

## Environmental Investment-Construction Projects: Global Practices in Financing

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### Abstract

The recognition of the paramount importance of the environment for the survival of humanity impels states to engage in the management of nature conservation processes and sustainable development. Global practice in combating the adverse effects of climate change entails the mandatory involvement of states and the engagement of the private sector. Research on global practices in "green" financing has revealed that the most common approach is a mixed financing model, incorporating "green" financing (funds, certificates, carbon units' sales), financial market resources, as well as contributions from the private and public sectors. Direct financing of projects aimed at reducing greenhouse gas emissions is one of the state's roles. This can be accomplished through the allocation of public funds or the establishment of special funds for financing such projects. The state can also ensure favorable investment climate for "green" projects. Additionally, it may be involved in developing and implementing standards and methodologies for the projects' assessment and certification, as well as establishing a system for the registration and accounting of carbon units.

Based on a review of foreign PPPs' models in the field of climate projects, the article suggests ways and prospects for changing their structure to finance and implement them. The driving force of the financial ecosystem of environmental projects is the development of financial technologies, which has significantly increased the efficiency of funding and ensured the involvement of citizens in decision-making. Mostly we are talking about accelerating the initiation of the launch of climate projects and raising funds for their implementation from a larger number of motivated investors based on public trade in carbon certificates.

**Keywords:** Environmental Projects, Financing Mechanisms, Green Bonds, Public-Private Partnerships, Carbon Units.

## Introduction

One of the ways to preserve the environment is through capital-intensive "green" and "climate" projects. Direct and indirect state involvement is necessary to enhance the appeal of such projects. Public-private partnership (PPP) is one of the possible forms of such interaction. Cooperation models within public-private partnerships vary depending on the type of "green" project and the development of the financial system.

We have conducted a thorough analysis of PPP models used in the implementation of "green" projects varying from direct agreement forms to schemes involving indirect state participation in boosting the financial ecosystem. The global experience of the stakeholders involved in financing "green" projects has been examined (Sternik & Semenov, 2023; Tavana, Nasr, Mina & Michnik, 2022).

Our analysis of global practices indicates that within public-private partnerships, there is a wide variety of financing instruments being used, including "green" bonds and "green" certificates. Therefore, in addition to the traditional format of public-private partnerships, we have also examined other related sources of "green" projects' financing.

## Theoretical Framework

Climate scientists have developed the concept of planetary boundaries. The latest large-scale study of the state of the planet has shown that six of the nine borders have been breached and the Earth is now far beyond the safe working space for humanity (Richardson, 2023). These include biogeochemical changes (disturbances in the phosphorus and nitrogen content on the planet), loss of biodiversity, climate change, the problem with global freshwater consumption, overexploitation of land use (deforestation) and chemical pollution. But three planetary boundaries are still in relative equilibrium: ocean acidification, atmospheric aerosol loading, and ozone depletion. At the same time, studies have shown that an additional or more extensive disturbance of one planetary boundary can change the risk gradients for other boundaries. For example, there is increasing evidence that a disruption of the planetary boundary, related either to climate change or

to the integrity of the biosphere, could potentially lead to a more dramatic risk aggravation in another area.

Understanding the exceptional importance of the state of the environment for the survival of mankind pushes governments to struggle for the management of the processes of nature protection and sustainable development. The global practice of combating the negative effects of climate change provides for the mandatory participation of the state and the involvement of the private sector.

Given the purpose of this study, our attention is focused on the analysis of public-private partnership models used in the implementation of "green" projects – from the direct form of agreements to schemes of indirect state participation. Based on the purpose of this study, our attention is focused on the analysis of public-private partnership models used in the implementation of "green" projects – from the direct form of agreements to schemes of indirect state participation to induce the boosting of the financial ecosystem.

The institution of public-private partnership and sustainable development are inextricably linked, their relationship is complex. On the one hand, public-private initiatives are valuable tools for creating infrastructure by attracting private capital to projects, on the other hand, they contribute to stimulating an environmentally friendly life cycle, in which government agencies, infrastructure creators and investors work together to meet the needs of society. Despite the increasing recognition that public-private partnerships play a significant role in sustainable development, there remains a lack of clarity in the literature regarding the relationship between PPP knowledge and sustainability (Castelblanco & Guevara, 2022).

The National Council on Public-Private Partnerships (USA) defines a public-private partnership as a contractual understanding between a government agency (federal, regional or local levels) and a private sector entity. In this partnership agreement, the skills, and assets of each of the sectors (public and private) are used together to provide services or facilities to the general public.

Governments and public organizations use PPPs to achieve

state policy objectives (i.e., risk sharing, better service, lower costs, increase revenue, and stimulate innovation) by sharing or transferring risks and responsibilities to private partners.

Hereby, we will introduce the results of a review of the global practice in financing public-private partnerships in the field of struggle against environmental changes.

## Methods

The research methods are based on a systematic approach, combining general scientific and special methods, including methods of abstraction, concretization, generalization, systematization, classification, comparison, formalization, content analysis, statistical analysis, investment analysis, and expert assessment.

The data base of this study was legislative and regulatory acts, scientific papers by Russian and foreign authors devoted to the fundamental provisions of financial management in the field of PPP projects financing with consideration to scientific notions on the peculiarities of environmental projects' financing. The empirical data of the study are ROSINFRA statistical materials on PPP projects implemented from 2019 to 2023, information on environmental projects that are listed in the Russian Register of Carbon Units, World Bank statistics on carbon units' prices in the global markets from 1990 to 2023, etc.

The assumptions and limitations of the study are due to the fact that the market for environmental investment and construction projects and the pricing model for carbon units in Russia are in an early stage of formation, as well as directly or indirectly under the influence of current economic restrictions, which complicates the immediate transfer of global practices to Russia and requires further differentiated research and justification by types of projects, industries, regions and participants.

## Results

“Green” bonds are a type of fixed income debt financing instrument that is specifically designed to raise funds for climate and environmental projects (Dauban, Mitali & Rochet, 2022).

There are four types of "green" bonds currently existing

(new types may appear with further market development):

1. A standard bond earmarked for the "green" use of proceeds: an unsecured debt obligation with full recourse solely to the issuer;
2. “Green” revenue bond: a debt obligation without recourse to the issuer, where the credit risk of the bond is secured by cash flows such as revenues, fees, taxes, etc., and the proceeds are directed towards related or unrelated "green" projects;
3. “Green” project bond: a project bond for one or several “green” projects in respect of which the investor is directly exposed to the risk of the project with or without potential recourse to the issuer;
4. Secured “green” bond: a secured bond, the net proceeds of which will be exclusively earmarked for financing or refinancing:
  - a specific tranche of a "green" project;
  - "green" projects of the issuer, where such "green" projects may or may not fully or partially secure a specific bond.

The study of China's practice in issuing "green" bonds indicates that the accumulated funds from their issuance significantly contribute to investments in renewable energy sources and reduce environmental pollution, while their reduction "stimulates" environmental harm. Similarly, the expansion of renewable energy consumption has considerably slowed down the environmental deterioration (Feng, Xiao, Zhou & Ni, 2023; Zhang, Tang, Liu, Jin & Zhou, 2023).

The evolving architecture of climate change adaptation financing is shifting towards competitive funding mechanisms, with some compliance with distribution principles (Garschagen & Doshi, 2022). Therefore, in the emerging architecture of fighting the climate change financing, it is necessary to make the selection procedures for "green" projects more transparent, ensuring that populations in countries with lower investment potential but the highest vulnerability are not left behind in the long term.

The study of financing practices for climate change mitigation measures in developing countries has shown that

global funds supporting "green" projects have prioritized factors such as high carbon dioxide emission intensity, a greater carbon absorption capacity, and a low per capita gross domestic product (GDP) under good governance (Halimanjaya, 2015).

The study of global practices in financing "green" projects has revealed that in many respects, it is incompatible with the prevailing commercial logic (demanding low risks, high returns, and short payback periods). This discord arises from the mismatch between the terms of commercial lending and venture developments in the field of renewable

energy sources, further diverging due to the inadequacy of the regulatory framework in meeting the new requirements of sustainable development and the preference for large-scale investments. Therefore, public-private partnership models should be prioritized as the financing scheme for "green" projects (Fleta-Asin & Muñoz, 2023; Othman & Khallaf, 2023).

Models of public-private partnerships differ in their composition and the dominant participant determining the development trend (Table 1).

**Table 1. Models of public-private partnerships illustrated by the example of countries with various climates:**

Country	Financial instruments	Financing models	Driving sector	PPP model
China	1. Preferential rates for RES. 2. Subsidizing the solar panels installation in buildings	1. Various schemes are used none of which is dominant.	1. State	Public-private partnership
USA	1. Preferential rates 2. Basic tariff extra payment to the supplier 3. Subsidy to the investor's capital 4. Green certificates 5. Income tax benefits 6. Subsidies to citizens for self-supply of RES 7. Subsidies to legal entities for RES network connection	1. Investor – third party 2. Lease financing 3. The community of solar energy consumers 4. Crowdfunding	1. Private sector 2. State	Public-private partnership
Spain	1. Subsidies to citizens for self-supply of RES 2. Subsidies to legal entities for RES network connection 3. Subsidizing the solar panels installation in buildings 4. Tax exemption	1. Investor – third party 2. The community of solar energy consumers 3. Crowdfunding	1. State 2. Individuals	Partnerships (cooperation) between stakeholders' communities.
Sweden	1. Basic tariff extra payment to the supplier 2. Subsidizing the charter capital 3. Green certificates 4. Income tax benefits 5. Subsidies to citizens for self-supply of RES 6. Subsidies to legal entities for RES network connection	1. Investor – third party 2. Lease financing 3. The community of solar energy consumers 4. Crowdfunding 5. Rent	1. State 2. Individuals	1. Public-private partnership. 2. Partnerships (cooperation) between stakeholders' communities

Source: compiled by the author based on data (Ruiz, Arboleda & Botero, 2016; Xue, Lindkvist & Temeljotov-Salaj, 2021)

As seen from Table 1, for example, in Sweden, the primary driving sector is the public sector, providing incentives in the form of preferential supplements, capital subsidies, green certificates, and income tax exemptions.

Summarizing the overview of foreign models of public-private partnerships in climate projects, it is important to note that the role of the state is diverse – ranging from direct financing to creating favorable conditions for project participants and corresponding infrastructure. However, business surveys highlight several issues hindering the development and monetization of environmental projects in Russia. (Calliari et al., 2022):

1. High cost of environmental projects;
2. Decrease in business profitability resulting in investment programs reduction;
3. Uncertainty regarding demand. Russian businesses lack understanding of whether Russian climate projects will be economically successful in the international market;
4. Non-recognition of the Russian verification system and the methodology used;
5. The issue of transboundary regulation of the carbon market with the EAEU countries;
6. Lack of regulatory requirements and constraints, as well as a fair carbon emission pricing mechanism, limiting the ability to conduct a comprehensive assessment of the economic efficiency and feasibility of such projects;
7. Lack of expertise and experience in implementing environmental projects and their monetization, which drives demand for methodological recommendations and advisory support in terms of project implementation, assessment, and promotion.

The driving force of the financial ecosystem for environmental projects is the development of financial technologies, which has significantly enhanced funding efficiency and has ensured the citizens' involvement in decision-making. Primarily, this concerns accelerating the initiation of environmental projects and fundraising for their implementation from a larger number of motivated

investors, including through the sale of carbon units, which is actively developing in Europe.

A carbon unit is a unit of measurement used to assess and account for greenhouse gas emissions, especially carbon dioxide (CO<sub>2</sub>). It provides a standardized way to measure and compare the impact of different projects or activities on climate change. The role of carbon units in project financing is linked to carbon credit market mechanisms. When a project or activity leads to a reduction in greenhouse gas emissions, a specific quantity of carbon units may be assigned to it, which can be sold on the market. Buyers of these carbon units may be interested in offsetting their own emissions or achieving goals related to reducing greenhouse gas emissions.

In Russia, the carbon unit market is still in the early stages of development. From 2019 to 2022, major Russian companies acquired approximately 700,000 carbon units. Experts highly appreciate Russia's potential in terms of environmental projects. According to their estimates, in the coming years, the volume of carbon units could reach between 1.5 and 10 million (GCI 4 Boards & Business Solutions and Technologies, 2022). Meanwhile, in 2020, the global volume of traded carbon units amounted to 188 million tons of CO<sub>2</sub> (Kalmatzky, 2022).

## Discussion

Research on global practices of "green" financing has revealed that the most widespread model is a mixed financing approach, incorporating "green" financing (funds, certificates, carbon credit sales), financial market resources, as well as contributions from the private and public sectors. Direct financing of projects aimed at reducing greenhouse gas emissions is one of the state's roles. This can be achieved through allocating public funds or establishing special funds for financing such projects. The state can also play a role in creating favorable investment climate for "green" projects. Additionally, the state may be involved in developing and implementing standards and methodologies for project assessment and certification, as well as creating a system for the registration and accounting of carbon units. Overall, state support and regulation play a crucial role in shaping the carbon units' market and stimulating "green" financing. They allow for

the development of innovative projects aimed at greenhouse gas emissions reduction and contribute to achieving global goals in fighting climate change.

## Conclusions

In international practice, a significant number of state programs are implemented, covering a wide range of environmental projects financing issues, which deserves attention in terms of the development of a national climate strategy. The state should be the main driver of climate initiatives, which effectiveness is largely determined by the success of joint initiatives with businesses, including public-private partnerships. Therefore, further scientific research on choice of methodological approaches to environmental projects' financing through PPP in the Russian Federation, especially in the face of new external challenges, is relevant.

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