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Financing "Green" Projects: Features, Risks and Tools

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ABSTRACT

The **subject** of the paper is the "green" projects of companies whose production activities are accompanied by a high level of anthropogenic emissions. The **purpose** of the paper is to study the features of analysis and practical application of the tools for financing "green" projects (hereinafter referred to as the tools). The **relevance** of the article is determined by the need **to solve the problems** of implementing in practice the provisions of Russian legislation on the development of "green" economy in the context of the need to develop and finance "green" projects by members of the National ESG Alliance. **The scientific novelty** of the paper is to develop the theory of development and practical use of tools, taking into account the peculiarities of their analysis and application. The paper uses theoretical and practical methods to the analysis of scientific publications and simulation results. The research is based on the provisions of normative and legal acts, monographs and scientific works devoted to the analysis, development and financing of "green" projects. Based on the research carried out in the article, the **following results were obtained**: an analysis was made of the specifics of the requirements for financing "green" projects; clarified the features of the classification of climate risks and formulated an approach to their transformation into corporate credit risks; the composition of the instruments is determined and their interpretation as controlled aggregates is proposed; the operator model of the units was developed, proposals for its practical use were made. The authors **recommend** that companies with a commodity product range use the operator model and cognitive maps developed on its basis to analyze existing and develop new tools. **In the future,** "green" companies are encouraged to use the tools obtained on the basis of the operator model and cognitive maps.

Keywords: "green" economy; "green" projects; financing instruments; operator model; climate risks; corporate credit risks; carbon-intensive products

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INTRODUCTION

Russia has adopted normative and legal acts regulating the capabilities of Russian organizations and individual entrepreneurs to develop and implement "green" projects "green" economy of the future, identified measures to account for and control greenhouse gas emissions and carbon footprint. The list of greenhouse gases in the territory of Russia approved.[1] A new category of property rights — carbon unit equivalent to one ton of carbon dioxide is provided. Adoption of the acts is a consequence of Russia's participation in the Paris Climate Agreement.[2,3]

Environmental, Social and Corporate Governance (ESG) accounting and regulatory standards are being developed and implemented by governments and interested commercial banks and companies in 110 countries around the world for climate purposes [1]. The initiative forms a long-term ethical trend of international "green" business, including the principles, mechanisms and tools needed to achieve the sustainable development goals of both banks, companies and the economy and society as a whole [2].

Russian commercial banks and companies of raw materials industries (ESG-leaders) have joined the National ESG-alliance to solve urgent problems in ecology, industry and finance.[4] Banking and corporate resources are needed for financing "green" projects of participating economic entities. In order to attract resources, the authors propose the use of appropriate tools used in practice as controlled aggregates. To achieve this, based on the international and Russian experience, firstly, the features of developing "green" projects are specified, secondly, the regularities of climate risk transformation into corporate credit risks are analyzed and, thirdly, taking into account the identified types of tools, it is proposed their operating model with various forms of asset security, which allows in a managed adaptive mode to analyze the consequences of financing of various for the purpose of "green" projects. Then the main conclusions are presented and the directions of further research that promote "greening" activities of Russian carbon intensive companies are determined.

"GREEN PROJECTS": DEVELOPMENT FEATURES

The specificity of the development of "green" projects in Russia is determined by the requirements set for them in normative and legal documents adopted over the last few years in the field of regulation of legal and institutional problems of the country's development, as well as long-term strategic planning policies in general. At present, the main documents regulating the low-carbon development of the Russian economy include: Federal Law,[5] Decree of the President of the Russian Federation,[6] Federal scientific and technical programme[7] and ensuring their implementation in practice of Orders of the Government of

[1] These are the following greenhouse gases: carbon dioxide (CO2); methane (CH4); nitrous oxide (N 2O); hydrofluorocarbons (GFC); perfluorocarbons (PFC); sulphur hexafluoride (SF6); nitrogen trifluoride (NF3). URL: https://www.profiz.ru/eco/8_2021/296-fz/ (accessed on 29.01.2022).

[2] Paris Agreement, adopted on 12 December 2015. URL: https://unfccc.int/files/ meetings/paris_nov_2015/application/pdf/paris_agreement_russian_.pdf. (accessed on 29.01.2022).

[3] Resolution of the Russian Government "On the adoption of the Paris Agreement" No. 1228 from 21.09.2019. URL: http://www.consultant.ru (accessed on 29.01.2022).

[4] National ESG Alliance established in Russia. URL: https://www.vedomosti.ru/ecology/esg/ news/2021/12/01/898565-v-rossii-sozdan-natsionalnii-esg-alyans (accessed on 25.02.2021).

[5] Federal Law "On limit greenhouse gas emissions" No. 296 from 02.07.2021. URL: https://www.garant.ru/products/ipo/prime/doc/401320454/ (accessed on 29.01.2022).

[6] Decree of the President of the Russian Federation "On the approval of the Fundamentals of the Russian Federation's state policy in the strategic planning sphere" No. 633 from 08.11.2021. URL: https://npalib.ru/2021/11/08/ukaz-633-id226070/ (accessed on 29.01.2022).

[7] Federal scientific and technical programme for environmental development of the russian federation and climate change 2021–2030. URL: http://science.gov.ru/media/files/file/wJgekXcVWebxcQmGATo4C 8EHE 2ZFjBh9.pdf (accessed on 29.01.2022).

the Russian Federation.[8, 9] The analysis and systematization of requirements to "green" projects, set out in these documents, leads to the following conclusions.

In the assessment of "green" projects, the key requirements are: state regulation, statistical accounting and environmental monitoring of greenhouse gas emissions characterizing the carbon intensity of products, as well as certification (confirmation) carbon credits to reduce emissions for sale by stakeholders.

The subject of monitoring is usually greenhouse gas emissions within the limits, and their excess performance, which may be a consequence of ineffectiveness of both development and implementation of "green" project, for example, insufficient consideration of energy conservation or renewable energy.

Emission certification uses methods that take into account raw materials, materials, energy and greenhouse gas emissions from the entire production chain of the finished product with the principles of "green" logistics. This makes it possible to estimate objectively the amount of greenhouse gas emissions per unit of product or service.

As the practice of a number of foreign countries shows, the introduction of effective monitoring mechanisms allows the State to gradually refine the optimal parameters of the carbon tax introduced for economic entities with the volumes of Russian export products [3].

Analysis shows that the specifics in the implementation of "green" projects with climate risks are:

- capacity to reduce greenhouse gas emissions by industry, activity and/or entity used to estimate trading in quotas potential;
- capacity to reduce greenhouse gas emissions by replacing individual fuel and energy resources (coal, diesel, etc.) with "green" energy sources;
- impact assessment of the implementation of "green" projects;
- development of tools to attract resources for these projects in order to increase the energy efficiency of production of products and/or services and reduce greenhouse gas emissions, including: "green" bonds, "green" loans, project financing, climate funds, etc.;
- development of carbon trading mechanisms, using, for example, the results of the experiment conducted in the Sakhalin region on carbon trading with the experience of scientific, legal and consulting support of the experiment.[10]

Sources of climate change risks and climate risks are represented in the papers [4, 5]. Specificity of climatic sources of financial risks for the development and implementation of "green" projects is investigated in documents G-20,[11] FSB[12] and highly competent reviews intended for the world banking community.[13] Analysis of these and other publications allows to identify two main groups of sources of climate risks: group of physical risks and group of risks of transition to "green" economy.

Physical risks are the impact of extreme natural and climatic events such as adverse weather conditions, rising sea levels,

[8] Order of the Russian Federation Government "On the development of investment activities and attraction of extra-budgetary funds in development projects in Russia" No. 3024 from 18.11.2020. URL: http://www.garant.ru/iv/request/?id=74929662 (accessed on 29.01.2022).

[9] Order of the Russian Federation Government "On approval of the strategy of socio-economic development of the Russian Federation with low greenhouse gas emissions until 2050" No. 3052 from 29.10.2021. URL: http://www.consultant.ru/document/cons_doc_LAW_399657/ba12a67ff89e1b6581fc0e37a3a6ff38f592f68e/ (accessed on 29.01.2022).

[10] Sakhalin region climate program. URL: https://ecology.sakhalin.gov.ru/ fileadmin/user_upload/klimaticheskaja_programma_A4_final_4__5_.pdf (accessed on 29.01.2022).

[11] G20 Green Finance Synthesis Report 2017. URL: http://unepinquiry.org/wp-content/uploads/2017/07/2017_GFSG_Synthesis_Report_EN.pdf (accessed on 29.01.2022).

[12] A Call for Action: Climate Change as a Source of Financial Risk. URL: https://www.ngfs.net/sites/default/files/medias/documents/synthese_ngfs-2019_-_17042019_0.pdf (accessed on 29.01.2022).

[13] Network for Greening the Financial System. URL: https://en.wikipedia.org/wiki/ Network_for_Greening_the_Financial_System (accessed on 29.01.2022).

desertification, freshwater depletion, soil depletion, forest fires, technological disasters leading to oil spills, radiation contamination of territories, water and soil pollution, etc.

The risks of transition to a "green" economy arise from the activities of states, institutions and companies aimed at addressing climate change and the environment.

The main categories of climate risks have multiple subcategories. The time horizons on which risks are considered also vary widely. For example, global warming risks are long-term, and natural disasters and the avoidance of technological risks are determined by the duration of force majeure. These risks, if any, are taken into account when assessing the risks of companies, usually either on the basis of statistics or on the basis of forecasts by international and Russian environmental organizations.

The risks of transition relate to human activities, human attempts to intervene and correct the processes of human activities that have increased in recent decades to negatively affect the nature, climate and ecology of the planet as a whole. The following trends can be identified:

- introduction and distribution of renewable and "green" energy projects (wind and solar), electrically "clean" engines;
- introduction of a system of trading in carbon emission quotas;
- transboundary carbon regulation, etc.

Objectives of climate risk management of financial institutions (support financial stability within prudential requirements of the regulator) are achieved through assessment and control of risks to which they are exposed. Here, most attention is paid to credit, market, operational, liquidity and underwriting risks [6].

ON THE TRANSFORMATION OF CLIMATE RISKS INTO CORPORATE CREDIT RISKS

One of the main obstacles in developing effective "green" projects is misunderstanding mechanism of transformation of climate risks into financial risks. One of the possible methods of solving the problem presented in the paper [7]. We will use its results for further research within the frame of the declared theme.

Financial companies may be exposed to physical climate risks directly, for example, in high-risk areas of natural disasters such as floods, forest fires, drought or heavy snowfall.[14] However, climate risks may have a much greater impact indirectly through the risks of companies and borrowers. Physical risks can affect companies and the economy as a whole through short-term shocks or long-term shifts.

For example, one of Texas's largest energy companies, the Brazos Electric Power Cooperative, declared bankruptcy in March 2021, due to numerous disruptions to the State's electricity system over seven days of extreme frost.[15]

Fires in Australia in late 2019 — early 2020 caused losses of 3.5 billion dollars, or 0.2–0.5% of the country's growth.[16]

Flood in Irkutsk region in July 2019 led to losses of more than 35 billion rubles, a significant part of which suffered infrastructure facilities (20 billion rubles), the population suffered from the loss of housing (about 11 billion rubles), the agricultural sector suffered losses (420 million rubles).[17]

Risks of transition in the process of development and introduction of "green" political and economic paradigm in the

[14] Natural disasters have caused record economic damage in the last decade. URL: https://investfuture.ru/news/id/stihiynye-bedstviya-nanesli-rekordnyy-ekonomicheskiy-ushcherb-za-poslednee-desyatiletie (accessed on 29.01.2022).

[15] Hill J., Gismatullin E., Morison R. Texas Power Firm Hit With $ 2.1 Billion Bill Files for Bankruptcy. URL: https://www.bloomberg.com/news/articles/2021–03–01/a-texas-power-firm-files-for-bankruptcy-after-historic-outages (accessed on 29.01.2022).

[16] Australia's fires wiped out 0.5% of economic growth. URL: https://investfuture.ru/news/id/pojary-v-avstralii-unichtojili-05-rosta-ekonomiki (accessed on 29.01.2022).

[17] Consequences of the floods. URL: https://www.interfax-russia.ru/siberia/view/cena-navodneniya (accessed on 29.01.2022).

country, and requirements to business can take the following main forms.

1. Introduction of technological innovations that reduce the costs of renewable energy and, consequently, the fall of hydrocarbon prices. This will affect the income, cost and creditworthiness of mining companies. Bloomberg estimates that average wind and solar energy costs will decrease to 87% of coal generation costs by 2027 and to 73% by 2030.[18]

2. Introduction of a «green» regulatory policy that will lead to a sharp increase in carbon prices. The World Bank estimates that the world average carbon price in 2019 was 2 USD per ton, which is a small percentage of 75 USD per ton to increase temperature by no more than 2 °C.[19] The introduction of cross-border carbon regulation, which is being actively discussed by EU countries, could have a significant impact on pricing.

3. Changing consumer preferences and increasing loyalty to "green" companies. According to a 2019 study by Accenture consulting company, about 72% of respondents said that they were paying more attention to green products than five years ago.[20] Analysis confirms that the trend of changing consumer preferences will only increase.

The factors described above can primarily have a major impact on carbon-intensive assets. According to the Tsinghua University, the share of non-performing loans (NPL) of coal energy companies may exceed 20% by 2030 (current NPL level — less than 3%) due to the expected drop in the cost of "green" electricity.[21] HSBC Finance Group in its Global Research study estimated that a fall in demand and the introduction of a carbon tax could lead to a 40–60% decline in EBITDA of large fossil fuel corporations (Shell, BP, Total, Statoil etc.).[22] Researches conducted abroad based on climate change models have shown that by 2030, the cost of reducing warming to 2 °C will be 1–4% of global consumption (in the most efficient scenario — without delay of control measures).[23] Banks' losses in the most negative scenarios range from 8 to 30% of their own funds [8].

An example from the policy area of "green" regulation, which characterizes the transition risks for companies and industries of the economy, is cross-border carbon regulation, a measure that is planned by the EU within the "European Green Deal" to reduce carbon emissions and improve the competitiveness of European producers. In the development of policy, the European Commission has determined that this mechanism (Carbon Border Adjustment Mechanism — CBAM) will come into force in the transition phase from 1 October 2023, and will be permanently operational from 1 January 2026.[24]

The cost of transboundary carbon regulation for Russia is estimated at 6 billion euros annually.[25] Of course, this will lead revising the qualitative and quantitative assessments of credit risk by both lenders and borrowers of resources.

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[18] Bloomberg New Energy Finance, BNEF. URL: https://renewnews.ru/bnef/ (accessed on 29.01.2022).

[19] Long J., Hart M., Guerriero S. Chemical (Re)action: Growth in a Circular Economy. 2019. URL: https://www.accenture.com/_acnmedia/PDF-107/Accenture-Chemicals-Circular-Economy-Growth.pdf#zoom=50. (accessed on 29.01.2022).

[20] Sun T.Y., Ma J. (2020). Quantifying the Impact of Physical Risks on Default Probability of Bank Loans. NGFS Occasional Paper on Case Studies of ERA Methodologies. URL: https://www.ngfs.net/sites/default/files/medias/documents/case_studies_of_environmental_risk_analysis_ methodologies.pdf (accessed on 29.01.2022).

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[22] Allen M.R., Barros V.R., Broome J., Cramer W., Christ R., Church J.A., Clarke L., Dahe Q., Dasgupta P., Dubash N.K. AR 5 Synthesis Report: Climate Change 2014. URL: https://www.ipcc.ch/report/ar5/syr/ (accessed on 29.01.2022).

[23] Allen M.R., Barros V.R., Broome J., Cramer W., Christ R., Church J.A., Clarke L., Dahe Q., Dasgupta P., Dubash N.K. AR 5 Synthesis Report: Climate Change 2014. URL: https://www.ipcc.ch/report/ar5/syr/ (accessed on 29.01.2022).

[24] Carbon Border Adjustment Mechanism. URL: https://ec-europa-eu.translate.goog/commission/presscorner/detail/en/ip_22_7719?_x_tr_sl=en&_x_tr_tl=ru&_x_tr_hl=ru&_x_tr_pto=sc&_x_tr_hist=true (accessed on 07.04.2023).

[25] Transboundary carbon regulation. URL: https://www.kommersant.ru/doc/4584233 (accessed on 29.01.2022).

TOOLS AS CONTROLLED AGGREGATES. OPERATOR MODEL

Problems of financing the development and implementation of "green" projects are devoted to a large number of publications having different, but close semantics. This is "green" financing [9, 10], "green" banking [11, 12], "ESG-banking" [13], etc. An analysis of data and other publications shows that two main theses are discussed.

The first thesis relates to the fact that in the current conditions of development of science, industry and economy there are no alternatives to the trends of "green" development of society.

The second thesis shows that the financing of "green" projects (in all its modifications) is the most important resource of transformation of branches of modern economy into "green" economy, creating a comfortable environment for humanity [14]. The effect is achieved by reducing the anthropogenic impact of economic entities on the environment by carbon regulation [15] of the carbon footprint characterizing the contribution of a project activity to the degree of pollution [16].

To achieve the goal in the article, and on the basis of practice of financing "green" projects [17], following the second thesis in the studies was evaluated by the authors of the article as more constructive, which allowed to interpret the tools as controlled aggregates. Based on this approach, and based on a number of paper analyses,[26, 27, 28] the tool parameters were aggregated as follows: application, purpose, asset of the tool, mortgaging maintenance of the tool, method of performance, rights and obligations of parties (see *Table*).

Approach to parametric description of tools as controlled aggregates allowed to develop their operator model [18]:

In/Out — operators of data input/output from the tool parameter analysis and transfer of the resulting funding model to the management decision-making;

A_1 — analysis of application the tool;

A_2 — determination of the purpose of the tool;

A_3 — determination of methods to achieve funding objectives;

A_4 — determination of actors involved in achieving funding objectives;

A_5 — analysis of mutual relations between the participating entities, identification of contradictions between them;

F_1 — formalization of input data on funding situation;

P_1 — check the shifts range of tool parameters;

St_1 — structuring the instrument parameters to financing objectives;

D_1 — decomposition of entities' objectives and assigning them to types of instruments and funding resources;

D_2 — decomposition of relationships of funding entities, determination of their sign, weight, linguistic significance, etc. parameters;

A_6 — analysis of the types of tools and the entities involved;

A_7 — analysis of the impact of relations between entities;

P_2 — check the adequacy of formed relations by an expert;

Sm — synthesis of the financing situation analysis model, including consideration of external and internal financing risks;

S_1 — synthesis of the organizational structure of financing;

S_2 — synthesis of the functional structure of financing with features of the aggregate parameters of the instruments;

[26] Registries of the Russian market "green" of finance: official website "Infagreen". URL: https://infragreen.ru/reestry-infragreen.html (accessed on 29.01.2022).

[27] Cbonds: Official website. Provider of data on financial markets. Bonds, shares, indices. URL: https://cbonds.ru/ (accessed on 29.01.2022).

[28] Register of Green Bonds of Russian Issuers: Center of Competence and Green Expertise of NAKDI. URL: https://wwf.ru/upload/iblock/0ee/NAKDI_Reyestr.zelenykh.obligats.pdf. (accessed on 29.01.2022).

Table

Aggregated Tool Parameters

Parameters Tools	Application of the tool	Purpose of the tool	Asset of the tool	Mortgaging maintenance of the tool	Method of performance	Rights and obligations of parties
1. Environmental funding taxes	Taxes aimed at environmental remediation	Financing of environmental protection after negative effects	Taxes	Financial results of entities	Indisputable charging by law	Determined by federal and/or regional laws
2. Environmental regulatory taxes	Taxes to prevent environmentally damaging activities	Financing environmental protection before negative effects	Taxes	Financial results of entities	Indisputable charging by law	Determined by federal and/or regional laws
3. Carbon fee (carbon tax)	Fees to prevent environmental damage and/or remediation	Financing of various environmental protection activities	Carbon pricing	Financial results of entities	Indisputable charging by law	Determined by federal and/or regional laws
4. Emissions trading	Quotas with limits on greenhouse gas emissions	Financing of economic activities, including directly "green" projects	Planned carbon dioxide emissions	Expected results of entities	Placing through the exchange and/or auction	Determined by exchange and/or auction regulations
5. Subsidies/ subvention	Transfers to entities that have reduced harmful emissions and/or introduced environmental measures	Financing of economic activities, including directly "green" projects	Federal and/ or regional resources	Production results of entities	Direct financing of the recipient	Determined by federal and/or regional laws
6. "Green" public procurement	Contract purchase with environmental criteria of suppliers of goods, works or services	Financing of programs and projects aimed at development of "green" economy	Federal and/ or regional resources	Production results of entities	Competitive financing through auction	Determined by tender documents
7. "Green" bonds	Bonds issued to finance "green" projects	Financing of programs and projects aimed at development of "green" economy	Federal and/or regional and corporate resources	Financial results of issuers	Purchase contracts	Determined by purchase contracts
8. "Green" lending	Loans provided for "green" projects and/or environmental improvements in general	Financing of programs and projects aimed at development of "green" economy	Commercial bank resources	Financial results of borrowers	Credit agreement	Determined by credit agreement
9. "Green" mortgage	Low interest mortgage for implementing "green" projects and/ or for improving environmental conditions	Financing the construction and/or purchase of energy efficient homes, investment in the modernization of production and/or in the "green" energy sector	Commercial bank resources	Financial results of borrowers	Mortgage agreement	Determined by mortgage agreement

Table (continued)

Parameters Tools	Application of the tool	Purpose of the tool	Asset of the tool	Mortgaging maintenance of the tool	Method of performance	Rights and obligations of parties
10. "Green" car loans	Low interest loans for future car owners	Financing the acquisition of high fuel economy cars	Commercial bank resources	Financial results of borrowers	Credit agreement	Determined by credit agreement
11. "Green" insurance	Insurance products differentiating environmental contributions	Insurance financing of "green" projects	Insurance resources	Financial results of entities	Insurance contract	Determined by insurance contract
12. "Green" deposits	Specialized type of banking activity	"Green" financing the activities of subjects	Deposit resources	Financial results of entities	Deposit contract	Determined by deposit contract
13. "Green" leasing	Specialized activities of leasing companies	Acquisition of property necessary for the implementation of "green" projects	Leasing property	Financial results of entities	Leasing agreement	Determined by leasing agreement
14. Weather derivatives	Derivative instruments for stock speculation	Entity financing	Weather condition indicators	No	Purchase contract	Determined by purchase contract
15. Climate fund	Fund resources for environmental remediation and protection	"Green" financing the activities of subjects	Climate fund resources	Financial results of entities	Agreement for financing "green" projects	Determined by agreement for financing

Source: Compiled by the authors.

K_1 — optimization of the financing model;

P_3 — estimation of probability of development of the financing situation according to the studied model;

A_8 — analysis of the development of the financing situation over time;

P_4 — forecasting the development of the financing situation and assessing its impact on decision-making;

V_1 — assessment for compliance with forecasts of the development of the situation with explanations satisfying the expert;

C_1 — adjustment of the funding structure and model;

P_5 — verification of the result evaluation based on the principle of "how satisfied?";

Sh_1 — clarification (if necessary) of the financing model and its formalization;

E_1 — obtaining the values of the situation parameters and transferring the approved funding model to the management decision-making.

The data above the definition and classification of operators allows you to construct the U_1 model of the process of analysis and management of the funding situation of "green" projects with a specific tool on the following formula:

$$U_1 = In_1A_1A_2A_3A_4\downarrow_1F_1A_4A_5In_2P_1\downarrow_2St\ {}_1D_1D_2A_6A_7P_2\downarrow_3SmS_1S_2K_1P_3\uparrow^3 \downarrow_4A_8P_4\downarrow_5V_1\omega\downarrow_6C_1\uparrow^2\downarrow_7P_5\downarrow_7Sh_1D_1E_1Out.$$

In this formula, the arrows separate the analysis operations and their results from the aggregate parameters presented in the *Table*. The down-arrow denotes a straight sequence of operations, and the up-arrow denotes a return to the previous blocks to clarify the intermediate results.

It follows from the structure of the U_1 model that it allows not only to describe the analysis processes and the results of the choice of tools parameters, but also to change the range of input data, to optimize the output, and to predict the funding situation, perform step-by-step analysis of the tool using process automation.

In practice, the specification of the operators of the U_1 model should be carried out with the provisions set out in the previous sections of this paper with regard to the peculiarities of the development and implementation of "green" projects with climate and credit risks, as well as the composition of aggregate parameters of specific instruments.

Based on the operator model U_1 it is possible to create cognitive maps of tools [19, 20], which will allow by probability analysis of the influence of parameters on the results of the application of tools to assess their effectiveness in the changing business environment.[29]

CONCLUSION

In the article the authors consider the analysis and application of tools with features of development of "green" projects and specifics of climate and corporate credit risks, accompanying their implementation in practice. The informative analysis of these factors allowed the authors to identify the aggregate parameters of the tools and to develop their operator model, which:

- provides opportunities for detailed research of analytical processes and tool management;
- allows to evaluate the effectiveness of tools by assessing the impact of parameters on the final result;
- saves the labour time of experts on the study of the effectiveness of tools and their optimization (if necessary).

The main advantage of operator modelling is that it can be used to develop cognitive tool maps. As shown by numerous studies based on them, the maps will bring closer the results of modelling and analysis to the statistics of the tools management experiments in practice.

"Green" companies are invited to use tools with operator model and cognitive cards, which will, firstly, adapt tools to the changing business environment, secondly, minimize the risks of financing "green" projects, thirdly, implement "green" technologies of production of carbon-intensive products and, fourthly, reduce losses from carbon tax and increase the volume of export of their products.

[29] Badvan N.L. Adaptation of cognitive modeling of complex systems to the problem of financial regulation of reproduction and capital accumulation. URL: https://cyberleninka.ru/article/n/adaptatsiya-instrumentariya-kognitivnogo-modelirovaniya-slozhnyh-sistem-k-probleme-finansovogo-regulirovaniya-vosproizvodstva-i/viewer (accessed on 29.01.2022).

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