

# Development of “Green” Building Standards in the Context of Global ESG-transformation

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## ABSTRACT

New trends in environmental development are focused on decarbonisation and carbon footprint reduction, reflected in national strategies and roadmaps for achieving carbon neutrality in the long term. Under these conditions, for large joint-stock companies, there is a reorientation to the ESG principles, declaring the commitment of the company's management to the “trilemma” of sustainable development. Increasingly important is the development of environmental requirements for construction projects and real estate at all stages of the life cycle, including operation, demolition and disposal of construction waste. The article discusses the key systems for certification of real estate objects according to “green” standards, as well as promising tools for their provision, which are under development.

**Keywords:** *Ecology, Green building standards, Green instruments, Environmental certificates, ESG principles, Sustainable development.*

## 1. INTRODUCTION

In December 2019, the EU adopted a large-scale environmental development strategy based on the European Green Deal roadmap, which declared the Green Deal measures, the goal of which is to achieve climate neutrality by 2050, with the “intermediate” benchmarks on the way to which will be reduction in 2030. CO<sub>2</sub> emissions by 55 % against the 1990 level and an increase in the share of renewable energy sources in the energy balance of countries to 38–40 % (in electricity – up to 65 %) [1]. In parallel with the EU, practical steps are being taken by the countries of Asia and North America. So, in September 2020, China declared carbon neutrality by 2060, and from February 1, 2021, the country introduced a national emissions trading system [2, 3]. In October 2020, Japan and South Korea made statements on achieving carbon neutrality by 2050 [4]. In October 2021, the United States signed the Paris Agreement on Climate Change, reaffirming its commitment to the environmental course of development of the industrial and energy sectors of the economy [5]. Russia signed the Paris Agreement in October 2019 [6]. At the same time, the first foresight to achieve carbon neutrality by 2060 was the Strategy for the Socio-Economic Development of Russia with a Low Level of Greenhouse Gas Emissions until 2050 [7].

Scientists and experts consider carbon neutrality as a set of actions aimed at reducing the carbon footprint at all stages of the product life cycle. At the same time, an important object of negative impact on the global environment is the property of industrial, residential, administrative and other purposes.

In the world practice, there is an active development of the markets of “green” certificates, received for erected and operated after reconstruction real estate objects for various purposes. In addition to national systems, international systems are becoming more widespread, the first prototypes of which were developed in the 90s, including: British BREEAM, American LEED, German DGNB. Also, new American WELL and Fitwel systems are being developed on the market, focused primarily on creating the best conditions for a comfortable and healthy living environment. The mainstream of green building is driven by the fact that the construction industry accounts for about 40 % of total direct and indirect CO<sub>2</sub> emissions. Green building (also green building, green building, eco-development) is a type of construction and operation of buildings, the impact of which on the environment is minimal. Its goal is to reduce the consumption of energy and material resources throughout the entire life cycle of a building: from the selection of a site for design, construction, operation, repair and demolition. Another goal of green

building is to maintain or improve the quality of buildings and the comfort of their internal environment. This practice expands and complements classical building design in terms of economy, utility, durability and comfort.

The object of the research is the market of “green” tools in construction.

The subject of the research is to ensure sustainable development of the construction industry, taking into account ESG principles.

The aim of the study is to identify trends in the development of “green” standards in international construction practice.

To achieve this goal during the study, the following tasks were set and solved:

- the analysis of the market for “green” building standards was carried out and their comparative characteristics were presented;
- international environmental foresights have been determined, which determine the requirements for the environmental friendliness of real estate objects for various purposes;
- presented the concept of creating "green" financial instruments in construction, ensuring the progressive development of the market for environmental certification and increasing the activity of economic entities in the implementation of the principles of sustainable development.

**2. LITERATURE REVIEW**

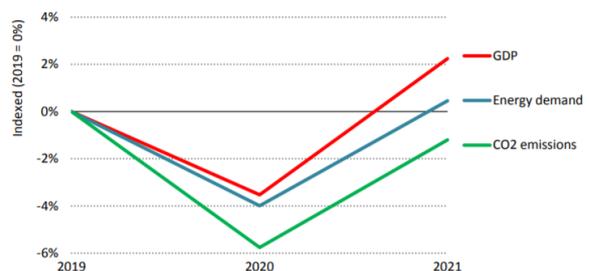
Publications and analytical reviews of the International Energy Agency (IEA), reference and normative literature of the portal of the European Union – Central Asia: Cooperation in the Field of Water Resources, Environment and Climate Change (WECOOP) were considered as an information base for the study of sustainable development and decarbonization. [8, 9]. Also, the most important resources that became the basis for the consolidation of information on the subject area of the research: the United States Green Building Council (USGBC); German Council for Sustainable Building (DGNB); Green Business Certification Institute (GBCI); publications of professional portals BuildingGreen, SALUS Global; national expert organizations NP “AVOK”, Russian Council for Green Building (RuGBC) [10–16].

International environmental foresights defining requirements for environmental real estate objects for various purposes are determined on the basis of information from intergovernmental organizations and national ministries for energy and environmental management.

The concept of creating “green” financial instruments in construction is based on information from the international organization ISO, open data Dom.RF, reference and methodological materials from VEB RF (methodology, verifiers and issues, knowledge base), publications of the European Bank for Reconstruction and Development (EBRD), Program data UN Environment (UNEP), the Expert and Analytical Platform “Infrastructure and Finance for Sustainable Development”, as well as the results of the development by the author as part of the working group of developers of the draft national standard “Green” standards. “Financing construction activities for sustainable development. Framework and principles» [17–26].

**3. METHODOLOGY**

The general trend in the development of the energy and construction industries indicates an increase in demand for energy resources that ensure the functioning of buildings and structures, which is due to improved access to energy resources in developing countries and the construction of new facilities around the world until 2020 [27]. During the 2020 pandemic, global energy consumption fell by 4 %, the largest decline in absolute terms on record [28]. This fact is due to the introduced lockdowns, which affected productivity in almost all industries and reduced transport activity. At the same time, according to international estimates, energy consumption is projected to grow by 4.6 % in 2021 compared to the previous year [28]. This assumption is not characterized by a high probability, due to the unpredictability of the spread of the incidence of Covid-19. In any scenario analysis, an increase in energy consumption is an inevitable event, the consequence of which is an increase in CO2 emissions [27] (Figure 1).



**Figure 1** Trends in global GDP, total primary energy demand and CO2 emissions compared to 2019. [27]

Oil demand is expected to grow 6 % faster than all other fuels in 2021, according to the IEA. An obvious compromise could be an increase in the energy balance of non-fossil fuels, the development of energy efficient, including best available technologies (BAT), as well as tools for capturing and utilizing CO2. All these aspects are reflected in the modern “green” building standards.

In the course of solving the tasks, the following general scientific research methods were used:

- empirical methods (description and comparison) in accordance with the level of scientific knowledge. These methods made it possible to present a comparative characterization of “green” building standards;
- methods used at the theoretical level of research (analysis and synthesis, induction and deduction). The application of these scientific methods was reflected in the development of the concept of creating “green” financial instruments in construction.

**4. RESULT**

When performing pre-design and design preparation, carrying out construction work on buildings, structures and other objects that have a direct or indirect impact on the environment, as well as during their operation,

conservation and liquidation, environmental safety requirements must be observed, measures for environmental protection, rational use and reproduction of natural resources, improvement of the environment.

In this case, the observed requirements are the minimum necessary. Modern concepts of “green” construction imply an excess of values for the energy and environmental characteristics of buildings over the normative values.

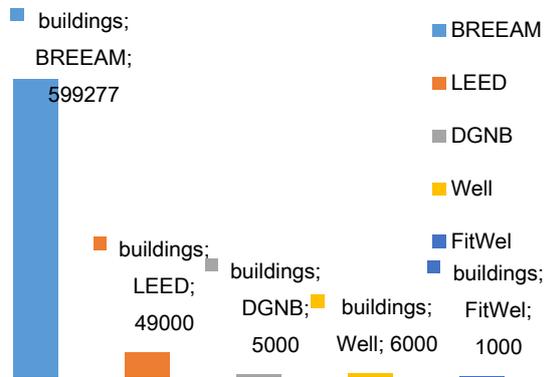
All working international standards have a number of fundamental differences, which are associated, first of all, with different priorities in the assessment.

Based on the official data of relevant certification organizations, a table has been compiled that allows us to give a comparative description of “green” building standards according to different comparison criteria. (Table 1) [10–14].

**Table 1.** Short cut keys for the template

Characteristic	Name of standards				
	BREEAM	LEED	DGNB	WELL	FitWel
Year of foundation	1990	1998	2009	2014	2020
Assessment categories	1 Energy 2 Health and wellness 3 Innovation 4 Land use 5 Materials (edit) 6 Management 7 Pollution 8 Transport 9 Waste 10 Water	1 Integrative process 2 Location and transport accessibility 3 Sustainable objects 4 Water use efficiency 5 Energy and atmosphere 6 Materials and resources 7 Indoor environmental quality 8 Integrative process 9 Regional priorities	1 Quality of the environment 2 Economic efficiency 3 Social, cultural and functional qualities 4 Technical equipment 5 The quality of the design and construction process 6 The quality of the location	1 Air; 2 Water; 3 Nutrition; 4 Lighting; 5 Physical activity; 6 Thermal comfort; 7 Noise control; 8 Materials; 9 Mental health; 10 Community; 11 Innovations	1 Increased physical activity 2 Labor protection 3 Reduction of morbidity and absenteeism 4 Supporting social equality for vulnerable groups of the population 5 Create a sense of well-being 6 Impact on community health 7 Expanding access to healthy food
National features	Separate for UK; separate for Europe; separate for Denmark; International; Individual; separate for the manufacturer Toyota; separate for the Gulf countries	Single Overall LEED USGBC Strategy	International GSBC system (DGNB); Separate for Germany; Individual	-	-
Certification levels	Pass Good Very good Excellent	Certified Silver Gold Platinum	Bronze Silver Gold Platinum	Silver Gold Platinum	* ** ***

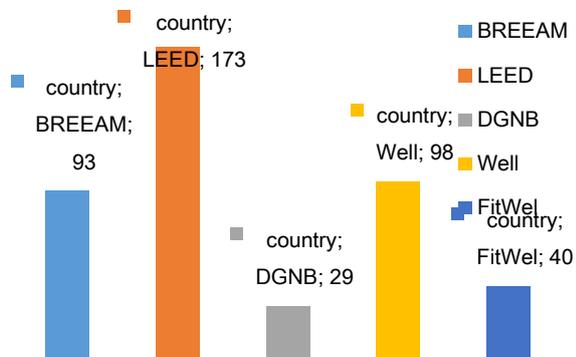
Based on the analysis of data from expert organizations that develop “green” standards, statistics on the coverage of buildings that have a “green” certificate have been consolidated (Figure 2).



**Figure 2** The number of buildings certified. according to “green” standards.

According to the data presented, the BREEAM system has the largest coverage, based on Eurocodes, British standards and local regulations. This is due both to the dating of the earliest start of the issuance of certificates, and to a more scientific system of assessment criteria, aimed primarily at the environmental parameters of the building, in contrast to the closest follower of LEED. This aspect allows us to determine the high compatibility of the BREEAM system with the principles of ESG. Also, the advantage of this building rating system is the release of translated national systems, not only taking into account the characteristics of individual countries, but also facilitating the understanding of the assessment methodology and principles.

The study analyses statistics on the country distribution of “green” building certificates. The LEED system has received the greatest international coverage, despite the complexity of the assessment and the parametric specificity associated with basing on the American standards ASTM, ASHRAE.



**Figure 3** The number of countries covered by green certification.

In the context of the construction industry's orientation towards ESG principles, obtaining “green” certificates can become an important competitive advantage for a developer. A gradual rethinking of approaches to the implementation of construction projects affects the growth of potential customers' interest in certification of new real estate objects. At the same time, the main unresolved issue is the creation of financial instruments for the implementation of “green” projects.

In the course of research carried out as part of the development of the national standard “Green” standards. Financing construction activities for sustainable development. Framework and principles”, identified the key factors that determine the financing of green projects are:

- economic;
- social;
- image.

Sustainable financing must be ensured through the following components:

- Regulation. The regulatory function at the interstate level should be performed by an interdepartmental international committee, at the national level by the Bank of Russia and VEB, at the organizational level by the executive director or the board of directors (in a joint-stock company), as well as authorized verifiers.

- Work with personnel. Establishing principles of sustainable development through corporate social responsibility.

- Identification and involvement of stakeholders. The principle of involvement in relation to the social, economic or environmental aspects of sustainable development of the organization. In practice, this means: a) identifying the key stakeholders of the organization or enterprise; b) interaction and dialogue with these stakeholders or with their representatives. Some typical questions that can be used to judge the application of this principle in the organization (taking into account the three main aspects of sustainable development): 1) social: personnel policy and practice; development of assessment systems; setting goals for teams and / or individuals within the organization; interaction with the community; 2) economic: setting economic goals and key performance indicators; development of financial reporting systems; socially oriented investment; 3) environmental: definition of environmental policy; development of environmental procedures; setting environmental targets and key performance indicators; environmental reporting; procurement policies and procedures [15].

- Setting sustainable priorities. Determination of the compliance of construction activities with the

Sustainable Development Goals (SDGs) and consideration of priorities in the organization's strategy. For example, “the basic principles and priority directions of the state policy in the field of waste management” [15].

- Measurement of assessment parameters. Taxonomy is applied [15].

## 5. DISCUSSION

Russia is preparing to launch a system for financing green projects and initiatives in the field of sustainable development. Funding will come from green or adaptive financial instruments (special bonds or loans). With their help, businesses will be able to attract extra-budgetary funds on favorable terms. Green projects must comply with the goals of international instruments in the field of climate and sustainable development. Such requirements are not imposed on adaptation projects, but they should not contradict Russian priorities in the field of ecology.

Priorities include reducing CO<sub>2</sub> emissions, increasing resource efficiency, and saving energy. “Green” financial instruments will be directed primarily to construction, industry, waste management, transport, agriculture, water supply and sanitation. A continuation of this work at the state level will be the development of criteria for the selection of green projects and a mechanism for their verification. The prerequisites for these questions were indicated by DOM.RF, which defined the first methodological documents. Developers of the national standard “Green” standards. “Financing construction activities for sustainable development. Framework and principles”, it is proposed to designate VEB.RF as the Competence Center, which makes a decision on the inclusion of independent legal entities - applicants in the list of verifiers based on the results of the analysis of the documents provided by them, confirming:

- a. Compliance of the verification methodology with the best international and Russian practices.
- b. The effectiveness of business processes related to verification.
- c. The presence of the necessary organizational structure, internal approved rules and processes (policies).
- d. Sufficient experience in conducting independent evaluations and providing professional judgment.
- e. Sufficient qualifications of experts (on staff or freelance, contracted) required for verification.
- f. Positive business reputation.

The procedure for selecting verifiers with detailed requirements for them is developed by the VEB.RF

Competence Center and approved in accordance with the established procedure.

If the Verifier detects violations of the requirements of the Methodological Recommendations, the VEB.RF Competence Center has the right to issue a warning to the Verifier, and in case of repeated violations, it may decide to exclude it from the list of verifiers.

The VEB.RF Competence Center maintains an up-to-date list of verifiers.

## 6. CONCLUSION

The main idea behind the construction of green buildings is to increase the sustainability of the living environment, which is achieved by reducing the overall impact of buildings on the environment and human health. Key aspects of green building are:

- environmental management;
- infrastructure and quality of the external environment;
- quality of architecture and layout of the facility;
- comfort and ecology of the internal environment;
- the quality of sanitary protection and waste disposal;
- rational water use and regulation of storm drains;
- energy saving and energy efficiency;
- environmental protection during the construction, operation and disposal of the facility;
- life safety.

Of great importance is the formation and rotation of effective financial instruments capable of ensuring the development of the construction of “green” buildings, the use of “ecological” materials and technologies in construction, energy-efficient equipment in the process of construction and operation of facilities.

Ensuring the compliance of construction activities with the SDGs determines the need to create effective ESG transformation tools for the Russian economy.

It is important to take into account the basic aspects and principles of the functioning of financial institutions, which allow integrating the concept of environmentally responsible financing into the existing infrastructure for the implementation of green projects.

Nowadays, green tools are the most important attribute in the development of ESG principles. In view of this, many economically developed countries are working on national and international standards in this area [14–17]. One of the first international standards was the ISO 14030 series:

- ISO 14030-1 Environmental Performance Assessment – Green Debt Instruments – Part 1: Process for Green Bonds [14];
- ISO 14030-2 Environmental Performance Assessment – Green Debt Instruments – Part 2: Green Lending Process [15];
- ISO 14030-3 Environmental Performance Assessment – Green Debt Instruments – Part 3: Taxonomy (under development) [16];
- ISO 14030-4, Environmental Performance Assessment – Green Debt Instruments – Part 4: Review Program Requirements [17].

The draft Russian standard for “green” financial instruments, developed by the working group of NRU MGSU under a contract with the Scientific and Educational Center “Environmental Safety, Green Standards and Technologies” (REC “Green Standards”) is under consideration by the Technical Committee for Standardization “Green Technologies of the living environment and “green” innovative products” (TC 366) and is planned for approval in 2022. It is also important to take into account the fact that in 2023 Russia is introducing obligations to declare CO2 emissions, which determined the activation of the largest developers of the construction market in terms of energy management and the development of strategies to reduce the carbon footprint through the certification of real estate construction projects.

## REFERENCES

- [1] An official website of the European Union. Factsheets on the European Green Deal URL: [https://ec.europa.eu/info/publications/factsheets-european-green-deal\\_en](https://ec.europa.eu/info/publications/factsheets-european-green-deal_en).
- [2] Aljazeera Net zero by 2060: China's bold new carbon emissions goal URL: <https://www.aljazeera.com/economy/2020/9/23/net-zero-by-2060-thats-chinas-bold-new-carbon-emissions-goal>.
- [3] Department of Multilateral Economic Cooperation of the Ministry of Economic Development of Russia. Greenhouse Gas Trading Systems in the Asia-Pacific Region. URL: [https://economy.gov.ru/material/file/d8d7071b90d7af3818ec3a836355244f/ETS\\_ATR.pdf](https://economy.gov.ru/material/file/d8d7071b90d7af3818ec3a836355244f/ETS_ATR.pdf).
- [4] SDG KNOWLEDGE HUB. Japan, Republic of Korea Pledge to Go Carbon-neutral by 2050. URL: [https://sdg.iisd.org/news/japan-republic-of-korea-pledge-to-go-carbon-neutral-by-2050/ ...](https://sdg.iisd.org/news/japan-republic-of-korea-pledge-to-go-carbon-neutral-by-2050/)
- [5] Support the Guardian. US makes official return to Paris climate pact. URL: <https://www.theguardian.com/environment/2021/feb/19/us-official-return-paris-climate-pact>.
- [6] Government of Russia. On Russia's participation in the Paris Climate Agreement URL: <http://government.ru/docs/37917/>.
- [7] Strategies for the long-term development of the Russian Federation with low greenhouse gas emissions until 2050. Approved. Government decree No. 2344-r dated 03.11.2016 URL: [https://economy.gov.ru/material/news/minekonmr\\_azvitiya\\_rossii\\_podgotovilo\\_proekt\\_strategii\\_dolgo\\_srochnogo\\_razvitiya\\_rossii\\_s\\_nizkim\\_urovнем\\_aro\\_vbrosov\\_pidogo.html](https://economy.gov.ru/material/news/minekonmr_azvitiya_rossii_podgotovilo_proekt_strategii_dolgo_srochnogo_razvitiya_rossii_s_nizkim_urovнем_aro_vbrosov_pidogo.html).
- [8] International Energy Agency: IEA. URL: <https://www.iea.org/analysis>.
- [9] WECCOOP. Introduction to the Green Deal for Europe. 2021 33 s.
- [10] U.S. Green Building Council. URL: <https://www.usgbc.org/>.
- [11] German Sustainable Building Council: DGNB. URL: <https://www.dgnb.de/en/index.php>.
- [12] Green Business Certification. URL: [Inc. https://gbci.org/](https://gbci.org/).
- [13] BuildingGreen. URL: <https://www.buildinggreen.com/>.
- [14] Salus Global. URL: <https://www.salusglobal.com/>
- [15] Orlov A.K., Kanhva V.S., Uvarova S.S., Meshcheryakova T.S., “ENERGY EFFICIENT BUILDINGS. TECHNOLOGIES. Financing sustainable construction. Basic national green standards,” ENERGY SAVING №8'2021.
- [16] Green Building Council. URL: <https://www.rugbc.org/>.
- [17] ISO 14030-1: 2021. Environmental performance evaluation – Green debt instruments – Part 1: Process for green bonds. URL: <https://www.iso.org/standard/43254.html>.
- [18] ISO 14030-2: 2021. Environmental performance evaluation – Green debt instruments – Part 2: Process for green loans / URL: <https://www.iso.org/standard/75558.html>.
- [19] ISO / DIS 14030-3.2. Environmental performance evaluation – Green debt instruments – Part 3: Taxonomy URL: <https://www.iso.org/standard/75559.html>.
- [20] ISO 14030-4: 2021. Environmental performance evaluation – Green debt instruments – Part 4: Verification program requirements URL: <https://www.iso.org/standard/76598.html>.

- [21] DOM.RF. “Green” standards will allow the issuance of preferential mortgages for their respective houses. URL: <https://dom.rf/media/smi/zelenye-standarty-pozvolyat-vydavat-lgotnyu-ipoteku-na-sootvetstvuyushchie-im-doma/>.
- [22] VEB RF. Green financing. URL: <https://veb.ru/ustojchivoe-razvitie/zeljonoefinansirovanie/>.
- [23] EBRD. Implementation of the EBRD Green Economy Transition Concept. Technical Guide for Consultants: Reporting on Green Economy Transition Projects, 2018. 42 p.
- [24] United Nations Environment Program (UNEP). URL: <https://www.unep.org>  
<https://www.unep.org/rug/ru>.
- [25] Green Bonds for Green Business <https://eabr.org/press/news/zelenye-bondy-dlya-zelenogo-biznesa/>.
- [26] Expert and analytical platform “Infrastructure and finance for sustainable development”. URL: <https://infragreen.ru/>.
- [27] IEA. Buildings. A source of enormous untapped efficiency potential URL: <https://www.iea.org/topics/buildings>.
- [28] Global Energy Review 2021 Energy demand Assessing the effects of economic recoveries on global energy demand and CO2 emissions in 2021. URL: <https://www.iea.org/reports/global-energy-review-2021>