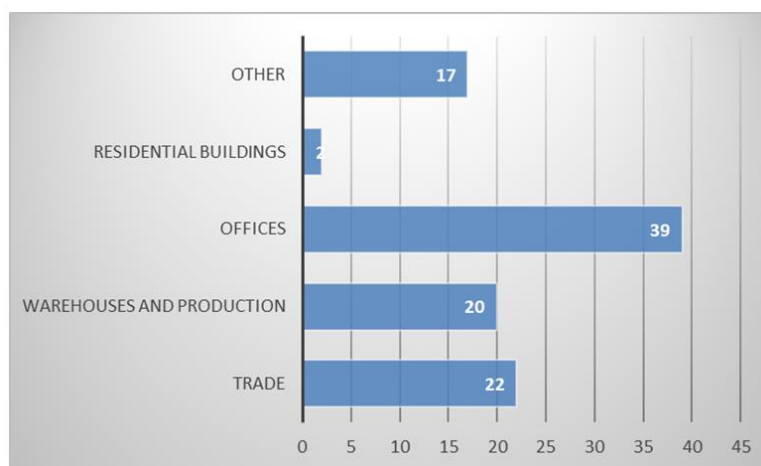


Fig. 2. Structure of certified buildings by functional activity [11].

The main requirements of green building when creating projects and constructing buildings are the use of natural resources without chemicals, energy-efficient technologies, separate waste collection and landscaping, control over the quality of air and water content of objects [12]. Rosselkhozbank analyzed the number of new buildings that meet the criteria for green building and found that only 4,786 objects (15% of the total building volume) have certificates in Russia. Of these, 1,812 objects are standard buildings, 2,431 are comfort-class objects, 438 new buildings are business and elite class. By 2030, the share of green buildings (apartment buildings) should increase to 30% (Fig. 3).

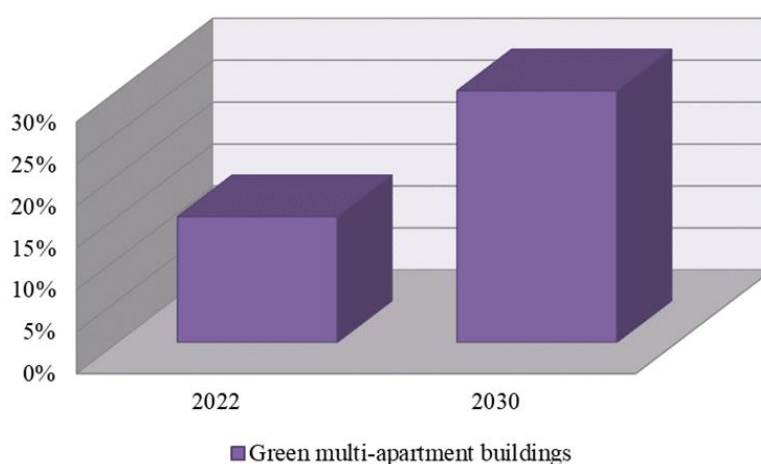


Fig. 3. Dynamics of green multi-apartment new buildings in Russia.

According to a population survey, it was found that more than 1/3 of Russian residents do not know about green building, more than 1/4 of the population heard about green technologies, but did not focus on them when choosing housing, 1/5 of the population did not know that buildings should have environmental certificates, 1/10 of the residents have never seen an eco-house and only 6% of the population of our country require a certificate when buying housing in the eco-house (Fig. 4).

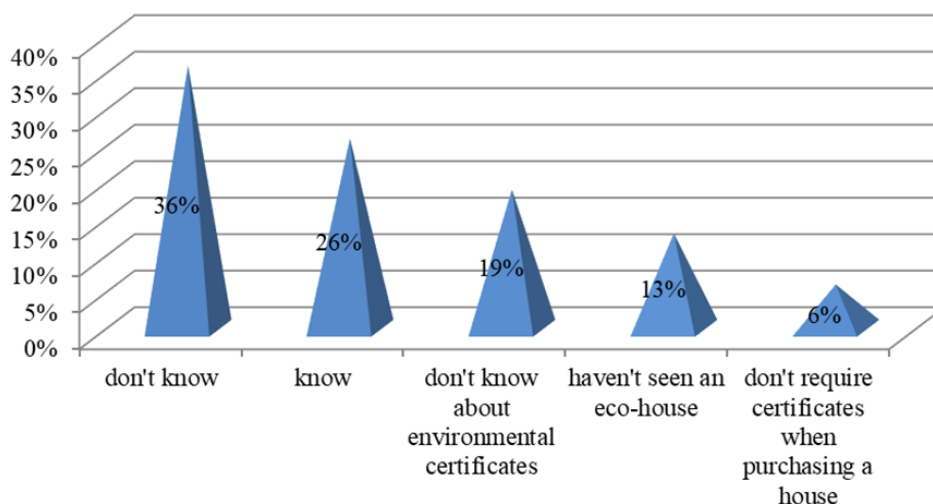


Fig. 4. Public awareness of green building in Russia.

Green building in Russia is at the initial stage of its development, but it is becoming a current trend in the building industry. Increasingly, green technologies are involved both in the building process and in the life cycle of buildings. In building, they began to use organic photovoltaic cells, environmentally friendly building materials, and create mini parks on the roofs of buildings, which increases the level of environmental safety and contributes to the sustainable development of Russia. Every year the number of energy efficient projects is growing, the pace of building is increasing, and opportunities for financing building projects and preferential lending are expanding. All these changes are related to the application of the green ESG standards in building. The use of green tools is promising and leads to the following positive effects:

- Building maintenance costs are reduced;
- Comfortable living conditions of the population are improved;
- Eco-buildings have a high market value and they are in demand;
- Attractive for investment;
- Environmental safety;
- The level of sustainable development of the country increases [13].

The results of the survey among the Russian population on the priority characteristics of eco-houses showed the following distribution: the first place is infrastructure (30%); the second place is water quality (21%); the third place is the ecological environment (17%); further is the quality of building materials (13%); sound insulation (11%) and energy efficiency (8%) (Fig. 5).

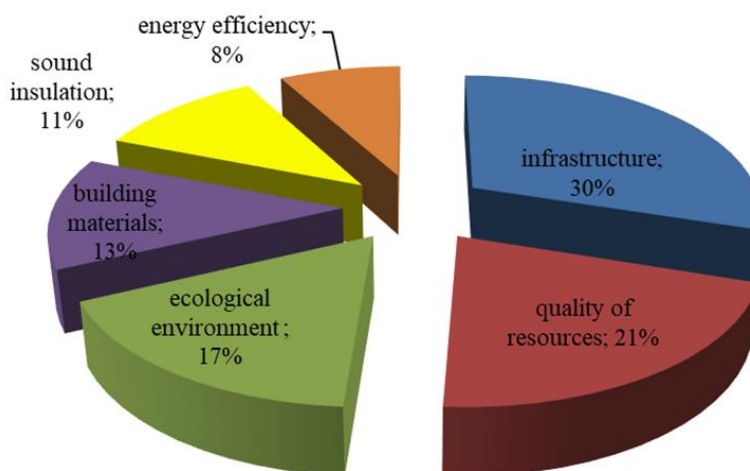


Fig. 5. Priority characteristics of eco-houses for the Russian population.

In Russia, the following eco-buildings were built based on green building standards (Fig. 6):

1. Active House is built in the Moscow region. The project used such green tools as:
 - Energy-saving technologies – sun protection elements on windows to regulate heat;
 - Automated control system for utility networks – built-in weather station that regulates temperature indicators;
 - Energy alternative – a collector to heat water; natural light.
2. Japanese House was built in the business center of Moscow. The project used such green tools as:
 - Recycling use of process water;
 - Energy-saving technologies – water and electricity meters, motion sensors, high-quality thermal insulation;
 - Green home management policy with annual analysis of energy costs, waste emissions, etc.;
 - Arrangement of the territory – there is a greenhouse and green area on the roof of the building.
3. Residential complex Triumph Park is an eco-comfort class complex, geographically located in St. Petersburg. The following green technologies were used in this project:
 - Energy-saving technologies (light bulbs, motion sensors are placed on internal and external lighting);
 - Plumbing with economical water consumption;
 - Emergency monitoring systems;
 - Safe building materials;
 - Landscaping;
 - Social facilities (schools, kindergartens, etc.) are located on the territory of the residential complex [14].



Fig. 6. Buildings using green technologies in Russia.

Despite the obvious advantages of eco-houses, not everyone is ready to purchase a green building project. They would agree to purchase housing in the ecological house under the following conditions (Fig. 7):

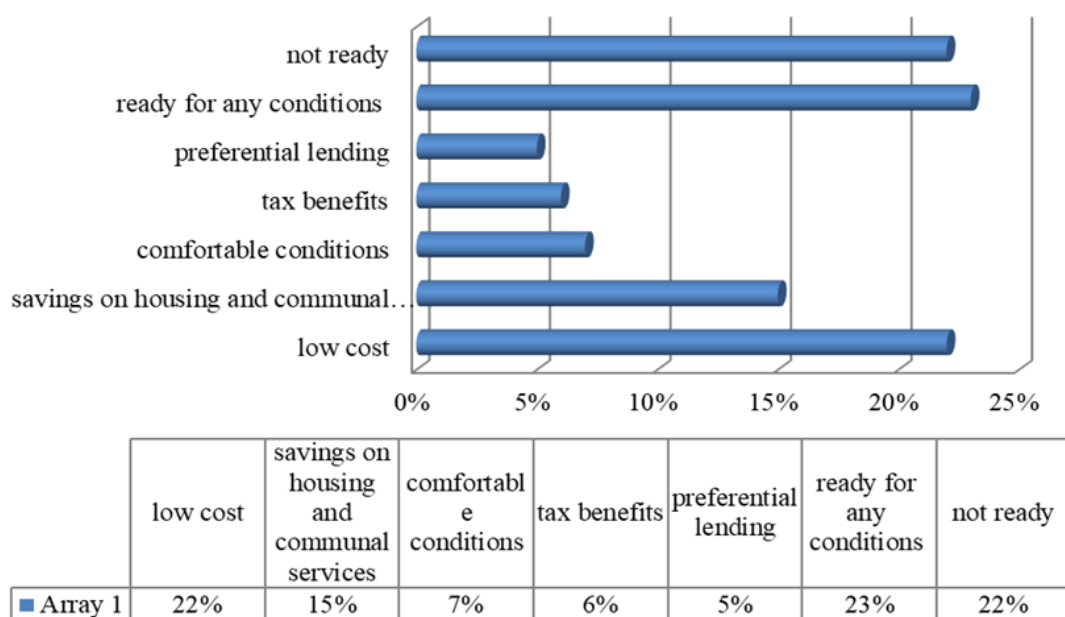


Fig. 7. Conditions for choosing eco-houses.

When making this or that choice, many do not consider the investment attractiveness of eco-friendly houses, since investments in energy efficiency bring economic benefits. For example, in the Leningrad region, the company ROCKWOOL Russia, which produces insulation products based on stone wool, insulated hot water pipes in the attic of the apartment building and recouped its capital investment in 1.5 years.

The analysis of the main domestic green standards made it possible to highlight their distinctive features (Table 2).

Table 2. Characteristics of the green standards in Russia.

Name	Characteristics	Features
Olympic green standard	The developer is GK Olimpstroy, certified twelve Olympic venues in Sochi in 2010. Represents rating system based on the LEED system.	Includes six groups of criteria, the assessment parameters of which are divided into mandatory and recommended. A significant difference is the presence of unique aspects (energy efficiency of facades, the use of the best building technologies, noise protection measures, etc.)
Standards of organizations NOSSTROY 2.35.4–2011 Residential and public buildings. Rating system for assessing the sustainability of the environment	Developed by Non-Commercial Partnership of ABOK in accordance with international standards, it introduces the concept of sustainable environment and establishes a rating system for its assessment. A list and methodology for assessing categories is provided. Introduces a system of regional correction coefficients. Designed for the conditions of Moscow and the Moscow region.	In addition to the list of criteria and points, it contains a methodology for assessing equivalents of parameters, sources and methods for obtaining initial data, as well as links to relevant regulations.

Continuation of Table 2

Standards of organizations NOSSTROY 2.35.68–2012	Developed on the basis of Standards of organizations NOSTROY 2.35.4–2011 to consider regional characteristics.	Categories and assessment criteria are divided into dependent and independent of regional characteristics. Includes regional adjustment factors from Standards of organizations NOSTROY 2.35.4–2011
GOST R 54964–2012 Conformity assessment. Environmental requirements for real estate. Characteristics of Russian greens	Developed by the Federal Agency for Technical Regulation and Metrology in 2013.	The document's requirements are presented in nine categories and the criteria that define them. The assessment of the eco-sustainability of the building is carried out by comparing project indicators with standard values. Contains a wider set of criteria than Standards of organisations NOSTROY 2.35.4–2011, but does not consider regional characteristics.
GOST R Standard for green building of multi-apartment residential buildings	Developed by JSC DOM.RF, approved by order of the Federal Agency for Technical Regulation and Metrology dated 09.09. 2022 No. 900-st.	Introduces the concept of the green multi-apartment residential building, 10 green assessment criteria covering the entire life cycle of the building project, and a methodology for assigning a rating value of “satisfactory”, “good”, “excellent”.
GOST R 58875-2020 Greenable and maintained roofs of buildings and structures	Developed by the REC Center of MGSU, Ilya Mochalov and Partners LLC, and the National Roofing Union. Approved by order of the Federal Agency for Technical Regulation and Metrology dated 28.05.2020 No. 245-st.	Introduces the concept of the green roof, environmental and technical requirements for it, but does not contain criteria for its rating purposes.

A more detailed analysis of domestic standards showed that the current regulatory documents are insufficient to meet the criteria for assessing green standards. The main reason is that developers receive all technical specifications according to SNiPs, that is, indicating average, and not potential, thermal and energy efficiency indicators of buildings, which is reflected in stimulating innovative technologies. There is no unified methodological basis for the integrated approach to the design of the sustainable environment, the architecture and engineering networks as a single organism. For some assessment criteria (for example, Standards of organizations NOSSTROY 2.35.4–2011 (Quality of the architectural appearance of the building)), there is no regulatory framework at all, which complicates the system of verification of the building's compliance with the declared standard. In this regard, the government of the Russian Federation at the current stage of development has to solve two main tasks – introduce green technologies and develop a regulatory framework for the full ESG transformation of the domestic building industry.

The development of the regulatory framework in the field of green building is the basis for the movement of Russian building companies towards sustainable development, considering all ESG factors.

Despite the clear advantage of green buildings, the practice shows that their promotion in the market is focused mainly on the supply side. The market demand for houses made of environmentally friendly materials still remains low. Green building has so far become more widely used only in

Moscow and St. Petersburg, because large, international companies, that are focused on compliance with environmental norms and standards, are concentrated in these cities. At the same time, green building is aimed at reducing heat and energy costs and at increasing the standard of living of the population. Therefore, this direction requires active inclusion in the ESG transformation both on the part of building organizations and the population, the state – the main stimulating mechanism for the country’s sustainable development. In studying the reasons hindering green building, it was revealed that most authors [15-18] associate them with the lack of:

- Interest in new technologies due to high cost and lack of profitability;
- Development incentives for organizations from the state;
- Common understanding of the principles of green building;
- Green technologies in projects undergoing state examination to provide preferential financing conditions.

From the point of view of developing incentives on the part of building companies and consumers of green building, the approaches to its development are of interest in the world practice. One of the identified areas is development of mandatory minimum standards for green private building. For example, Singapore launched the BCA Green Mark program in 2005, which established green building standards and became the basis of the first green building plan (Singapore Green Building Masterplan). The voluntary certification system for green building projects provided for four rating levels from Platinum to Certified in descending order [19]. At the same time, national standards and certificates were adapted to local climatic and other conditions. As a result, by 2021, 100 thousand buildings in the country were certified. In 2021, the Green Plan 2030 was launched, which aims to increase the proportion of green buildings and reduce energy consumption by 80% in Singapore by 2030. To be fair, it should be noted that to implement this approach in Russia, the state must first solve the problem of import substitution of green building materials and technologies, access to which has been significantly difficult in recent years. As a result, their cost has increased significantly, which cannot serve as a stimulating factor either for building companies or for consumers of green objects.

Another approach to the effective green buildings market is associated with the useful strategy of “strict supervision and minor fines” [20]. In their study, the authors apply maturity theory, which is based on the assumption that consumers continue to trust the quality of green building from developers, and the synergy between government, developers and consumers collectively contributes to the maturity of the green building market. Some authors [21] highlight poor geographical location, limitations of the rating system, huge financial consequences, inadequate market conditions and policies as limiting factors for green building. With regard to stimulating demand for green building projects, studies by individual authors have shown that economic opportunities, environmental morality motivation and socio-psychological motivation have a significant impact on the intention to buy residential green buildings [22, 23]. The authors also emphasize the importance of such types of incentives as environmental education, government subsidies and preferential lending for green building projects. Government interest in expanding green building may create green building alliances in the industry [24].

Global and domestic practice uses two green financing instruments: green bonds (for financing projects with positive environmental and climate effects) and greenloans (for preferential lending for projects with significant environmental effects). One of the main lenders for green building in Russia is the universal mortgage and building Bank Dom.RF, which offers lending programs for development projects in 39 constituent entities of the Russian Federation. 2.6 billion rubles have been allocated for the implementation of this program. The goal of the program is to stimulate green building by reducing the financial risks of developers and the limited financial risks of building projects. In November 2022, Dom.RF together with the Ministry of Building of the Russian Federation developed a green standard for apartment buildings (GOST R 70346-2022). Within the framework of this standard, the main assessment criterion is a high energy efficiency class, which leads to the minimization of heat and energy costs.

Tax incentives also provide incentives for the development of green building in our country. However, they are provided only in terms of improving energy efficiency and only for two taxes: property tax and income tax (Fig. 8).

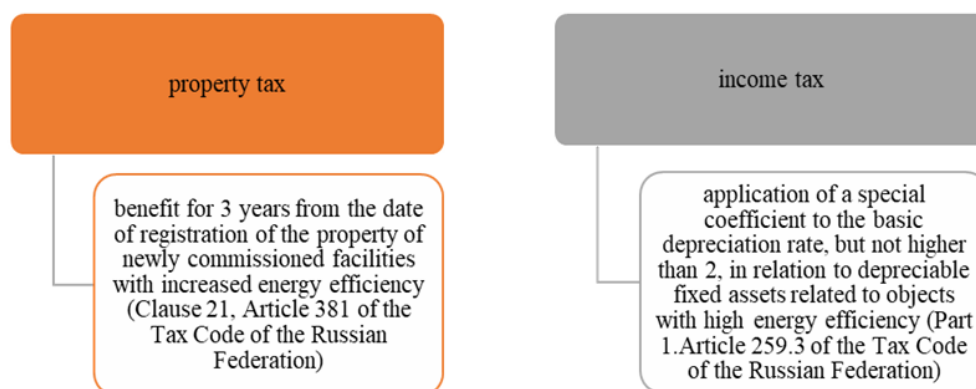


Fig. 8. Tax incentives that stimulate the development of green building in Russia.

The focus on achieving sustainable development goals poses a number of tasks for the building industry and state, the solution of which will significantly expand the scale of green building in Russia:

- Eliminate contradictions in legislative documents and bring consistency to the regulatory framework and green standards;
- Bring into compliance with the assessment criteria of green standards and assessment methods;
- Develop software training for expert appraisers in Russia;
- Study foreign rating systems that have gained positive experience and adapt them for domestic building companies, considering Russian characteristics (climate, mentality, economy, design and building features);
- Apply a more expanded list of assessment criteria, adding such indicators as health, environmental safety, transport features, etc.;
- Increase the application of green standards: introduce requirements for different types of buildings into GOST R 54964–2012, and for industrial buildings into NOSTROY 2.35.4–2011;
- Do not allow the architectural design of very dangerous objects and industries with harmful emissions that harm the water, air, and soil environment;
- Do not allow the design of cities, industrial facilities, production and storage areas that are not aesthetically unattractive;
- Solve the problem of “hunger” of specialists in the field of green design, green building and green assessment by expanding educational programs in the field of ecology;
- Introduce environmental education of the population in the field of moral, technogenic, environmental ethics;
- Develop traditions of environmental loyalty, law-abidingness in compliance with legislative norms in the field of green building;
- Explain the principles and prospects of green building in Russia.

Updating the system of green standards and norms is a relevant area of influence on the thinking of society to formulate rules in the field of green building and, as a result, achieve sustainable development, environmental well-being, and economic well-being of the Russian population.

4. CONCLUSIONS

Interest in the principles of sustainable development of our country led to the development of green building. A cost-effective solution of green building in building and operation of both residential buildings and infrastructure and commercial real estate using eco-technologies. Innovations in the field of green building are an effective tool for preserving the environment and for increasing competitiveness and sustainable development of Russia. The use of green technologies, standards and approaches reduces the negative impact on the environment. The target indicators for green facilities are: creating maximum comfort in residential buildings and/or operated premises; minimal impact of green objects on the environment throughout the entire operating period; minimal costs for maintaining green facilities [25].

Increasing the number of specialists in the field of green building is one of the most important tools for stimulating its development. Therefore, having clear advantages for investors and property owners, the new environmental direction in building expands the range of educational programs of specialized educational institutions at all levels.

The development of green building is impossible without the support of the state, which must expand support and apply preferential investment and lending conditions for all participants in the building market.

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